THIRUVALLUVAR UNIVERSITY

BACHELOR OF ARTS

B.A. ENGLISH

DEGREE COURSE

CBCS PATTERN

(With effect from 2017-2018)

Sl.No.	Part	Study Components / Course Title		Ins.hrs/ Week	Credit	Title of the paper	Maximum Marks		
SEMESTER-I							CIA	Uni. Exam	Total
1.	I	Language	Paper-1	6	4	Tamil /other Languages	25	75	100
2.	II	English	Paper-1	6	4	English	25	75	100
3.	III	Core Theory	Paper-1	5	4	Indian Writing in English	25	75	100
4.	IV	Core Theory	Paper-2	5	4	Advanced English Grammar	25	75	100
5.	V	Allied - 1	Paper-1	6	4	Literary Forms and Terms	25	75	100
6.	VI	Environmental Studies		2	2	Environmental Studies	25	75	100
				30	**22**		**150**	**450**	**600**

Sl.No.	Part	Study Components / Course Title		Ins.hrs/ Week	Credit	Title of the paper	Maximum Marks		
SEMESTER-II							CIA	Uni. Exam	Total
7.	I	Language	Paper-2	6	4	Tamil /other Languages	25	75	100
8.	II	English	Paper-2	4	4	English	25	75	100
9.	III	Core Theory	Paper-3	5	4	British Literature-I	25	75	100
10.	III	Core Theory	Paper-4	5	4	American Literature -I	25	75	100
11.	IV	Allied-1	Paper-2	6	4	The Social History of England	25	75	100
12.	IV	Value Education		2	2	Value Education	25	75	100
13.	IV	Soft skill		2	1	Soft Skill	25	75	100
				30	**23**		**175**	**525**	**700**

Sl.No.	Part	Study Components Course Title		Ins.hrs/ Week	Credit	Title of the paper	Maximum Marks		
SEMESTER-III							CIA	Uni. Exam	Total
14.	I	Language	Paper-3	6	4	Tamil /other Languages	25	75	100
15.	II	English	Paper-3	6	4	English	25	75	100
16.	III	Core Theory	Paper-5	5	4	British Literature-II	25	75	100
17.	IV	Core Theory	Paper-6	5	4	American Literature-II	25	75	100
18.	V	Allied-2	Paper-3	5	4	History of English Literature -I	25	75	100
19.	VI	Skill based subject	Paper-1	3	3	Skill for Employment - I	25	75	100
20.	IV	Non-Major Elective	Paper-1	2	2	Language skills and Communication I	25	75	100
				30	**25**		**175**	**525**	**700**

Sl.No.	Part	Study Components Course Title		Ins.hrs/ Week	Credit	Title of the paper	Maximum Marks		
SEMESTER-IV							CIA	Uni. Exam	Total
21.	I	Language	Paper-4	6	4	Tamil /other Languages	25	75	100
22.	II	English	Paper-4	6	4	English	25	75	100
23.	III	Core Theory	Paper-7	5	4	British Literature-III	25	75	100
24.	III	Core Theory	Paper-8	5	4	History of English Language	25	75	100
25.	III	Allied-2	Paper-4	5	4	History of English Literature-II	25	75	100
26.	IV	Skill based Subject	Paper-2	3	3	Skill for Employment-II	25	75	100
27.	IV	Non-Major Elective	Paper-2	2	2	Language skills and communication II	25	75	100
				30	**25**		**175**	**525**	**700**

Sl.No.	Part	Study Components / Course Title		Ins.hrs/ Week	Credit	Title of the paper	Maximum Marks		
SEMESTER-V							CIA	Uni. Exam	Total
28.	III	Core Theory	Paper-9	5	4	British Literature - IV	25	75	100
29.	III	Core Theory	Paper-10	5	4	Language and Linguistics	25	75	100
30.	III	Core Theory	Paper-11	5	4	Introduction to Literary Criticism	25	75	100
31.	III	Core Theory	Paper-12	6	4	Indian literature in Translation	25	75	100
32.	III	Elective	Paper-1	4	3	Journalism and Mass communication **(or)**Techniques of Translation	25	75	100
33.	IV	Skill based subject	Paper-3	3	3	Conversational English	25	75	100
				30	**22**		**150**	**450**	**600**

Sl.No.	Part	Study Components / Course Title		Ins.hrs/ Week	Credit	Title of the paper	Maximum Marks		
SEMESTER-VI							CIA	Uni. Exam	Total
34.	III	Core Theory	Paper-13	6	5	Shakespeare	25	75	100
35.	III	Core Theory	Paper-14	6	4	British Literature-V	25	75	100
36.	III	Core Theory	Paper-15	6	4	New Literatures in English	25	75	100
37.	III	Elective	Paper-2	4	3	Technology Mediated English **(or)** Business English	25	75	100
38.	V	Elective	Paper-3	4	3	Copy –editing and proof Reading **(or)** Effective Communication	25	75	100
39.	VI	Skill based subject	Paper-4	4	3	English Language Teaching	25	75	100
40.	V	Extension Activities			1		100		100
				30	**23**		**250**	**450**	**700**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	4	8	100	200
	Allied (Even Semester)	2	4	8	100	200
	Electives	3	3	9	100	300
	Core	15	(3-5)	61	100	1500
Part IV	Environmental Science	1		2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang.&others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension Activity	1	1	1	100	100
	Total	**40**		**140**		**4000**

SEMESTER-I
Paper -1 - INDIAN WRITING IN ENGLISH

UNIT I: POETRY

1. Sarojini Naidu: Love and Death
2. Jayanta Mahapatra: Evening Landscape by the River
3. Rabindranath Tagore: Lyric No. LXXIII (from Gitanjali)
4. Toru Dutt: Our Casuarina Tree

References:

1. Indian Yarns: An Anthology of Indian English Writing. Cambridge University Press, 2013.
2. Tagore, Rabindranath. Gitanjali. Wellesley: branden Books, 2000
3. Ramaswamy,S. Commentaries on Commonwealth Poetry and Drama. New Delhi: Prestige Books, 1994.

UNIT II: PROSE

1.Jawaharlal Nehru: A Tryst with Destiny
2.. Rabindranath Tagore Realization of the Infinite
3. Shashi Tharoor: Ajanta and Ellora in the Monsoon

References:

1. Indian Yarns: An Anthology of Indian English Writing. Cambridge University Press, 2013.
2. Dutta, Krishna. Ed. Rabindranath Tagore: An Anthology. New Delhi: Oxford University Press, 1998.

UNIT III: SHORT STORIES

1. Ruskin Bond The Eyes Have it
2. Anita Desai A Devoted Son

UNIT IV: DRAMA

1. Girish Karnad The Fire and the Rain

References:

Karnad, Girish, The Fire and the Rain New Delhi: Oxford University Press, 1999.

UNIT V: FICTION

1. R.K. Narayan The Bachelor of Arts

SEMESTER I

PAPER – 2 - ADVANCED ENGLISH GRAMMAR

UNIT I

Introduction to Modern English grammar

Sentences – various types of sentence – simple – compound – complex – declaratives – interrogatives – imperatives – exclamatives.

Basic sentence patterns in English - constituents of sentences – subject – verb - object - complement - adverbials.

UNIT II

Clauses - main and subordinate clauses - noun clauses - relative clauses - adverbial clauses - finite and non-finite clauses - analysis and conversion of sentences – Active to Passive and vice versa – Direct to Indirect and vice versa – Degrees of Comparison, one form to the other.

UNIT III

Phrases - various types of phrases - noun, verb, adjectival and prepositional phrases.

Words - parts of speech – nouns – pronouns – adjectives - verbs - adverbs – prepositions – conjunctions - determinatives.

UNIT IV

Nouns - different types - count and uncount – collective - mass - case - number – gender.

Pronoun - different types - personal, reflexive - infinite-emphatic – reciprocal.

Adjectives - predicative - attributive - pre- and post-modification of nouns.

Verbs - tense-aspect - voice -mood - Concord - types of verbs – transitive – intransitive finite – non-infinite.

Helping verbs and modal auxiliaries - function and use.

UNIT V

Adverbs - different types - various functions - modifying and connective.

Prepositions - different types - syntactic occurrences - prepositional phrases - adverbial function.

Conjunctions - subordinating and coordinating Determinatives articles - possessives – quantifiers

Same words used as different parts of speech – Words followed by appropriate prepositions.

Books for Study and Reference:

A Remedial English Grammar for Foreign Students. Publisher: Macmillan. Author: F T Wood

Carter, Ronald and Michael McCarthy.Cambridge Grammar of English.CUP, 2006.

Greenbaum, Sidney. Oxford English Grammar.Indian Edition.Oxford University Press, 2005.

SEMESTER I

ALLIED - 1 - PAPER - 1 - LITERARY FORMS AND TERMS

UNIT I : PROSE

1. The Essay
2. The Short Story
3. Biography
4. Autobiography

UNIT II : POETRY

1. The Lyric
2. The Sonnet
3. The Elegy
4. The Epic
5. The Ode
6. The Ballad

UNIT III : DRAMA

1. Comedy
2. Tragedy & Tragic Comedy
3. One-act play
4. Mystery and Miracle Play
5. The Absurd Drama
6. Monologue

UNIT IV: NOVEL

1. Historical Novel
2. Psychological Novel
3. Stream of consciousness Novel
4. Realistic Novel
5. Science Fiction

UNIT V: LITERARY TERMS

Poetry: Simile, Metaphor, Allusion, Rhyme, Oxymoron, Blank-Verse, Symbolism
Drama: Soliloquy, Climax and Anti-climax, Unity of Time, Place and Action
Prose: Allegory, Didacticism, Fable, Satire, Irony

Books for Study and Reference:

Prescribed text – A Glossary of Literary Terms. M.H. Abrams – Macmillan Publishers India Ltd. (Trinity -Laxmi Publications, Chennai)
Prasad, Birjadish. A Background to the Study of English Literature. Chennai: Macmillan India Press, 2007.Print.
Baldick, Chris. The Concise Oxford Dictionary of Literary Terms, Delhi: OUP, 1990

SEMESTER II

PAPER – 3 – BRITISH LITERATURE I

Objectives:

- To enable the learners to appreciate the versatility and knowledge of the Elizabethan age.

- To enable the students to understand the history and the growth of English Literature.

UNIT I: POETRY (Detailed Study)

Geoffrey Chaucer : The Prologue to Canterbury Tales:

Whan that april with his shoures soote….And eek in what array that they were inne; (1-41lines)

Edmund Spenser : Sonnet 75: One Day I Wrote Her Name upon the Strand

UNIT II : PROSE (Detailed Study)

Francis Bacon : of Adversity, of Beauty, of Honour and Reputation

UNIT III : DRAMA (Detailed Study)

Christopher Marlowe : Dr. Faustus

UNIT IV : POETRY (Non-Detailed Study)

John Donne : The Good Morrow

George Herbert : The Pulley

UNIT V : DRAMA (Non-Detailed Study)

Ben Jonson : Every Man in His Humour

Books for Study and Reference:

Greenblat, Stephen Ed.*The Norton Anthology of English Literature,* Vol B,16th and early 16th century, W.W Norton &Company, Inc., 9th Edition.2012

Marlowe, Christopher. *The Tragical History of Doctor Faustus.*Ed Roma Gill, New Delhi, Bloomsbury Methuen Drama. 2015

Dave, Smita., *Christopher Marlowe.* New Delhi, Arnold Heinemann publishers (India) Private Limited.1974.

Jump, John., *Marlowe: Doctor Faustus.* New York , Palgrave Macmillian. 2007

Ellis-Fermor, Una., *The Jacobean Drama,* London, University Paperbacks.1969

Web Resources

Literary Texts – Prose, Poetry and Fiction:
http://www.library.utoronto.ca/utel/works.html

SEMESTER II

PAPER– 4 - AMERICAN LITERATURE-I

UNIT I- POETRY (Detailed)

Whitman : One's Self I Sing

E.A. Poe : To Helen

Emily Dickinson : I taste a liquor never Brewed

UNIT II- POETRY (Non- Detailed)

Carl Sandburg : Happiness

Robert Frost : Mending Wall

Ezra Pound : The Rest

UNIT III- PROSE (Detailed)

Emerson : The American Scholar

UNIT IV- DRAMA (Detailed)

Eugene O'Neil : The Hairy Ape

UNIT V- FICTION (Non- Detailed)

Herman Melville : Moby Dick (The Whale)

Books for Study and Reference:

Fisher, William J., H. Willard Reninger, Ralph Samuelson, and K. B. Vaid. *An Anthology American Literature of the Nineteenth Century*. S. Chand & Company Ltd. New Delhi, 1955. Print.

Oliver, Egbert S. *An Anthology of American Literature* 1890-1965.S.Chand & Company Ltd. New Delhi, 1967. Print.

Melville, Herman. *Moby- Dick*. Harper & Brothers Publishers. London, 1851. Print.

SEMESTER II

ALLIED - 1 - PAPER - 2 – THE SOCIAL HISTORY OF ENGLAND

UNIT I

1. Tudor England (1485 to 1603)
2. The Renaissance
3. The Reformation and the Counter Reformation

UNIT II

1. Puritanism
2. Restoration England (1660 to 1688): Social Life
3. The Age of Queen Anne (1702 to 1714)
4. The Industrial Revolution and the Agrarian Revolution

UNIT III

1. The effects of the French Revolution on British Life.
2. The Victorian Age (1837 to 1901)
3. The Reform Bills

UNIT IV

1. The Dawn of Twentieth Century
2. Life Between the Two World wars (1919 to 1939)
3. The effects of World War II and the Cold War
4. Life in the Sixties.

UNIT V

1. Life in the Seventies
2. Life in the Eighties
3. The Origin and Growth of Political Parties in England
4. Contemporary Life in England.

Prescribed text

Padmaja Ashok. The Social History of England . Orient Black swan Pvt. Ltd.

SEMESTER III

PAPER –5– BRITISH LITERATURE II

Objectives:

- To expose the students to the Neo-classical tradition in literature
- To enable them to explore the remarkable changes in literary forms
- To train them to comprehend the trends in the literary expression of the period

UNIT I : POETRY (Detailed Study)

John Milton : Paradise Lost Book IV: (Lines 131-287)

So on he fares, and to the border comes…Of living creatures, new to sight and strange

Thomas Gray : Elegy Written in a Country Churchyard

William Blake : The Tyger

UNIT II :

Prose (Detailed Study)

Samuel Johnson : Preface to Shakespeare: His histories, being neither tragedies nor comedies… are to copy nature and instruct life (extract)

Drama (Detailed Study)

Oliver Goldsmith : She Stoops to Conquer

UNIT III : POETRY (Non-Detailed Study)

Andrew Marwell : On a Drop of Dew

John Dryden : A Song for St. Cecilia's Day

UNIT IV: PROSE (Non-Detailed Study)

Joseph Addison : 1. Popular Superstitions
2. Will wimble Selections from 'The Spectator'

UNIT V: FICTION (Non-Detailed Study)

Jonathan Swift : Gulliver's Travels

Books for Study and Reference:

Lynn, Mary Johnson Ed., John E. Grant. *Blake's Poetry and Designs*. Norton Critical Edition. 2004.

Defoe, Daniel. *Robinson Crusoe*. Ed.Pramod K.Nayar.Hyderbad,Orient BlackSwan.2011

Ellis, Frank H. *Twentieth Century Interpretations of Robinson Crusoe*. Spectrum Book. 1969.

Grierson, HJC. *Metaphysical Lyrics and Poems of the Seventeenth Century*. Oxford University. 1972.

The Norton Anthology of English Literature: The Restoration and the Eighteenth Century. Norton. 1962.

Web Resources

Literary Texts – Prose, Poetry and Fiction:
<http://www.library.utoronto.ca/utel/works.html>

SEMESTER III

PAPER –6 – AMERICAN LITERATURE-II

UNIT I-POETRY (Detailed)

E.E.Cummings : Among Crumbling People

Wallace Stevens : Anecdote of a Jar

Sylvia Plath : Mirror

UNIT II- POETRY (Non-Detailed)

William Carlos William : The Yachts

Hart Crane *: from* The Bridge: To Brooklyn Bridge

John Crowe Ransom : Bells For John Whiteside's Daughter

UNIT III- PROSE

Robert Frost : The Figure a Poem Makes

UNIT IV- DRAMA (Detailed)

Tennessee Williams : The Glass Menagerie

UNIT V- FICTION (Non -Detailed)

Ernest Hemingway : The Snows of Kilimanjaro

Books for Study and Reference:

1. Oliver, Egbert S. *An Anthology of American Literature 1890-1965*.S.Chand & Company Ltd. New Delhi, 1967. Print.

2. Thomas, C.T, Ed.*Twentieth Century Verse An Anglo-American Anthology*.Macmillan Publisher India Ltd. Reprinted 2009.

SEMESTER III

ALLIED 2 – PAPER 3 -HISTORY OF ENGLISH LITERATURE I

UNIT I:

The Age of Chaucer - Chapters II & III

UNIT II:

The Development of Drama - Chapters IV & V

UNIT III:

The Age of Shakespeare- Chapters VI, VII & VIII

UNIT IV:

The Age of Milton - Chapters IX & X

UNIT V:

The Age of Dryden -Chapters XI & XII

Prescribed Book: W.H. Hudson: An Outline History of English Literature

Reference: History of English Literature Author: Edward Albert

SEMESTER III

SKILL BASED SUBJECT - PAPER 1 - SKILL FOR EMPLOYMENT I

UNIT - I

Oral Communication Skills Listening & Hearing, Barriers to Everyday Listening

UNIT - II

Workplace Listening, Documentation

UNIT - III

Written Communication skills

UNIT - IV

Reading, Barriers, Reading Strategies

UNIT - V

Ability to Read & follow instructions, giving and Receiving Instructions, Directions, Language of Instructions Transcoding Information graphic Communication, Charts, Tables & Transcoding

Books for Study and Reference:

Communication and soft skills: SP Dhanavel. Orient Blackswan

English & Soft skills: SP Dhanavel. Orient black swan.2010

Essential English : E. Suresh kumar P.Sreehari J. Savithri.2010

G M Sundaravalli, A S Kamalakar, P Kusuma Harinath. Communication and Softskills Vol 1: Orient Blackswan, 2015

English for Competitive examinations: Manamohan Bhatnagar.

SEMESTER III

NON-MAJOR ELECTIVE - PAPER 1 -

LANGUAGE SKILLS AND COMMUNICATION I

(for other departments)

UNIT - I

1. Meeting people

2. Exchanging greetings

3. Introducing, others, giving personal information, taking about people animals and places

UNIT - II

1. Answering telephone, asking for someone
2. Making enquiries on the phone
3. Dealing with wrong number
4. Taking and leaving messages

Books for Study and Reference:

Mastering communication skills and soft skills

N.Krishnaswamy, Manju Dariwal, Lalitha Krishnaswamy(Bloomsbury)

SEMESTER IV

PAPER - 7 - BRITISH LITERATURE III

Objectives:

- To understand the roots of Romantic Literature.
- To familiarize the students with the outstanding writers of the period.

UNIT I: POETRY (Detailed Study)

William Wordsworth : I Wander Lonely as a Cloud

S. T. Coleridge : Time, Real and Imaginary

John Keats : Ode to Autumn

Percy Bysshe Shelly : Ode to a Skylark

UNIT II: PROSE

Charles Lamb : Poor Relations

William Hazlitt : On going a Journey

UNIT III: POETRY (Non-Detailed)

Lord Byron : She Walks in Beauty

Robert Burns : A Red Red Rose

UNIT IV: FICTION

Jane Austen : Pride and Prejudice

UNIT V: FICTION

Walter Scott : Ivanhoe

Books for Study and Reference:

Nayar, k Pramod. *The English Romantic Poets: An Anthology*. Orient Blackswa. 2013

Ed. Hollingworth. *Essays: Hazlitt*. University Tutorial Press Limited.

Scott, Sir Walter. *Ivanhoe*. J.M. Dent and Sons Limited. 1977.

Plowman, Max. *An Introduction to the Study of William Blake*. Atlantic Publishers and Distributors. New Delhi. 1994.

Gill, Stephen. Ed., WU, Duncan. *William Wordsworth Selected Poetry*. Oxford University Press. New York. 2008.

Blunden, Edmund. Ed., *Selected Poems John Keats*. Rupa Publications India Private Limited. New Delhi. 2011.

Jump. D. John, *Byron*. Routledge & Kegan Paul Ltd. U.S.A. 1972.

Bloom, Harold. Ed., *Jane Austen's Pride and Prejudice*. Viva Books Private Limited. New Delhi. 2010.

Web Resources

Literary Texts – Prose, Poetry and Fiction:
<http://www.library.utoronto.ca/utel/works.html>

SEMESTER IV

PAPER 8 - THE HISTORY OF ENGLISH LANGUAGE

UNIT I

Origin of English Language

General Characteristics of the Origin of English language

Indo European family

UNIT II

Shakespeare's Contribution to the Growth of English Language.

Milton's Contribution to the Growth of English Language

UNIT III

The Pronunciation, Spelling & Vocabulary Development

Role of Dictionary in the Marking of English language

Change of Meaning

UNIT IV

Growth of English Vocabulary loan words in Latin, French, Greece and Indian

The Contribution of foreign Languages to English

UNIT V

Differences between British English and American English

The Evolution of Standard English

Prescribed Text:

Outline History of English Language C.L.Wren. Macmillian J.D.O' Connor.

Better English in pronunciation (second edition) .Cambridge

Reference:

F.T. Wood: An Outline History of English Language. Delhi, Macmillan India Limited, 1969.

Krishnaswamy. N. Verma, S.K. Nagarajan. M. Modern Applied Linguistics. Chennai, Macmillan Limited, 2000.

Cruttenden, Alan. Gimson's Pronunciation of English. London, Oxford University Press, 2001.

AC.Baugh. History of English Language

Lalitha Ramamoorthy : A History of English Language & Elements of Phonetics, Macmillan.

Baugh, Albert. C. Cable, Thomas. A History of The English Language. Delhi, Routledge,2000.

Crystal, David. Linguistics. Great Britain, Richard Clay Ltd, 1985

SEMESTER IV

ALLIED 2- PAPER 4 – HISTORY OF ENGLISH LITERATURE II

UNIT 1:

The Age of Pope - Chapters XIII & XIV

UNIT II:

The Age of Johnson - Chapters XV - XVII

UNIT III:

The Age of Wordsworth - Chapters XVIII - XXI

UNIT IV:

The Age of Tennyson - Chapters XXII & XXIV

UNIT V:

The Age of Hardy & the Present Age -Chapters XXV & XXVII

Prescribed Book: W.H. Hudson: An Outline History of English Literature

Reference: Edward Albert: History of English Literature

SEMESTER IV

SKILL BASED SUBJECT - PAPER 2

SKILL FOR EMPLOYMENT II

UNIT -I

Interpersonal Communication

UNIT -II

Information collection - telephone conversation

Encoding & Decoding strategies

UNIT -III

Communication with Employees - Supervisors and customers

Employment Communication goal setting, Written, Spelling & Grammar

UNIT -IV

Job Application and Interview, covering letter, Resume, Interview, Frequently asked Questions

Model Interview

UNIT -V

Polite Behavior in Communication

The Importance of being courteous – Politeness - Body Language - facial language - Eye contact

Books for Study and Reference:

S.P. Dhanavel. Communication and Soft skills. Mainspring Publishers

SEMESTER IV

NON-MAJOR ELECTIVE - PAPER 2 –

LANGUAGE SKILLS AND COMMUNICATION II

(for other departments)

UNIT I

1. Getting people's attention and interrupting
2. Giving instructions and seeking clarification
3. Making requests, Asking for direction and giving directions

UNIT II

1. Inviting, Accepting and refusing invitation
2. Apologising and responding to an apology
3. Congratulating and responding to congratulations
4. Asking for, Giving and refusing permission

Prescribed Text: Kamlesh Sadan and and Susheela Punitha. Spoken English: A Foundation Course (Part I). Orient black swan.2014

SEMESTER V

PAPER 9 -- BRITISH LITERATURE IV

Objectives

- To enable students to analyse literary works through careful study of the Victorian Age.
- To integrate critical sources effectively into their analysis of literature.

Unit I : Poetry (Detailed Study)

Alfred Lord Tennyson : The Lady of Shalott – Part I

Robert Browning : Memorabilia

Dante Gabriel Rossetti : The Blessed Damozel

Unit II : Poetry (Non-Detailed study)

Alfred Lord Tennyson : Ulysses

Gerard Manley Hopkins : God's Grandeur

Christina Rossetti : Remember

Unit III : Prose (Detailed study)

John Henry Newman : The Idea of a University -

If I were asked to describe as briefly and popularly as I could,… how the "gentlemanlike" can otherwise be maintained; and maintained in this way it is.(extract)

Unit IV : Drama

(Detailed study)

Oscar Wilde : Lady Windermere's Fan

(Non-Detailed study)

George Bernard Shaw : Arms and the Man

Unit V : Fiction (Non-Detailed study)

Thomas Hardy : Far from the Madding Crowd

Charles Dickens : Oliver Twist

Books for Study and Reference

Gilbert, J. Garraghan S. J. Prose Types in Newman. New York: Schwartz, Kirwin & Faussi.

Hill, Robert W. Jr. Tennyson's Poetry. New York: W. W. Norton & Co, 2010. Print.

Sen, S. G. M. Hopkins: Selected poems. New Delhi: Unique Publishers, 2008. Print.

Wilde, Oscar. The Importance of being Earnest and Other Plays. United States: OPU, 2008. Print

Steane, J. B. Literature in Perspective: Tennyson. London: Evans Brothers Limited.

Web Resources

Literary Texts – Prose, Poetry and Fiction:
<http://www.library.utoronto.ca/utel/works.html>

SEMESTER V

PAPER 10 - LANGUAGE AND LINGUISTICS

UNIT I

The Origins of Language

The Development of Writing

Introduction to sounds

Words Stress, Strong & weak forms

Sentences stress & intonation, Voice Modulation

UNIT II

The properties of Language

Morphology

Communication process barriers to Communication

Group talk

UNIT III

Phrases and sentence: grammar syntax

Grammar

UNIT IV

Semantics: Language & Mechanics

Non- Verbal Presentation skills public speaking & presentation skills

UNIT V

Language Varieties

Language, Society and Culture

Preparing for Interview

Books for Study and Reference:

George Yule: The Study of Language . Cambridge University Press. 1996
John Lyons: Language and linguistics: An Introduction. (Cambridge)
Spring Board to success: Sharada Kaushik Bindu Bajwa. Orient black swan.2011

SEMESTER V

PAPER 11 - INTRODUCTION TO LITERARY CRITICISM

UNIT I

1. PLATO

Age and Works – View of Art – Attack on Poetry – The Function of Poetry – Comments on Drama – Observations on Style

2. ARISTOTLE

Critical Works and their Nature – The Plan of Poetics – Observations on Poetry – Observations on Tragedy

UNIT II

1. SIR PHILIP SIDNEY

The Writer and his Work - The 'Argument' of his Book – Respect for Rules

2. BEN JONSON

The Critic and his Work – Classicism – The Qualifications of a Poet – Observations on Style

UNIT III

1. JOHN DRYDEN

Critical Works – The Nature of Poetry – The Function of Poetry – Dramatic Poetry

2. ALEXANDER POPE

Critical Work – Classicism – On the Function of Criticism – Remarks on Literature

UNIT IV

1. W. WORDSWORTH

The occasion and Limitations of his Critical Work – concept of poetic diction - Concept of Poetry

2. S. T. COLERIDGE

The Nature of his Critical Work – Theory of Imagination

UNIT V:

1. MATTHEW ARNOLD

Critical Works – Criticism on Poetry – On Criticism

2. T. S. ELIOT

Classicism – True Criticism – Impersonality of Poetry – Other Concepts

Prescribed Book:

B. Prasad. An Introduction to English Criticism. Macmillan. (Trinity:Laxmi Publications).2014

Books for study and Reference

S.Ramaswami V.S.Sethuraman .The English Critical Tradition. An Anthology of English Literary Criticism (Volume I&II)

SEMESTER V

PAPER -12- INDIAN LITERATURE IN TRANSLATION

UNIT I: INTRODUCTION TO TRANSLATION

1. Survey of the History, Growth and role of Translation in India

2. Key concepts in Translation

From Wordworlds: Translation and Communication

UNIT II: POETRY

1. Subramania Bharati	: Wind,9 (113)
2. Chemmanam Chacko	: Rice (148-149)
3. Jyoti Lanjewar	: I Never Saw You (171-175
4. Gaddar	: It Will Not Stop
5. Sahir Ludhianvi	: Let's Weave a Dream

UNIT III: PROSE

1. Rassundari Devi	: Amar Jiban (My Life)The sixth composition (199-202)
2. A.K.Ramanujan	: Telling Tales: Tales have Relatives all over the word Pg 456-462
3. P.Sivakami	: Land: Woman's Breath and Speech
4. Durga Khote	: Memories of the Marathi Stage (1910 -26)
	I had inherited…taking its course Pg 42 - 47

UNIT IV: DRAMA

Girish Karnad	: Tughlaq

UNIT V: FICTION

Shanmugasundaram	:Nagammal

SHORT STORIES

1. R.Chudamani : Does Anyone Care?
2. Prabanchan : Brahma Vriksha
3. Satyam Sankarmanchi : The Flood
4. B.M. Zuhara : Literacy
5. Afrose Sayeeda : Destination Spring

Prescribed Text:

Wordscapes: Indian Literature in Translation, Oxford University Press

SEMESTER V

ELECTIVE PAPER 1 –
JOURNALISM & MASS COMMUNICATION

UNIT-I MASS COMMUNICATION-ORIGIN AND DEVELOPMENT

1. Need for Communication.
2. Types of Communication.
3. Elements of Communication.
4. Barriers of Communication.
5. 7-C's of Communication.
6. Functions and uses of Mass Communication.

UNIT-II JOURNALISM

1. What is Journalism?
2. History of Journalism
3. The Role of the Press
4. Functions of the Press
5. Journalism as a Career
6. Qualification of a Successful Journalist

UNIT-III PRINT MEDIA

1. What is News?
2. Collecting the Fact
3. Reporting the News
4. Editing the News
5. How to write Headlines
6. The News Editor
7. The Sub-Editor

UNIT-IV REPORT WRITING

1. The Reporter
2. The Chief Reporter and other Correspondents
3. The News Editor
4. Feature Writing
5. Writing for the Magazines
6. The Freelance Journalist

UNIT-V ELECTRONIC MEDIA

1. Radio
2. Television
3. The Internet
4. Writing for Radio and Television

Prescribed Texts

1. Vir Aggarwal & V.S.Gupta., **Handbook of Journalism and Mass Communication**, Concept Publishing Company, New Delhi.
2. Puri. G.K. **Competition Success: Review Communication .** New Delhi: Sudha Publication,
3. Roy, Baron, **Beginner's Guide to Journalism**, New Delhi: Pushtak Mahal, 2003.
4. Parthasarathy,Rangaswami, **Basic Jounalism**,Macmillan Publications,New Delhi,1984 Print.

SEMESTER V

ELECTIVE PAPER 1
TECHNIQUES OF TRANSLATION

Unit I
PERSPECTIVES ON TRANSLATION:

Definition of Translation
Equivalence: semantic and stylistic
Rules: description and prescription

Unit II
DEFINITION OF A TRANSLATOR:
Memory,meaning and language
The communication process
The translation process

Unit III
TRANSLATION THEORY:
Theories ,models and analogies
Requirements for a theory of Translation
Methodology;Investigating translation

Unit IV
TRANSLATING:MODELLING THE PROCESS
TheTranslator: Knowledge and Skills
Ideal:Bilingual competence – Expertise - Communicative competence

Unit V
TRANSLATING: THE MODEL
components and processes –Analysis – synthesis
Using the process to translate
Analysis: reading the source language text
Preparation to Translate
Synthesis: writing the target translation text

Prescribed text:
Bell, Roger T.Translation and Translating: Theory and Practice.UK: Longman Group.1991
https://pandoraenglish.files.wordpress.com/2012/11/ebooksclub-org__translation_and_translating__theory_and_practice__applied_linguistics_and_language_study_.pdf

SEMESTER V

SKILL BASED SUBJECT - PAPER 3
CONVERSATIONAL ENGLISH

Unit I

Greeting
Introducing
Inviting someone
Making requests
Seeking permission
Persuading

Unit II

Compliments/Congratulating
Expressing sympathy
Complaining
Apologising
Starting a conversation with a stranger
Ending a conversation

Unit III

Asking for Information
Asking someone to say something again
Checking that you have understood
Asking if someone is able to do something

Unit IV

At the Doctor's
At the bank
Railway enquiry
Looking for Accommodation
In a Government office
At the Greengrocer's

Unit V

Invitation to a party
Talking about a vacation
Seeking admission in a school
Asking about a course
Selling a Product
Getting a book published
An Interview

Prescribed Texts:

Spoken English For You Level 1, RadhakrishnaPillai G,KRajeevan. Emerald Publishers, Chennai

Spoken English For You Level 2, RadhakrishnaPillai G,Emerald Publishers, Chennai

SEMESTER VI

PAPER - 13 - SHAKESPEARE

Objectives:

- To enable the students to read the plays in the light of the critical approaches that has emerged prominent.
- The students will be enabled to review the traditional concepts of genre such as the Tragedy and the Romantic comedy etc.

UNIT I (Detailed Study)

: Macbeth

UNIT II (Detailed Study)

: As You Like It

UNIT III (Non-detailed Study)

The Tempest

UNIT IV SHAKESPEARE CRITICISM I (Non-detailed Study)

Thomas Dequincey : On the Knocking at the gate in Macbeth

(A Book of English Essays. Penguin Books, New Delhi 1992)

William Hazlitt : Character of Shakespeare's Plays

1. Macbeth
2. As You Like It
3. The Tempest

UNIT V SHAKESPEARE CRITICISM II (Non-detailed Study)

Nevill Coghill : The Basis Of Shakespearian Comedy
Part-III: As Shakespeare matured in comedy… the first modification of Vincent's formula for comedy

W.H. Auden : Music in Shakespeare Part VII: Ariel's songs in The Tempest…a place where silence shall be all.

From Ridler,Anne.*Shakespeare Criticism:1935-60*.OUP , London.1965

Books for Study and Reference

Hazlitt, William .*Characters of Shakespeare's Plays*. Oxford University Press, London.1966

Ridler,Anne. *Shakespeare Criticism: 1935-60*. Oxford University Press, London.1965

Charlton H.B. *Shakespearian Comedy*.Methuen & Co.Ltd. London 1969.

Wells, Stanley and Lena Cowen Orlin, *Shakespeare: An Oxford Guide*. Oxford University Press 2003 Newyork.

Edwards, Philip. *Shakespeare and the confines of Art* Methuen & CO.LTD London 1972.

Clemen,Wolfgang. *Shakespeare's Dramatic Art* –Methuen & CO.LTD London 1972.

Dover, John Wilson The Essential Shakespeare –Cambridge University Press 1967 Bennett H.S. Studies in Shakespeare - Oxford University Press 1964 London.

Smith,Emma..The Cambridge Shakespeare Guide, plots, characters and Interpretations. Cambridge University Press.

Rosen,Joseph Blum Ed The Greenwood Companion to Shakespeare. Volume I,II,III,IV Atlantic Publishers – New Delhi 2007.

Kurian,Anna.ed., *Shakespeare.* Orient BlackSwan, 2016

Shakespeare,William. *Macbeth*.The Arden Shakespeare ed., Sandra Clerk and Pamela Mason Bloomsbury,New Delhi. 2015

Shakespeare,William. *A Midsummer Night's Dream*.The Arden Shakespeare ed., Harold F.Brooks Bloomsbury,New Delhi. 2013

SEMESTER VI

PAPER - 14 - BRITISH LITERATURE V

Objectives:

- To give the students knowledge of the literary accomplishments and an exposure to twentieth century writers.
- To familiarize them with the writers of the modern era.

UNIT I: POETRY (Detailed Study)

W. B. Yeats : The Lake Isle of Innisfree

Philip Larkin : Church Going

Wilfred Owen : Insensibility

UNIT II: PROSE (Detailed Study)

George Orwell : Why I Write

D.H. Lawrence : Why the Novel Matters

UNIT III: DRAMA (Detailed Study)

T.S.Eliot : Murder in the Cathedral

UNIT IV: POETRY (Non-Detailed Study)

Dylan Thomas : Fern Hill

W. H. Davis : Leisure

UNIT V

DRAMA

J.M. Synge : Riders to the Sea

FICTION

E. M. Foster : A Passage to India

Virginia Woolf : To the Lighthouse

Books for Study and Reference

David,Green. *The Winged Word*. London: Macmillan, 1974

Viswanathan,Gauri. *Masks of conquest: Literary Study and British Rule in India*.OUP,1998

Sherry,Vincent,ed. *The CambridgeCompanion to the Literature of the First World War*. CUP,2005

Mukherjee, Sipra. *Literary Contexts: Modern English Literature 1890-1960*.Orient BlackSwan,2016

Web Resources

Literary Texts – Prose, Poetry and Fiction:
<http://www.library.utoronto.ca/utel/works.html>

George Orwell – Why I write –Text:
<http://orwell.ru/library/essays/wiw/english/e_wiw>

SEMESTER VI

PAPER -15 -NEW LITERATURES IN ENGLISH

UNIT I: POETRY

Derek Walcott	: A far Cry from Africa
Pablo Neruda	: Tonight I can write…
Margaret Atwood	: Journey to the Interior

UNIT II: DRAMA

Wole Soyinka **:** The Lion and the Jewel

UNIT III: SHORT STORIES

Gabriel Garcia Marquez	: The Handsomest Drowned Man in the World
Nadine Gordimer	: Once Upon a Time
Katherine Mansfield	: Miss Brill
Isabel Allende	: And of Clay re We Created

UNIT IV: PROSE

Ngugi Wa Thiong'o	: On the Abolition of the English Department
Thomas B. Macaulay	: Minute on Indian Education

UNIT V: FICTION

Chinua Achebe	: Things Fall Apart

Books for Study and Reference

Texts and their worlds II.ed., K Naryan chandran. Foundation Books.,Chennai,2005

Ed. Nasta, Susheila. *Writing Across Worlds*. London: Routledge.2004

Punter, David. *Postcolonial Imaginings*: *Fictions of a New World Order*. Atlantic: New Delhi. 2005.

SEMESTER VI

ELECTIVE PAPER 2 -

TECHNOLOGY MEDIATED ENGLISH

Unit 1:

1. World Wide Web & Email: WWW FAQ'S : Email, Internet
2. Searching the Internet & Search FAQ's
3. The Internet as Resource Bank and classroom tool
4. E.Mail Projects and Discussion Lists

Unit 2:

1. Introduction to NET (I)
2. Introduction to NET (II)

Unit 3:

1. Strange news
2. Making news
3. Eco-tourism

Unit 4:

1. Writing Projects
2. Online groups
3. Blogs and Wikis
4. Email projects and discussion lists

Unit 5:

1. A good book
2. Puzzle maker
3. web quest
4. Professional development online

Prescribed Text

The Internet and the Language Classroom – A Practical Guide for Teachers – II Edition – Gavin Dudency , Cambridge University Press, 2007.

SEMESTER VI

ELECTIVE - PAPER 2

BUSINESS ENGLISH

UNIT I

1. Introduction to Business Communication
2. Communication in Organizations

UNIT II

1. Non- Verbal Communication
2. Effective Listening

UNIT III

1. Making presentations
2. Audio - Visual Aids
3. E-Mail Communication

UNIT IV

1. Resumes and cover letters
2. Preparing an Effective cv
3. Group Discussions
4. Interview Techniques

UNIT V

1. Memos, Reports, Proposals
2. Note taking, Note making
3. Inter cultural communication

Books for Study and Reference

N. Krishnaswamy, Manju Dariwal, Lalitha Krishnaswamy.

Mastering communication and soft skills: A Learner's Guide to Life Skills. Bloomsbury. 2015

Om P. Juneja and Aarti Mujumdar Business Communication: Techniques and Methods (Hyderabad: Orient Blackswan Private Limited, 2010.

Sanghita Sen , Alankrita Mahendra , Priyadarshi Patnaik.
Communication & language skills. Cambridge University Press India.2015

SEMESTER VI

ELECTIVE PAPER - 3 COPY EDITING AND PROOF READING

UNIT I: INTRODUCTION TO COPY EDITING

1. What is copy editing?
2. Type Scripts: Hard copy, Electronic and Camera ready
3. Type Scripts corrected by the author
4. Copy editing on Screen

UNIT II: PREPARING THE TEXT FOR THE TYPE SETTER

1. Various legal aspects
2. A well organized and consistent book
3. Copy right permissions and acknowledgements

UNIT III: ILLUSTRATIONS AND PROOFS

1. How to read proofs
2. How to make corrections
3. Colour coding corrections
4. The author's corrected proof
5. After passing proofs for Press

UNIT IV: HOUSE STYLE

1. House Style and Preliminary Pages
2. Cross – references
2. Date and Time
3. Spelling and Punctuation
4. Title page
5. Contents List
6. List of Illustrations

UNIT V: OTHER PARTS OF A BOOK AND LITERARY MATERIAL

1. Running Heads
2. Page numbers
3. Headings
4. Footnotes and Endnotes
5. Tables
6. Appendixes
7. Glossaries

Prescribed Text:

"Butcher's copy Editing" – Fourth Edition – Judith Butcher, Caroline Drake and Marseen Leach – CUP.

SEMESTER VI

ELECTIVE PAPER -3

EFFECTIVE COMMUNICATION

UNIT I- JUST A MINUTE

Planning a speech- Beginning a speech-Transitions-Closing statements- Body language- Voice modulation- Practising a speech- Effective Communication

UNIT II- WRITING SKILLS

Features of good writing – Gathering ideas – Purposes of writing – Writing for a specific audience – Organising ideas – Writing an introduction

UNIT III- CRITICAL THINKING SKILLS

Developing support ideas- Writing a conclusion – Using linkers – Choosing the right words – Common errors in writing – Editing and proofreading

UNIT IV- GROUP DISCUSSION

Group discussion as a tool for selection- Skills for group discussion- Leadership and problem solving skills- Types of group discussions- Group dynamics- Roles and functions: beginning, presenting, elaborating- Roles and functions: agreeing/disagreeing and summarising- Etiquette, body language and time management- group discussion activities

UNIT V- CRITICAL THINKING SKILLS

Reasoning- Analysis- Making an argument- Evaluating an argument- Evaluating alternative points of view- Synthesising and making connection- Interpreting information- Thinking about experiences- Problem solving- Thinking out of the box.

Prescribed Book

Mukhopadhyay, Lina *et* al. Polyskills*: A course in communication skills and life skills.* New Delhi: Cambridge University Press India Pvt. Ltd., 2012.

SEMESTER VI

SKILL BASED SUBJECT - PAPER 4
ENGLISH LANGUAGE TEACHING

UNIT I

Problems & prospects for the teacher of English.

What is involved in teaching English?

UNIT II

The content of the teaching of English

Strategies of techniques for the teacher

Planning the lesson

Methods & Techniques for Teaching

English in large classes- prose

UNIT III

Teaching reading skills: poetry

UNIT IV

Teaching of grammar & Composition

Examinations in English

UNIT V

Non- Verbal Presentation skills

Public speaking & presentation skills

Preparing for Interview

Books for Study and Reference

1. Bright . Mc. Gregor : Teaching English as a second language (Longman)
2. Spring Board to success: Sharada Kaushik Bindu Bajwa
3. Gosh, Sastrie, Dass : Introductions to English Language Teaching vol:3 CIEFL(oup)
4. Nagaraj, Geetha. English Language Teaching. Delhi, Orient Blackswan Private Limited, 2010.
5. Saraswathi. V. English Language Teaching, Principles and Practice. Chennai, Orient Longman, 2004.
6. Willis, Jane. Teaching English Through English. Hong Kong, Sing Cheong Printing co. Ltd, 1984.

THIRUVALLUVAR UNIVERSITY

B. COM., (GENERAL)

Degree Course

CBCS Pattern

(With effect from 2017-18)

The course of study and the scheme of Examination

Semester – I

S. No.	Part	Study Components Course Title	Ins. Hrs. / Week	Credit	Title of the paper	CIA	Uni. Exam	Total
SEMESTER – I								
1	I	Language – I	6	4	Tamil – I / Other Language	25	75	100
2	II	English – I	6	4	English – I	25	75	100
3	III	Core Paper – I	6	4	Financial Accounting – I	25	75	100
4	III	Core Paper – II	4	3	Business Organisation	25	75	100
5	III	Allied – I	6	4	**(To choose one out of 3)** a. Indian Economy – I b. Business Mathematics c. Consumer Protection and Consumer Rights	25	75	100
6	IV	EVS	2	2	EVS	25	75	100
			30	**21**		**150**	**450**	**600**
SEMESTER – II						**CIA**	**Uni. Exam**	**Total**
1	I	Language – II	6	4	Tamil – II / Other Language	25	75	100
2	II	English – II	4	4	English – II	25	75	100
3	III	Core Paper – III	6	4	Financial Accounting – II	25	75	100
4	III	Core Paper – IV	4	3	Elements of Insurance	25	75	100
5	III	Allied – II	6	6	**(To choose one out of 3)** a. Indian Economy – II b. Logistic Management c. Merchant Banking	25	75	100
6	IV	Value Education	2	2	Value Education	25	75	100
7	IV	Soft Skill	2	1	Soft Skill	25	75	100
			30	**21**		**175**	**525**	**700**
SEMESTER – III						**CIA**	**Uni. Exam**	**Total**
1	I	Core Paper – V	6	4	Corporate Accounting – I	25	75	100
2	II	Core Paper – VI	5	4	Business Law	25	75	100
3	III	Core Paper – VII	4	3	Banking Theory, Law & Practice	25	75	100

4	III	Core Paper – VIII	4	3	Business Statistics – I	25	75	100
5	III	Allied – III	6	4	Business Economy – I	25	75	100
6	IV	Skill based Subject - I	3	3	E-Commerce & Its Applications	25	75	100
7	IV	Non-Major - I	2	2	Elements of Accountancy	25	75	100
			30	**23**		**175**	**525**	**700**
SEMESTER – IV						**CIA**	**Uni. Exam**	**Total**
1	III	Core Paper – IX	6	4	Corporate Accounting – II	25	75	100
2	III	Core Paper – X	5	4	Company Law	25	75	100
3	III	Core Paper – XI	4	3	Business Communication	25	75	100
4	III	Core Paper – XII	4	3	Business Statistics – II	25	75	100
5	III	Allied – IV	6	6	Business Economy – II	25	75	100
6	IV	Skill based Subject - II	3	3	Industrial Organisation	25	75	100
7	IV	Non-Major - II	2	2	Advertising and Salesmanship	25	75	100
			30	**25**		**175**	**525**	**700**
SEMESTER – V						**CIA**	**Uni. Exam**	**Total**
1	III	Core Paper – XIII	6	4	Cost Accounting – I	25	75	100
2	III	Core Paper – XIV	5	4	Practical Auditing	25	75	100
3	III	Core Paper – XV	6	4	Business Management	25	75	100
4	III	Core Paper – XVI	6	4	Income Tax Law & Practice – I	25	75	100
5	III	Elective – I	4	3	**(To choose one out of 3)** a. Entrepreneurial Development b. Industrial Relations c. Management Information System	25	75	100
6	IV	Skill based Subject - III	3	3	Principles of Marketing	25	75	100
			30	**22**		**150**	**450**	**600**
SEMESTER – VI						**CIA**	**Uni. Exam**	**Total**
1	III	Core Paper – XVII	6	5	Cost Accounting – II	25	75	100
2	III	Core Paper – XVIII	6	5	Management Accounting	25	75	100
3	III	Core Paper – XIX	6	5	Income Tax Law & Practice – II	25	75	100
4	III	Elective – II	5	3	**(To choose one out of 3)** a. Financial Management b. Business Environment c. Office Management	25	75	100
5	III	Elective – III	4	3	**(To choose one out of 3)**	25	75	100

					a. Human Resource Management b. Financial Services c. Portfolio Management			
6	IV	Skill based Subject – IV	3	3	Computer Application in Business	25	75	100
7		Extension Activities	-	1		100	0	100
			30	**25**		**250**	**450**	**700**

Consolidated statement

Part	subject	Papers	credit	Total credits	Marks	Total Marks
Part - I	Languages	2	4	8	100	200
Part - II	English	2	4	8	100	200
Part - III	Allied (Odd Semester)	2	4	8	100	200
	Allied (Even Semester)	2	6	12	100	200
	Electives	3	3	9	100	300
	Core	19	(3-7)	73	100	1900
Part - IV	Environmental Science	1	2	2	100	100
	Soft Skills	1	1	1	100	100
	Value Education	1	2	2	100	100
	Language & Others / NME	2	2	4	100	200
	Skill based	4	3	12	100	400
Part - V	Extension Activities	1	1	1	100	100
	Total	**40**		**140**		**4000**

THRUVALLUVAR UNVERSITY
B.COM (GENERAL)
SYLLABUS

UNDER CBCS

(With effect from 2017-2018)

SEMESTER – I

CORE PAPER - 1

FINANCIAL ACCOUNTING - I

Objective:

To gain knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Introduction

Meaning of accounting – objectives of accounting – advantages and limitations of accounting- Accounting concepts and conventions - Methods of accounting -Rules of debit and credit- Journal - Ledger accounts– Trial Balance - Errors and their rectification - Rectification of Errors without suspense a/c - Rectification errors with suspense a/c (effect of rectification on profit and rectification during subsequent accounting year are excluded) - Bank Reconciliation Statement.

Unit - II: Depreciation, Provisions and Reserve

Meaning of depreciation – causes for depreciation – need for charging depreciation – Methods of calculating depreciation: straight line method and written down value method (change in method of depreciation is excluded) – Methods of recording depreciation: by charging depreciation to assets account or by creating provision for depreciation account.

Unit - III: Bills of exchange

Meaning of bill of exchange - features and advantages of bill of exchange- types of bill of exchange: Trade bills and accommodation bills - Accounting treatment of trade bills (accommodation bills are excluded).

Unit - IV: Final accounts

Meaning of final accounts – adjustments in preparation of final accounts – preparation of trading, profit & loss account and balance sheet of sole proprietorship concern.

Unit V: Accounts from incomplete records

Meaning of single entry system – features and limitations of single entry system – Distinction between single entry system and double entry system - Methods of calculation of profit: Statement of affairs method and Conversion method – Distinction between statement of affairs and balance sheet.

Note: Questions in section A,B and C shall be in the proportion of 20: 80 between theory and problems

Text books

1. Jain &Narang,Financial Accounting, KalyaniPublishers, New Delhi.
2. T.S. Reddy & Dr. A.Murthy, Financial Accounting, MarghamPublications, Chennai.

Reference books

1. Gupta,R.L&Gupta,V.K,AdvancedAccounting,Sulthan Chand&Sons,NewDelhi.
2. Shukla&Grewal,AdvancedAccounting,S.Chand&Co.NewDelhi.
3. Parthasarathy,S.&Jaffarulla,A.FinancialAccounting,KalyaniPublishers, NewDelhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER- 2

BUSINESS ORGANISATION

Objective:

To gain a knowledge of Business Organization and its importance.

UNIT - I

Business - meaning and types - Profession - meaning and importance of business Organization - Social Responsibilities of Business - Business Ethics.

UNIT - II

Forms of Business organization - sole trader - partnership - joint Hindu family - joint stock companies - co-operative societies - public utilities and public enterprises - Public Sector vs. Private Sector

UNIT - III

Location of industry - factors influencing location - size of industry - optimum firm - advantages of large - scale operation - limitation of small scale operation - industrial estates - district industries centres.

UNIT - IV

Stock Exchange - Function - Types - Working - Regulation of Stock Exchanges in India - Business Combination - Causes - Types - Effects of Combination in India.

UNIT-V

Trade association - Chamber of commerce - Functions - Objectives - Working in India.

Text Books:

1. Y.K.Bhushan, Business organization, Sultan Chand, New Delhi.
2. Business organization & Management, R.N. Gupta, S. Chand & Co. New Delhi.
3. Dr. K. Sundar, Business Organisaion, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books:

1. Prakash&Jagedesh, Business organization & Management.
2. Reddy &Gulshar, Principles of Business Organization & Management
3. Vasudevan&Radhasivam, Business Organization.

ALLIED - 1

(to choose any 1 out of 3)

PAPER - 1

A. INDIAN ECONOMY - I

Objective

To acquire sufficient knowledge about India's Economic features; occupational structure and the relative shares of the different Sectors. Students should know that India is an emerging economic power in the World market.

UNIT-I

Features of less developed and developing Economies. - Economic and Non-Economic factors impeding Economic development - Concept of growth and development - Indicators - Factors in Economic Development.

UNIT-II

Capital Formation - Human and Physical, Savings and Investment pattern since 1991 - National Income - Methods, trends, limitation - Distribution - Recent trends in National Income - Black Money - Corruption.

UNIT-III

Human Resources - Human Resource Development Size and growth of population- Causes,impact-mesaures to controlpopulation-Recent Population Policy.

UNIT-IV

Agriculture - It's Contribution to Economic Development - Food Problems - Methods of solving it - Agricultural productivity - Land Reforms - Green Revolution

UNIT-V

Agricultural labour – Definition – Features- Problems – Remedies Agricultural Credit - Grameen Bank.

BOOKS FOR REFERENCE:

1.	Agrawal, A.N.	:	Indian Economy, Vikas Publishing House, New Delhi.
2.	Alak Ghosh	:	Indian Economy, The World Press, Kolkatta.
3.	Arora, R.C.	:	Integrated Rural Development, S.Chand & Co.,
4.	Arthur Lewis	:	The Theory of Economic Growth.
5.	Arun Ghosh	:	India in Transition, Economic Policy Options, S.Chand & co.,
6.	Bimal Jalan	:	Indian Economic Crisis, Oxford University Press, Chennai.
7.	Bright Singh	:	Economics of Development.
8.	Dewett, Verma & sharma	:	Indian Economics, S.Chand & Co.,
9.	Dhingra, I.C.	:	Indian Economy, Sultan Chand & Co.,
10.	Hajela & Goswami (E.D.)	:	Economic Reforms and Employment, Indian Economic Association, New Delhi.
11.	Jhingan, M.L.	:	Economics of Development & Planning, Konark Publishers , New Delhi.
12.	Kanka, S.S.	:	Human Resource Management, S.Chand & Co.,
13.	Kindle berger	:	Economic Development.
14.	Minhas	:	Planning for the Poor.
15.	Mongia, J.N. (Editor)	:	India's Economic Policies, Allied Publishers
16.	Pndey, B.N.	:	Role of Science & Technology in Rural and Economic Development of India, S.Chand & Co.,
17.	Pramit Chaudhury	:	The Indian Economy, Poverty and Development, Vikas Publishing House, New Delhi.
18.	Pramod Verma	:	Labour Economics and Industrial Relations, Tata McGraw Hill
19.	Ray, S.K.	:	Economics of Development - Prentice Hall of India.

ALLIED - 1

PAPER - 1

B. BUSINESS MATHEMATICS

Objective:

To understand the fundamentals of Business Mathematics.

UNIT-I

Sets: Finite and infinite sets - equality of sets - Disjoint sets - universal set - set operation Union of sets, intersection of sets - difference of sets - complement of sets - venn diagram - De-Morgan's law - Cartesian product.

UNIT-II

Matrices - type of matrices - matrix operation - Determinant of matrix - Singular and Non Singular matrices - adjoint, inverse of matrix - solving simultaneous linear equations - matrix inversion method and method of reduction.

UNIT-III

Co-ordinate geometry - Co-ordinates - distance between two points - straight line - Concurrent lines - slope - intercept from, slope - point from, two points form - angle between straight lines, parallel and perpendicular conditions - simple problems.

UNIT-IV

Simple interest - compound interest - annuities - discount on bills.

UNIT-V

Differentiations - limits - derivatives of standard function x^n, e^x, $\log_x^e$, trigonometric functions - rules of Differentiation - Differentiation on different types of functions - successive Differentiation - maxima and minima - applications in business problems.

Reference Books:

1. S.P.Gupta, Statistical Methods, S.Chand& Co.,
2. P.R. Vittal, Business Mathematics & Statistics, Margham Publishers, Chennai.
3. Chandran&Agarwal, Business Mathematics.
4. Raghavachari, Mathematics for Management,
5. Raja Gopalan and Sattinathan, Business Mathematics, Vijay Nicole Publications, Chennai.

ALLIED - 1

PAPER - 1

C. CONSUMER PROTECTION AND CONSUMER RIGHTS

Objective:

To make students to acquire basic knowledge of consumer laws, consumer rights and consumer welfare and protection.

Unit - I

Introduction of Consumer Protection Act 1986 – Objectives - Consumer Protection Act 2006 (Amendments) – Salient features.

Unit - II

Definitions of the term: - Consumer – Types of Consumer Appropriate authority – Complainant – Consumer dispute – Restrictive Trade Practice.

Unit - III

The various Consumer Rights: - Right to Safety, Right to Information, Right to Choose, Right to be heard – Right against exploitation – Right to Consumer Education.

Unit - IV

Consumer Production Council: - Composition and Powers of National Commission, State Commission and District Consumer Forum.

Unit - V

Redressal of consumer grievances-Goods & Services covered under Consumer Protection Act-Procedure for filing of complaints with District Forum, State Commission , National Commission.

Books for reference

1. Lecture on Torts and Consumer Protection Laws by Dr. Rega Surya Rao – Asia Law House, Hyderabad.
2. Consumer Protection Laws – By Prof. RakeshKhanna – Central – Law Agency.
3. Consumer Protection (Amendment) Act, 2002. S. Chand & Sons.2012.

SEMESTER – II

CORE PAPER- 3

FINANCIAL ACCOUNTING - II

Objective:

To gain a knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Branch accounts

Meaning – objects of branch accounts – accounting in respect of dependent branches: debtors system; stock and debtors system; wholesale branch system and final accounts system - Independent branches – incorporation of branch trial balance in head office books.

Unit - II: Departmental Accounting

Meaning of departments and departmental accounting – Distinction between departments and branches- need for departmental accounting – advantages of departmental accounting - Apportionment of indirect expenses – Inter departmental transfers at cost and selling price - preparation of departmental trading, profit & loss account and balance sheet.

Unit - III: Hire purchase and Instalment purchase systems

Meaning and features of hire purchase system - calculation of interest – books of hire purchaser and books of hire vendor - default and repossession (Hire purchase trading account excluded)

Meaning of instalment system -distinction between hire purchase system and instalment system - calculation of interest – books of buyer and books of seller.

Unit - IV: Partnership accounts (fundamentals and reconstitution of partnership)

Meaning and features of partnership – Partnership deed - calculation of Interest on capital and interest on drawings – preparation of profit & loss appropriation account – preparation of capital accounts (fixed and fluctuating) – admission of a partner – retirement of a partner – death of a partner – treatment of goodwill as per AS 10.

Unit - V: Partnership Accounts (Dissolution of partnership firms)

Dissolution of a firm – insolvency of a partner (Garner Vs Murray rule) – Insolvency of all the partners – Piecemeal distribution: proportionate capital method and maximum loss method.

Note: Questions in section A, B and C shall be in the proportion of 20: 80 between theory and problems.

Text books

1. Jain &Narang ,Financial accounting, Kalyani publishers, New Delhi
2. T.S. Reddy & Dr. A.Murthy, Financial accounting, Margham publications, Chennai

Reference books

1. Gupta,R.L&Gupta,V.K,AdvancedAccounting,Sultan Chand&Sons,NewDelhi.
2. Shukla&Grewal,AdvancedAccounting,S.Chand&Co.NewDelhi.
3. Parthasarathy,S.&Jaffarulla,A.FinancialAccounting,KalyaniPublishers,NewDelhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER- 4

ELEMENTS OF INSURANCE

Objective:

To gain a knowledge of insurance and its importance.

UNIT-I

Definition of insurance - classification of Contracts of insurance - marine and non-marine - general principles of law as applied to non-marine insurance.

UNIT-II

Life Assurance - objects of life Assurance - principles of life Assurance - different plans of life Assurance and annuities - policy condition and privilege - assignment and nomination - lapses and revivals - surrender values and loans - claims - double insurance.

UNIT-III

Marine insurance - principles of marine insurance - functions of marine insurance - proximate clause - subrogation and contribution

UNIT-IV

Types of marine policy - clauses in general use - warranties - kinds of marine losses - reinsurance and double insurance.

UNIT-V

Fire insurance - principles of law as applied to fire insurance - the subject matter of fire insurance - fire waste - hazard types of fire policy - cover notes - surveys and inspection average - re-insurance - renewals.

Text and Reference Books:

1. Dr. B. Vardharajan - Insurance Vol 1 and 2. - Tamil Text Book.
2. R.S. Sharma - Insurance Principle & Practice - Vara Bombay, 2006.
3. A. Murthy - Elements of Insurance Risk management & Insurance - Harrington, 2006 - Tata McGraw Hill pub.

ALLIED - 1

(To choose any 1 out of 3)

PAPER – 2

A. INDIAN ECONOMY - II

UNIT-I

Role of Technology - Information Technology BPO in India - their impact on Economic Development – Cyber Crime.

UNIT-II

Role of industries - Cottage & Small Scale industries - Some Large Scale industries (Cotton, Sugar, Iron & Steel, Tea & Petro Chemical) Industrial Policy - 1991 and after - Public sector Enterprises - Dis-investment and Privatisation.

UNIT-III

Transport - Importance of Transport (Roadways, Railways, Shipping and Civil Aviations) to Economic growth - Evaluation of Government in Policy in relation to privatisation policy - Transport Coordination.

UNIT-IV

Planning in India - Strategy of Indian Planning - Resources for Financing Plan - Agriculture and Industrial Development - Planning techniques - Investment Priorities – General Objectives – Targets, Achievements and Failures – 11^{th} and 12^{th} five year plans- NITIAYOG

UNIT-V

Poverty in India - Poverty Eradication Programmes - Recent Employment scheme-Swaraj Bharat Mission - Role of Micro finance - (SHG, Cottage and Household Sector etc.,) - Regional Development Disparities -India's Foreign Trade and Balance of Payments.

ALLIED - 1

PAPER - 2

B. LOGISTIC MANAGEMENT

Objective:

To understand the comprehensive nature of Logistics Management.

UNIT-I

Logistics - definition - scope - functions - objectives of Logistics Management - customer service and logistics.

UNIT-II

Supply Chain - components - role of logistics in supply chain - Warehousing - functions - types - warehouse layout - material handling and logistics - Inventory Management.

UNIT-III

Transportation - infrastructure - freight management - transportation network - route planning - containerization.

UNIT-IV

Logistical packaging - logistics information needs - logistics design for distribution channels - logistics outsourcing.

UNIT-V

Government policies and regulations - Motor Vehicles Act, carriage by air, sea, multi-modal transportation etc., Documentation - Airway Bill, Railway Receipt, Lorry Receipt, Bill of Lading etc.

Reference Books:

1. Vinod V. Sople, Logistics Management, Pearson Education (Singapore) P. Ltd.,
2. Satis C. Ailawadi, Rakesh Singh, Logistics Management, Prentice Hall of India, New Delhi - 110 001.
3. Ronal H. Ballou, Business Logistics / Supply Chain Management, Pearson Education, Prentice Hall, New Delhi - 2001.

Text Books:

1. Sunil Chopra & Peter Meindi, Supply Chain Management / Strategy, Planning and Operation - Pearson Education Asia, New Delhi.
2. B. S. Sahay, Supply Chain Management for Global Competitiveness, Macmillan India Ltd., Delhi.
3. B. Nanthakumar, Logistic and Supply Chain Management, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

ALLIED - 1

PAPER - 3

C. MERCHANT BANKING

Objective:

To enable the students to understand Merchant banking and its services to corporate sector.

UNIT-I

Merchant Banking – Definitions and Functions – Regulatory Framework – Registration of Merchant Bankers – Procedure Capital Adequacy Requirement – Lead Merchant Banker Appointment, Restrictions and Responsibilities

UNIT-II

Public Issue Management – Functions and Mechanism – Categories of Issue – Issue Manager – Category and Restrictions Activities Involved in Public issue Management – Marketing of New Issues – Methods – Pricing of Rights and Other Public Issues

UNIT-III

Post Issue Management – Allotment / Dispatch of Shares / Refunds – Basis of Allotment – Procedure – Listing Requirements of Stock Exchanges – Advantages – Listing Requirements of OTCEI

UNIT-IV

Capital Market Instruments – Meaning and Types – Commercial Paper – Issue of Commercial Paper – Usance – E-nomiation – Ceiling – Mode of Issue – Credit Syndication – For Long Term and Working Capital

UNIT-V

Port Folio Management – Functions – Registration of Port-folio Managers – Obligation – Investment of Client Funds – Maintenance of Book and Accounts – Reports to be Furnished – Code of Conduct

Text Books:

1. Dr.S.Guruswamy, Merchant Banking and Financial Services, Vijay Nicholes Imprint Pvt. Ltd., Chennai.
2. Dr.V.Balu, Merchant Banking and Financial Services, Sri Venkateswara Publications, Chennai

Reference Books:

1. H.R. Machiraju, Merchant Banking, New Age International, New Delhi.
2. A Treatise on Merchant Banking, Skylark Publications, New Delhi
3. Dr. J.C.Verma, A Manual of Merchant Banking, Bharath Law House, New Delhi.

SEMESTER - III

CORE PAPER- 5

CORPORATE ACCOUNTING – I

Objective:

To gain comprehensive understanding of all aspects relating to corporate accounting.

Unit - I: Share capital

Meaning and types of shares - Issue and allotment of equity and preference shares- issue at par, premium and at discount – calls in advance – calls in arrears – forfeiture of shares – reissue of forfeited shares – redemption of preference shares – underwriting of shares (Determining the liability of underwriters – firm underwriting)

Unit - II: Debentures

Meaning and types of debentures - Issue of debentures at par, premium and at discount – writing off discount on issue of debentures – issue of debentures as collateral security – issue of debentures for consideration other than cash - redemption of debentures – methods – open market buying – conversion of debentures into shares – sinking fund method – insurance policy method.

Unit - III: Acquisition of Business

Meaning of Acquisition of business – accounting treatment – new set of books to be opened - same set of books to be continued – profit prior to incorporation

Unit - IV: Final accounts

Preparation of Statement of profit & loss and Balance sheet (as per revised schedule VI)

Unit - V: Amalgamation, Absorption, External and Internal reconstruction

Purchase consideration – methods - Amalgamation in the nature of merger or purchase – absorption (AS 14). Alteration of share capital – reduction of share capital (scheme of capital reduction is excluded).

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text Books

1. Jain,S.P & Narang,N.L., Advanced Accounting, Kalyani Publications.
2. Reddy T.S.& Murthy,A,Corporate Accounting, Margham Publications, Chennai.

Reference Books

1. Gupta,R.L & Radhaswamy, M, Advanced Accounts, Sulthan Chand, New Delhi.
2. Shukla & Grewal & Gupta, Advanced Accounting, S. Chand & Co., New Delhi.
3. Palaniyappan, Corporate Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER - 6

BUSINESS LAW

Objective:

To gain a comprehensive knowledge on all aspects of law as applied to business.

UNIT-I

Contract - Formation and Essential Elements of Contract – Types of Contract and Agreements – Rules as to offer, Acceptance and Consideration – Capacity to Contract – Lawful Object and Free Consent – Quasi Contract.

UNIT-II

Performance of Contract – Devolution of Joint Rights and Liabilities – Discharge of Contract – Breach of Contract and Remedies.

UNIT-III

Indemnity and Guarantee – Features and Distinctions – Extent of Surety's Liability – Rights and Discharge of Surety – Bailment and Pledge – Features – Difference – Rights and Duties of Bailor and Bailee – Law Relating to Lien and Finder of Lost Goods – Rights and Duties of Pawnor and Pawnee – Pledge by Non-Owner.

UNIT-IV

Contract of Agency – Definition and Meaning – Creation – Ratification and Requisites – Rights of Principal and Agent – Relation of Principal with Third Parties – Personal Liability of Agent – Termination of Agency – Irrevocable Agency.

UNIT-V

Sale of Goods Act 1930 – Definition of Sale – Sale Vs Agreement to Sell – Subject Matter – Express and Implied Conditions and Warranties – Caveat Emptor and Exceptions – Performance of Contract – Transfer of Property – Rights of an Unpaid Seller – Sale by Non-owner – Auction Sale.

Text Books:

1. N.D.Kapoor, Business Laws, Sultan Chand & Sons, New Delhi.
2. R.S.N.Pillai&Bagavathi, Business Laws, S.Chand& Co., New Delhi.

Reference Books:

1. M.C.Dhandapani, Business Laws, Sultan Chand & Sons, New Delhi.
2. M.C.Shukla, Mercantile Law, S.Chand& Co., New Delhi.
3. P.C. Tulsian, Business Laws, Tata McGraw Hill, New Delhi.
4. Dr.N.Premavathy, Business Law, Sri Vishnu Publications, Chennai.
5. Dr.N.Premavathy, Business Law (in Tamil), Sri Vishnu Publications, Chennai.
6. Balachandran. V and Thothadri. R, Business Law, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER - 7

BANKING THEORY, LAW AND PRACTICE

Objective:

To study in detail about the Central Bank and Commercial Banking System including the latest directives and decisions of Reserve Bank of India. To study the recent developments in Indian banking system. To acquire the basic knowledge about the banking transactions.

Unit - I

Origin of banks – Banking Regulation Act, 1949 – Roll of Banks and Economic Development – Central Banking and Role of RBI and their functions - Credit Control Measures of Central Bank.

Unit - II

Commercial Banks – Functions – E-Banking – ATM Cards, Debit cards, Personal Identification Number – Online enquiry and update facility – Electronic Fund Transfer – Electronic Clearing System – Credit Creation and Credit Control – Role of SBI in the Economic Development of India.

Unit - III

Types of Bank Accounts - Savings Account, Current Account - Types of Deposit Account – Fixed and Recurring Deposits Account – Procedure for opening of an Account – Types of customers (Individuals, firms and Companies) – Importance of CRM – Customer grievances and redressal – Ombudsman.

Unit - IV

Negotiable instruments – Promissory Note – Bills of Exchange, Cheque, Draft – Definitions, Features – Crossing – Endorsement – Material Alteration – Dishonour of Cheques – Paying Banker – Rights, Duties and Statutory Protection to Paying Banker – Collecting banker – Rights and Duties.

Unit - V

Principles of lending – Types of Loans – Precautions to be taken by a banker while lending against LIC Policies, Shares, Gold, Silver Ornament and Jewellery.

Text Books:

1. Banking Law Theory and Practice – Sundaram and Varshney – Sultan Chand Co.
2. Banking and Financial Systems – B. Santhanam, Margham Publishers.
3. Banking Law Theory and Practice – S.N. Maheswari – Kalyani Publications.
4. Banking Theory Law and Practice, Dr. S. Guruswamy, 3rd Edition, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books:

1. Indian Banking – Parameswaran – S. Chand and Co.
2. Financial Services – Dr. S. Gurusamy, Tata McGraw-Hill Education India.
3. Banking Theory Law Theory and Practice – Dr. S. Gurusamy, Tata McGraw-Hill Education India.

CORE PAPER - 8

BUSINESS STATISTICS – I

Objective

To understand and apply statistical tools in business.

UNIT-I

Statistics - Definitions - Scope and Limitations - Collection of Data - Primary and Secondary Data - Questionnaire - Classification and Tabulation - Diagrammatic and graphical representation of data.

UNIT-II

Measures of Central tendency - Mean - Median - Mode - Harmonic Mean and Geometric Mean,

UNIT-III

Measures of Dispersion - Range - Quartile deviation - Mean Deviation - Standard Deviation - Coefficient of Variation - Lorenz Curve.

UNIT-IV

Measures of Skewness - Karl Pearson's and Bowlay's Coefficient of Skewness - Kurtosis - Characteristics of Kurtosis - Measures - Calculation.

UNIT-V

Statistical Quality Control - Control Charts - X, P, C, R - Charts - Acceptance sampling only.

(Weightage of Marks = Problems - 80%, Theory - 20%)

Text Books:

1. Dr. S.P. Gupta, Business Statistics & Operation Research - Sultan Chand.
2. PA. Navanitham, Business Statistics & Operation Research, Jai Publications, Trichy.
3. S.P. Rajagopalan& R. Sattanathan, Business Statistics & Operation Research 3rd Edition, Vijay Nicole Publications, Chennai.

Reference Books:

1. Dr. S.P. Gupta, Statistical Methods - Sultan Chand.
2. R.S.N. Pillai&Bhagavathi, Statistics.
3. J.K. Sharma, Business Statistics - Pearson Education.
4. B. Agarwal, Basic Statistics - Wiley Eastern.

ALLIED - 2

PAPER - 3

BUSINESS ECONOMICS – I

UNIT-I

Introduction to Business Economics - Objectives of Business Profit maximization - Social responsibility of Business.

UNIT-II

Demand analysis - Demand schedule - Demand curve - Different types of Elasticity of demand - Measurement - Importance of elasticity of demand.

UNIT-III

Utility analysis - Cardinal - Ordinal - The law of diminishing marginal utility - Equi-Marginal utility - Indifference curve - Break-even analysis - Profit theories and concepts.

UNIT-IV

Demand Forecasting - Different types of Demand Forecasting.

UNIT-V

Production - Production function - The law of variable proportions - Economies of scale, Law of returns to scale.

Reference Books:

Business Economics, K.P.M Sundaram and E.N. Sundaram, Sultan & Chand, New Delhi.

Business Economics, S. Sankaran, Margham Publications, Chennai

Managerial Economics, R.L. Varsheny and K.L. Maheshwari, Sultan & Chand. New Delhi.

Business Economics, H.L. Ahuja, S.Chan

SKILL BASED SUBJECT

PAPER – 1

E-COMMERCE AND ITS APPLICATIONS

Unit - I:

Introduction to E-Commerce – Meaning – Working of E-Commerce – Electronic Business – Categories of E-Commerce Application – Global Trading Environment and Adoption of E-Commerce – Product suitability – Comparison between Traditional and Electronic Commerce – Advantages and Disadvantages of E-Commerce.

Unit - II:

Business Models of E-Commerce – Introduction – Major challenges of B2C E-Commerce – Meaning of B2B Exchange – Development of B2B E-Commerce – Types of B2B Markets – Difference between B2C and B2B Commerce.

Unit - III:

Introduction to E-Hub Concept – Introduction to B2G Concept – E-filing.

Unit - IV:

Internet – Internet Operation – Internet Explorer – Creation of E-mail ID, E-mail etiquettes.

Unit - V:

Web Browsing – Role of Website in B2C E-Commerce, Website strategies and goals. Websites Design Principles for E-Commerce websites.

Text Books:

1. E-Commerce – SrinivasaVallabhan. S.V – Vijay Nicole Imprints Private Ltd., Chennai.

NON-MAJOR ELECTIVE
PAPER – 1
ELEMENTS OF ACCOUNTANCY

Objectives:

To facilitate the non- commerce students to have a basic knowledge in Book-Keeping and Accounting.

Unit - I:

Need for Accounting – Definition (AICPA) – Steps – Objectives — Double Entry System - Meaning of Debit and Credit - Advantages – Limitations – Types of Accounts – Accounting Rules – Accounting Terminology – Accounting Concepts and Conventions – Meaning and Types – Accounting Equation.

Unit - II:

Journal – Ledger Accounts – Trial Balance.

Unit - III:

Subsidiary Books – Meaning – Types (no problems from Bills Receivable Book and Bills Payable Book but only theory) – Advantages over Journal – Ledger Accounts – Trial Balance.

Unit - IV:

Errors – Classification – Rectification (Rectification after the preparation of final account is excluded) – Suspense Account – Meaning and Need.

Unit - V:

Closing and Adjustment Entries – Final Accounts with simple Adjustments.

(Weightage: Theory: 25%, Problems: 75%)

Text Books

1. Jain,S.P & Narang,N.L., Advanced Accounting, Kalyani Publications.
2. Jaya Charulatha and Baskar, Introduction to Accountancy, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books

1. Gupta,R.L&Radhaswamy,M,AdvancedAccounts,SulthanChand,NewDelhi.
2. Shukla&Grewal&Gupta,AdvancedAccounting,S.Chand&Co.,NewDelhi.

SEMESTER – IV

CORE PAPER – 9

CORPORATE ACCOUNTING – II

Objective:

To gain accounting knowledge in advanced corporate accounting.

Unit - I: Valuation of goodwill and shares

Methods of Valuation of Goodwill – Average Profit Method – Super Profit Method – Capitalisation Method.

Methods of Valuation of Shares- Net Assets Method – Yield Method – Fair Value Method.

Unit - II: Liquidation of companies

Order of Payments – Preferential Creditors – Liquidator's Remuneration - Liquidator's Final Statement of Account - Statement of Affairs and Deficiency Account.

Unit - III: Bank and Insurance Company accounts

NPA – Interest on Doubtful Debts – Rebate on Bills Discounted – Preparation of Bank Profit &Loss Account and Balance Sheet.

Life insurance – Ascertaining Correct Assurance Fund –Revenue Account – Valuation Balance Sheet - Profit & Loss account – Balance Sheet (new format).

General Insurance – Revenue Account – Profit & Loss Account – Balance Sheet (new format).

Unit - IV: Holding company accounts

Capital Profit - Revenue Profit - Cost Of Control - Minority Interest– Elimination Of Common Transactions – UnrealisedProfit – Revaluation of Assets and Liabilities – Bonus Shares - Consolidated Balance Sheet (IntercompanyInvestment is Excluded).

Unit - V: Inflation accounting (Accounting for price level changes)

Limitations of Historical Accounting – Meaning of Inflation Accounting – Methods of Inflation Accounting – CPP Method; Gain or Loss on Monetary Items; Valuation of Cost of Sales and Closing Inventory – CCA Method: COSA; MWCA; Depreciation Adjustment; Gearing Adjustment.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text Books

1. Jain,S.P & Narang, N.L., Advanced Accounting, Kalyani Publications.
2. Reddy T.S. & Murthy, A, Corporate Accounting, Margham Publications, Chennai.

Reference Books

1. Gupta,R.L & Radhaswamy, M, Advanced Accounts, Sulthan Chand, New Delhi.
2. Shukla & Grewal & Gupta, Advanced Accounting ,S.Chand & Co., New Delhi.

CORE PAPER - 10

COMPANY LAW

Objective:

To gain knowledge about the company law.

UNIT-I

Introduction – Meaning and Definition of a Company – Characteristics of a Company – Advantages – Limitations – Types of Companies – Distinction between a Private Ltd. Company and a Public Ltd. Company.

UNIT-II

Formation of a Company – Promotion – Functions of a Promoter – Memorandum of Association – Meaning – Contents – Purpose – Articles of Association – Meaning – Contents – Distinction between Memorandum and Articles.

UNIT-III

Prospectus – Meaning – Requirements of a Prospectus – Conditions for a Prospectus – Objects of Issuing a Prospectus – Contents – Statement in Lieu of Prospectus.

UNIT-IV

Members of a Company – Meaning and Definition – Who can become a Member? – Rights of the Members – Liabilities of the Members – Termination of Membership.

UNIT-V

Directors of a Company – Definition – Eligibility to become a Director – Number of Directorships – Appointment of Directors – First Directors – Subsequent Directors – Removal of Directors – Powers, Duties and Liabilities of Directors – Winding up of a Company – Meaning – Methods of Winding up.

Text Book:

1. N.D.Kapoor, Company Law – Sultan & Chand.

Reference Books:

1. Dr.N.Premavathy, Company Law, Sri Vishnu Publications, Chennai.
2. Gaffoor and Thothadri, Company Law, 2nd Edition, Vijay Nicholes Imprint Pvt. Ltd., Chennai.
3. Kathiresan and Radha, Company law – Prasanna Publishers, Chennai.

CORE PAPER - 11

BUSINESS COMMUNICATION

Objective:

To enable the students to know importance of communication in commerce and trade and to draft business letters.

UNIT-I

Business Communication – Meaning – Definition - Features of Business Communication – Importance of effective Communication in Business – Classification of Communication – Characteristics (7cs) and Guidelines of Effective Business Communication.

UNIT-II

Analysis of Business Letters – Basic Principles in Drafting – Appearance, Structure and Layout – Letter Styles.

UNIT-III

Various types of Business Letters – Letters of Enquiry – Offers, Quotations, Orders, Complaints and Settlement, Circular Letters, Status Enquiry – Collection Letters.

UNIT-IV

Letters of Application – Essential Qualities – Letters of Application with CV, Resumes – Application with reference to an Advertisement – Solicited and Unsolicited Letters – Reference Letters.

UNIT-V

Business Report – Importance – Characteristics – Types – Reports by Individuals and Committees.

Text Books:

1. Dr.K.Sundar, Business Communication, Vijay Nicole Publications, Chennai.
2. Rajendra Pal & J S Korlahali, Essentials of Business Communication.

Reference Books:

1. Ramesh and Pattanchetti, Business Communication, R Chand & Co.
2. Dr.N.Premavathy, Business Communication, Sri Vishnu Publications, Chennai.
3. Dr.N.Premavathy, Business Communication (in Tamil), Sri Vishnu Publications, Chennai.

CORE PAPER - 12

BUSINESS STATISTICS – II

Objective

To understand and apply statistical tools in Business.

UNIT-I

Correlation - Definition - Karl Pearson's Coefficient of Correlation - Rank Correlation.

UNIT-II

Regression Equations – Properties of Regression Lines and Coefficients – Standard Error of Estimate.

UNIT-III

Index Number - Definition - Uses - Unweighted Index Number - Simple Aggregate Price Index, Simple Average of Price Relatives Index - Weighted Index - Laspeyre's Paasche, Dorbish Bowley's - Marshall Edge worth, Fisher Ideal Index - Time and Factor Reversal Test - Cost of Living Index.

UNIT-IV

Time Series - Definition and Uses - Components - Semi Average, Moving Average - Method of Least Square - Seasonal Variation - Simple Average Method.

UNIT-V

Probability - Addition and Multiplication Theorem - Permutation and Combination - Baye's Theorem.

(Weightage of Marks = Problems - 80%, Theory - 20%)

Text Books:

1. Dr. S.P. Gupta, Business Statistics & Operation Research - Sultan Chand.
2. PA. Navanitham, Business Statistics & Operation Research, Jai Publications, Trichy.
3. S.P. Rajagopalan& R. Sattanathan, Business Statistics & Operation Research 3rd Edition, Vijay Nicole Publications, Chennai.

Reference Books:

1. Dr. S.P. Gupta, Statistical Methods - Sultan Chand.
2. R.S.N. Pillai&Bhagavathi, Statistics.
3. J.K. Sharma, Business Statistics - Pearson Education.
4. B. Agarwal, Basic Statistics - Wiley Eastern.

ALLIED - 2

PAPER - 4

BUSINESS ECONOMICS - II

UNIT-I

Cost and Revenue analysis - Different types of cost and their relations to each other - Average cost - Marginal cost - Various types of revenue curves short term and long term - Diagrammatic representation.

UNIT-II

Market structure and pricing - Pricing under perfect computation - Pricing under monopoly - Pricing under monopolistic competition.

UNIT-III

Distribution theories - Theories of profits.

UNIT-IV

Government and Business - Industrial Policy - National Income Computation – Concepts of National Income – Methods of Measuring National Income - National Income in India - Contribution.

UNIT-V

Fiscal Economics - Revenues and Public expenditure - Canons of Taxation - Fiscal policy of India.

Reference Books:

Business Economics, K.P.M Sundaram and E.N. Sundaram, Sultan & Chand, New Delhi.

Business Economics, S. Sankaran, Margham Publications, Chennai

Managerial Economics, R.L. Varsheny and K.L. Maheshwari, Sultan & Chand. New Delhi.

Business Economics, H.L. Ahuja, S.Chand.

SKILL BASED SUBJECT - II

PAPER - 2

INDUSTRIAL ORGANIZATION

Objective:

To gain knowledge of the basic industrial structure and its working.

UNIT-I

Meaning of Industrial Organisation – Industrial Revolution – Industrial Growth – Aggregation, Consolidation, Integration - Mass Production – Importance, Advantages, Limitations – Specialisation – division of labour – its advantages and disadvantages – Industrial growth in India – major industries in India – current scenario.

UNIT-II

Industrial ownership – Sole Proprietorship - Features, merits and demerits – partnership - Features, merits and demerits - Joint Stock Company - Features, merits and demerits - Types – Public Ltd and Private Ltd companies.

UNIT-III

Physical facilities – plant location – need for selection of location – stages in selection of location – plant layout – definition, objectives, advantages, types – factors influencing plant layout – tools used for design of plant layout – principles of a good plant layout.

UNIT-IV

Production management – product design – characteristics of a good product design – design of production system – its types – design of work study – motion study – time study - production planning – objectives, levels – production control – factors determining production control operation – functions of production planning and control.

UNIT-V

Materials management – its meaning, objectives, advantages, functions – purchasing-types of purchasing policy – store keeping – organisation of stores department – inventory control – its objectives, functions, benefits.

Text Book:

1. Dr. A. Murthy, Industrial Organisation, Margham Publications, Chennai.

Reference Books:

1. L Bethel, Atwater, Smith and Stackman, Industrial Organisational Management, McGraw Hill.
2. Kimball & Kimball, Principles of Industrial Organisation, McGraw Hill.
3. Lundy, Effective Industrial Management Eurasia Publishing House (Pvt.) Ltd., New Delhi.

NON-MAJOR ELECTIVE

PAPER - 2

ADVERTISING AND SALESMANSHIP

UNIT-I

Origin and Development of Advertising – Objectives – Nature – Functions – Types – Benefits – Difference between Advertising and Publicity – Scope of Advertising – DAGMAR approach.

UNIT-II

Various media of Advertising – Print Media – Newspapers – Magazines – Advantages – Limitations – Radio and TV advertising - Advantages – Limitations.

UNIT-III

Advertisement copy – Characteristics – Clarification – Components – Salesmen Recruitment – Salesmen report – Types – Salesmanship and Psychology.

UNIT-IV

Salesmanship – Characteristics of Salesmanship – Objectives of Personal selling – Advantages – Limitations – Essentials of Effective selling – Advertising and Salesmanship.

UNIT-V

Qualities of Good Salesman – Sales Promotion – Kinds of Sales promotion – Importance of Salesmanship – Types of Salesmen – Methods of Remuneration – Qualities of successful Salesman.

Text Books:

1. Modern Marketing (Principles and Practises) R.S.N. Pillai&Bagavathi, S. Chand & Co. New Delhi
2. Sales and Advertisement Management S Rajkumar, V Rajagopalan, S. Chand & Company Pvt. Ltd.

Reference Books:

1. Advertising (Principles and Practise) Chunawalla K.C. Sethia, Himalaya Publishing House, Delhi.
2. Advertising Management Dr. M.M. Varma, R. K. Agarwal, Forward 300K Depot, New Delhi.
3. Advertising Management Mahendra Mohan, Tata Mcgraw-hill Publishing Company Limited,New Delhi,India.
4. Advertising Marketing and Sales Management G.R. Basotia N. K Sharama, Mangal Deep Jaipur.
5. Essentials of Marketing, Dr. K. Sundar, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

SEMESTER – V

CORE PAPER - 13

COST ACCOUNTING – I

Objective:

To understand the basic concepts and methods of Cost Accounting.

UNIT-I: Nature and Scope of Cost Accounting

Cost Accounting : Nature and Scope – Objectives, Advantages and Limitations – Financial Vs. Cost Accounting - Costing System - Types of Costing and Cost Classification – Cost Sheet and Tenders – Cost Unit – Cost Centre and Profit Centre.

UNIT-II: Material Purchase and Control

Purchase Department and its Objectives – Purchase Procedure – Classification and Codification of Materials, Material Control: Levels of Stock and EOQ – Perpetual Inventory System, ABC and VED Analysis – Accounting of Material Losses.

UNIT-III: Methods of pricing of Material Issues

Cost Price Methods: FIFO, LIFO, Average Price Methods: Simple and Weighted Average Price Methods, Notional Price Methods: Standards Price, and Market Price Methods

UNIT-IV: Labour Cost Control

Labour Turnover: Causes, Methods of Measurement and Reduction of Labour Turnover – Idle and Over Time – Remuneration and Inventive: Time and Piece Rate – Taylor's, Merricks and Gantt's Task – Premium Bonus System – Halsey, Rowan and Emerson's Plans – Calculation of Earnings of Workers.

UNIT-V: Overheads

Classification of Overhead Costs – Departmentalization of Overheads – Allocation Absorption and Appointment of Overhead Costs – Primary and Secondary Distribution of Overheads – Computation of Machine Hour Rate and Labour Hour Rate.

(Weightage of Marks = Problems 80%, Theory 20%)

TEXT BOOKS:

1. T.S. Reddy &Hari Prasad Reddy – Cost Accounting – Margham Publications, Chennai
2. A.Murthy and S. Gurusamy, Cost Accounting 2nd Edition, Vijay Nicole Imprints Private Ltd., Chennai.
3. A.Murthy and S. Gurusamy, Cost Accounting, Tata McGraw-Hill Publishing Company Ltd. New Delhi.
4. Tulsian P.C. – Cost Accounting – Tata McGraw Hills.

REFERENCE BOOKS:

1. S.P.Jain and Narang – Cost Accounting – Kalyani Publishers, New Delhi
2. S.N.Maheswari – Principles of Cost Accounting – Sultan Chand & sons, New Delhi
3. A.Murthy and S. Gurusamy, Essentials of Cost Accounting, Vijay Nicole Imprints Private Ltd., Chennai.
4. S.P.Iyangar – Cost Accounting – Sultan Chand & Sons, New Delhi.

CORE PAPER - 14

PRACTICAL AUDITING

Objective:

To gain knowledge of the principles and practice of auditing.

UNIT-I

Meaning and Definition of Auditing – Nature and Scope of Auditing – Accountancy and Auditing, Auditing and Investigation – Objectives of Auditing – Limitations of Audit – Advantages of Audit – Classification of Audit

UNIT-II

Meaning and Definition of Audit Programme – Advantages and Disadvantages – Audit File, Audit Note Book, Audit Working Papers – Purposes and Importance of Working Papers – Internal Check – Meaning, Object of Internal Check – Features of Good Internal Check System – Auditors duty with regards to Internal Check System – Internal Check and Internal Audit.

UNIT-III

Vouching – Meaning – Objects – Importance of Vouching – Meaning of Voucher – Vouching of Cash Receipts and Vouching of Cash Payments – Vouching of Trading Transactions.

UNIT-IV

Verification and Valuation of assets and liabilities – Meaning and objects of verification – Vouching and verification – Verification and Valuation of different kinds of Assets and Liabilities.

UNIT-V

The Audit of Limited Companies – Necessity of Company Audit – Qualification and Disqualification of Auditors – Appointment – Removal – Remuneration – Status of Auditors – Rights – Powers – Duties and Liability of Auditors – Auditor's Report – Importance and Contents.

Text Books:

1. B.N. Tandon, Sultan Chand – A handbook of practical auditing
2. B.N. Tandon, Sudharsanam, Sundharabahu – S Chand – Practical auditing.
3. Sundar. K and Pari. K, Vijay Nicole Imprints Private Ltd., Chennai.

Reference Books:

1. Sharma, SahityaBhavan, Agra – Auditing
2. Dr.N.Premavathy, Practical Auditing, Sri Vishnu Publications, Chennai.
3. Dr.N.Premavathy, Practical Auditing (in Tamil), Sri Vishnu Publications, Chennai.

CORE PAPER - 15

BUSINESS MANAGEMENT

Objective:

To understand the basic principles of Business Management.

UNIT-I

Management – Meaning – Definition – Nature – Importance – Distinction between Administration and Management – Scope – Principles and Functions of Management.

UNIT-II

Planning – Meaning – Nature – Importance – Advantages and Limitations – Process of Planning – Types of Plans – MBO – Forecasting – Decision Making.

UNIT-III

Organising – Meaning – Definition – characteristics – Importance – Types – Authority and Responsibility – Centralisation and Decentralisation and Departmentation.

UNIT-IV

Directing – Meaning – Definition – Characteristics – Directing Process – Span of Supervision – Motivation – Leadership - Communication.

UNIT-V

Controlling – Definition – Principles – Controlling process – Types of Controls – Control Techniques - Coordination.

REFERENCE BOOKS:

1. Dr. C.B. Gupta, Business Management –Sultan Chand & Sons
2. Jayashankar, Business Management –Margham Publications, Chennai.

REFERENCE BOOKS:

1. Koontz, Weihrich and Aryasri, Principles of Management, Tata McGraw hill
2. Dr.H.C. Das Gupta, Principles & Practice of Management & Sahitya Bhawan. Agra
3. Lallan Prasad & S.S.Gulshan, Management principles and Practices & S.Chand & Co.
4. Dr.N.Premavathy, Principles of Management, Sri Vishnu Publications, Chennai.

CORE PAPER - 16

INCOME TAX LAW AND PRACTICE - I

Objective:

To enable the students to have a knowledge of law of practice of Income tax.

Unit - I: Introduction

Income Tax Act 1961- Basic Concepts – Assessment Year – Previous Year – Person – Assessee – Income – Gross Total Income – Total Income - Agricultural Income – Casual Income – Capital and Revenue Receipts – Capital and Revenue Expenditures – Exempted Incomes u/s 10.

Residential status of an individual- Residential status of a HUF – Residential status of a firm and association of persons – Residential status of a company – incidence of tax liability.

Unit - II: Salaries

Meaning and features of Salary – Allowances – Perquisites – Profits in lieu of Salary – Provident Fund and its types – payments exempted u/s 10: Leave travel concession; gratuity; pension; leave encashment; retrenchment compensation; VRS – Deductions from salary: EA and professional tax- deduction u/s 80C- taxable salary

Unit - III: Income from House Property

Annual value – Determination of annual value- Income from let out house property – Income from self-occupied house property – Deductions allowed from Income from house property u/s 24.

Unit - IV: Profit and Gains of Business or profession and depreciation

Meaning of business and profession – deductions expressly allowed – expenses expressly disallowed – treatment/ admissibility of certain expenses and incomes – income from business- income from profession.

Meaning of depreciation – conditions for depreciation – actual cost – written down value – computation of allowable depreciation.

Unit - V: Income tax authorities

CBDT – powers – Director General of income tax – Chief commissioner of income tax – Assessing officer – appointment – Jurisdiction – powers relating to search and seizure.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text books

1. Gaur & Narang, Income Tax Law & Practice, Kalyani Publishers.
2. Dr. A. Murthy, Income Tax Law & Practice, Vijay Nicole Imprints Pvt.Ltd. Chennai
3. Reddy,T.S. & Hariprasad Reddy,Y, Income Tax Theory, Law&Practice, Margham Publications, Chennai.

Reference books

1. Mehrotra -Income Tax Law & Accounts, Sahithiya Bhavan Publications.
2. Vinod,K.Singhania, Students Guide to Income Tax,Taxman Publications Pvt. Ltd.

ELECTIVE

(To choose any 1 out of 3)

PAPER - 1

A. ENTREPRENEURIAL DEVELOPMENT

Objective:

To encourage students to become entrepreneurs.

UNIT-I

Meaning of Entrepreneur – Entrepreneur and Enterprise – Entrepreneur and Manager – Entrepreneur and Intrapreneur – Qualities (Traits) of True Entrepreneur – Characteristics of Entrepreneur – Types of Entrepreneurs – Functions of an Entrepreneur – Roles of Entrepreneurs in the Economic Development.

UNIT-II

Establishing an Enterprise – Project Identification – Selection of the Product – Project Formulation – Assessment of Project Feasibility – Preparation of Project Report – Selection of Site (Location).

UNIT-III

Selection of Types of Organization – Sole Proprietorship – Partnership Joint Stock Company – Factors Influencing the Choice of Organization – Sources of Project Finance – Sources of Long Term Finance – Sources of Short Term Finance.

UNIT-IV

Incentives and Subsidies – Meaning of Incentives and Subsidies – Need and Problems – Incentives for Development of Backward Area – Incentives for SSI Units in Backward Areas – Taxation Benefits to SSI Units – Subsidies and Incentives in Tamil Nadu.

UNIT-V

Women Entrepreneurs – Concept – Functions and Role – Problems of Women Entrepreneurs – Suggestions for Development of Women Entrepreneurs – Rural Entrepreneurship – Need – Problems – How to Develop Rural Entrepreneurship.

Text Books:

1. C.B. Gupta, Entrepreneurship development in India – Sultan Chand.
2. Gupta C.B and Srinivasan N.P. Entrepreneurial Development, Sultan Chand & Sons, New Delhi.

Reference Books:

1. P Sarvanavel, Entrepreneurial development – Ess Pee kay Publishing House.
2. S.S. Khanka, Entrepreneurial Development, S. Chand & Co., New Delhi.

ELECTIVE

PAPER - 1

B. INDUSTRIAL RELATIONS

Objective: To enable the students to learn the concepts of Industrial Relations including trade unions, collective bargaining and various labour enactments.

Unit - I: Industrial Relations (IR)

Concept of Industrial Relations; Nature of Industrial Relations; Objectives of IR; Factors affecting IR in changing Environment, Evolution of IR in India; Role of State; International Dimensions of IR.

Unit - II: Trade Union

Trade Union: Origin and growth, unions after Independence, unions in the era of liberalization; Factors affecting growth of Trade Unions in India, Major Provisions of Trade Union Act 1926.

Unit - III: Collective Bargaining and Worker's Participation in Management

Collective Bargaining: Meaning, Nature, Types, Process and Importance of Collective Bargaining Status of Collective Bargaining in India, Functions and role of Trade Unions in Collective bargaining.

Workers' Participation in Management: Consent, practices in India, Works Committees, Joint management councils; Participative Management and co-ownership; Productive Bargaining and Gain Sharing.

Unit - IV: The Industrial Disputes Act, 1947:

Definitions of Industry, workman, and Industrial Dispute; Authorities under the Act; Procedure, Powers and Duties of Authorities; Strikes and Lock outs; Lay-off and Retrenchment; Provisions relating to Layoff, Retrenchment, and closure.

Unit - V: The Factories Act, 1948:

Provisions relating to Health, Safety, Welfare facilities, working hours, Employment of young persons, Annual Leave with wages.

Text Books:

1. B. Nandhakumar, *Industrial Relations and Labour Welfare and Labour Laws* - Vijay Nicole Imprints Private Ltd., Chennai.
2. JP Sharma, *Simplified Approach to Labour Laws*, Bharat Law House (P) Ltd.

Reference Books:

1. PK Padhi, *Industrial Relations and Labour Law*, PHI Learning.
2. ArunMonalppa, *Industrial Relations and Labour Law*, McGraw Hill Education.
3. SC Srivastav, *Industrial Relations and Labour Law*, Vikas Publishing House.
4. C.S. VenkataRatnam, *Industrial Relations*, Oxford University Press.
5. P.L. Malik's *Handbook of Labour and Industrial Law*, Vol 1 and Vol 2, Eastern Book Company.

ELECTIVE

PAPER – 1

C. MANAGEMENT INFORMATION SYSTEM

Unit-I:

Management Information – Meaning of Information – Information needs of Managers – Web Data basis – Data warehousing – Knowledge management – Information system for decision making.

Unit-II:

Types of Information System – Transaction Processing System – Office Automation System – Decision Support System – Executive Support System – MIS – Evolution of MIS – Computer and MIS.

Unit-III:

System Analysis – System Planning and Mutual Investigation – System Design - The Process and Stages of System Design – Input / Output forms Design – File Organisation – System Implementation.

Unit-IV:

Management Information Needs and Communication links for Marketing system, Production System, Accounting System, Manufacturing System, Inventory Control System and Budget Control System - IS Organisation – Top Management Responsibility – Processing Group Responsibility.

Unit-V:

Development – Maintenance of MIS – Operation of manual Information System –Role of Computer in MIS – Data base Concept – Expert Systems – System Audit.

Text Book:

1. M. Assam – Fundamentals of Management Information System – Vijay Nicole Imprints Private Ltd., Chennai.
2. Effy Oz, "Management Information Systems", Second edition, Thomson Learning Course Technology, 2002.
3. Jawadekar W.S, "Management Information Systems", Tata McGraw Hill Publishing Company Ltd, 2002.
4. Kenneth.CLaudon and Jane P. Laudon, "Management Information Systems", Prentice Hall of India Ltd, 2002.

Reference Books:

1. David Knoenke (1989), "Management Information Systems", Tata McGraw Hill, New Delhi.
2. Iandon K.C and Landon J.P (2001), "Management Information Systems', Maxwell Macmillan Publishing Company.
3. Murdic Rose and Elaggett, "Information System for Modern Management, Prentice Hall.
4. Robert Schultheis, Mary Sumner, "Management Information Systems" – The Manager's View, Fourth edition, Tata McGraw Hill Edition, 1999

SKILL BASED SUBJECT

PAPER - 3

PRINCIPLES OF MARKETING

Objective:

To enable the students to understand the concept and importance of marketing and the developments that have taken place in the field of marketing in the global scenario.

Unit - I Introduction

Meaning of market – classification of markets- meaning and definition of marketing- features of marketing – importance of marketing – difference between marketing and selling – Evolution of marketing concepts - functions of marketing.

Unit - II Market Segmentation and Consumer Behaviour

Meaning and definition of market segmentation – different patterns of market segmentation – Bases for segmenting consumer markets – benefits and limitations of market segmentation

Definition of consumer behaviour - consumer behaviour theories - factors determining consumer behaviour.

Unit - III Marketing Mix and Product policy

Definition and components of marketing mix - four P's of marketing mix - definition of product - features of a product - classification of products - stages in new product development - product life cycle – Branding – advantages of branding a product - packaging – functions of package – labelling – functions of labelling – kinds of labels.

Unit - IV Pricing policy, Channel of distribution and Promotion Mix

Meaning of price – factors affecting price decision – Types of pricing strategies - definition of channel of distribution – features of marketing channels – types of Channel of distribution - factors determining Channel of distribution - functions of wholesalers – types of retailers – promotion mix – Advertising – types of advertising – personal selling – qualities of a good salesman – sales promotion – kinds of sales promotion.

Unit - V Recent trends in Marketing

Social marketing – De-marketing – Re – marketing – Over marketing – Meta marketing – E- Marketing – online retailing – shopping malls.

Text Books:

1. Rajan Nair, Marketing, Sultan Chand & Sons , New Delhi
2. Varshney, Marketing Management, Sultan Chand & Sons , New Delhi.

Reference Books:

1. Jaisankar, Marketing, Margham Publications, Chennai
2. L. Natarajan, Marketing, Margham Publications, Chennai
3. Dr. K. Sundar, Essentials of Marketing, Vijay Nicole Imprints Private Ltd., Chennai.

SEMESTER – VI

CORE PAPER - 17

COST ACCOUNTING II

Objective:

To understand the basic concepts and methods of Cost Accounting.

UNIT-I

Job, Batch, Contract Costing: Job Costing – definition – Features – Procedure – WIP – Cost Accumulation, Batch Costing – EBQ, Contract Costing – Definition, Features, Work Certified and Uncertified – Incomplete Contact – Escalation Clause – Cost Plus Contract – Contract Account

UNIT-II

Process Costing : Definition – Features – Job Vs Process Costing – Process Account – Losses – By Products and Joint Products – WIP – Equivalent Units and its Calculation - Closing WIP with or without Process Loss.

UNIT-III

Operating Costing (Transport Costing): Cost Unit – Cost Classification – Operating Cost sheet.

UNIT-IV

Marginal Costing: Definition – Advantages and Limitation – Break Even Point – Margin of Safety – P/V Ratio – Key factor – Make or Buy Decision – Selection of Product Mix – Changes in Selling Price – Foreign Market Offer – Desired Level of Profit.

UNIT-V

Reconciliation of Cost and Financial Accounts.

(Weightage of Marks = Problems - 80%, Theory - 20%)

TEXT BOOKS:

1. T.S. Reddy &Hari Prasad Reddy – Cost Accounting – Margham Publications, Chennai
2. A.Murthy and S. Gurusamy, Cost Accounting 2nd Edition, Vijay Nicole Imprints Private Ltd., Chennai.
3. A.Murthyand S. Gurusamy, Cost Accounting, Tata McGraw-Hill Publishing Company Ltd. New Delhi.
4. Tulsian P.C. – Cost Accounting – Tata McGraw Hills.

REFERENCE BOOKS:

1. S.P.Jain and Narang – Cost Accounting – Kalyani Publishers, New Delhi
2. S.N.Maheswari – Principles of Cost Accounting – Sultan Chand & sons, New Delhi
3. S.P.Iyangar – Cost Accounting – Sultan Chand & Sons, New Delhi.

CORE PAPER - 18

MANAGEMENT ACCOUNTING

Objective:

To enable the students to gain knowledge in the application of accounting to Management.

UNIT-I

Management Accounting: Definition – objectives - Functions – Advantages and limitations – Financial Statement Analysis – Comparative and Common size statements – Trend Analysis.

UNIT-II

Ratio Analysis : Definition – Significance and Limitations – Classification – Liquidity, Solvency, Turnover and Profitability ratios – Computation of Ratios from Financial Statements – Preparation of Financial Statement from Ratios.

UNIT-III

Fund Flow and Cash Flow Analysis: Concept of Funds, Sources and Uses of Funds – Fund Flow Statement – Concept of Cash Flow – Cash Flow Statement as Per AS3.

UNIT-IV

Standard Costing – Variance Analysis – Material – Labour – Overheads – Fixed - Variable Sales Variance.

UNIT-V

Budget and Budgetary Control: Definition – Objectives – Essentials – Uses and Limitations – Preparation of Material Purchase, Production, Sales, Cash and Flexible Budget – Zero Base Budgeting.

(Weightage of Marks - Problems - 80%, theory - 20%)

Reference Books:

1. S.N.Maheswari, Management Accounting – Sultan Chand & Sons, New Delhi.
2. A.Murthy and S.Gurusamy, Management Accounting, Tata Mc-Graw Hill Publishing Company, New Delhi.

Reference Books:

1. Manmohan&Goyal, Management Accounting – SahithiyaBhavan, Agra.
2. S.P.Gupta, Management Accounting – Sultan Chand & Sons, New Delhi.
3. R.S.N.Pillai&Bhagavathi, Management Accounting – S.Chand& Co. Ltd., New Delhi.
4. T.S.Reddy&Hari Prasad Reddy, Management Accounting – Margham Publications, Chennai.

CORE PAPER - 19

INCOME TAX LAW AND PRACTICE – II

Objective:

To enable the students to have a knowledge of law of practice of Income tax.

Unit I: Capital gains

What are capital assets? – what are not capital assets? – kinds of capital assets – transfer u/s 2 (47) – cost of acquisition – cost of improvement – computation of short term capital gain - computation of long term capital gain – exemptions from capital gains.

Unit II: Income from other sources

Specific incomes chargeable to tax – general incomes chargeable to tax – Interest on securities – Interest exempt from tax u/s 10 (15) - deductions allowed from Income from other sources – computation of income from other sources.

Unit III: Clubbing of Incomes and Set off and carry forward of losses

Income transfer without asset transfer – cross transfer –transfer for the benefit of son's wife – capital gain on an asset gifted before marriage – gifted money used for construction of house by spouse – income including losses – clubbing of business income – clubbing of minor's income – computation of total income.

Provisions relating to set off of losses- Provisions relating to set off and carry forward of losses – unabsorbed depreciation – order of set off – computation of total income.

Unit IV: Agricultural Income and Deductions from gross total income

Meaning of agricultural income – types of agricultural income – income from growing and manufacturing rubber - income from growing and manufacturing coffee - income from growing and manufacturing tea – income of a sugar mill growing its own sugarcane – computation of tax of an assessee having agricultural income.

Permissible deductions from gross total income – section 80C, 80CCC, 80CCD, 80D, 80DD, 80DDB, 80E, 80G, 80GG, 80GGA, 80QQB, 80RRB, 80U.

Unit V: Assessment of Individuals and Assessment procedures

Sources of income of an individual – computation of total income and tax liability of an individual.

Filing of returns – permanent account number (PAN) –Usage of PAN – TDS - types of assessment – self assessment – Best judgement assessment – Income escaping assessment (reassessment) – Advance payment of tax

Note: Questions in Sec .A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text books

1. Gaur & Narang, Income Tax Law & Practice, Kalyani Publishers.
2. Murthy.A, Income Tax Law & Practice,Vijay Nicole Imprints Pvt. Ltd. Chennai
3. Reddy,T.S.& Hariprasad Reddy, Y, Income Tax Theory, Law & Practice, Margham Publications, Chennai.

Reference books

1. Mehrotra-Income Tax Law & Accounts, Sahithiya Bhavan Publications.
2. Vinod,K.Singhania, Students Guide to Income Tax, Taxman Publications Pvt.Ltd.

ELECTIVE

PAPER - 2

A. FINANCIAL MANAGEMENT

UNIT-I

Nature and Importance of Finance Functions – Organizing Finance Functions – Functions of Finance Manager – Objectives of Finance Function – Methods and Sources of Raising Finance – Critical Appraisal of the Various Sources of Finance.

UNIT-II

Goals of Finance Function – Financing Decisions – Financial Planning – Financial Forecasting – Capital Structure Decisions – Capitalization – Cost of Capital – Dividend Policy

UNIT-III

Investment Decisions – Estimation of Cash Flows – Evaluation of Alternative Investment Proposals like NPV, ARR, IRR Methods – Decision Making Under Risk and Uncertainty – Inflation and Investment Decisions

UNIT-IV

Working Capital – Gross and Net Working Capital – Determinants of Working Capital – Sources of WC – Credit and Collection Policies.

UNIT-V

Security Analysis and Portfolio Management - Leverages – Financial Ratio Analysis.

(Weightage of Marks = Problems - 60%, Theory - 40%)

Reference Books:

1. Dr. S.N.Maheswari, Financial Management, Sultan Chand & Sons, New Delhi.
2. Dr. A.Murthy, Financial Management, Margham Publications, Chennai.
3. Dr. J. Srinivasan, Sridhar and Ramalingam, Financial Management, Vijay Nicole Imprints Pvt .Ltd. Chennai

Reference Books:

1. I.M.Pandey, Financial Management.
2. Prasanna Chandra, Financial Management.
3. Subirkumar Banerjee, Financial Management.
4. Vyuptakesh Sharan, Fundamentals of Financial Management.
5. Dr .N. Premavathy, Financial Management, Sri Vishnu Publications, Chennai.

ELECTIVE

PAPER - 2

B. BUSINESS ENVIRONMENT

UNIT-I

The concept of Business Environment - Its nature and significance - Brief overview of political - Cultural - Legal - Economic and social environments and their impact on business and strategic decisions.

UNIT-II

Political Environment - Government and Business relationship in India - Provisions of Indian constitution pertaining to business

UNIT-III

Social Environment - Cultural heritage - Social attitudes - impact of foreign culture - castes and communities - Joint family systems - Linguistic and Religious groups - Types of Social Organization

UNIT-IV

Economic Environment - Economic Systems and their impact of Business - Macro Economic Parameters like GDP - Growth Rate - Population - Urbanization - Fiscal deficit - Plan investment - Per capita Income and their impact on business decisions

UNIT-V

Financial Environment - Financial System - Commercial banks - RBI - IDBI - Non-Banking Financial Companies NBFC's

Text Books:

1. Dr. S. Sankaran - Business Environment. Margham Publications, Chennai
2. Aswathappa - Business Environment, Himalaya Pub. House, 2009.

Reference Books:

1. Dasgupta and Sengupta - Government and Business in India.
2. Srinivasan K - Productivity and Social Environment.
3. International Business Environment - Prentice - Hall of India.
4. Dhana bakiyam & M. Kavitha, Business Environment, Vijay Nicole Imprints Pvt .Ltd. Chennai.

ELECTIVE

PAPER - 2

C. OFFICE MANAGEMENT

UNIT-I

Meaning and scope -Function and qualifications of Office Manager -Poor and good organization Departments -Flow of Work -Organization Charts and manual

UNIT-II

Administrative arrangements and physical conditions - Centralization and Decentralization of Office services - Office Accommodation and Layout -Office Furniture - Meaning of Various terms - Basic pattern of work -Sub-division - Standardization and Standards - Work Measurement and control

UNIT-III

Office equipments - Reproduction equipments - Typewriter - Duplicators - Photo Copier - Franking Machine - Communication Equipments - Dictaphone - Intercom - Telephone - Telex - Teleprinters - PABX - PBX - STD - Storage equipments - Filling Cabinets - Time Clocks - Use of Computers in Office Management

Office System - Procedure - Routine - And methods - Paper work in office Filling functions - essentials of good filling systems - Central vs. Departmental Filling classification - Methods of filling Old and Modern - Micro filing - Indexing Types.

UNIT-IV

Mail service and communication - Office Correspondence - Central vs. Departmental Correspondence - Handling Mail - Postal Services - Postbag and Post Box Numbers - Registered and Insured Posts - VPP Communications - Oral written - Internal and external communication - Records Management Types - Forms Controls - Principles - Foremost - Continuous stationery

UNIT-V

Office Supervisor - Meaning and characteristics of Supervisor - Status - Place and Role of Supervisor - Effective Supervisor - Qualification - Knowledge and skill of Supervisor.

Text Books:

1. Pillai R.S.N, Bhagwathi. V - Office Management, S.Chand, New Delhi.
2. Arora SP - Office Management, Vikas Publications Pvt. Ltd., Chennai.

Reference Books:

1. Dr.T.S. Devanarayan, N.S.Raghunathan - Office Management.
2. Balachandiran. V and Chandrasekaran, Office Management, Vijay Nicole imprints Private Limited, Chennai.

ELECTIVE

(To choose any 1 out of 3)

PAPER - 3

A. HUMAN RESOURCE MANAGEMENT

Objective:

To enable the students to recognize that the Human beings are the important assets in the organisation and to replace the term personnel by Human Resource Management.

To make the students to acquire knowledge about the development of Human Resource Managementwhich is crucial for quality productivity and growth.

UNIT-I

Nature and scope of HRM – personnel Management and HRM – Functions of HRM – Functions of HR Manager – HRM as a profession – Indian perspective

UNIT-II

Human Resource Planning – Recruitment – Selection – Methods of Selection – Use of Various tests – Interview techniques in selection – Induction - Placement

UNIT-III

Training methods – Techniques – Identification of training needs.

UNIT-IV

Job satisfaction – Motivation (Maslow's and Two Factor Theory only) – Performance Appraisal – Methods – Compensation – Incentives – Monetary and Non-Monetary

UNIT-V

Transfer – Promotion and Termination of Services – Career Development - Monitoring

TEXT BOOKS:

1. Dr.K.Sundar&Dr.J.Srinivasan, Human Resource Management, Vijay Nicole Publications, Chennai.
2. C B Gupta, Human Resource Management, S.Chnd, New Delhi.
3. Aswathappa, Human Resource and Personnel Management, Vikas Publications Pvt. Ltd., Chennai.

REFERENCE BOOKS:

1. Dr.K.Sundar & Dr.J.Srinivasan, Human Resource Development, Margham Publications, Chennai.
2. J. Jayasankar, Human Resource Management, Margham Publications, Chennai.
3. Dr. N. Premavathy, Human Resource Management & Development, Sri Vishnu Publications, Chennai.

ELECTIVE

PAPER - 3

B. FINANCIAL SERVICES

Objective:

To enable the students to gain knowledge of business financial services.

UNIT-I

Financial services – meaning – Financial services and economic environment – legal and regulatory framework – financial institutions and other participants in the financial services sector – capital and money markets – Instruments – Government – Securities market – SWAP Analysis

UNIT-II

Introduction to leasing – legal and tax aspects – lease evaluation – Merits and Demerits – Accounting and Reporting for Lease – lease funding – Types of lease – Lease agreement – Hire purchase Vs lease – Legal aspects of Hire purchase – rights and duties of hire vendor and hire purchaser.

UNIT-III

Factoring – Types and feature of factoring agreement – Factoring Vs Bills discounting – Services of factor – Consumer Finance and credit card services – forfeiting.

UNIT-IV

Venture capital – meaning and characteristics – criteria for assistance – schemes and guidelines – infrastructure financing – assessment of risk – legal aspects.

UNIT-V

Mutual funds – SEBI Guidelines – Features and types – Management structure and performance evaluation – Growth and recent trends – Investor services – Credit rating agencies – CRISIL, CARE, ICRA – Services – Criteria for rating – Symbols.

Text Books:

1. Dr.S.Gurusamy, Financial Services, Vijay Nicholes Imprint Pvt. Ltd., 2004 – Chennai

Reference Books:

1. Dr.V.Balu, Merchant Banking & Finance Services, Sri Venkateswara Publication, Chennai.
2. Dr.S.Gurusamy, Financial Services and Systems, Vijay Nicholes Imprint Pvt. Ltd., 2004 – Chennai
3. Dr.S.Gurusamy, Essentials of Financial Services, 2nd Edition, Vijay Nicholes Imprint Pvt. Ltd.,– Chennai
4. Dr. N. Premavathy, Financial Services and Stock Exchange, Sri Vishnu Publications, Chennai.

ELECTIVE

PAPER – 3

C. PORTFOLIO MANAGEMENT

UNIT-I

Portfolio Regulation and Management – Need – Traditional Approach – Efficient Market Hypothesis – Approaches to Portfolio Theory and Practices – Need for costing – Share Costing – Risk and Return.

UNIT-II

Portfolio Analysis – Theory and Practices – Risk Analysis – Types of Risks – Risk Management –Diversification of risk – Analysis of risk – Building a balanced portfolio.

UNIT-III

Characteristics of portfolio – Principles and Practices – Characteristics of Portfolio Analysis – Liquidity Vs. Safety – Income Vs. growth – Short Term and Long Term –Risk Vs. Return – Need for insuring risk to attract stable investors.

UNIT-IV

Revision of Investment Portfolio – Diversification of Investment Portfolio – International Scenario influencing portfolio – Need for reviewing portfolio constantly.

UNIT-V

Regulation of Investment Portfolio – Evaluation of investments in terms of market trends – Shape of Optimal Portfolio – Need for Investment Consultancy – Importance of Computer data Analysis for Security Analysis and Portfolio Analysis.

Text Books:

1. Dr. S. Guruswamy, Security Analysis and Portfolio Management, Vijay Nicholes Imprint Pvt. Ltd., – Chennai.
2. V. K. Bhalla, Portfolio Analysis and Management, Sultan Chand & Sons
3. PunithavathyPandian, Security Analysis and Portfolio Management, Vikas Publishing House Pvt. Ltd.

Reference Books:

1. **I. M. Pandey**, Financial Management, Vikas Publishing House Pvt. Ltd. Chennai.
2. Fischer & Jordan, Security Analysis and Portfolio Management, Prentice Hall India.
3. V. A. Avadhani, Investment and Securities Market in India, Himalaya Publishing House.

SKILL BASED SUBJECT

PAPER - 4

COMPUTER APPLICATION IN BUSINESS

Objective:

To provide basic knowledge of computer applications in business.

UNIT-I

Introduction to Computer–Characteristicsof a Computer –History of Computer– Computer generation - Hardware–Software – System Software and application software.

UNIT-II

MS - Word Processing: Starting MS word - MS word environment - working with word documents, text, tables - checking spelling and grammar - printing a documents.

UNIT-III

MS Excel - MS Excel Sheet - MS Excel environment - Working with Excel workbook - worksheet - Formulas and functions - Inserting charts - printing in Excel.

UNIT-IV

MS Power Point - Starting MSPower Point - MS power point environment - working with power point - working with different views – designing, presentation &printing in Power Point.

UNIT-V

Electronic Commerce - Types - Advantages and Disadvantages - Electronic data interchange (EDI) working of EDI - EDI benefits &Limitations - SMART card - SMART card applications.

TEXT BOOK

1. AnanthiSheshasaayee: Computer Application in Business and Management, Margam Publication.
2. Leon & Leon, Computer Applications in Business, Vijay Nicholes Imprint Pvt. Ltd.,– Chennai

REFERENCE BOOK

3. A. Zakiudeen Ahmed: Computer Application in Business, Margam Publication.

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Question Paper Pattern:

Pattern	Total Questions	To answer	Marks per Question	Total Marks
Section A	10	10 (All)	2	20
Section B	8	5	5	25
Section C	5	3	10	30

Instructions to Paper Setter:

Section-A: Minimum 2 Questions to be asked from each of the five Units

Section-B: Minimum 1 Question to be asked from each of the five Units.

Section-C: 1 Question to be asked from each of the five Units.

THIRUVALLUVAR UNIVERSITY

B.Sc. (Mathematics)
Curriculum & Syllabus
2017 – 2018 onwards

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THIRUVALLUVAR UNIVERSITY
B.Sc. MATHEMATICS
SYLLABUS
CBCS PATTERN
(For the candidates admitted from 2017 - 2018)

S.No.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title							
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper - 1	5	3	Algebra	25	75	100
4	III	Core Theory	Paper –2	4	3	Trigonometry	25	75	100
5	III	ALLIED -1 (Theory)	Paper-1	7	4	(**to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
6	IV	Environ. Studies		2	2	Environmental Studies	25	75	100
				30	**20**		**150**	**450**	**600**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
7	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8	II	English	Paper-2	4	4	English	25	75	100
9	III	Core Theory	Paper-3	5	3	Calculus	25	75	100
10	III	Core Theory	Paper-4	4	3	Analytical Geometry of three dimensions	25	75	100
11	III	Allied 2 Theory	Paper-2	4	4	(**to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
12	III	Allied 1 Practical	Practical 1	3	2	(**to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
13	IV	Value Education		2	2	Value Education	25	75	100
14	IV	Soft Skill		2	1	Soft Skill	25	75	100

S.No.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
				30	**23**		**200**	**600**	**800**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
15	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
16	II	English	Paper-3	6	4	English	25	75	100
17	III	Core Theory	Paper-5	6	4	Differential Equations	25	75	100
18	III	Allied – 2 Theory	Paper – 3	7	4	(**to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
19	IV	Skill Based Subject	Paper – 1	3	3	Linear Programming	25	75	100
20	IV	Non-major Elective	Paper – 1	2	2	Basic Mathematics	25	75	100
				30	**21**		**150**	**450**	**600**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
21	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
22	II	English	Paper-4	6	4	English	25	75	100
23	III	Core Theory	Paper-6	6	4	Vector Analysis and Fourier analysis	25	75	100
24	III	Allied – 2 Theory	Paper – 4	4	4	(**to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
25	III	Allied – 2 Practical	Practical – 2	3	2	(**to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
26	IV	Skill Based Subject	Paper -2	3	3	Mathematics for competitive Examinations – I	25	75	100
27	IV	Non-Major	Paper-2	2	2	Foundation Mathematics	25	75	100

S.No.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Elective				for Competitive Examinations - I			
				30	**3**		**175**	**525**	**700**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
28	III	Core Theory	Paper-7	5	4	Abstract Algebra	25	75	100
29	III	Core Theory	Paper-8	5	4	Real Analysis - I	25	75	100
30	III	Core Theory	Paper – 9	5	4	Complex Analysis - I	25	75	100
31	III	Core Theory	Paper – 10	5	4	Statics	25	75	100
32	III	Core Theory	Paper – 11	4	4	Dynamics	25	75	100
33	III	Elective	Paper-1	3	3	(**to choose any 1 out of 2)** 1. Graph Theory 2. Astronomy	25	75	100
34	IV	Skill Based Subject	Paper-3	3	3	Mathematics for Competitive Examinations – II	25	75	100
				30	**26**		**175**	**525**	**700**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
35	III	Core Theory	Paper -12	5	4	Linear Algebra	25	75	100
36	III	Core Theory	Paper -13	5	4	Real Analysis II	25	75	100
37	III	Core Theory	Paper -14	5	4	Complex Analysis II	25	75	100
38	III	Core Theory	Paper -15	3	3	Programming in C Language	25	75	100
39	III	Core Practical	Practical - 1	3	3	Practical in C Language	25	75	100
40	III	Elective	Paper-2	3	3	(**to choose any 1 out of 2)** 1. Operations	25	75	100

S.No.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
						Research 2. Calculus of finite differences & Numerical Methods. (to be chosen only those students who have not taken numerical methods as allied subject)			
41	IV	Elective	Paper-3	3	3	**(to choose any 1 out of 2)** 1. Special functions 2. Fuzzy Mathematics	25	75	100
42	IV	Skill Based Subject	Paper -4	3	3	Mathematics for Competitive Examinations – III	25	75	100
43	V	Extension Activities		0	1		100	0	100
		Total		**30**	**27**		**300**	**600**	**900**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	4	8	100	200
	Allied (Even Semester)	2	4	8	100	200
	Allied Practical (Even Sem)	2	2	4	100	200
	Electives	3	3	9	100	300
	Core	15	(3-7)	55	100	1500
	Core Practical	1	2	2	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**43**		**140**		**4300**

THIRUVALLUVAR UNIVERSITY

B.Sc. MATHEMATICS

SYLLABUS
CBCS PATTERN
(For the candidates admitted from 2017 - 2018)

SEMESTER I

PAPER - 1

ALGEBRA

Objectives

In this Course students are exposed to topics like Theory of Equations, Summation of Series, Matrices, Continued Fractions and Elementary Number Theory. The stress is on the development of problem solving skills.

UNIT-I: THEORY OF EQUATIONS

Polynomial Equations - Symmetric Functions of roots in terms of Coefficients - Reciprocal Equations - Transformation of Equations.

UNIT-II: THEORY OF EQUATIONS (Contd...)

Descartes Rule of Signs - Approximate Solutions of Polynomials by Horner's method - Newton - Raphson method of Solution of a Cubic Polynomial.

UNIT-III: SUMMATION OF SERIES

Summation of series using Binomial - Exponential and Logarithmic series (Theorems without proofs) - Approximation using Binomial & Exponential series and logarithmic series simple problems.

UNIT-IV: MATRICES

Symmetric - Skew symmetric, - Hermitian - Skew Hermitian - Orthogonal and Unitary Matrices - Cayley-Hamilton Theorem (without proof) - Eigen Values - Eigen Vectors–Similar Matrices - Diagonalisation of a Matrix.

UNIT-V: ELEMENTARY NUMBER THEORY

Prime Number - Composite Number - Decomposition of a Composite Number as a Product of Primes uniquely (without proof) - Divisors of a Positive Integer - Congruence Modulo *n* - Euler Function (without Proof) - Highest Power of a Prime Number p contained in *n!*- Fermat's and Wilson's Theorems (statements only) - simple problems.

Recommended Texts

T.K.ManicavachagomPillay, T.Natarajan and K.S.Ganapathy.(2004) *Algebra,* Volume I & II S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books

1. P.Kandasamy, K.Thilagavathy (2004), Mathematics for B.Sc. Vol-I, II, III & IV, S.Chand& Company Ltd., New Delhi-55.
2. S.Arumugam (2003) *Algebra*. New Gamma Publishing House, Palayamkottai.
3. A.Singaravelu (2003) *Algebra and Trigonometry*, Vol.-I & II Meenakshi Agency, Chennai.
4. S.Sudha(1998) *Algebra and Trigonometry*. Emerald Publishes, Chennai.

PAPER - 2

TRIGONOMETRY

Objectives

This course is a fundamental one for many courses of this Degree Programme. This covers topics on the expansions of trigonometric functions, hyperbolic functions, inverse circular, inverse hyperbolic functions and it aims to develop computational skills.

UNIT-I

Expansions of cosnθ , sin nθ - Expansion of tan nθ in terms of tan θ - Expansion of tan(A+B+C+…) - Formation of Equations. Chapter III section 1 to 3

UNIT-II

Powers of sines and cosines of θ in terms of functions of multiples of θ - expansions of sin θ and cos θ in a series of ascending powers of θ - Expansion of Inverse Circular Functions. Chapter III section 4 and 5

UNIT-III: Hyperbolic Functions

Definition – Relation between Hyperbolic Functions - Inverse Hyperbolic Functions. Chapter IV sections 1 to 2.3

UNIT-IV

Resolution into Factors - simple problems only - DeMoivre's Property on the Circle and Cote's Property on the Circle.Logarithm of complex quantities.
Chapter V sections 2 and 3(Problems only)
Chapter V sections 4, 4.1, 4.2, 5, 5.1, 5.2...

UNIT-V

Summation of Trigonometric Series: When the angles are in A.P, C+iS method of summation - Method of Differences - Gregory Series - Euler Series.
Chapter VI section 1, 2 ,3 ,3.1, 3.2.

Recommended Text

1. S.Narayanan and T.K.ManicavachagomPillay (2004) *Trigonometry*.S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books

1. P.Kandasamy, K.Thilagavathy (2004), Mathematic for B.Sc. Vol.-I, II, III & IV, S.Chand& Company Ltd., New Delhi-55.
2. S.Duraipandian and LaxmiDuraipandian (1984) *Trigonometry*. Emerald Publishers, Chennai.
3. B.S.Grewal. (2002) *Higher Engineering Mathematics.*Khanna Publishers. New Delhi.
4. S.L.Loney. (1982) *Plane Trigonometry,* Part II, Cambridge University Press, London.
5. A.Singaravelu (2003) *Algebra and Trigonometry*, Vol.-I Meenakshi Agency, Chennai.
6. P.R.Vittal. (2004) *Trigonometry*, Margham Publications, Chennai.

SEMESTER II

PAPER - 3

CALCULUS

Objectives

The course introduces students to the fundamental principles, concepts and knowledge in the areas of Differential and Integral Calculus. This prepares the students to apply these fundamental concepts and working knowledge to other courses.

UNIT-I

Differential Calculus: n^{th} derivative - Leibnitz's theorem (Without proof) and its application - Jacobians - Total differential - maxima and minima functions of 2 & 3 independent variable, Lagrange's method (without proof), problems on this concepts.

UNIT-II: Differential Calculus (Contd…)

Polar coordinates – Angle between radius vector and tangent – Angle between two curves, Curvature, Radius of Curvature in Cartesian and Polar coordinates, p-r equation, Evolutes.

UNIT-III: Differential Calculus (Contd…)

Asymptotes: Methods (without proof) of finding asymptotes of rational algebraic curves with special cases.(First 5 sections only)

UNIT-IV: Integral Calculus

Reduction formulae, $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \sin^m x\cos^n x\,dx$, Beta and Gamma Functions - Properties and Problems.

UNIT-V: Integral Calculus (Contd…)

Double Integrals - Change of order of Integration - Triple Integrals - Applications to Area, Surface Area and Volume.

Recommended Text

S.Narayanan and T.K.ManicavachagomPillay (2004) *Calculus.*S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books

1. P.Kandasamy, K.Thilagavathy (2004), Mathematic for B.Sc. Vol.-I, II, III & IV, S.Chand& Company Ltd., New Delhi-55.
2. Shanti Narayan (2001) *Differential Calculus*. Shyamlal Charitable Trust, New Delhi.
3. Shanti Narayan (2001) *Integral Calculus.*S.Chand& Co. New Delhi.
4. S.Sudha (1998) *Calculus.* Emerald Publishers, Chennai.
5. G.B.Thomas and R.L.Finney. (1998) *Calculus and Analytic Geometry*, Addison Wesley (9^{th}Edn.), Mass. (Indian Print)
6. P.R.Vittal. (2004) *Calculus*, Margham Publication, Chennai.

PAPER - 4

ANALYTICAL GEOMETRY OF THREE DIMENSIONS

Objective:

To deepen the knowledge of the students in various concepts of Analytical Solid Geometry.

Unit I: Plane

General equation of a plane – Equation of a plane in the normal form – Angle between planes – Plane through three given points – Equation of a plane through the line of intersection of two planes.

UNIT II: Straight Line

Symmetrical form of a straight line – Image of a point with respect to a plane – Image of a line with respect to a plane – Length and equation of the shortest distance between two skew lines - Coplanar lines.

UNIT III: Sphere

Equation of the sphere – Length of the tangent – Tangent plane – Section of a sphere by a plane – Orthogonal spheres – Equation of a sphere through a given circle.

UNIT IV: Cone

Equation of a cone with a given vertex and a given guiding curve - Equation of a cone with its vertex at the origin - Condition for the general equation of the second degree to represent a cone - Right circular cone – Enveloping cone - Tangency of a plane to a cone.

UNIT V: Cylinder

Equation of a cylinder with a given generator and a given guiding curve - Right circular cylinder - Enveloping cylinder – Enveloping cylinder as a limiting form of an enveloping cone.

Recommended Text

T.K.ManickavachagomPillay& others. (2004) *Analytical Geometry*(Three Dimensions) S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books

1. P.Duraipandian and LaxmiDuraipandian (1965) *Analytical Geometry-2D*, Asia Publishing company, Bombay
2. P.Duraipandian and LaxmiDuriapandian (1975) *Analytical Geometry-3 D*, Emerald Publishers, Chennai.
3. G.B.Thomas and R.L.Finney.(1998) *Calculus and Analytic Geometr*y, Addison Wesley (9^{th}Edn.), Mass. (Indian Print).
4. P.R.Vittal (2003) *Coordinate Geometry.*Margham Publishers, Chennai

SEMESTER III

PAPER - 5

DIFFERENTIAL EQUATIONS

Objectives

This course aims to provide logical skills in the formation of differential equations, to expose to different techniques of finding solutions to these equations and in addition stress is laid on the application of these equations in geometrical and physical problems.

UNIT-I: Ordinary Linear Differential Equations

Bernoulli Equation – Exact Differential Equations – Equations Reducible to Exact Equations – Equations of First order and Higher degree: Equations solvable for p, Equation solvable for x and Equations Solvable for y – Clairaut's Equation.

UNIT-II: Ordinary Linear Differential Equations [Contd...]

Method of Variation of Parameters – 2^{nd} order Differential Equations with Constant Coefficients for finding the P.I's of the form e^{ax} V, where V is sin(mx) or cos(mx) and x^n – Equations reducible to Linear equations with constant coefficients – Cauchy's homogeneous Linear Equations – Legendre's Linear Equations.

UNIT-III: Differential Equations of Other Types

Simultaneous Equations with Constant coefficients – Total Differential Equations Simultaneous Total Differential Equations – Equations of the form dx/P = dy/Q = dz/R

UNIT-IV: Laplace Transform

Transform-Inverse Transform – Properties – Application of Laplace Transform to solution of first and second order Linear Differential equations [with constant coefficients].

UNIT-V: Partial Differential Equations

Formation of PDF – Complete Integral – Particular Integral – Singular Integral – equations Solvable by direct Integration – Linear Equations of the first order – Non-linear Equations of the first Order:

Types:

f[p,q]=0,

f[x,p,q]=0, f[y, p, q]=0, f(z, p, q]=0, f[x, q]= f[y, p],

z= px+qy + f[p, q]

Recommended Text

S.Narayananand T.K.Manickavachagapillai[2004] Calculus S.Viswanathan Printers and publishers Pvt.Ltd.,Cheenai.

Reference Books

1. M.D. Raisinghania, [2001] Ordinary and Partial Differential Equations, S.Chand and Co., New Delhi.
2. M.R.Spiegel [2005] Advanced mathematics for Engineers and Scientists, Tata McGraw Hill Edition, New Delhi.
3. M.R.Spiegel [2005] Laplace Transforms, Tata McGraw Hill Edition, New Delhi.
4. S.Sudha [2003] Differential Equations and Integral Transforms, Emerald Publishers, Chennai.
5. M.K.Venkataraman [1998] Higher Engineering Mathematics, III-B, National Publishing Co., Chennai.
6. P.r.Vittal [2004] Differential Equations and Laplace Transform, Margham Publications, Chennai.
7. P.Kandasamy, K.Thilagarathy [2004] Mathematics for B.Sc. Vol. III S.Chand& Co., Ltd., New Delhi-55.
8. B.S.Grewal [2002] Higher Engineering Mathematics, Khanna Publishers, New Delhi.
9. Sheply. L.Ross [1984] Differential Equations, III Edition john Wiley and Sons, New York.

SKILL BASED SUBJECT

PAPER - 1

LINEAR PROGRAMMING

Objectives

To improve the skills of solving very common problems which we come across in various fields like transportation, games and industries with machines.

UNIT-I

Linear programming problem - Mathematical formulation of the problem - Graphical solution method - simple method - Duality - primal and dual relation (simple Problems).

UNIT-II

Transportation problem - Degeneracy in transportation problem.

UNIT-III

The Assignment problem – Travelling salesman method.

UNIT-IV

Game theory - two persons zero sum game - the maximin minimax principle - saddle points - games without saddle points.

UNIT-V

Simulation - application - advantages and disadvantages - Monte Carlo method - simple problems.

Recommended Text

Gupta P.K.and Hira D.S., (2000) Problems in Operations Research, S.Chand & Co. Delhi

Reference Books

1. Quantitative Aptitude - R.S. Aggarwal (S.Chand & Co - New Delhi 2008)
2. Quantitative Aptitude for Competitive Examinations – Abhigit Guha (Tata McGraw - Hill Pub., Co., Ltd. New Delhi - III Edn.,)
3. Course in Mental Abilities and Quantitative Aptitude for Competitive Examinations - Edgar Thorpe (Tata McGraw - Hill Pub., Co., Ltd. New Delhi - II Edn.,)
4. Statistic, RSN Pillai and A. Bagavathi, S.Chand & Co.,
5. Elements of statistics, Sivadanu Pillai.
6. Algebra, Manickavachakam Pillai & Narayanan

NON-MAJOR ELECTIVE

PAPER -1

BASIC MATHEMATICS

Objectives

To introduce a few basic and elementary concepts of mathematics for other major students.

UNIT-I: Sets

Definition - Subsets - Power sets - Equality of sets - Finite and Infinite sets - Set operations - De-Morgan's laws - Distributive tables - Cartesian products.

UNIT-II: Number system

Binary, octal, hexadecimal numbers - conversion from one system to another system - addition and subtraction - one's complement.

UNIT-III: Symbolic logics

Logical statements - connectives - truth tables - tautologies operations - groups – (problems and simple properties only).

UNIT-IV: Determinants

Definition - properties (without proof) - application of determinants - Cramer's rule for the solution of a system of equations

UNIT-V: Matrices

Definition - types of matrices - operations on matrices - adjoint and inverse - applications - solving non-homogeneous equations.

Recommended Texts

1. Dr.M.K.Venkataraman & others, "Discrete mathematics and structures", The National Publishing Company, Madras.
2. Trembly J.P and Manohar.R "Discrete Mathematical Structures with applications to computer science" Tata McGraw - Hill Pub., Co., Ltd. New Delhi 2003.

Reference Books

1. P.R.Vittal "Algebra, Analytical Geometry and trigonometry" Margham Publications, Chennai.
2. Richard Johnsonbaugh, "Discrete Mathematics" fifth Edn., Pearson Education Asia, New Delhi 2002.

SEMESTER-IV

PAPER-6

VECTOR ANALYSIS AND FOURIER ANALYSIS

Objectives

This course covers the topics in vector and tensor calculus which are essential tools of modern applied mathematics. To develop deep understanding of key concepts followed by problems of applied nature. The portion on Fourier analysis will lead to post-graduate studies and research in pure as well as applied mathematics.

UNIT-I: Differential Vector Calculus

Differentiation of a Vector - Geometrical Interpretation of the Derivative - Differentiation Formulae - Differentiation of dot and Cross Products - Partial Derivatives of Vectors - Differentials of Vectors.

UNIT-II: Gradient, Divergence and Curl

Vector Differential Operator Del - Gradient of a Scalar Function - Directional Derivative - Geometric Interpretation - Gradient of the sum of Functions; of the product of functions and of a function of function - Operations involving Del - Divergence of a Vector and its Physical Interpretation - Curl of a Vector and its Physical Interpretation - Expansion Formulae for Operators involving Del - Solenoidal and Irrotational.

UNIT-III: Vector Integration

The Line Integral - Surface Integral and its Physical Meaning – Volume integral. Simple problems.

UNIT-IV: Vector Integration(Contd.)

Statements of Stoke's Theorem, Gauss Divergence Theorem and Green's Theorem and problems.

UNIT-V: Fourier Series

Euler's Formulae - Conditions for Fourier Expansion - Functions having Discontinuity - Change of Interval - Odd and Even Functions - Expansions of Odd or Even periodic Functions - Half-range Series-Typical Wave Forms - Parseval's Formula.

Recommended Text

P.R.Vittal. (2004) *Vector Calculus, Fourier series and Fourier Transform*.Margham Publications, Chennai.

Reference Books

1. G.B.Thomas and R.L.Finney. (1998) *Calculus and Analytic Geometry*, Addison Wesley (9^{th} Edn), Mass. (Indian Print).
2. M.K.Venkataraman. (1992) *Engineering Mathematics-Part B.* National Publishing Company, Chennai.
3. B.S.Grewal. *Higher Engineering Mathematics* (2002), Khanna Publishers, New Delhi.

SKILL BASED SUBJECT

PAPER - 2

MATHEMATICS FOR COMPETETIVE EXAMINATIONS-I

Objectives

To introduce concepts of mathematics with emphasis on analytical ability and computational skill needed in competitive examinations.

Unit- I

Numbers, H.C.F. and L.C.M. of numbers, Decimal Fractions.

Unit -II

Simplification, Square roots and Cube Roots, Average.

Unit- III

Problems on numbers, problems on Ages.

Unit -IV

Surds and Indices, Percentage, Profit and Loss.

Unit -V

Ratio and Proportion, Partnership.

Text Books:-

1. Quantitative Aptitude for competitive Examination, R.S.Aggarwal. S.Chand and company Ltd, 152, Anna salai, Chennai. (2001)
2. Quantitative Aptitude and Reasoning Praveen PHI P. Ltd.

NON-MAJOR ELECTIVE

PAPER -2

FOUNDATION MATHEMATICS FOR COMPETETIVE EXAMINATIONS

Objectives

To introduce concepts of mathematics with emphasis on analytical ability and computational skill needed in competitive examinations.

UNIT-I

Ratio and proportions

UNIT-II

Percentages

UNIT-III

Profit and loss, discounts.

UNIT-IV

Simple and compound interest**.**

UNIT-V

Time, Distance and Work

Recommended Text book:

Quantitative Aptitude - R.S. Aggarwal (S. Chand & Co. - New Delhi 2008)

SEMESTER - V

PAPER - 7

ABSTRACT ALGEBRA

Objectives

This course aims to impart emphasis on concepts and technology of the groups and rings as these algebraic structures have applications in Mathematical Physics, Mathematical Chemistry and Computer Science.

UNIT-I: Groups

Definition of a Group - Examples - Subgroups;

UNIT-II: Groups (Contd)

Counting Principle - Normal Subgroups - Homomorphisms.

UNIT-III: Groups (Contd)

Automorphisms - Cayley's Theorem - Permutation Groups.

UNIT-IV: Rings

Definition and Examples - Integral Domain - Homomorphism of Rings - Ideals and Quotient Rings.

UNIT-V: Rings (Contd)

Prime Ideal and Maximal Ideal - The field of quotients of an Integral domain – Euclidean rings.

Recommended Text

I.N.Herstein (1989), Topics in Algebra, (2nd Edn.)Wiley Eastern Ltd. New Delhi

Chapter-2: Sections 2.1-2.10 (Omit Applications 1 and 2 of 2.7)

Chapter-3: Sections 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7

Reference Books

1. S.Arumugam. (2004) *Modern Algebra.*Scitech Publications, Chennai.
2. J.B.Fraleigh (1987). *A First Course in Algebra* (3rd Edition) Addison Wesley, Mass. (Indian Print)
3. Lloyd R.Jaisingh and Frank Ayres,Jr. (2005) *Abstract Algebra,* (2nd Edition), Tata McGraw Hill Edition, New Delhi.
4. M.L.Santiago (2002) *Modern Algebra,* Tata McGraw Hill, New Delhi.
5. Surjeet Singh and QaziZameeruddin. (1982) *Modern Algebra*. Vikas Publishing House Pvt. Ltd. New Delhi.

PAPER - 8

REAL ANALYSIS I

Objectives

To understand various limiting behavior of sequences and series

To explore the various limiting processes viz.continuity, uniform continuity, differentiability and integrability and to enhance the mathematical maturity and to work comfortably with concepts.

UNIT-I: Functions & Sequences

Functions – real valued functions – equivalence – countability and real numbers – least upper bound – definition of sequence and subsequence – limit of a sequence – convergent sequence
Ch. 1.4 to 1.7, 2.1 to 2.3 of Goldberg.

UNIT-I: Sequences [Contd...]

Divergent sequences – Bounded sequences – Monotone sequence – Operations on convergent sequences – Operations on divergent sequences – Limit superior and Limit inferior – Cauchy sequences
Ch. 2.4 to 2.10 of Goldberg.

UNIT-III: Series of Real Numbers

Convergence and Divergence – Series with non negative terms – Alternating series – conditional convergence and Absolute convergence – Test for Absolute convergence.
Ch. 3.1 to 3.4 and 3.6 of Goldberg.

UNIT-IV: Series of Real Numbers [Contd...]

Test for Absolute convergence – The class ℓ^2 – Limit of a function on the real line – Metric spaces – Limits in Metric spaces.
Ch. 3.7, 3.10, 4.1 to 4.3 of Goldberg.

UNIT-V: Continuous Functions on Metric Spaces

Functions Continuous at a point on the real line – Reformulation – Functions Continuous on a Metric Spaces – Open Sets – Closed Sets.
Ch. 5.1 to 5.5 of Goldberg

Recommended Text

R.Goldberg [2000] Methods of Real Analysis. Oxford & IBH Publishing Co., New Delhi.

Reference Books

1. Tom M.Apostol [1974] Mathematical Analysis, 2nd Edition, Addison-Wesley New York.
2. Bartle, R.G. and Shebert [1976] Real Analysis, John Wiley and Sons Inc., New York.
3. Malik, S.C. and SavitaArora [1991] Mathematical Analysis, Wiley Eastern Limited, New Delhi.
4. Sanjay Arora and BansiLal [1991], Introduction to Real Analysis, SatyaPrakashan, New Delhi.

PAPER - 9

COMPLEX ANALYSIS - I

Objectives

This course provides

(i) a modern treatment of concepts and techniques of complex function theory

(ii) To gain knowledge about the complex number system, the complex function and complex integration.

UNIT-I: Complex numbers and Elementary functions

Complex Number system, complex numbers –Algebraic properties-Point at Infinity Stereographic Projection-Function of a complex variable-Mappings-Elementary Functions- The Logarithmic function- Branches of log Z.
Sections 1-10, 21-30.

UNIT-II: Analytic functions

Definitions of Limits -Continuity-Derivatives and Differentiation formula-Cauchy-Riemann equations-Cauchy-Riemann equations in polar form-properties of Analytic functions-Necessary and sufficient conditions for Analytic functions-problems. Sections 11-19.

UNIT-III: Conformal Mappings

Harmonic functions-Determination of Harmonic conjugate and Analytic functions-conformal mapping-Isogonal mapping-Further properties and examples-transformations of Harmonic functions**.**
Sections 20, 76-80.

UNIT-IV Mapping by Elementary transformations

The transformations $w=z+d$, $w=1/z$, $w=z^2$, $\overline{w}=\sqrt{z}$, $w = e^z$, $w=\sin z$ Bilinear Transformation andspecial Bilinear Transformation problems.
Sections 31-36, 38-39

UNIT-V: Integrals

Contours - Line Integrals _ Cauchy-Goursat's Theorem (without proof) Cauchy's Integral Formula - Derivatives of Analytic Functions - problems. Sections 43-46, 50-52.

Recommended Text

R.V.Churchill and J.W.Brown, (1984) *Complex Variables and Applications*. McGraw Hill International Book Co., Singapore. (Third Edition)

Reference Books:

1. P. Duraipandian and LaxmiDuraipandian (1976) Complex Analysis: Emerald Publishers, Chennai
2. S. Ponnusamy. (2000) Foundations of Complex Analysis, Narosa Publishing House, New Delhi
3. Murray R. Spiegel. (2005) Theory and Problems of Complex Variable. Tata-Mcgraw Hill Edition, New Delhi.

PAPER - 10

STATICS

OBJECTIVES

This course introduces the students the basic concepts of forces, moments, couple, friction law virtual displacement and work, catenary and the centre of gravity and kinematics. This course stresses the development of skills in formation of suitable mathematical models and problems solving techniques.

UNIT- I

Forces, Type of forces- Resultant of three forces related to triangle acting at a point - Resultant of several forces acting on a particle - Equilibrium of a particle under three forces - Equilibrium of a particle under several forces - Limiting Equilibrium of a particle on an inclined plane.

UNIT- II

Moment of a forces- General motion of a Rigid body- Equivalent system of forces – Parallel forces- Forces along the sides of the triangle.

UNIT- III

Couples- Resultant of several coplanar forces – Equation of line of action of the resultant – Equilibrium of a rigid body under three coplanar forces.

UNIT - IV

Reduction of coplanar forces into a force and a couple – Friction – laws of friction – cone of friction and angle of friction – Applications involving frictional forces.

UNIT - V

Center of mass – Center of mass of a triangular lamina – Three particles of same mass - Three particles of certain masses – uniform rods forming a triangle – lamina in the form of a trapezium and solid tetrahedron – Center of mass using integration – circular arc – circular lamina – elliptic lamina – solid hemisphere – solid right circular cone – hemispherical shell – hollow right circular cone.

Recommended Text

P. Duraipandian, LaxmiDuraipandian ,MuthamizhJayapragasam, Mechanics, 6-e,
S. Chand and Company Ltd, 2005**.**

Reference Books

1. S. Narayanan, R. HanumanthaRao, K. Sitaraman, P. Kandaswamy, *Statics*, S. Chand and Company Ltd, New Delhi.
2. S. L. Loney, *An Elementary Treatise on Statics*, Combridge University Press, 1951
3. A.V. Dharmapadam(1991) *Mechanics*. S. Viswanathan Printers & Publishers. Chennai.
4. M.K. Venkataraman (1990) *Statics*. A Rajhans Publications. (16thEdn), Meerut.
5. Joseph F. Shelley (2005) *Vector Mechanics for Engineers Vol-I: Statics*, Tata McGraw Hill Edition, New Delhi.

PAPER - 11

DYNAMICS

OBJECTIVES

This course aims to provide models for some real life problems. This covers topics like Simple Harmonic Motion, Projectiles, Central Orbits and Moment of Inertia. Stress is on the mathematical formulation of the physics aspects of the problems and it develops logical deduction and interpretation.

UNIT- I

Velocity, Relative Velocity, Angular Velocity, Acceleration, Rectilinear motion, Rectilinear motion with constant acceleration, Relative angular velocity, Work, Power, Energy.

UNIT- II

Motion of a projectile, Nature of a trajectory, Results pertaining to the motion of a projectile, Range on an inclined plane, Maximum range on the inclined plane. Simple problems.

UNIT -III

Impulsive force, Conservation of linear momentum, Impact of a sphere, Laws of impact, Impact of two smooth spheres, Direct impact of two smooth spheres, Direct impact of a smooth sphere on a plane, oblique impact of a smooth sphere on a plane. Simple problems.

UNIT- IV

Central force and Central Orbit, Equation of central orbit, finding law of force and speed for a given orbit, Determination of the orbit when law of force is given, Kepler's Laws on planetary motion. Simple Problems.

UNIT -V

Moment of Inertia of simple bodies, Theorems of parallel and perpendicular axes, Moment of inertia of triangular lamina, circular lamina, circular ring, right circular cone, sphere. Simple problems.

Recommended Text

P. Duraipandian, LaxmiDuraipandian ,MuthamizhJayapragasam, Mechanics, 6-e,
S. Chand and Company Ltd, 2005**.**

Reference Books

1. S. Narayanan, R. HanumanthaRao, K. Sitaraman, P. Kandaswamy, *Statics*, S. Chand and Company Ltd, New Delhi.
2. S. L. Loney, *An Elementary Treatise on Statics*, Combridge University Press, 1951
3. A.V. Dharmapadam(1991) *Mechanics*. S. Viswanathan Printers & Publishers. Chennai.
4. M.K. Venkataraman (1990) *Statics*. A Rajhans Publications. (16thEdn), Meerut.
5. Joseph F. Shelley (2005) *Vector Mechanics for Engineers Vol-I: Statics*, Tata McGraw Hill Edition, New Delhi.

ELECTIVE

PAPER - 1

A. GRAPH THEORY

Objectives

To study and develop the concepts of graphs, subgraphs, trees connectivity, Eulerian and Hamiltonian graphs, matching colorings of graphs and planar graphs

UNIT-I

Graphs, subgraphs, Degree of a vertex, Isomorphism of graphs, independent sets and coverings.

UNIT-II

Intersection graphs; Adjacency and incidence of matrices; Operations on graphs;;

UNIT-III

Walks; trails; paths; Connectedness and components; cut point, bridge, block.

UNIT-IV

Connectivity theorems and simple problems. Eulerian graphs and Hamiltonian graphs; simple problems

UNIT-V

Trees, theorems, and simple problems.

Recommended Text

S.Arumugam and S.Ramachandran, "Invitation to Graph Theory", SITECH Publications India Pvt. Ltd., 7/3C, Madley Road, T.Nagar, Chennai - 17

Reference Books

1. S.Kumaravelu, SusheelaKumaravelu, Graph Theory, Publishers, 182, Chidambara Nagar, Nagercoil-629 002.
2. S.A.Choudham, A First Course in Graph Theory, Macmillan India Ltd.
3. Robin J.Wilson, Introduction to Graph Theory, Longman Group Ltd.
4. J.A.Bondy and U.S.R. Murthy, Graph Theory with Applications, Macmillon, London.

B. ASTRONOMY

Objectives

This course aims to provide working knowledge about the universe.

UNIT-I

Celestial Sphere - Diurnal motion - Simple Problems page 39 - 83 (Use the results 65,67,83,84) to solve problems.No derivation.)

UNIT-II

Zones of Earth - Terrestrial Latitudes and Longitudes - Rotation of Earth - Dip of the horizon - - Simple problems. Page 90-131 (Use the results of 96,99,102 to solve problems. No need for derivation.

UNIT-III

Twilight-simple problems-Astronomical refraction - Simple problems.page 131-157. (use the result of 124,125,126,127 to solve problems. No need to derive the result)

UNIT-IV

Kepler's Laws - simple problems page 172-189. (Use result s of 159,160 to solve the problems.No need to derive the results.

UNIT-V

Moon - phases of moon - Eclipses - Introduction - umbra and penumbra - lunar eclipse - solar eclipse - condition for the occurrence of lunar and solar eclipses. Page 334-377. (Use the results of 270,271,272 to solve problem, no need to derive the results)

Recommended Text

S.Kumaravelu and SusheelaKumaravelu.(2004) *Astronomy.* SKV Publishers, Nagarkoil

Reference Books

1. L.W.Frederick and R.H.Baker (1976) *Astronomy* (10thEdn) Vas Nostrand, New York.
2. R.Jastrow and M.H.Thompson (1984) *Astronomy : Fundamentals and Frontiers*, (4thEdn) John Wiley & Sons, New York.
3. H.Karttunenet. al. (2003) *Fundamental Astronomy* (4thEdn) Springer Verlag, Berlin.
4. L.Motz and A.Duveen. (1977) *Essentials of Astronomy* (2ndEdn) Columbia University Press, New York.
5. G.V.Ramachandran. (1965) *A Text Book of Astronomy* (5thEdn) Published by Mrs. RukmaniRamachandran, Tiruchirappalli
6. M.Zeilik (2002) *Astronomy: The Evolving Universe* (9thEdn) Cambridge University Press, Cambridge.

SKILL BASED SUBJECT

PAPER - 3

MATHEMATICS FOR COMPETETIVE EXAMINATIONS - II

Unit- I

Chain rule –Time and work.

Unit- II

Time and Distance

Unit- III

Problems on Trains.

Unit- IV

Boats and Streams.

Unit- V

Alligation or Mixture.

Text Book:-

Quantitative Aptitude for competitive Examination R.S. Aggarwal. S. Chand and company Ltd,152,Anna salai, Chennai. 2001

SEMESTER VI

PAPER - 12

LINEAR ALGEBRA

Objectives

To study the Algebraic structures of Vector Spaces and Linear Transformation

UNIT-I: Vector Spaces

Definition and examples-Linear dependence and independence

UNIT-II: Vector Spaces (Contd)

Dual space - Inner Product spaces.

UNIT-III: Linear Transformation

Algebra of linear transformations - Characteristic roots

UNIT-IV: Linear Transformation (Contd)

Matrices, Canonical forms; Triangular forms.

UNIT-V: Linear Transformation (Contd)

Trace and Transpose, Determinants

Recommended Text

I.N.Herstein. (1989) *Topics in Algebra*.Wiley Eastern Ltd. New Delhi.
Chapter-4: Sections 4.1, 4.2, 4.3, 4.4,
Chapter-6: Sections 6.1, 6.2, 6.3, 6.4, 6.8, 6.9

Reference Books

1. S.Arumugam. (2004) *Modern Algebra.*Scitech Publications, Chennai.
2. J.B.Fraleigh (1986) *A First Course in Algebra* (3rd Edition) Addison Wesley. Mass. (Indian Print)
3. S.Lipschutz (2005) *Beginning Linear Algebra*, Tata McGraw Hill Edition, New Delhi.
4. M.L.Santiago. (2002) *Modern Algebra*, Tata McGraw Hill, New Delhi.
5. Surjeet Singh and QaziZameeruddin. (1982) *Modern Algebra.*Vikas Publishing House Pvt. Ltd., New Delhi, 1982

PAPER - 13

REAL ANALYSIS II

Objectives

To understand Integration process of Riemann
To develop the understanding of point wise and uniform convergence of sequence and series of functions.
To enhance the mathematical maturity and to work comfortably with concepts.

UNIT-I: Connectedness, Completeness

Open Sets – Connected Sets – Bounded Sets and Totally Bounded Sets – Complete Metric Spaces.
Ch. 6.1 to 6.4 of Goldberg

UNIT-II: Compactness

Compact Metric Space – Continuous Functions on Compact Metric Spaces - Continuity of Inverse Functions – Uniform Continuity.
Ch. 6.5 to 6.8 of Goldberg

UNIT-III: Riemann Integration

Sets of measure zero - Definition Riemann Integral – Properties of Riemann Integral – Derivatives.
Ch. 7.1, 7.2 7.4, 7.5 of Goldberg.

UNIT-IV: Riemann **Integration [Contd...]**

Rolle's Theorem – The law of mean – Fundamental theorems of calculus – Taylor's theorem.

Ch. 7.6 to 7.8 and 8.5 of Goldberg.

UNIT-V: Sequences and Series of Functions

Pointwise convergence of sequences of functions – Uniform convergence of sequences of functions – consequences of uniform convergence – Convergence and uniform convergence of series of functions.

Ch. 9.1 to 9.4 of Goldberg.

Recommended Text

R.Goldberg Methods of Real Analysis Oxford & IBH Publishing Co., New Delhi.

Reference Books

1. Tom M.Apostol [1974] Mathematical Analysis, 2nd Edition, Addison-Wesley Publishing Company Inc. New York.
2. Bartle, R.G. and Shebert [1976] Real Analysis, John Wiley and Sons Inc., New York,
3. Malik, S.C. and SavitaArora [1991] Mathematical Analysis, Wiley Eastern Limited, New Delhi.
4. Sanjay Arora and BansiLal [1991] Introduction to Real Analysis, Satya Prakashan, New Delhi.

PAPER - 14

COMPLEX ANALYSIS II

Objectives:

(1) To gain knowledge about complex Integration and series.
(2) This course provides methods to solve problems in pure as well as in applied mathematics.

UNIT-I: Integrals:

Morera's theorem- Maximum Moduli of functions- The fundamental theorem of Algebra-Lioulle's theorem-convergence of sequences and series-uniform convergence. Sections 53-56, 61.

UNIT-II: Power series.

Taylor's and Laurent's theorem-Integration and differentiation o f power series-problems.
Sections 57-60.

UNIT-III: Singularities and Residues.

Singularities and classifications- Isolated singularties:Removable singularity Pole and essential singularity-Residues-Cauchy's Residue theorem-problems.
Sections 67-71.

UNIT-IV: Analytic continuation

Conditions under which f (z)=o-Uniqueness-Singular points:Poles and zeros-Essential singular points-Number of zeros and poles-The Argument principal.
Sections 106 -114.

UNIT V: Contour Integration

Evaluation of Improper Real Integrals-Improper integrals involving Trigonometric functions -Integration around a Branch point.
Sections 72-75.

Recommended Text

R.V.Churchill and J.W.Brown, (1984) *Complex Variables and Applications*. McGraw Hill International Book Co., Singapore. (Third Edition)

Reference Books

1. P. Duraipandian and LaxmiDuraipandian (1976) Complex Analysis: Emerald Publishers, Chennai.
2. S. Ponnusamy. (2000) Foundations of Complex Analysis, Narosa Publishing House, New Delhi.
3. Murray R. Spiegel. (2005) Theory and Problems of Complex Variable. Tata-Mcgraw Hill Edition, New Delhi.

PAPER - 15

PROGRAMMING IN C LANGUAGE

Objectives

To develop programming skill in the Computer Language C

UNIT-I

C Constants, variables, Data-type, Declaration of variables, assigning values to variables.

UNIT-II: Operators

Arithmetic, Relational, Logical, Assignment, Increment and decrement, Conditional, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic operators, Formatted input and output.

UNIT-III: Operators

Decision making and branching If, simple if, If else, Nesting of if - else, Else - If ladder, Switch statement, the?: operator, Go to statement. Decision making with looping: While, Do, for statement, Jumps in loops.

UNIT-IV: Arrays

One - dimensional array, two - dimensional array, Initializing arrays, Multi - dimensional arrays.

UNIT-V: User-Defined Function

Need for User-defined function, Multi-function program, the form of C-Function, Return Value and their types.

Structures and Unions:

Structure definition, Structure initialization, Comparison of structure variables, union**.**

Recommended Text

E.Balagurusamy. (1996) *Programming in* ANSI *C*. Tata McGraw Hill, New Delhi

Reference Books

1. V.Rajaraman. (1995) *Computer Programming in C*. Prentice Hall. New Delhi
2. H. Schildt, Obsborne. (1994) *Teach Yourself C* McGraw Hill. New York.
3. Mullish Cooper. *The Spirit of C- An Introduction to Modern Programming.*Jaico Publishing House. Delhi. 1998.
4. Yashavantkanetkar, let us C, 16TH edition BPB publication.
5. Dr.P.Rizwan Ahmed, Programming in C, Margham Publications, 2016

PRACTICAL

PRACTICAL IN C LANGUAGE

Objectives

This computer practice course aims to provide strong logical thinking and error-free syntax codes writing, to master the debugging techniques and to present the results in neat form in C Language for numerical methods. Students will be able to solve problems numerically whenever theoretical methods are not available.

The following exercises shall be performed as minimum mandatory requirements (for eligibility to take the practical examination) and a RECORD of the code-listing and outputs shall be maintained by each students.

1. Assigning the ASCII value.
2. Square of numbers: Using For loop, While loop
3. Square of numbers: Do-While loop, Goto statement.
4. Characters between two given characters.
5. Number of vowels and consonants.
6. Three – dimensional matrix.
7. Prime numbers between two give numbers.
8. Fibonacci series.
9. Factorial numbers
10. Power of a value.
11. Interchange sort.
12. Student record.

Note: Mathematics faculty should be appointed as an Examiner.

Reference Books

1. The spirit of C, Mullish Cooper, Indian Edition by Jaico Publishers, 1987.
2. Teach yourself C, Herbert Schildt, Obsbome Megrawhill, 2nd Edition 1994.
3. Programming in C, Schaum Series.

ELECTIVE
(to choose 1 out of the given 2)

PAPER - 2

OPERATIONS RESEARCH

Objectives

To develop computational skill and logical thinking in formulating industry oriented problems as a mathematical problem and finding solutions to these problems.

UNIT-I

Network-construction of network diagram-Critical path method (CPM) – Three floats

UNIT-II

Three time estimates-Network scheduling by PERT Method-PERT Computation

UNIT-III

Inventory models - EOQ model (a) Uniform demand rate infinite production rate with no shortages (b) Uniform demand rate finite production rate with no shortages – Inventory control with Price Breaks.

UNIT-IV

Sequencing problem - n jobs through 2 machines, n jobs through 3 machines - two jobs through m machines – n jobs through m machines.

UNIT-V

Queuing Theory - Basic concepts - Steady state analysis of M/M/1 and M/M/N systems with finite and infinite capacities.

Recommended Text: Gupta P.K. and Hira D.S. (2000) *Problems in Operations Research,* S.Chand& Co. Delhi

Reference Books

1. J.K.Sharma, (2001) Operations Research: Theory and Applications, Macmillan, Delhi
2. KantiSwaroop, Gupta P.K. and Manmohan, (1999) *Problems in Operations Research*, Sultan Chand & Sons., Delhi.
3. V.K.Kapoor [1989] *Operations Research*, sultan Chand & sons.
4. Ravindran A., Philips D.T. and Solberg J.J., (1987) *Operations research*, John Wiley & Sons, New York.
5. Taha H.A. (2003) *Operations Research,* Macmillan Publishing Company, New York.
6. P.R.Vittal (2003) *Operations Research,* Margham Publications, Chennai.
7. S.J.Venkatesan, *Operations Research,* J.S. Publishers, Cheyyar-604 407.
8. Arumugam&Issac, Operations research - Vol. - I, New Gamma Pub., House. Palayamkottai.

PAPER - 2

CALCULUS OF FINITE DIFFERENCES AND NUMERICAL METHODS

(To be chosen only by those students who have not taken Numerical Methods as Allied subject)

Objectives

This course covers the basic methods for finding the finite difference, solution of simultaneous equations and the techniques of Numerical Differentiation and Numerical Integration. It also deals with solution of Algebraic and Transcendental equations.

(Note: All The Formulae Without Proof - Units I to V)

UNIT-I: Finite differences & Interpolation

Forward difference operator ▲ and Backward difference operator ▼ and shifting operator E, Relation between ▲, ▼and E - Interpolation - Newton - Gregory forward & backward formulae, Estimating the missing terms- Lagrange's and Newton's divided difference Formula for unequal intervals.

UNIT-II: Solutions of simultaneous linear equations

Gauss elimination method - matrix inversion method - Gauss-Jordan Method, Gauss – Seidal method.

UNIT-III: Numerical Differentiation

Newton's forward and backward differences formulae to compute derivatives - using Guass forward and backward formulae.

UNIT-IV: Numerical Integration

General Quadrature formula - Trapezoidal rule - Simpson's one third rule - Simpson's three-eight rule.

UNIT-V: Solution of Algebraic and Transcendental Equations:

Bisection method - Regula - falsi method (False Position method) – Newton - Raphson method. Numerical solution of ordinary Differential equation (First order only): Euler's method, modified Euler's method, Picard's method, Runge - Kutta method

Recommended Text

1. B.D. Gupta. (2001) *Numerical Analysis.* Konark Pub. Ltd., Delhi.

2. H.C.Saxena, Calculus of finite differences and Numerical Analysis, S. Chand & Co., New Delhi. IX Edition.

Reference Books

1. M.K.Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.
2. S. Arumugam (2003) - Numerical Methods, New Gamma Pub., for Palayamkottai.
3. A.Singaravelu, Numerical Methods, Meenakshi Publications-First Edition 1992.

ELECTIVE - III

PAPER – 3

A. SPECIAL FUNCTIONS

Objectives

To develop computational skill in certain special functions which are frequently occurring in higher mathematics and mathematical physics.

UNIT-I

Properties of Linear Operators - Simultaneous Linear Differential Equations -

UNIT-II

Special Solvable Types of Nonlinear Equations. Numerical Solutions Using Taylor Series -

UNIT-III

Adams and Modified Adams Method - Extrapolation with
Differences Properties of Power Series - Examples

UNIT-IV

Singular Points of Linear Second Order Differential Equations - Method of Frobenius.

UNIT-V

Bessel Functions - Properties – Legendre Functions.

Recommended Text

F.B.Hildebrand. (1977) *Advanced Calculus for Applications.*Prentice Hall. New Jersey.

Reference Books

1. J.N.Sharma and R.K.Gupta (1998) *Special Functions*, Krishna PrakashanMandir, Meerut.
2. SatyaPrakash. (2004)*Mathematical Physics.* Sultan & Sons. New Delhi.
3. B.D.Gupta (1978) Mathematical Physics, Vikas Publishing House.

PAPER – 3

B.FUZZY MATHEMATICS

Objectives

1. To know the fundamentals of fuzzy Algebra.
2. To know the basic definitions of fuzzy theory
3. To know the applications of fuzzy Technology.

UNIT-I

Introduction- Fuzzy subsets-Lattices and Boolean Algebras- L fuzzy sets-operations on fuzzy –α level sets – properties of fuzzy subsets of a set. section s 1.1-1.10

UNIT-II

Algebraic product and sum of two fuzzy subsets-properties satisfied by Addition and product-cartesian product of fuzzy subsets. Sections 1.11-1.13.

UNIT-III

Introduction- Algebra of fuzzy relations-logic-connectives. section s 2.1-2.4

UNIT-IV

Some more connectives-Introduction-fuzzy subgroup-homomorphic image and Pre-image of subgroupoid. Sections 2.5,3.1-3.3

UNIT-V

Fuzzy invariant subgroups-fuzzy subrings.
Section 3.4 and 3.5.
Recommended Text S.Nanda and N.R.Das "Fuzzy Mathematical concepts,Narosa Publishing House, New Delhi.

SKILL BASED SUBJECT

PAPER - 4

MATHEMATICS FOR COMPETETIVE EXAMINATIONS - III

Unit- I

Simple Interest.

Unit- II

Compound Interest

Unit- III

Logarithms – Races and Games of Skill.

Unit- IV

Area

Unit- V

Volume and surface areas.

Text Book:-

Quantitative Aptitude for competitive Examination , R.S.Aggarwal. S.Chand and company Ltd, 152, Anna salai, Chennai. 2001

ALLIED SUBJECTS FOR MATHEMATICS STUDENTS

To choose any two out of the following Four Allied subjects as Allied I and Allied II. Each Allied subject consists of two Examination papers as paper I and Paper II.

1. Mathematical Statistics (Paper I and II)
2. Numerical Methods (Paper I and II)
3. Physics (Paper I and II)
4. Chemistry (Paper I and II)

ALLIED

MATHEMATICAL STATISTICS - I

Objective

To apply Statistics Methods for Mathematical Problems

UNIT-I

Concept of Sample Space - Events - Definition of Probability (Classical, Statistical and Axiomatic) - Addition and Multiplication laws of Probability - Independence of Events - Conditional Probability - Baye's Theorem - Simple Problems.

UNIT -II

Random Variables (Discrete and Continuous) - Distribution Function - Expectation and Moments - Moment Generating Function - Probability Generating Function - Cumulant Generating Function - Simple Problems.

UNIT-III

Characteristic Function - Properties - Uniqueness and Inversion Theorem (Statement only) Chebychev's Inequality - Simple Problems

UNIT-IV

Concept of Bivariate Distribution - Correlation - Karl Pearson's Coefficient of Correlation - Rank Correlation - Linear Regression.

UNIT-V

Standard distributions: Discrete distributions - Binomial, Poisson, Hyper Geometric and Negative Binomial Distributions - Continuous Distributions Normal, Uniform, Exponential.

Recommanded text book:

S.C. Gupta & V.K. Kapoor : Fundamentals of Mathematical Statistics, Sultan & sons

Books for Reference

1. Hogg, R.V. &Craig.A.T.(1998) : Introduction to Mathematical Statistics, Macmillan
2. Mood. A.M. Graybill. F.A.&Boes.D.G.(1974) : Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967) : Statistical Methods, Oxford and IBH
4. Hoel, P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. Wilks S.S. Elementary Statistical Analysis, Oxford and IBH

ALLIED

MATHEMATICAL STATISTICS II

Objective

To apply Statistics for Mathematical problems

UNIT-I

Statistical Population Census and Sampling Survey - Parameter and Statistics - Sampling and Sampling Distribution and Standard Error. Sampling distributions - students 't', chi - square and F distributions.

UNIT-II

Test of significance - Large sample test for proportion, mean and standard deviation - Exact test based on 't', Chi - square and F distribution with respect to population mean, variance and correlation coefficient - Tests of independence of attributes - goodness of fit tests.

UNIT-III

Point estimation - Concept of unbiasedness, consistency, efficiency and sufficiency - Cramer- Rao Inequality - Methods of Estimation - Maximum Likelihood Estimation - Method of Moments.

UNIT-IV

Test of Hypothesis: Null and Alternate Hypothesis - Type I and Type II error - Power of the test - Neymann Pearson lemma - Likelihood Ratio Test - Concept of Most Powerful test (Statement and Results only) - Simple Problems

UNIT-V

Analysis of Variance - One - way and Two-way Classification - Basic Principles of Design of Experiments - Randomization, Replication, Local Control, Completely Randomized Design, Randomized Block Design and Latin Square Design.

Recommended Text:

S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan & sons

Books for Reference

1. Hogg, R.V. & Craig. A. T. (1998): Introduction to Mathematical Statistics, Macmillan
2. Mood.A.M.,Graybill. F.A.&Boes. D.G.(1974): Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967): Statistical Methods, Oxford and IBH
4. Hoel.P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. Wilks . S. S.Elementary Statistical Analysis, Oxford and IBH
6. O. Kempthone - Design of Experiments
7. Das and Giri : Design of Experiments Wiley Eastern

ALLIED PRACTICAL

MATHEMATICAL STATISTICS

1. Measures of location and Dispersion (absolute and relative)
2. Computation of Correlation Coefficient for raw and Grouped data, Rank Correlation Coefficient
3. Computation of Regression Equations for Raw and Grouped Data
4. Curve Fitting by the Method of Least Squares
   a. $y=ax+b$
   b. $y=ax^2+bx+c$
   c. $y=ae^{bx}$
   d. $y=ax^b$
5. Fitting of Binomial, Poisson, Normal distributions and tests of goodness of fit.
6. Large sample tests with regard to population mean, proportion, standard deviation
7. Exact tests with Respect to Mean, Variance and Coefficient of Correlation
8. Test for Independence of Attributes Based on Chi-Square Distribution
9. Confidence Interval based on Normal, t and Chi-square and F Distributions
10. Problems based on ANOVA-one way and two way Classification
11. Completely Randomized Design
12. Randomized Block Design
13. Latin Square Design

Note
Use of scientific calculator shall be permitted for practical examination.
Statistical and Mathematical tables are to be provided to the students at the examination hall.

- Mathematics faculty alone should be appointed as examiners.

Books for Reference

1. Hogg, R.V. &Craig.A.T.(1998): Introduction to Mathematical Statistics, Macmillan.
2. Mood.A.M. ,Graybill. F.A.&Boes.D.G.(1974) : Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967): Statistical Methods, Oxford and IBH
4. Hoel.P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan &sons
6. S.C. Gupta & V.K. Kapoor: Fundamentals of Applied Statistics, Sultan & sons
7. Wilks . S. S. Elementary Statistical Analysis, Oxford and IBH
8. O. Kempthone - Design of Experiments.

ALLIED PAPERS

NUMERICAL METHODS - I

Objectives

This course will cover basic methods for finding the Finite differences, Central differences, Inverse interpolation, Summation of series, Interpolation for equal & unequal intervals, Solutions of simultaneous equations, Important principles, Method and Processes to get numerical results, Reliability of numerical result.

UNIT-I: Finite Differences

First and higher order differences-forward differences and Backward differences-Properties of operators-Differences of a Polynomial-Factorial Polynomials-Operator E, Relation between ▲,▼and E–Interpolation - Newton - Gregory forward & backward formulae for interpolation.

UNIT-II: Central Differences

Central difference Operators-Central differences formulae: Gauss Forward and Backward formulae-Sterling's formula-Bessel's formula.

UNIT-III: Interpolation for Unequal Intervals

Divided differences-Newton's divided differences formula and Lagrange's-Estimating the Missing terms (With one or more missing values).

UNIT-IV: Inverse Interpolation

Lagrange's method and Reversion of series method (Using Newton's forward formula only).

Summation of series: Sum to n term of the series whose general term is the first difference of a function-summation by parts.

UNIT-V: Solutions of Simultaneous Linear Equations

Gauss elimination method-matrix inversion method-Gauss-Jordan Method, Gauss-Seidal method (Three unknowns only).

Recommended Text

1. B.D. Gupta.(2001) *Numerical Analysis.*Konark Pub. Ltd., Delhi
2. M.K. Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.

Reference Books

1. S. Arumugham. (2003) *Numerical Methods*, New Gamma Publishing, Palamkottai.
2. H.C. Saxena. (1991) *Finite differences and Numerical analysis* S.Chand & Co., Delhi
3. A.Singaravelu (2004). *Numerical Methods*Meenakshi Agency, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite difference & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

NUMERICAL METHODS II

Objectives

This course covers the techniques of Numerical Differentiation and Numerical Integration. It also deals with solution of difference equations, Algebraic and Transcendental equations and Numerical solution of Ordinary differential equations of first order.

UNIT-I: Numerical Differentiation

Newton's forward and backward differences to compute derivatives-derivative using divided differences formula-maxima and minima using the above formulae.

UNIT-II: Numerical Integration

General Quadrature formula-Trapezoidal rule-Simpson's one third rule-Simpson's three-eight rule, Weddle's rule- Euler-Maclaurin Summation Formula

UNIT-III: Difference Equations

Linear differences equations-Linear homogeneous difference equation with constant co-efficient-Particular integrals for a^x, x^m, sinax, cosax and $a^x f(x)$.

UNIT-IV: Solution of Algebraic and Transcendental Equations

Bisection method-Iteration method-Regula-falsi method (False Position Method)-Newton-Rapson Method.

UNIT-V: Numerical Solution of Ordinary Differential Equations (First order only)

Euler's method- Euler's modified method-Picard's method - Taylor's methods-Runge-Kutta method (Fourth order only).

Recommended Text

1. B.D. Gupta. (2001) *Numerical Analysis.*Konark Pub. Ltd., Delhi
2. M.K.Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.

Reference Books

1. Gupta-Malik, Calculus of finite differences and numerical Analysis, KrishbaPrakashanMandir, Meerut Seveenth Edition.
2. S.C.Saxena, Calculus of finite differences and Numerical Analysis, S.Chand& Co., New Delhi. IX Edition.
3. A.Singaravelu, Numerical methods, Meenakshi Publications-First Edition 1992.
4. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite Difference & Numerical Analysis, S.Chand& Company Ltd., New Delhi-55.

ALLIED PRACTICAL

NUMERICAL METHODS

LIST OF PROBLEMS

1. Derivatives by Newton's method
2. Gauss elimination method.
3. Gauss-Jacobi method.
4. Gauss-Siedel method.
5. Power method (eigenvalue).
6. Newton's forward and backward interpolation.
7. Lagrange interpolation.
8. Trapezoidal and Simpson one-third rules.
9. Euler's method.
10. Picard's method
11. Runge-Kutta's method.
12. Predictor-corrector method.

ALLIED

PHYSICS - I

UNIT – I: PROPERTIES OF MATTER

Elasticity : Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula .

Surface Tension: Surface Tension – Surface Tension and interfacial surface tension by the method of drops.

UNIT – II: HEAT

Heat: Specific heat – Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power.
Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Super conductors. Type I and II – Meisner Effect – Helium I and II.

UNIT – III: ELECTRICITY AND MAGNETISM

Electricity: Potentiometer – Principle – Calibration of low range voltmeter – Measurement of internal resistance of cell – measurement of an unknown resistance.

Magnetism – Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer in Tan C position and the vibration magnetometer.

UNIT – IV: SOUND AND ACOUSTICS OF BUILDING

Sound: Transverse vibration of strings – Velocity and frequency of vibrations of a stretched string – laws – sonometer – A.C. Frequency – Steel Wire – Brass wire.

Ultrasonics – Production by Piezo – electric method – properties and uses.
Acoustics of buildings: Reverberation – Reverberation time – Sabine's formula (definition only) – Sound absorption co-efficient of surface – conditions for the perfect acoustics.

UNIT – V: OPTICS

Interference: Air Wedge – Description – Test for optical flatness of glass plate – Determination of diameter of a thin wire by air wedge.

Diffraction: Theory of transmission grating – Normal Incidence – Determination of Wavelength of monochromatic source and Wavelength of mercury line using a grating by normal Incidence.

Fibre optics: principle-classification of optical fibres-fibre optic communication system block diagram.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Introduction to Fibre optics- K.Thyagarajan and Ajay Ghatak,Cambridge,University Press(1999).

ALLIED

PHYSICS II

UNIT – I: WAVE MECHANICS

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

UNIT – II : NUCLEAR PHYSICS

Particle accelerators – cyclotron, particle detectors – GM Counter Artificial Transmutation – Rutherford's Experiment – The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions.

Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy – Conservation of Parity – Quantities conserved and quantities not conserved in a nuclear reaction.

UNIT – III : ENERGY PHYSICS

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

UNIT – IV: CRYSTALLOGRAPHY

Crystallography : The crystal structure – Unit Cell –Bravais lattice- structures of simple cubic-BCC and FCC- co ordination number, packing factor calculation for the above structures –Hexogonal closed packed(HCP) structure -Miller indices – concept of Reciprocal Vectors.

UNIT – V: ELECTRONICS

Electronics: Transistor characteristics in common base and common emitter mode- Transistor single stage amplifier- Expression for input impedence, output impedence and current gain.
Digital Electronics : NAND and NOR as universal building blocks- De Morgan's theorem –statement and proof- Fabrication of diodes and transistors using Monolithic technology–limitations.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
9. Introduction to Solid State Physics – C. Kittel, 5^{th} Edition Wiley Eastern Ltd.
10. Renewable & Sustainable energy sources – Agarwal.

ALLIED PRACTICAL

PHYSICS

(Any 15 Experiments)

1. Young's modulus – non uniform bending – pin and microscope.
2. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
3. Ridigity modulus – Torsional oscillation method (without symmetric masses).
4. Determination of Co-efficient of Viscosity – Graduated Burette.
5. Surface Tension and Interfacial Tension – By drop weight method.
6. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
7. Sonometer – Determining A.C. Frequency. (Screw Gauge is given).
8. Sonometer – frequency of tuning fork.
9. Newton's Rings – Radius of Curvature.
10. Air Wedge – Determination of thickness of thin wire.
11. Spectrometer Grating – Minimum Deviation – Mercury Lines.
12. Spectrometer – Refractive Index of a liquid – Hollow Prism.
13. Potentiometer – Calibration of High Range Ammeter.
14. Potentiometer – Calibration of Low Range Voltmeter.
15. Determination of M and B_H using Deflection Magnetometer in Tan C position and vibration magnetometer.
16. Figure of merit and voltage sensitiveness of table galvanometer.
17. Construction of AND, OR gates using diodes and NOT by transistors.
18. Zener diode – Voltage Regulation.
19. NAND / NOR as universal gate.
20. Demorgan's theorem verification.

ALLIED

PAPER – 1

CHEMISTRY – I

OBJECTIVE:

- Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications wherever necessary are to be taught for I- Semester.

UNIT – I

1.1General Metallurgy - Extraction of Metals - Minerals and Ores- Difference between Minerals and Ores – Minerals of Iron, Aluminum and Copper - Ore Dressing or Concentration of Ores - Types of Ore Dressing- Froth Floatation process, Gravity separation and Magnetic separation.

1.2 Calcination, Smelting, Roasting, Fux, Slag - Definition - Reduction methods - Goldschmidt Aluminothermic process and Carbon Reduction method - Refining of Metals - Electrolytic, Van Arkel and Zone Refining.

1.3 Ores of Titanium and Cobalt - Extraction of Titanium and Cobalt.

UNIT – II

2. Cycloalkanes - Preparation – Wurtz reaction and Dieckmann's condensation - Properties of Cycloalkanes – Substitution and Ring opening reactions.

2.2 Polarisation - Inductive effect, Mesomeric effect and Steric effect (Acid and Base Strength).

2.3Stereoisomerism – Types - Cause of Optical Activity – Enantiomers - Diastereomers - Meso form - Optical Activity of Lactic acid and Tartaric acid - Racemisation and Resolution – Definition and Methods - Geometrical isomerism – Definition and example - Maleic and Fumaric acid – Differences.

UNIT – III

3.1 Chemical Kinetics – Rate of a reaction – Definition of Order and Molecularity – Distinction between Order and Molecularity - Derivation of First order rate equation - Half Life Period of first order reaction.

3.2 Catalysis - Catalyst - Autocatalyst - Enzyme catalyst - Promoters - Catalytic poisons –

Active Centre - Differences between Homogeneous and Heterogeneous Catalysis - Industrial Applications of Catalysts.

3.3 Photochemistry – Grothus-Draper's law – Stark-Einstein's law - Quantum yield – Photosynthesis - Phosphorescence – Fluorescence.

UNIT – IV

4.1 VSEPR Theory – Hybridisation and Shapes of simple molecules BF_3, PCl_5, SF_6 and XeF_6.

4.2 Fuels – Classification of Fuels - Calorific value of Fuels – Water gas, Carbureted Water gas and Producer gas – Composition and Uses - Non-Conventional fuels - Need of Solar Energy - Applications - Biofuels – Oil gas, Natural gas and LPG – Uses.

4.3 Osmosis - Osmotic pressure - Reverse osmosis – Definition - Desalination of Sea water.

UNIT – V

5.1Nuclear Chemistry – Atomic number, Mass number - Isotopes, Isobars and Isotones – Definition and Examples - Definition of Half life period - Nuclear Binding Energy, Mass Defect and N/P ratio - Nuclear Fission and Nuclear Fusion (Elementary idea) - Applications of Radioisotopes in Medicine, Agriculture and Industries – Carbon Dating.

5.2 Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking – Naphthalene – Preparation – Haworth's method – Properties – Oxidation, Reduction and Uses of Naphthalene - Structure of Naphthalene (Structural elucidation not necessary).

5.3 Conductors, Insulators, Semiconductors, N- and P- Type Semiconductors – Definitions and Examples.

ALLIED

PAPER – 2

CHEMISTRY – II

OBJECTIVE:

- Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins, Medicinal Chemistry, Corrosion and Applications wherever necessary are to be taught for II- semester.

UNIT – I

1.1 Coordination Chemistry - Nomenclature of Coordination Compounds - Ligands, Central Metal Ion and Complex Ion – Definition and Examples – Coordination Number - Werner's Theory of Coordination Compounds - Chelates - Functions and Structure of Haemoglobin and Chlorophyll.

1.2 Industrial Chemistry - Fertilisers and Manures – Biofertilisers - Organic Manures and their importance - Role of NPK in plants - Preparation and Uses of Urea, Ammonium Nitrate, Potassium Nitrite and Super Phosphate of Lime.

1.3 Contents in Match Sticks and Match Box - Industrial making of Safety Matches – Preparation and Uses of Chloroform, DDT, Gammexane and Freons.

UNIT – II

2.1 Carbohydrates - Definition and Examples - Classification – Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate.

2.2 Amino Acids – Definition and Examples - Classification of Amino Acids - Preparation - Gabriel Phthalimide Synthesis – Properties – zwitterion and Isoelectric point - Structure of Glycine.

2.3 Proteins – Definition - Classification of Proteins based on Physical properties and Biologcal functions - Primary and Secondary Structure of Proteins (Elementary Treatment only) – Composition of RNA and DNA and their Biological role - Tanning of Leather - Alum (Aluminum chloride tanning) - Vegetable tanning – Chrome Tanning.

UNIT – III

3.1 Electrochemistry - Electrolytes – Definition and Examples – Classification - Specific and Equivalent Conductance - their determination – Variation of Specific and Equivalent conductance with Dilution – Ostwald's Dilution Law and its Limitations.

3.2 Kohlrausch's Law - Determination of Dissociation Constant of weak Electrolytes using Conductance measurement - Conductometric titrations.

3.3 pH – Definition and pH determination by indicator method - Buffer solutions - Buffer action - Importance of buffers in the living systems.

UNIT – IV

4.1Paints - Components of Paint – Requisites of a Good Paint - Pigments – Classification of Pigments on the basis of Colour – Examples - Dyes – Definition – Chromophores and Auxochromes – Examples - Colour and Dyes - Classification based on Constitution and Application – Examples.

4.2 Vitamins – Definition – Classification – Water Soluble and Fat Soluble – Occurrence - Biological Activities and Deficiency Diseases caused by Vitamin A, B, C, D, E and K - Hormones – Definition and Examples – Biological Functions of Insulin and Adrenaline.

4.3 Chromatography - Principles and Applications of Column and Paper chromatography- R_f value.

UNIT – V

5.1 Drugs - Sulpha Drugs – Preparation and Uses of Sulphapyridine and Sulphadiazine - Mode of Action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicol and Streptomycin - Drug Abuse and Their Implication - Alcohol – LSD.

5.2 Anaesthetics - General and Local Anaesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS.

5.3 Electrochemical Corrosion and its Prevention – Electroplating – Applications.

ALLIED PRACTICAL

CHEMISTRY

VOLUMETRIC ANALYSIS

1. Estimation of HCl – Standard sulphuric acid.
2. Estimation of Borax - Standard Sodium Carbonate.
3. Estimation of NaOH – Standard Oxalic Acid.
4. Estimation of $FeSO_4$ – Standard FAS.
5. Estimation of Oxalic acid – Standard $FeSO_4$.
6. Estimation of FAS – Standard Oxalic Acid.
7. Estimation of Oxalic acid – Standard Oxalic Acid.
8. Estimation of Fe^{2+} using Diphenylamine / N- Phenyl Anthranilic acid as indicator.

ORGANIC ANALYSIS

Systematic Analysis of Organic Compounds containing One Functional Group and Characterisation by Confirmatory Tests.

Reactions of Aromatic Aldehyde, Carbohydrates, Mono and Dicarboxylic acids, Phenol, Aromatic Primary Amine, Amide and Diamide.

REFERENCE BOOKS

- Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).
- Inorganic Chemistry - B. R.. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications (2013).
- Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
- Text Book of Inorganic Chemistry – R. Gopalan, Universities Press – 2012.
- Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
- Advanced Organic Chemistry - Bahl and Arun Bahl - Sultan Chand and Co. Ltd – 2012.

- Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
- A Text Book of Organic Chemistry K. S. Tewari, N. K. Vishol, S. N. Mehrotra- Vikas Publishing House – 2011.
- Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishal Publishing Company – 2013.
- Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha andU. N. Dash - Sultan Chand & Co – 2006.
- Understanding chemistry – C. N. R. Rao, Universities Press – 2011.

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SCHEME OF VALUATION FOR ALLIED CHEMISTRY PRACTICALS

Internal assessment: 25 Marks

External assessment: 75 marks

Total: 100 marks

Max. Marks: 75

Record: 15 Marks

Volumetric Analysis: 30 Marks

Organic Analysis : 30 Marks

Volumetric Analysis : 30 Marks (Maximum)

Procedure : 5 Marks

Error upto 2 % : 25 Marks

2.1 to 3 % : 20 Marks

3.1 to 4 % : 15 Marks

4.1 to 5 % : 10 Marks

> 5 % : 5 Marks

Arithmetic error : Deduct 1 mark

Wrong calculation : Deduct 20 % of marks scored

No calculation : Deduct 40 % of marks scored

Organic Analysis : 30 Marks

Preliminary Reactions : 4 Marks

Aliphatic or Aromatic : 4 Marks

Saturated or unsaturated : 4 Marks

Tests for 3 elements : 9 Marks (3 x 3)

Tests for functional group : 9 Marks.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. MICROBIOLOGY

DEGREE COURSE
CBCS PATTERN
(With effect from 2017-2018)

The Course of Study and the Scheme of Examinations

S.NO	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title							
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper-1	6	5	Fundamentals of Microbiology	25	75	100
4	III	Core Practical	Practical-1	3	0		0	0	0
5	III	ALLIED - 1	Paper-1	4	4	Biochemistry I	25	75	100
6	III	Allied Practical	Practical-1	3	0		0	0	0
7	IV	Environ. Studies		2	2	Environmental Studies	25	75	100
				30	**19**		**125**	**375**	**500**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English	Paper-2	4	4	English	25	75	100
10	III	Core Theory	Paper-2	6	5	Microbial Physiology	25	75	100
11	III	Core Practical	Practical-1	3	3	Subjects covering Core Papers 1 & 2	25	75	100
12	III	ALLIED-1	Paper-2	4	4	Biochemistry II	25	75	100
13	III	Allied Practical	Practical-1	3	2	Biochemistry	25	75	100

14	IV	Value Education		2	2	Value Education	25	75	100
15	IV	Soft Skill		2	1	Soft Skill	25	75	100
				30	**25**		**200**	**600**	**800**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
16	I	Language	Paper-3	6	4	Tamil/Other Languages	25	75	100
17	II	English	Paper-3	6	4	English	25	75	100
18	III	Core Theory	Paper-3	3	3	Immunology	25	75	100
19	III	Core Practical	Practical-2	3	0		0	0	0
20	III	ALLIED-2	Paper-3	4	4	Human anatomy and physiology	25	75	100
21	III	Allied Practical	Practical-2	3	0		0	0	0
22	IV	Skill based Subject	Paper-1	3	3	Haematology and blood banking	25	75	100
23	IV	Non-major elective	Paper-1	2	2	Computer Applications in Biology	25	75	100
				30	**20**		**150**	**450**	**600**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
24	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
25	II	English	Paper-4	6	4	English	25	75	100
26	III	Core Theory	Paper-4	3	3	Microbial Genetics	25	75	100
27	III	Core Practical	Practical-2	3	3	Subjects covering Core Papers 3 & 4	25	75	100
28	III	ALLIED-2	Paper-4	4	4	Bio-statistics	25	75	100
29	III	Allied Practical-2	Practical-2	3	2	Human anatomy and physiology	25	75	100
30	IV	Skill based Subject	Paper-2	3	3	Vermi tech	25	75	100

31	IV	Non-major elective	Paper-2	2	2	Human microbial diseases, causes and control	25	75	100
				30	**25**		**200**	**600**	**800**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
32	III	Core Theory	Paper-5	7	5	Molecular Biology and Genetic Engineering	25	75	100
33	III	Core Theory	Paper-6	7	5	Medical Bacteriology	25	75	100
34	III	Core Theory	Paper-7	7	5	Medical Virology, Mycology and Parasitology	25	75	100
35	III	Core Practical	Practical-3	3	0	Subjects covering Core Papers 5, 6 & 7	0	0	0
36	III	Elective	Paper-1	3	3	Herbal Technology	25	75	100
37	IV	Skill based Subject	Paper-3	3	3	Mushroom culture techniques	25	75	100
				30	**21**		**125**	**450**	**600**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
38	III	Core Theory	Paper-8	5	5	Food Microbiology	25	75	100
39	III	Core Theory	Paper-9	5	4	Soil, Agricultural and Environmental Microbiology	25	75	100
40	III	Core Theory	Paper-10	5	5	Industrial and Pharmaceutical Microbiology	25	75	100
41	III	Core Practical	Practical-3	3	3	Subjects covering Core Papers 5, 6 & 7	25	75	100
42	III	Core Practical	Practical-4	3	3	Subjects covering Core Papers 8 & 9	25	75	100
43	III	Elective	Paper-2	3	3	Bio inoculants technology	25	75	100
44	III	Elective	Paper-3	3	3	Food analysis and quality control	25	75	100

45	IV	Skill based Subject	Paper-4	3	3	Bioinstrumentation	25	75	100
46	V	Extension Activities		0	1		100	0	100
				30	**30**		**300**	**600**	**900**

Part	**Subject**	**Papers**	**Credit**	**Total credits**	**Marks**	**Total marks**
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Sem)	2	4	8	100	200
	Allied (Even Sem)	2	4	8	100	200
	Allied -Prac(Even Sem)	2	2	4	100	200
	Electives	3	3	9	100	300
	Core	10	(3-7)	45	100	1000
	Core Practical	4	3	12	100	400
Part IV	Env. Science	1	2	2	100	100
	Soft skill)	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**41**		**140**	**1400**	**4100**

THIRUVALLUVAR UNIVERSITY

B.Sc. MICROBIOLOGY

SYLLABUS
UNDER CBCS PATTERN
(With effect from 2017-2018)

SEMESTER I

PAPER - 1

FUNDAMENTALS OF MICROBIOLOGY

Objective

To make the students to understand the fundamentals on microbes.

UNIT-I

Definition and scope of Microbiology - History of Microbiology. The origin of Microbial life - Theory of spontaneous generation. Pasteurs's Tyndall experiments fermentation studies. Contributions of Leewenhoek, Lister, Robert Koch, Thomas J.Burrill, Sergei N. Winogeadsky, Willen Beijerinck, Emil Christian Hansen, S.A. Wakmann, Alexander flaming, Stanely Iwenewsky - Impact of Microbiology and the future.

UNIT-II

Microscopy - simple, compound, dark field, phase contrast, Florescence & Electron microscopy. Staining methods and its principles.

UNIT-III

Microbial Evolution and Diversity - Endosymbiotic theory. Binomial nomenclature of Microbes. Classification - Five kindom concept - eight kindom concept (Cavalier Smith).

UNIT-IV

Anatomy of prokaryotes - cell wall, cytoplasmic membrane, cilia flagella capsule, cytoplasmic inclusions, sporulation.

UNIT-V

Sterilization - methods of sterilization and Disinfection. Antimicrobial chemotherapy - tests for sensitivity to antimicrobial agents.

Text Books:

1. Rajan. S and Selvi Christy (2015). Essentials of Microbiology, Anjanaa Book House Publishers, Chennai.
2. Pelczar Jr. M.J. Chan. E.C.S and Kreig. N.R (2006). "Microbiology"- 5th Edition Mc Graw Hill Inc. New York.
3. Ananthanarayan and Panikers (2013) Textbook Microbiology 9th edition, Universities Press (India) Private Ltd.
4. David, B.D., Delbecco, R., Eisen, H.N and Ginsburg, H.S (1990) "Microbiology" 5th Edition. Harper & Row, New York.
5. Dubey RC and Maheswari DK (2005). A text book of Microbiology, Revised Multicolour edition, S.Chand Publishers, New Delhi.
6. Purohit SS (2005). Microbiology - Fundamentals and Applications. Student Edition Publishers, Jodhpur.
7. Powar & daginawala (2005). General Microbiology Vol.I & II 8th Edition, Himalaya Publishing House, Mumbai.
8. Salle, AJ (2001). Fundamentals & Principles of Bacteriology. 7th edition. Tata McGraw-Hill, Davis,
9. Delbecco, Eisen & Ginsburg (1990) Microbiology 5th Edition Harper & raw, New York

Reference Books:

1. Lansing M. Prescott., John. P. Harley., Donald A, Klein, "Microbiology"-Mc Graw Hill Inc. New York.
2. Robert F.Boyd., "General Microbiology" 2nd Edition, Times MIRROR/Moshy College Publishing Virginia.

ALLIED - 1
PAPER - 1
BIOCHEMISTRY I

UNIT-I: Chemistry of Carbohydrates

Definition and Classification of carbohydrate. Monosaccharides - occurrence, structure; physical and chemical properties, linear and ring forms (Haworth formula) for glucose and fructose. Disaccharides - occurrence, structure; physical and chemical properties of sucrose and lactose. Polysaccharides - occurrence, structure, physical and chemical properties of starch.

UNIT-II: Chemistry of amino acids

Definition and classification of amino acids. Reaction with ninhydrin, common properties of amino acids, amphoteric nature, isoelectric point, isoelectric pH and Zwitter ion.

UNIT-III: Chemistry of Proteins

Classification based on solubility, shape and size. Physical properties: salting in and salting out, denaturation, peptide bond. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT-IV: Chemistry of Lipids

Definition, classification and functions of lipids. Occurrence, chemistry and biological functions of simple lipids, compound lipids (e.g. phospholipids) and derived lipids: steroids (e.g. cholesterol). Physical property-emulsification. Chemical property-saponification. Functions of bile acids and bile salts.

UNIT-V: Chemistry of Nucleic acids

Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNA and its biological functions. Structure, types and functions of RNA: tRNA, mRNA and rRNA. Differences between DNA and RNA.

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan , MJP Publishers, Chennai - 5.

SEMESTER II
PAPER - 2
MICROBIAL PHYSIOLOGY

Objective

To make the students to understand the physiology of microbes.

UNIT-I

Basic concepts of metabolism - Nutritional types of microorganisms uptake of nutrient in to the cell. Transport of nutrients by active and passive ways.

UNIT-II

Cultivation of microbes - Bacteria fungi, virus. Culture technique - media preparation. Types of media. Isolation of pure culture - preservation of cultures.

UNIT-III

Microbial growth - Growth curve measurement of microbial growth - Measurement of cell number, measurement of cell mass. Factors affecting growth.

UNIT-IV

Control of microbial growth by Antiseptics. Antiparasitic and Antiviral drugs - Antimicrobial resistance.

UNIT-V

Basic concepts of metabolism - Mechanism of ATP formation - Substrate phosphorylation. Electron transport, phosphorylation, photophosphorylation. Energy production during oxidation of organic substrate - Amino acid and assimilatory pathway. Bacterial enzymes - coenzymes - isoenzymes - structure, classification and properties.

Text Books:

1. Rajan. S and Selvi Christy (2015). Essentials of Microbiology, Anjanaa Book House Publishers, Chennai.

2. Ananthanarayan and Panikers (2013) Textbook Microbiology 9th edition, Universities Press (India) Private Ltd.

3. Pelczar Jr. M.J. Chan. E.C.S and Kreig. N.R (2006). "Microbiology"- 5th Edition Mc Graw Hill Inc. New York.

4. Sale, A.J (1992) "Fundamentals Principles of Bacteriology", 7th Edition. McGraw Hill Publishing Co. Ltd., New York.

5. Dubey, R.C. and Maheswari, D.K. (2005) A Text book of microbiology. S. Chand & Company Ltd. New Delhi.

6. David, B.D., Delbecco,. R., Eisen, H.N and Ginsburg, H.S (1990) "Microbiology" 5th Edition. Harper & Row, New York.

7. Dubey RC and Maheswari DK (2005). A text book of Microbiology, Revised Multicolour edition, S.Chand Publishers, New Delhi.

8. Purohit SS (2005). Microbiology - Fundamentals and Applications. Student Edition Publishers, Jodhpur.

9. Powar & daginawala (2005). General Microbiology Vol.I & II 8th Edition, Himalaya Publishing House, Mumbai.

10. Delbecco, Eisen & Ginsburg (1990) Microbiology 5th Edition Harper & raw, New York

Reference Books:

1. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L and Painter, P.R. (1986). "General Microbiology" -Mac Milan Education Ltd. London.

2. Dall, D.O and Rao, K.K (1995) "Photosynthesis" –Cambridge University press.

3. Chandar Sbekar, C.N. (2006). Manipal Manual of Physiology, CBS Publishers and distributors Pvt. Ltd., Chennai.

4. Pal, G.K and Pravathi Pal (2016), A text book of Practical Physiology, 4th Edition Universities Press (India) Pvt Ltd,

CORE PRACTICAL
PAPER 1 & 2

Objective:

To impart hand on training on basics of microbiology and microbial physiology.

1. Cleaning of glass ware.

2. Sterilization principle and methods-moist heat - dry heat and filtration methods.

3. Media preparation: Liquid media, solid media, Agar deep, Agar slants, Agar plates, Basal, enriched, selective media preparation - quality control of media, growth supporting properties and sterility check of media.

4. Pure culture technique: Streak plate, pour plate, spread plate, decimal dilution.

5. Cultural characteristics of microorganisms: Growth on different media, growth characteristics and description. Demonstration of pigment production and extraction.

6. Microscopy: Light microscopy, bright field microscopy, dark field microscopy and phase contrast microscopy.

7. Motility demonstration: Hanging drop preparation, wet mount, dark field microscopy, semisolid agar, Craigies tube method.

8. Staining techniques: Smear preparation, simple staining, Gram's staining, Acid fast staining, staining for metachromatic granules.

9. Morphology of microorganisms: Morphological variations in algae. Morphology of fungi, yeasts, slide culture techniques.

10. Antibiotic sensitivity testing: Disc diffusion test - Quality control with standard strains.

11. Micrometry: Determination of size of Bacteria, yeast. Fungal filaments.

12. Physiological characteristics: IMViC test, MR-VP test, H_2S, Oxidase, catalase, urease test, gelatin liquefaction, casein, starch degradation. Carbohydrate fermentation, Maintenance of pure culture, Paraffin method - Stab culture - maintenance of mound culture.

References Book:

1. Rajan. S and Selvi Christy (2015). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.

ALLIED - 1

PAPER - 2
BIOCHEMISTRY II

UNIT-I: Metabolism

Glycolysis, TCA cycle and its energetics, HMP shunt pathway. Deamination, transamination reaction, transaminase enzymes, Urea cycle.

UNIT-II: Metabolic Disorders

Diabetes mellitus, Glycogen storage diseases, Glycosuria, Ketosis, Jaundice, Phenyl ketonuria, Alkaptonuria. Dehydration: definition, causes, symptom and prevention.

UNIT-III: Enzymes

Definition, classification of enzymes with one example. Mechanism of enzyme action - Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Enzyme inhibition: competitive, uncompetitive and non competitive. Biological functions of enzymes.

UNIT-IV: Molecular Biology

Central dogma of molecular biology. DNA and RNA act as genetic material. Replication: Definition, types, mode of action of replication, mechanism of replication. General mechanism of transcription and translation. Genetic code.

UNIT-V: Vitamins

A brief outline of source, requirement, biological function and deficiency of Vitamins (fat soluble and water soluble vitamins).

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Robert K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan, MJP Publishers, Chennai-5.

ALLIED PRACTICAL
BIOCHEMISTRY I & II

PRACTICAL I

Volumetric Estimation

1. Estimation of HCl using Na2CO3 as link and NaOH as primary standard.

2. Estimation of Iron in Ferrous Ammonium Sulphate using potassium permanganate as link solution and oxalic acid as primary standard.

3. Estimation of Glucose by Benedict's method.

4. Estimation of Glycine by formal titration.

5. Estimation of Ascorbic acid.

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SEMESTER III
PAPER - 3
IMMUNOLOGY

Objective:

To make the students to understand the immune system

UNIT-I

History of Immunology - Immunohaematology. Blood groups - Blood transfusion - Host parasite relationships. Microbial infections.

UNIT-II

Structure and function of the cells, tissues and organs of immune system. Types of immunity - Humoral and cell-mediated, innate, acquired immunity. Complement system - function and pathways.

UNIT-III

Antigen - types, properties. Hapten, adjuvants, Immunoglobulins: Structure types properties and their function - Theory of antibody production.

UNIT-IV

Vaccines and Immunization - Types and their characteristics. Monoclonal Antibody - Hybridoma Technology. Cell mediated immune response - Lymphokines, Cytokines.

UNIT-V

Antigen-antibody interaction in vitro Agglutination, complement fixation, Precipitation, ELISA, RIA, Flow cytometry and Fluorescence immunoblotting – Hypersensitivity. Skin tests (In vivo).

Text Books:

1. Roitt, I.M (1998) Essential Immunology Blackwell Scientific Publishers.
2. Kuby, J. (1994) Immunology, 2nd edition, W.H. Freeman and Company. New York.
3. Leffel, Donnenberg, A: and rose, W.1997 hand book of human Immunology Boca Raton Fla: C.R.C Press.
4. Ajoy Paul (2016). Text Book of Immunology, Books and Allied (P) Ltd, Kolkatha.
5. Sudha Gangal and Shubhangi Sontakke, (2013) Text Book of basic and clinical Immunology, Universities Press (India) Private Ltd.

Reference Book:

1. Abbas, A.K. Lichtman, A.M. and Pober, J.S. (1997) Cellular and Molecular immunology 3rd edition Philadelphia: W.B. Saunders.

ALLIED - 2
PAPER - 3
HUMAN ANATOMY AND PHYSIOLOGY

Objective: To make the students to understand the importance of human anatomy.

UNIT-I: Respiratory System (RS) and Special Sensory Organs (SSS)

Introduction to applied human anatomy and physiology.

Respiratory System (RS): Different organs of the Respiratory System. Functions of the different organs of the Respiratory System.

Special Sensory Organs (SSS): Introduction to special sensory organs. Function and functions of eye, ear, nose, tongue, and skin.

UNIT-II: Gastro Intestinal (GI) System

Gastro Intestinal (GI) System: Different organs associated with the Gastro Intestinal system: (Salivary glands, Pancreas, Liver and Gall bladder and others).

UNIT-III: Musculoskeletal System (MSS), Skin and Nervous System (NS)

Musculoskeletal System (MSS) and Skin: Introduction of musculo-skeleton system. Different parts of involved in skeleton system. Function of skeleton. Parts and function of skin.

Nervous System (NS): Introduction to nervous system. Different organs and function of central nervous system (CNS) and peripheral nervous system PNS and related to infection

UNIT-IV: Circulatory System (CS) and Endocrine System (ES)

Circulatory System (CS): Blood: Site of formation, composition, functions of blood cells, Different parts of the circulatory system and its function.

Endocrine System (ES): Introduction to endocrine system.

UNIT-V: Reproductive System (RS) and Urinary System (US)

Reproductive System (RS): Introduction Male reproductive system – physiological anatomy, spermatogenesis and its regulation, testicular hormones, composition of semen Female reproductive system – menstrual cycle, pregnancy and parturition, lactation and family planning.

Urinary System (US): Different organs and Functions of Urinary System.
Mechanism of urine formation and composition of urine.

Text books:

1. Sampath Madhyastha, (2016) Manipal Manual of Anatomy, 3rd Edition, CBS Publishers and Distributors Pvt Ltd. Chennai.
2. Chandar Sbekar, C.N. (2006). Manipal Manual of Physiology, CBS Publishers and distributors Pvt Ltd., Chennai.
3. Chaurasia, B.D, (2005) Handbook of Human anatomy 3rd Edition, CBS Publishers and Distributors Pvt Ltd. Chennai.
4. Human physiology, 2nd edition- BJ Mejer, HS Meij, AC Meyer, AITBs publishers abd distributers.
5. Cell physiology by Giese, 5th edition, W.B Saunders Company, Tokyo, Japan.
6. A text book of animal physiology, KA Goel, KV Sastri, Rastogi publications Meerut.
7. Animal physiology and Biochemistry- RA Agarval, Anil. K, Srivastava, Kausshal Kumar, S. Chand & Co.
8. A Hand Book of Basic Human physiology- K. Saradha subramanyam, S. Chand & Co., Ltd.

References Books:

1. Srivastava, (2013), Text book of Anatomy, Books and Allied (P) Ltd, Kolkatha.
2. Suresh.R, (2012), Essentials of Human Physiology, Books and Allied (P) Ltd, Kolkatha.
3. Asis Das (2006), Medical Physiology, Books and Allied (P) Ltd, Kolkatha.
4. Guide to physiology- Y. Rajakshmi, S. Chand & Co., Ltd. Cathleen JW Wilson OBE Anne Wangh: Anatomy and physiology in Health and illness. Churchill Livingstone Publication, UK, NK, 1996.
5. Waugh A., Grant, A Ross and Wilson's Anatomy and Physiology in Health and Illness, 9th Edition, Churchill Livingston, London.2001.
6. Guyton AC and Hall JE. Guyton Human Physiology and Mechanisms of Disease. Hartcourt Publishers, Limited, 1996.
7. Williams PL (Ed). Gray' anatomy, Churchill Livingstone, London.

SKILL BASED SUBJECT
PAPER - 1
HEMATOLOGY AND BLOOD BANKING

UNIT-I

Blood: Definition, Characters, Composition. Collection of Blood - Capillary Blood: from Adults / Infants, Examinations employed. Advantages/Disadvantages - venous blood: from Adults / Infants, Examinations employed Advantages/Disadvantage. Anticoagulants: Definition - Type: Wintrobes /EDTA /Heparin /Citrate, Concentration, Examinations, Advantages /Disadvantage.

UNIT-II

Counting of Blood Cells: Neubaeur counting chamber - Total RBC count : diluting fluids , Macro dilution / Micro dilution technique , Falsely Law and High Counts , Normal values - Total WBC count : diluting fluids , Macro dilution / Micro dilution technique , Falsely Law and High Counts , Normal values - correction for TWBC - Absolute Eosinophil count - Differential Leucocyte count: Granulocyte / Agranulocytes, Morphology / Function, Staining Technique - Platelet Count : Morphological characters / Functions , Direct /Indirect method - Reticulocyte count, Dry/ Wet smear technique. Haemoglobin: Composition/Normal Values: Determinations: Tallqvist/Acid Haematin /Alkaline Haematin, Haldane's Carboxy/Drabkins /Dare, Spencers/Specific gravity/ Gasometric, Chemical.

UNIT-III

Coagulation Mechanism: Factors: Bleeding time, Clotting time. Halmotological indices:- Packed cell volume : Wintrobes / Micro HCT method - Mean corpuscular Volume - Mean corpuscular haemoglobin - Mean Corpuscular haemoglobin concentration - Volume index- volume thickness index - Mean corpuscular diameter - saturation index. Erythrocyte sedimentation etc, Principle-Determination: introbes / Westegren Method - advantages / disadvantages - Factors influencing.

UNIT-IV

Preparations of stains and staining techniques: Wright stain - Leishmans stain - Gienisa's stain -Jaswanth singh and Bhattarcharji stain - Fields stain - Peroxidase stain: Examination of Blood smear:-Peripheral smear report: Size/colour/shapes/inclusions -Blood parasites: Malarial parasite/Microfilaria.

UNIT-V

ABO Grouping: History/Discovery - slide / Tube technique - Rh. Typing: Slide / Tube technique, Bovine replacement technique - Coombs test: Direct /Indirect - Donor screening - Cross matching: Major / Minor - Collection Of blood / preservation /storage.

Text books:

1. Mukerjee, K.L. (1988). Medical Laboratory Technologies Vol I – III Tata McGraw Hill. Publishers, New Delhi.

2. Mukerjee, K.L. (1988). Medical Laboratory Technology: A Procedures Manual for Routine Diagnostic Tests. Tata McGraw Hill. Publishers, New Delhi.

3. Gadkar, P.B and Gadakar, D.P. Textbook Medical Laboratory Technology by Gudkar.

4. Medical Laboratory Technologies by Samuel. 5. Medical Laboratory Technologies by Malhotra.

5. Rajan. S and Selvi Christy (2010). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.

6. Pal, G.K and Pravathi Pal (2016), A text book of Practical Physiology, 4th Edition Universities Press (India) Pvt Ltd,

NON-MAJOR ELECTIVE
PAPER - 1
COMPUTER APPLICATIONS IN BIOLOGY

Objective

To make the students to understand the applications of computers in biology.

UNIT-I

Introduction to Computers. History of Computers, Basic Anatomy of Computers.

UNIT-II

Input and output devices, hardware and software. Operating system. MS Windows, Desk top publishing: MS Word, Data bases and graph generation: MS-Excel, project presentation: MS-PowerPoint.

UNIT-III

Programming in C (Basic) Introduction, simple programs, Decision is making and looping, functions, structures, input and output filing system.

UNIT-IV

Basic of WEB Design using HTML: Basic HTML, text styles, list and special characters, adding pointers and links, adding pictures, backgrounds and music, tables and frames.

UNIT-V

Computers in Taxonomy and Systemic Data Analysis in Microbiology. Computers in clinical microbiology - Computer applications in fermentation - Technology Computers in Drug - Designing using various software's in Drug designing.

Text Books:

1. Dave Taylor 1995 HTML. Tata McGraw - Hill Publishing Company Ltd, New Delhi

2. Paul McFedries 1997. Microsoft office 97 sams publishing techmedia, New Delhi.

3. Rajagopalan 1987. Understanding Computers Tata McGraw-Hill Publishing Company Ltd, New Delhi.

4. Sharon Crawford 1998. Windows 98 No Experience Required. BPB publications, New Delhi.

5. Yashwant Canetrar 1980. Let us C. BPP Publishers, New Delhi.

SEMESTER IV
PAPER - 4
MICROBIAL GENETICS

Objective:

To make the students to understand the genetics of microbes.

UNIT-I

Genetics - Historical Introduction - Discovery of DNA structure and organization of DNA and RNA - DNA and RNA as genetic material - Genetic code.

UNIT-II

Organization & functioning of prokaryotic genome plasmids - Structure and types - Replication of DNA.

UNIT-III

Gene transfer mechanism - transformation, transduction, Conjugation.

UNIT-IV

Oncogenes and cancer - Mutation - its types, transforming viruses carrying oncogenes - Retroviral oncogenes - Immortalization & transformation.

UNIT-V

RNA and Protein synthesis in prokaryotes and eukaryotes. Operon concept - Lac & Try Operon. Mutagenesis - Mutation - Mutants - Types of mutants - DNA repair mechanism.

Text Books:

1. Lodish, H. Baltimore Daerk . A. Zipsury, S.L. Marsudaisa. P. Darnel. J. (1995) Molecular cell biology.

2. Gardner- Simon snustad Principles of genetics, 8th Edition. John Wiley & sons. Inc. New York.

Reference books:

1. Maloy, S.R. Cronan Jr. J.E, Freifelder D (1994), Microbial genetics. Jones and Barlett publishers.

2. Ajoy Paul (2011). Text Book of Genetics- from Genes to Genomes, Books and Allied (P) Ltd, Kolkatha.

CORE PRACTICAL - 2
PAPER 3 & 4

Objective:

To impart hands on training on immunology and microbial genetics.

1. Blood groups and Rh. typing coomb's test.

2. Precipitation reaction in gel. Ouchterlony double immuno diffusion test, single redial immuno diffusion test.

3. VDRL, RPR

4. Agglutination reactions: Slide and Tube methods RBC agglutination IHA, TPHA, Bacterial agglutination: Widal, typing of bacteria Latex agglutination: RA, ASLO (Latex) B HCG.

5. Complement fixation test. Titration of amboceptor complements (Demonstration only)

6. Immunofluorescence, ELISA (Demonstration only).

7. Isolation of Buffy coat, using heparin lymphocytes (T cells, B cells) enumeration of different cells types, Peripheral blood cell counts, absolute cell counts.

8. Antibody productions in rabbits against sheep RBC and its titration (Demonstration only).

9. Anaphylactic reactions in guinea pigs. Authorities' reaction in rabbits. (Demonstration).

10. Skin tests. Both immediate and delayed hypersensitivity reactions of egg proteins, bacterial, fungal antigens.

ALLIED - 2
PAPER - 4
BIOSTATISTICS

Objective:

To make the students to understand the biostatistics.

UNIT-I

Nature and scope of statistical methods and their limitations - compilation Classification and tabulation of statistical - data.

UNIT-II Events and sets - samples space - concepts of probability - Addition and multiplication theorem on probability - conditional probability and independence of events.

UNIT-III

Coefficient of correlation - scattered diagram - regression lines.

UNIT-IV

Standard distributions - Binomial Poisson and normal distributions - Standard distributions - Binomial Poisson and normal distributing. To test based on normal - t, Chi - square and R- non parametric test run median, Sign, Mann, Whitney and Wilcox signed rank test.

UNIT-V

Principles of scientific experiment Randomization replication and local control Analysis of Variance - One way and two way classifications.

ALLIED PRACTICAL-2
(Subjects covering Paper- Allied - 2 Paper – 3 only)

HUMAN ANATOMY AND PHYSIOLOGY

Objective:

To impart hands on training on human anatomy and physiology

1. Absolute Eosinophil Count
2. Demonstration of ECG/Echo and its interpretation techniques.
3. Determination of Bleeding Time and Clotting Time
4. Determination of Erythrocyte Sedimentation Rate
5. Determination of Specific Gravity of Blood
6. Estimation of Bile Salt
7. Estimation of Hemoglobin Concentration
8. Estimation of Urine albumin,
9. Estimation of Urine sugar
10. Hair perforation Test
11. Measurement of Pulse, BP
12. Preparation and Examination of Blood smear
13. Serum cholesterol analysis
14. Serum Sugar analysis
15. Study of different histological slides
16. Total Platelet count

Reference books:

1. Rajan. S and Selvi Christy (2010). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.
2. Pal, G.K and Pravathi Pal (2016), A text book of Practical Physiology, 4th Edition Universities Press (India) Pvt Ltd.

SKILL BASED SUBJECT
PAPER - 2
VERMITECH

UNIT-I

General properties of the soil - structure of the soil -sand, clay, salt, types of soils - soil organisms.

UNIT-II

Physical properties of soil - soil colour, soil moisture, soil temperature, bulk density of soil, chemical properties of soil PH, Electrical conductivity, organic, Nitrogen, Phosphate and potash.

UNIT-III

Soil biota -Earthworms -Ecological classification of earth worms as Epigeics - Introduction to earthworm biology -physical and chemical effects of earth worms on soils - Role of earthworms in soil -classification of earthworms based on ecological strategies- Burrowing activity of earthworms- Drilospheres -Microorganisms and their relationship with earthworms.

UNIT-IV

Composing -anaerobic composing, aerobic composing, types of composing, vermicompost- earthworm species used in vermicompost production - endemic species, exotic species.

UNIT-V

Vermicopost -setting up vermicompost quality N, P, K, C, N, Microbial quality applications - vermiculture -vermiwash -role of vermicompost in organic farming - its quality and advantages over chemical inputs. Earthworms in Bio-reclamation of soil. Problems in vermiculture units - remedial suggestions. Vermicomposting as a tool for solid waste management - a small scale industry and its economics.

Reference Books:

1. Brady, C.N, 1974 "The Nature and Properties of soils" Macmillan publishing Co. New York, London. 2. Edwards, C.A., and Bohlen, P.J., 1996. Biology and Ecology of Earthworms, Chapman and Hall, London Ismail, S.A., 1997, Vermicology: The Biology Earth worm Orient Longman.

3. Kale Radha,D 1998. Earthworm: Cinderella of organic farming. Prism Books Pvt. Ltd., Bangalore.

4. Satchell, J.E., 1983 Earthworm ecology: From Darwin to Agriculture. Chapman and Hall, London StephensonJ., 1923. The fauna of British India -Oligo.

NON MAJOR ELECTIVE
PAPER – 2
HUMAN MICROBIAL DISEASES, CAUSES AND CONTROL

UNIT I:

Morphology, pathogenicity and laboratory diagnosis of Gram positive organisms, *Staphylococcus aureus, Streptococcus pyogenes, Bacillus anthracis, Corynebacterium diphtheriae, Clostridium perfringens, Clostridium tetani*. Morphology, pathogenicity and laboratory diagnosis of Gram negative organisms - *Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, Salmonella typhi, Shigella dysentriae, Pseudomonas aeuruginosa, Vibrio cholerae*.

UNIT II:

Morphology, pathogenicity and laboratory diagnosis of *Mycobacterium tuberculosis, Mycobacterium leprae, Treponema pallidum, Leptospira icterohaemorragens, Chlamydia trachomatis, Rickettsia rickettsi.*

UNIT III:

Mycology, superficial infections – Dermatophytes – *Microsporum – Trichophyton, Epidermophyton* – Madura mycosis – Opportunistic fungal infections – *Candida albicans, Aspergillus, Mucor.*

UNIT IV:

Parasitic diseases – *Plasmodium vivax, Giardia, Taenia solium, Ancylostoma, Ascariasis, Wuchereria bancrofti, Enterobius, Trichuris trichura*.

UNIT V:

Antibiotics and chemotherapeutic agents – mechanism of actions – Drug resistance – Antimicrobial susceptibility testing – Disc diffusion – Kirby Bauer - MIC, MBC, Serum killing power.

Text books:

1. Ananthanarayanan, R. and C.K., Jayaram Paniker, Textbook of Microbiology. Orient Longman, 5th Edition, (1994).
2. Jawetz, E., Melnic, J.L. and Adelberg E. A., Review of Medical Microbiology Lange Medical publications, USA, 4th Edition, (1998).

Reference books:

1. Mackie and Mc Cartney, Medical Microbiology No 1 and II. Churchill Livingston, 14th Edition, (1994).
2. Chakraborty, P. A text book of microbiology, New central Book agency pvt Ltd. Calcutta, 2nd Edition, (1995).
3. Bailey and Scotts, Diagnostic Microbiology, Baron and Finegold CV Mosby publications, 9th Edition, (1994).

SEMESTER V
PAPER - 5
MOLECULAR BIOLOGY AND GENETIC ENGINEERING

Objective

To make the students to understand the molecular biology and genetic engineering.

UNIT-I

Historical perspectives - Synthetic DNA, DNA amplification technique - PCR.

UNIT-II

Preparation of genomic library, DNA library, gene cloning system, vectors enzymes, expression system.

UNIT-III

Application of genetic engineering in medical field - genetherapy, vaccines preparation, Hybridoma and monoclonal antibody techniques.

UNIT-IV

Application in agricultural field - Production of biotechnological products. Food - SCP (algae, yeast, mushrooms, Biopesticide) 'Nif' gene - transfer - development of resistant plant variety,

UNIT-V

Application in Pharmaceuticals - antigens, interferons, vaccines, insulin, Social impact of recombinant DNA technology.

Text Books:

1. Old, R.S. and Primrose, S.B. (1995) Principles of Gene manipulation. An introduction to genetic Engineering. 5th Edition. Blackwell Scientific Publication, London.

2. Lodish, H. Baltimore Daerk . A. Zipsury, S.L. Marsudaisa. P. Darnel. J. (1995) Molecular cell biology.

Reference Books:

1. Click. B.R. and-Pasternat J.J. (1994) Molecular Biotechnology. ASM press. Washington DC.

2. Benjamin Lewin (1997) Genes VI, Oxford University Press.

3. Ajoy Paul (2007). Textbook of Cell and Molecular Biology, Books and Allied (P) Ltd, Kolkatha.

PAPER - 6
MEDICAL BACTERIOLOGY

Objective:

To make the students to understand the medical bacteriology.

UNIT-I

Normal microbial flora of human body; General attributes and virulence factors of bacteria causing infections. Host Parasite relationships.

UNIT-II

Specimen Collection, Transport and Storage; Specimen processing. (Blood, Urine, GSF, Sputum, other body fluids)

UNIT-III

Classification morphology, cultural characteristics, pathogenicity, epidemiology, laboratory diagnosis, treatment, prevention and control of diseases caused by: Staphylococci, Streptococci, Pneumococci, Neisseriae (Gonococci and Meningococci), Corynebacterium, Mycobacterium, Clostridium, Bacillus, Pseudomonas and Haemophilus.

UNIT-IV

Human Pathogens - of Salmonella, Shigella, Vibrios, Brucella, Bordetella, Escherichia, Gramnegative anaerobes, Spirochaetes, Rickettsiae, Chlamydiae, Mycoplasmas and Ureoplasmas.

UNIT-V

Zoonotic diseases and their control; Hospital acquired infections and their control; Hospital waste disposal; Ethical committee and their functions.

Text Books:

1. Ananthanarayanan R. and Jayaram Panicker C.K. (1994). Text book of Microbiology. Orient Longman.
2. Balasubramanian, A. and Senthil kumar, P.K, (2017) Medical Microbiology. Darshan Publication, Rasipuram.
3. Salle, A.J. (1992). Fundamental Principles of Bacteriology. 7th Edition, Mc. Graw Hill Publishing Co. Ltd., New York.
4. Baron, E.J. and Finegold S.M. (1995). Scientific Company. Diagnostic Microbiology. Blackwell Scientific Company.

Reference Book: 1. Bergeys Manual of determinative Bacteriology.

PAPER - 7
MEDICAL VIROLOGY, MYCOLOGY AND PARASITOLOGY

Objective

To make the students to understand the medical virology, mycology and parasitology.

UNIT-I

General properties of viruses - Detection of viruses and antigens in clinical specimens - Serological diagnosis of virus infections. Cultivation of viruses. Structure & properties of viroids, prions.

UNIT-II

Arthropod borne and rodent borne virus diseases - Picorna viruses and diseases, Hepatitis viruses-Rabies and other neuro viruses - Orthomyxo and paramyxo viruses. Pox, Adeno, Horpes, Reo, Rota and AIDS viruses. Oncogenic viruses. Viral vaccines, their preparation and their immunisation schedules. Viruses of importance to plants and soil.

UNIT-III

Viruses of importance to bacteria - Bacteriophages - Their structure, types - Uses in Microbiology - Typing and application in bacterial genetics.

UNIT-IV

General Introduction Morphology and taxonomy of fungi of medical importance. Detection and recovery of fungi from clinical specimens. Dermatophytes and agents of superficial mycoses. Yeasts of medical importance dimorphic fungi causing systemic mycoses.

UNIT-V

Classification Morphology, Pathogenicity, lab diagnosis of common protozoan diseases - Amoebiasis, Giardiasis, Balantidiosis, Trypanosomiasis, Malaria, Toxoplasmosis, Leishmaniasis. Classification Morphology, Pathogenicity, lab diagnosis of common parasitic metazoan diseases – Ascariasis, Hook worm, Filariasis, Hydatidosis, Taenia infection.

Text Books:

1. Rajesh Karykarte and Ajit Damle (2003). Medical Parasitology, 3rd Edition. Books and Allied (P) Ltd, Kolkatha.

2. Balasubramanian, A. and Senthil kumar, P.K, (2017) Medical Microbiology. Darshan Publication, Rasipuram.

3. Morag C. and Timbury M.C. (1994). Medical Virology, 10th Edition. Churchil Livingston London.

4. Dimmock N.J., Primrose S.B. (1994). Introduction to Modern Virology 4th Edition. Blackwell Scientific Publications. Oxford.

5. Conrat, HF, Kimball, PC and Levy JA, (1994). Virology. 12th Edition. Prentice Hall, Englewood Cliff. New Jersey.

6. Parija, S.C. (1996). Textbook of Medical Parasitology. Orient Longman.

7. Jagdish Chandra (1996) Textbook of Medical mycology. Orient Longman.

Reference Books:

1. Baker, F.J. and Brech (1990) Medical Microbiologigal techniques. Butter worths, London.

2. Chatterjee, K.D. Parasitology, M.D. 12th Edition. Chatter (1980) Joe media Publishers Culcutta.

ELECTIVE
PAPER - 1

HERBAL TECHNOLOGY

OBJECTIVES

To enable the students to understand the basic knowledge in Herbal technology.

UNIT - I

Pharmacognosy: Pharmacology - Definition and history, Indian systems of medicine - Siddha, ayurvedha, and Unani systems. Taxonomy of locally available medicinal plants, their chemical constituents and medicinal uses - Classification of Crude drugs - Chemistry of Drugs - Future of pharmacognosy.

UNIT - II

Classification of medicinal plants - Vernacular name and family - Geographical source, cultivation, collection, and processing for market and commerce in crude drugs. Morphological and histological studies, chemical constituents - Therapeutic and other pharmaceutical uses. Underground stem - ginger, Alpinia - Roots - Rauolfia - Belladona - Aerial parts - Bark - Cinchona.

UNIT - III

Leaves - Adathoda, Eucalyptus - Flower - Clove fruits seeds - Nux vomica Nutmegs, Gooseberry - unorganized drugs - Gum - Acacia - Resin - Turpentine, fixed oil - castor oil.

UNIT - IV

Herbal medicines for Human ailments - Drugs acting on cardiac diseases, cerebral diseases, Nasal, diseases - Blood pressure Drugs acting on Nervous system - Depressants. - stimulants - Respiration and Drugs - Urogenital system and drugs - Psychoactive plants.

UNIT - V

Propagation of medicinal plants - Micro and macro propagation conservation of rare medicinal plants Role of biotechnology in medicinal plants banks - cultivation of medicinal and aromatic plants - Drug adulteration - methods of Drug evaluation, Herbal food - Food processing - packaging - Herbal sale and Export of medicinal plants - marketing - Intellectual property rights - Export laws.

Reference books:

1. Agarwal, S.S and Paridhavi, M (2012) Herbal Drug Technology, 2nd Edition. Universities Press (India) Private Ltd.
2. Wallis, T.E, Text book of pharmacognosy by 5th edition. CBS publishers and distributors Chennai.
3. Kuntal Das (2014). Herbal Plants and their Applications in Cosmeceuticals, CBS publishers and distributors Pvt. Ltd., Chennai.
4. George Edward Trease and W.C. Evans - Pharmacognosy 12th edition, English Language Books Society, Baelliere Tindall.
5. Handa, S.S. and Kapoor, V.K. Pharamcognosy by 2nd Edition, Vallabh Prakashan Publishers, New Delhi.
6. Jain, S.K (1980) Indian Medicinal plants.
7. Kokate, C.K., Durohit, A.P. and Gokhale, S.R., Pharmacognosy by 12th edition - Nirali Prakasham Publishers, Pune.
8. Kumar N.C. (1993) Introduction to Medical Botany and Pharmacognosy.
9. Nadkarni (1981) Indian Materia Medica.
10. Shah, S.C. and Qudary (1990). A text book of Pharmacognosy.

SKILL BASED SUBJECT
PAPER - 3
MUSHROOM-CULTURE TECHNIQUES

UNIT-I

Edible and non-edible mushroom (Historical account, most commonly cultivated mushrooms in the world, distribution and production in various countries).

UNIT-II

Cultivation of button mushroom -morphology raising a pure culture & spawn preparation. Preparation of compost & cultivation of Agaricus bisporus, Pleurotus flabelltus, harvest.

UNIT-III

Cultivation of oyster and paddy straw mushroom - preparation of pure culture & spawn cultivation methods, harvest.

UNIT-IV

Pests and diseases of Edible mushrooms (Environmental, fungal, bacterial, viral, insect pests and Nematode diseases and competitor moulds.

UNIT-V

Economics of mushroom cultivation (fixed assets, recurring expenditure, labour, economics of cultivation throughout the year and seasonal growing formulation of project report for getting finance from funding agencies). Precautions in mushroom cultivation (precaution to be taken while selecting the area, spawn preparation, spawn run, during cropping harvesting etc.). Mushroom recipes (western and Indian recipes, pickles, powders, jams etc.

Reference books:

1. Changs. T. W.A. Hayanes 1978. "Biology and cultivation of Mushrooms" Acad Press.N.Y.

2. Zadrazil. F & K. Grabbe 1983 "Edible Mushroom, Biotechnology" Vol. 3, Weinheim: Verlag Chemie, Berlin.

3. Kannaiyan. 2001. Handbook of Edible Mushrooms" TNAU Publication.

SEMESTER VI
PAPER - 8
FOOD MICROBIOLOGY

Objective

To enable the students to understand the microbes in the food.

UNIT – I

Food as a substrate for microorganisms - factors affecting the growth of micro-organism in food. Mold, yeast and bacteria- general characteristics, classification & importance.

UNIT – II

Principles of food preservation – Methods of food preservation – asepsis, removal of microorganism anaerobic conditions, high temperature- low temperature, drying and food additives – Canning.

UNIT – III

Contamination and spoilage of milk and milk products, meat and meat products, fish and fish products, vegetables and fruits and canned food.

UNIT – IV

Fermented foods – Bread, malt beverages, Beer & wine, vinegar, fermented vegetables – Fermented Dairy products. Microorganisms as food –SCP.

UNIT –V

Food bore disease – food borne infections and intoxication – laboratory testing – preventing measures - food sanitation – plant sanitation.

Text books:

1) Frazier, W.C and Westhoff, D.C (1988). Food microbiology, 4th edition, Tata Mac Graw Hill, New Delhi.

2) Adams, M.R and Moss M.O (1995) Food Microbiology New Age International (p) Limited Publishers.

3) Banwart, G.J., (1989). Basic Food Microbiology, 2nd Edition CBS Publishers and Distributors, New Delhi.

4) Robinson R.K (1990) Dairy Microbiology, Elsevier Applied science, London.

5) Hobbs BC Roberts D (1993). Food Poisoning and Food Hygiene Edward Arnold, London.

PAPER - 9

SOIL, AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY

Objective

To enable the students to understand the microbes in the Agriculture and environment.

UNIT-I

Soil – physical and chemical properties of soil – types of sil – Microflora of soil.

UNIT-II

Biogeochemical cycles – carbon, nitrogen, phosphorus, sulphur and iron. Organic matter decomposition - Composting & Vermicomposting. Biopesticide (Bacterial, Viral & Fungal).

UNIT-III

Microbial interaction between microorganisms, plants and animals – Rhizosphere, phyllosphere. Rumen microbiology.

UNIT-IV

Microbiology of air – Sources of microorganisms in air – Assessment of air quality – air sampling techniques – Enumeration of air borne organisms – air borne diseases – air sanitation.

UNIT-V

Aquatic Microbiology – Ecosystems – Fresh water (Ponds, Lakes, Streams, Marine, Esturies, Mangrooves, Deep sea). Microbial assessment of water quality – Water purification. Water borne diseases. Waste treatment – Solid and liquid waste treatment.

Text Books:

1. Alexander. (1997). Introduction to soil Microbiology. John Wiley and Sons. N.Y.

2. Subba Rao, N.S. (1995) .Soil Micro organisms and plant growth, Oxford and IBH publishing Co. Pvt. Ltd.

3. Atlas, R. M. and Bartha. R. (1992). Microbial Ecology: Fundamentals and Applications. 3 rd Edition. Benjamin| Cummings. Redwood City. CA.

Reference Books:

1. Michell, R. (1974). Introduction to Environmental Microbiology. Prentice- Hall. Inc. Englewood Clilffs – New Jersy.

2. Paul, E.A. and Clark. F.E. (1989). Soil Microbiology and Biochemistry. Academic pres New York.

3. Subba Rao, N.S. (1995). Biofertilizers in Agriculture and Forestry. 3rd Edition. Oxford and IBH publication Co. Pvt. Ltd., New Delhi.

PAPER - 10
INDUSTRIAL AND PHARMACEUTICAL MICROBIOLOGY

Objective

To enable the students to understand microbial processes in industries and pharmaceutical companies.

UNIT-I

Industrially important microbes and their products, screening, strain development strategies.

UNIT-II

Food fermentations and food produced by microbes, bread, fermented dairy products. Microbial cell as food, feed, SCP.

UNIT-III

Bioreactors – Structure and types. Fermentation media, media sterilization, Types of fermentation (Batch and Continuous) and downstream processing.

UNIT-IV

Microbial productions of citric acid, lactic acid, acetic acid, alpha amylase. Ethanol. Production of pharmaceutical compounds through microbes – TPA, Insulin, Recombinant Vaccines.

UNIT-V

Tannery technology – Tanning – types of tanning – chrome tanning and vegetable tanning. Tanning Process (pre tanning, tanning, post tanning and finishing). Treatment of tannery effluents by microbes.

Text Books:

1. Hugo, W.B., Russell, A.D, pharmaceutical Microbiology 4th edition. Blackwell scientific publications / Oxford.
2. Balasubramanian D, Bryce CFA, Dharmalingam K, Green J, Jayaraman K. (1996). Concepts in Biotechnology, University Press, India.
3. Satyanarayana.U, Biotechnology, Books and Allied (P) Ltd, Kolkatha: 2005.
4. Glazer AN, Nikaido H. (1994) Microbial Biotechnology - Fundamentals of Applied Microbiology WH Freeman and Company, New York.
5. Arumugam, N. and Kumaresan, V. (2016) Fundamentals of Biotechnology, Saras Publication, Nagercoil.

Reference Books:

1. Russell and Ayliffe, G.A.J (1982) Principles and practice of Disinfection, preservation and sterilization Oxford:

2. Gregory P.H. Microbiology of the atmosphere, 2nd edition. Leonard Hill.

3. Mann, I. Process of utilization of Animal by products, FAO Rome 1962.

4. Scaria .K.J. Mahendrakumar and Divakaran, S. Animal byproducts – Their processing and utilization, CLRI, Madras, 1961.

CORE PRACTICAL - 3

PAPERS 5, 6 & 7

Objective

To impart hands on training on molecular biology, genetic engineering and medical microbiology.

1. General requirements of collections, transport of clinical specimens Direct examinations - staining of specimens, - Methods of enriched, selective and enrichment culture techniques used to isolate organisms from clinical materials.
2. Wet mounts examinations of stool for parasites. Cholera stool, vaginal specimens for Trichomonas.
3. KOG and Lacto phenol preparations for skin scrapings, for fungi and for scables mites.
4. Simple, differential and special staining of clinical materials viz. Throat swab, vaginal swab, slit smears, pus, urine, sputum, stool etc.,
5. Enumeration of Bacteria in urine. Quantitative test for yeasts.
6. Estimation of worm burden in stool. Floatation and sedimentation techniques of stool examination.
7. Germ tube, Assimilation, fermentation tests for yeasts.
8. Isolation and identification of bacterial pathogens from clinical specimens their biochemical reactions.
9. Antimicrobial sensitivity testing and determination of MIC and quality control.
10. Identification of pathogenic microbes including viruses in slides / smears / specimens as spotters.

CORE PRACTICAL - 4

PAPERS - 8 & 9

Objective

To impart hands on training on microbes of food, agriculture and environment and industrial and pharmaceutical microbiology.

1. Water analysis by MPN technique Presumptive coli forms test Confirmed coli forms test Completed coli forms test.

2. Isolation of microorganisms from air - air sampler technique - settle plate method.

3. Isolation and counting of fecal bacteria from water.

4. Detection of bacteria in milk by SPC - Dye reduction test Detection of number of bacteria in milk.

5. Litmus mil reaction. 6. Isolation of lactobacilli and staphylococcus from curd.

7. Azolla - Morphological study; Seed inoculation with rhizobia.

8. Isolation of bacteria and fungi from spoiled food. 9. Isolation of fungi from molting leaves.

ELECTIVE
PAPER - 2
BIOINOCULANTS TECHNOLOGY

UNIT- I

General account of the microbes used as biofertilizers for crop plants and their advantages. Symbiotic N2 fixers: Rhizobium - Isolation, characterization, identification, Classification, inoculum production and field application. Frankia - Isolation, characterization - actinorrhizal nodules - non-leguminous crop symbiosis.

UNIT- II

Non - Symbiotic N2 fixers - Azospirillum - Free living - Azotobacter - free isolation, characterization, mass inoculum production and field application.

UNIT-III

Symbiotic N2 fixers - Cyanobacteria, Azolla - Isolation, characterization, mass multiplication - Role in rice cultivation - Crop response – field application - immobilization.

UNIT-IV

Phosphate solubilizers - Phosphate solubilizing microbes - Isolation, characterization, mass inoculum production, field application - Phosphate solubilization mechanism.

UNIT-V

Mycorrhizal bioinoculants - classification - importance of mycorrizal Ectomycorzhizae - Endomycorrhizae - Ectendo mycorrhizae - Taxonomy of mycorrhizae - Isolation of VA mycorrhizae - Quantification and assessment of VAM in roots - Mass inoculum production of VAM - field applications of Ectomycorrhizae and VAM.

Reference:

1. Kannaiyan, S. (2003). Bioetchnology of Biofertilizers, CHIPS, Texas.
2. Mahendra K. Rai (2005). Hand book of Microbial biofertilizers, The Haworth Press, Inc. New York.
3. Reddy, S.M. et. al. (2002). Bioinoculants for sustainable agriculture and forestry, Scientific Publishers.
4. Subba Rao N.S (1995) Soil microorganisms and plant growth Oxford and IBH publishing co. Pvt. Ltd. NewDelhi.
5. Subba Rao N.S. (1988) Biofertilizers in Agriculture and forestry Oxford and IBH Publishing Co., Ltd., New Delhi.

ELECTIVE
PAPER - 3
FOOD ANALYSIS AND QUALITY CONTROL

Objectives: The paper focuses on physical, chemical, microbial and sensory analysis of food, concepts of quality control and quality management, national and international food loss and adulterants in various food products

UNIT-I

Sampling – Sampling techniques and preparation of food samples.

Techniques used in food analysis – Chromatography, Electrophoresis, Electrometric determinations, Refractometry and Polarimetry Spectrophotometry, Fluorimetry, Radio - active tracer techniques, Atomic absorption

UNIT-II

Physico chemical methods for food analysis - Moisture and Total solids, Carbohydrates, Proteins, Fats, Fiber, Ash and its types, Minerals, Vitamins. Enzymatic methods

Biological methods of food analysis - Standard plate count; Plate loop method; Spiral plate; Droplet technique; Dye reduction; Catalase test and ELISA. Testing of food for organisms such as *B. cereus, C. botulinum, E. coli, L. monocytogenes, S.aureus, Salmonella* and *Shigella.*

UNIT-III

Sensory assessment of food quality –Appearance of food, Flavor of food, Texture of food.

Sensory Tests – Difference, Rating and Sensitivity tests. Types of panels, Testing area and schedule.

Quality control of following food products – Milk and milk products, Oils and Fats, Cereal grains and flours, Fruits and vegetable products, Canned foods, Egg and egg products, Meat and Meat products

UNIT-IV

Food quality management – Objectives, Importance and Functions of quality control. Total quality, management, Good manufacturing practices, seven principles of HACCP and codex in food. Quality control, methods of – a. raw materials, b. manufacturing process and c. finished products.

UNIT-V

Food Safety – Role of voluntary agencies and legal aspects of consumer protection. National and International food laws – PFA, FDA, BIS, AGMARK, Essential Commodity Act, Export (quality and inspection act, Consumer protection act), Nutritional labeling requirements of foods, Food adulteration.

INDUSTRIAL VISIT: Food and Pharmaceuticals Industry and Report.

References books:

1. Pomeranz.Y, Meloan.C.E, 1996, Food Analysis – Theory & Practice, CBS Publiushers, New Delhi.
2. Adams, M.R and Moss M.O (1995) Food Microbiology New Age International (p) Limited Publishers.
3. Ananthanarayanan R and CK Jayaram Panicker, 1994, Textbook of microbiology Orient Longman.
4. Chakraborty P 1995, A Text book of microbiology, New Central Book Agency Pvt Ltd. Calcutta.
5. Rajan. S and Selvi Christy (2010). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.
6. Debnath, 2005, Tools & Techniques of Biotechnology, Pointer Publishers, Jaipur.
7. Frazier, W.C and Westhoff, D.C (1988). Food microbiology, 4th edition, Tata Mac Graw Hill, New Delhi.
8. Jacobs.M.B., 1999, Chemical Analysis of Food & Food Products, CBS Publiishers, New Delhi.
9. Jay.J.M, 1996, Modern Food Microbiology, CBS Publishers, New Delhi.
10. Nielsen, S.S, 2004, Introduction to chemical Analysis of foods, CBS Publishers, New Delhi.
11. Ranganna. S., 2001, Handbook of Analysis & Quality control for Fruit & Vegetable Products, Tata McGraw Hill, New Delhi.
12. Robinson R.K (1990) Dairy Microbiology, Elsevier Applied science, London.
13. Salle, A.J. (1992). Fundamental Principles of Bacteriology. 7th Edition, Mc. Graw Hill Publishing Co. Ltd., New York.

SKILL BASED SUBJECT
PAPER - 4
BIOINSTRUMENTATION

UNIT-I

Centrifuge: Basic principles of sedimentation – relative centrifugal force – Types of centrifuges (clinical, high speed, refrigerated and ultra). Centrifugation - Principles and various types – Applications.

UNIT-II

Calorimetry – principle, Beer – Lambert's law – Applications. Spectrophotometry – UV & Visible, Parts of a spectrophotometer – IR, NMR & Atomic absorption spectrophotometry – Applications.

UNIT-III

Chromatography – Paper, TLC, Column, Adsorption, Ion exchange, GC & HPLC – Principle & applications.

UNIT-IV

Electrophoresis techniques: proteins and nucleic acids – Types of electrophoresis – Paper, Gel, Immunoelectrophoresis.

UNIT-V

Radioisotopes and their applications. Radioisotopic techniques – RIA. Detection and measurement of radioactivity – GM counter, Scintillation counter, Autoradiography. Biosensor & its types.

Text books:

1. Keith Wilson and John Walker, 1994. Practical Biochemistry – principles and techniques. Cambridge Press, New York.

2. Principles of Applied Biomedical Instrumentation – A. Geddes and L.E Baker John Wiley & Sons.

3. Instrumental methods of analysis – Den, Williard & Merrit. Asian Edition.

Industrial Visit (IV)

Factory Industrial Visit (M. Sc. Applied Microbiology)

Course Objectives: Students will be exposed to professional work environment to acquire the knowledge, independent working capacity and leadership so that at the end of the course they will be able to manage the laboratory and research work with full responsibility and reliability.

Factory Industrial Visit Guide Line: Internship will be conducted in an institute under the supervision of supervisor/s.

During the **Industrial Visit**, students should his/her visiting work should be submitted to the supervisor/department. A report of an industrial Visit should be submitted to the department after completion of the work should be authorized by the concerned supervisor of the institute/factory.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS

DEGREE COURSE

CBCS PATTERN

(With effect from 2017-2018)

The Course of Study and the Scheme of Examinations

S.No.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper -1	6	6	Digital Logic & Programming in C	25	75	100
4	IIII	Core Practical	Practical-1	3	2	Programming in C Lab	25	75	100
5	III	ALLIED-1	Paper-1	7	4	Mathematical Foundations - I	25	75	100
6	IV	Environ. Studies		2	2	Environmental Science	25	75	100
				30	**22**		**150**	**450**	**600**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
7	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8	II	English	Paper-2	4	4	English	25	75	100
9	III	Core Theory	Paper-2	6	6	C++ & Data Structure	25	75	100
10	III	Core Practical	Practical-2	3	2	C++ and Data Structures Lab	25	75	100
11	III	ALLIED-1	Paper-2	7	6	Mathematical Foundations - II	25	75	100
12	IV	Value Education		2	2	Value Education	25	75	100
13	IV	Soft Skill		2	1	Soft Skill	25	75	100
				30	**25**		**175**	**525**	**700**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
14	III	Core Theory	Paper-3	5	3	Java Programming	25	75	100
15	III	Core Theory	Paper-4	4	4	E-Commerce	25	75	100
16	III	Core	Paper-5	5	4	Resource Management	25	75	100

S.No.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Theory				Techniques			
17	III	Core Practical	Practical-3	4	3	Java Programming Lab	25	75	100
18	III	ALLIED-2	Paper-3	7	4	Financial Accounting - I	25	75	100
19	IV	Skill based Subject	Paper-1	3	3	Design and Analysis of Algorithm	25	75	100
20	IV	Non-major elective	Paper-1	2	2	Introduction to Information Technology	25	75	100
				30	**23**		**175**	**525**	**700**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
21	III	Core Theory	Paper-6	5	3	Database Management Systems	25	75	100
22	III	Core Theory	Paper-7	4	4	Enterprise Resource Planning	25	75	100
23	III	Core Theory	Paper-8	5	4	Decision Support System	25	75	100
24	III	Core Practical	Practical-4	4	3	RDBMS Lab	25	75	100
25	III	ALLIED-2	Paper-4	7	6	Financial Accounting - II	25	75	100
26	IV	Skill based Subject	Paper-2	3	3	Computer Organisation and Architecture	25	75	100
27	IV	Non-major elective	Paper-2	2	2	Internet and its applications	25	75	100
				30	**25**		**175**	**525**	**700**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
28	III	Core Theory	Paper-9	6	3	Mobile Application Development	25	75	100
29	III	Core Theory	Paper-10	6	3	Operating System	25	75	100
30	III	Core Theory	Paper – 11	4	2	Data Communication & Network	25	75	100
31	III	Core Practical	Practical-5	4	3	Mobile Applications Development - Lab	25	75	100
32	III	Core Practical	Practical-6	4	3	Operating System - Lab	25	75	100
33	III	Elective I	Paper-1	3	3	A. Data Mining	25	75	100

S.No.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
						B. Computer Graphics C. Information Security			
34	IV	Skill Based Subject III	Paper-3	3	3	Software Engineering	25	75	100
				30	**20**		**175**	**525**	**700**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
35	III	Core Theory	Paper-12	7	5	Cloud Computing	25	75	100
36	III	Core Theory	Paper-13	6	4	Open Source Programming	25	75	100
37	III	Core Practical	Practical-7	4	3	ASP .NET Lab	25	75	100
38	III	Core Practical	Practical-8	4	3	Open Source Programming - Lab	25	75	100
39	III	Elective II	Paper-2	3	3	A. Software Testing B. Mobile Computing C. Microprocessor	25	75	100
40	III	Elective III	Paper-3	3	3	A. Internet of Things B. System Software C. Multimedia Systems	25	75	100
41	IV	Skill Based Subject IV	Paper-4	3	3	ASP .NET	25	75	100
42	V	Extension Activities		0	1		100	0	100
				30	**25**		**275**	**525**	**800**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	2	4	8	100	200
Part II	English	2	4	8	100	200
Part III	Allied (Odd Semester)	2	4	8	100+100 (I + III SEM)	200
	Allied (Even Semester)	2	6+6	12	100+100 (II + IV SEM)	200
	Electives	3	3	9	100	300
	Core	13	(3-6)	51	100	1300
	Core Practical	8	(2-3)	22	100	800
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**42**		**140**		**4200**

THIRUVALLUVAR UNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS

SYLLABUS
UNDER CBCS

(with effect from 2017 - 2018)

SEMESTER I

PAPER – 1
Digital Logic &Programming in C

Objective :

Provide basic knowledge on Digital Electronics to understand the working principles of Digital computer and to develop programming skill using C language .

UNIT I: Number systems and Boolean Algebra

Number Systems -Decimal, Binary, Octal, Hexadecimal and their inter conversions, - Binary Arithmetic -1's complement, 2's complement and 9's complement .Binary codes - BCD, Excess-3, Graycode.

Boolean Algebra : Boolean Laws - Simplification of Boolean Functions - Logic gates and Truth Table – Universal Gates (NAND and NOR) - The K-map method up to five variables, don't care conditions, POS & SOP forms.

UNIT-II: Combinational and Sequential Circuits

Combinational Logic: Half/Full adder/subtractor , code conversion, Multiplexers,demultiplexers, encoders, decoders, Combinational design using MUX & DEMUX. BCD adder, magnitude comparator.**Sequential logic**: Flip flops (RS, Clocked RS, D, JK, JK Master Slave)-Counters & types Synchronous and Asynchronous counters- Registers, Shift registers and their types.

UNIT –III: C Basics and Control constructs

C fundamentals- Operators- Constants- Expression – Library functions- Decision making and branching- Switch- FOR,WHILE, DO WHILE loops- Continue- break

Unit IV: Arrays, Functions and Structures

Arrays-Multi dimensional arrays- User defines functions- Call by Value and reference- Recursion- Storage classes- Structures and Union –Self referential structures

Unit – V: Pointers and Files

Pointers- Pointer operations and Arithmetic- File management in C :File opening and closing- - I/O operations on files - Error handling during I/O operations - Random access to files - Command line arguments

Text Book:

1. Morris Mono M. "**Digital Logic and Computer Design**",PHI Latest Pub. Ed. (Unit I and 2)
2. ReemaThareja,**" Programming in C "** Oxford University Press

Reference Book

1. Albert Paul Malvino, Donald P Leach, **Digital principles and applications**TMH,1996.
2. Balagurusamy," Programming in C" TMH

CORE PRACTICAL – I

PROGRAMMING IN C- LAB

1. Summation of Series: Sin(x) (Compare with built in functions)
2. Summation of Series Cos(x) (Compare with built in functions)
3. Counting the no. of vowels, consonants, words, white spaces in a line of text
4. Reverse a string & check for palindrome without built in string function
5. ${}^{n}P_{r}$, ${}^{n}C_{r}$ in a single program using function
6. Matrix Addison, subtraction and multiplication
7. Linear Search of a number in an array
8. Sorting an array in ascending and descending order
9. Finding maximum and minimum of list of numbers
10. Call by value and call by reference of functions
11. Employee pay bill using structure
12. Preparing an EB bill using file

ALLIED

PAPER - I

MATHEMATICAL FOUNDATIONS - I

Objectives

To know about Logical operators, validity of arguments, set theory and set operations, relations and functions, Binary operations, Binary algebra, Permutations & Combinations, Differentiation, Straight lines, pair of straight lines, Circles, Parabola, Ellipse, Hyperbola.

UNIT-I: SYMBOLIC LOGIC

Proposition, Logical operators, conjunction, disjunction, negation, conditional and bi-conditional operators, converse, Inverse, Contra Positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

UNIT-II: SET THEORY

Sets, set operations, venndiagram, Properties of sets, number of elements in a set, Cartesian product, relations & functions,

Relations : Equivalence relation. Equivalence class, Partially and Totally Ordered sets,

Functions: Types of Functions, Composition of Functions.

UNIT-III: BINARY OPERATIONS

Types of Binary Operations: Commutative, Associative, Distributive and identity, Boolean algebra: simple properties. Permutations and Combinations.

UNIT-IV: DIFFERENTIATION

Simple problems using standard limits,

$$\lim_{x \to a} \frac{x^n - a^n}{x - a}, \lim_{x \to 0} \frac{\sin x}{x}, \lim_{x \to 0} \frac{\tan x}{x}, \lim_{x \to 0} \frac{e^x - 1}{x}, \lim_{n \to \infty} (1 + 1/n)^n, \lim_{n \to 0} (1+n)^{1/n}$$

Differentiation, successive differentiation, Leibnitz theorem, partial differentiation, Applications of differentiation, Tangent and normal, angle between two curves.

UNIT-V: TWO DIMENSIONAL ANALYTICAL GEOMETRY

Straight Lines - Pair Straight Lines

Text Book.

P.R. Vittal, Mathematical Foundations – Maragham Publication,

Chennai.

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V.Sundaram& Others, Dircrete Mathematical Foundation - A.P.Publication, sirkali.
3. P.Duraipandian& Others, Analytical Geometry 2 Dimension - Emerald publication 1992 Reprint.
4. Manicavachagompillay&Natarajan. Analytical Geometry part I - Two Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

SEMESTER II

CORE THEORY PAPER – 2

C++ AND DATA STRUCTURE

Objective: To develop Object oriented programming skills using C++ and to introduce data structure concepts.

UNIT-I : Object Oriented Concepts and C++

C++ Fundamentals - Operators, Expressions and Control Structures: If, If..Else, Switch - Repetitive Statements- for, while, do..while - Input and Output in C++ - manipulators- manipulators with parameters. - Pointers and arrays

UNIT-II : Functions and Classes

Functions in C++ - Main Function - Function Prototyping - Parameters Passing in Functions - Values Return by Functions - inline Functions - Function Overloading.
Classes and Objects; Constructors and Destructors; and Operator Overloading - Type of Constructors

UNIT – III : Inheritance, Polymorphism & Files

Inheritance : Single Inheritance - Multilevel inheritance - Multiple inheritance - Hierarchical Inheritance - Hybrid Inheritance - Polymorphism - Working with Files : Classes for File Stream Operations - Opening and Closing a File - End-of-File Detection - Updating a File - Error Handling during File Operations .

UNIT-IV : Fundamental Data Structures

Definition of a Data structure - primitive and composite Data Types, Stacks (Array) - Operations –Linked Stack-Operations- Applications of Stack (Infix to Postfix Conversion).

Queue (Array)- operations-Linked Queue- Operations- - Singly Linked List - Operations, Application of List (Polynomial Addition)-. Doubly Linked List - Operations.

UNIT-V : Trees and Graphs

Trees: Binary Trees –Binary Search Tree- Operations - Recursive Tree Traversals- Recursion
Graph - Definition, Types of Graphs, Graph Traversal –Dijkstras shortest path- DFS and BFS.

Text Books

1. Mastering in C++, K.R.Venugopal, Raj Kumar, T.Ravisankar – McGraw Hill, 2011.
2. C++ Plus Data Structure by Nell Dale ,Narosa Publications, 2000

Reference Books:

1.ReemaThareja , Object Oriented Programming with C++, Oxford University Press, 2015

2. Balagurusamy, c++ programming, TMH.

3. Fundamentals of Data Structures in C++ by Ellis Horowitz, SartajSahni and Dinesh Mehtha, Second Edition, University Press

4. Data Structures using C++ byVarshaH.Patil. Oxford University Press, 2012

PRACTICAL – II

C++ & DATA STRUCTURE - LAB

1. Implementing classes, object, constructors and member functions for calculating area and perimeter of a circle.
2. Implementing function overloading(Find area/volume of rectangle, circle, sphere, cylinder, cone etc).
3. Implementing operator over loading(Addition, subtraction, multiplication of matrices)
4. Implementing single , multiple , hierarchical inheritance.
5. Implementing sequential file operations using error handling functions.
6. Implementing PUSH, POP operations of stack using Arrays.
7. Implementing add, delete operations of a queue using Arrays.
8. Implementing Infix to postfix conversion of an expression using stack
9. Implementing Binary tree recursive traversals (in-order, pre-order, and post-order).
10. Implementing Polynomial addition using linked list.

ALLIED II

MATHEMATICAL FOUNDATIONS II

Objectives

To know about Matrix Operations, Symmetric, Skew-Symmetric, Hermitian, Skew-Hermitian, Orthogonal, Unitary Matrices. Rank of a Matrix Solutions of linear equations Consistency and Inconsistency, Characteristic roots and Characteristics Vectors, Cayley - Hamilton Theorem, Integration of rational functions, Integration by parts, Reduction formulae, Area and volume using integration, Planes, Straight lines, Spheres, Curves, Cylinders.

UNIT-I: MATRICES

Multiplication of matrices, Singular and Non-Singular matrices, Adjoint of a Matrix, Inverse of a matrix Symmetric and Skew-Symmetric, Hermitian and Skew-Hermition, Orthogonal and unitary matrices, Rank of a matrix, Solution of Simultaneous Linear equations by

(i) Cramer's rule.

(ii) Matrix Inversion Method.

UNIT-II: MATRICES

Test for Consistency and Inconsistency of linear equations, (Rank Method), characteristic roots and characteristic vectors, Cayley - Hamilton theorem, matrix of linear transformations: reflection about the x, y axes and the line y=x, rotation about the origin through an angle, expansion or compression, shears, translation.

UNIT-III

Integration Simple problems, integration of rational function involving algebraic expressions of the form

$$\frac{1}{\sqrt{ax^2+bx+c}}, \frac{1}{\sqrt{ax^2+bx+c}\sqrt{ax^2+bx+c}}, \frac{px+q}{\sqrt{ax^2+bx+c}}, \frac{px+q}{\sqrt{ax^2+bx+c}}, \sqrt{px+q}$$

integrations using simple substitutions integrations involving trigonometric functions of the form

$$\frac{1}{a+b\cos x}, \frac{1}{a^2\sin^2 x+b^2\cos^2 x}$$

Integration by parts.

UNIT-IV

Properties of definite integrals. Reduction formulae for

$\int x^n e^{ax} dx$, $\int \sin^n x dx$, $\int \cos^n x dx$, $\int x^m (1-x)^n dx$, applications of integration for (i) Area under plane caurves, (ii) Volume of solid of revolution.

UNIT-V: ANALYTICAL GEOMETRY OF THREE DIMENSION

Planes, straight lines.

Text Book.

P.R.Vittal, Mathematical Foundations - Margham Publication, Chennai.

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V.Sundaram& Others, Dircrete Mathematical Foundation - A.P.Publication, sirkali.
3. P.Duraipandian& Others, Analytical Geometry 3 Dimension – Emerald publication 1992 Reprint.
4. Manicavachagompillay&Natarajan. Analytical Geometry part II - three Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

SEMESTER III

CORE THEORY PAPER – 3

JAVA Programming

Objectives:
To improve Object Oriented Programming gathered already through an independent platform.

Unit – I: BASICS, ESSENTIALS, CONTROL STATEMENT AND CLASSES & OBJECTS

Computer and its Languages – Stage, Origin and Features for Java - JDK–OOP; Java Essentials:Program – API - Variables& Literals - Data Types - String Class – Operators - Type conversion - Constants - Scope – Comments - Keyboard Input; Control Statements: Conditional Statements – Looping Statements - Break and Continue Statements; Classes and Objects: Modifiers - Arguments - Constructors - Packages and import - Static Class - Overloaded Methods and Constructors - Returning Objects – toString() - this reference – Enumeration - Garbage Collection.

Unit – II: ARRAYS, INHERITANCE, INTERFACES AND PACKAGES

Arrays - Three or More Dimensions; Inheritance: Basics - Calling the Superclass Constructor - Overriding Superclass Methods - Inheritance from Subclasses – Polymorphism -Abstract Classes and Methods - Interfaces: Fields - Multiple inheritance - Interface inheritance; Packages: Creating packages – Accessing package from other packages- Access Specifier.

Unit – III: STRING HANDLING, EXCEPTION HANDLING AND MULTITHREADING

String Handling: Basics - Operations –String Methods - String Buffer class - String Builder – to String method -String Tokenizer class. Exception Basics: try and catch block - Multiple catch block - Nested try - throws keyword - Throw vs Throws - Final vs Finally vs Finalize - Method Overriding - Custom Exception - Multithreading: Life Cycle - Methods in Thread - thread application – Thread priority – Synchronization - Inter-thread communication - Suspending, Resuming, and Stopping Threads;

Unit – IV: APPLET AND GUI APPLICATION

Applets: Basis - Lifecycle - Applet classes - Application – Graphics; AWT-I: GUI Programming - AWT classes - Windows fundamentals- Creating Windows - Dialog Boxes - Layout Managers - Radio Buttons and Check Boxes – Borders-Swing

Unit – V: JAVA DATABASE CONNECTIVITY

JDBC - Types of Drivers- Architecture- Classes and Interfaces - Developing JDBC Application - New Database and Table with JDBC - Working with Database Metadata.

Text Book

1. S.Sagayaraj, R.Denis, P.Karthik & D.Gajalakshmi, "Java Programming", Universities Press, 2017

References

1. Patrick Naughton and Herbert Schildt. "The Complete Reference JAVA 2". 3rd Edition. Tata McGraw-Hill Edition, 1999.
2. Muthu C. "Programming with JAVA". 2nd Edition. Vijay Nicole Imprints, 2011.
3. Ken Arnold Gosling and Davis Holmen. "The Java Programming Language". 3rd Edition. Addition Wesley Publication.

CORE THEORY PAPER – 4

E-Commerce

UNIT-I

Electronic Commerce Framework, Traditional vs. Electronic business applications, the anatomy of E-commerce applications.

UNIT-II

Network infrastructure for E-Commerce - components of the I-way - Global information distribution networks - public policy issues shaping the I-way.The internet as a network infrastructure.The Business of the internet commercialization.

UNIT-III

Network security and firewalls - client server network security - firewalls and network security - data and message security - encrypted documents and electronic mail.

UNIT-IV

Electronic Commerce and world wide web, consumer oriented E-commerce, Electronic payment systems, Electronic data interchange (EDI),EDI applications in business ,EDI and E-commerce EDI implementation.

UNIT-V

Intraorganizational Electronic Commerce supply chain management.
Electronic Commerce catalogs, Document Management and digital libraries.

Text Book

1. R. Kalakota and A. B. Whinston, Frontiers of Electronic Commerce, Addison Wesley, 1996.

Reference Books

1.R.Kalakota and A.B.Whinston,Readings in Electronic Commerce, Addison Wesley, 1997.
2. David Kosiur, Understanding Electronic Commerce, Microsoft Press, 1997.
3. E-Commerce and E-Business, P.Rizwan Ahmed, Margham Publications.

CORE THEORY PAPER – 5

RESOURCE MANAGEMENT TECHNIQUES

Objectives: To improve the skills of solving very common problems which we come across in various fields like transportation and industries with machines. To develop computational skill and logical thinking in formulating industry oriented problems as a mathematical problem and finding solutions.

UNIT – I: Introduction and Linear Programming

.

BASICS OF OPERATIONS RESEARCH: Development – Definition – Characteristics – Phases – Models – Advantages and Limitations **LINEAR PROGRAMMING :** Formulation – Graphical Method of Solution – General Linear Programming Problem – Canonical and Standard form of LPP – Simplex method.

UNIT – II: Transportation and Assignment Model

TRANSPORTATION MODEL : Definition – Formulation and Solution – Additional Problems **ASSIGNMENT MODEL :** Definition – Solution of Assignment Models – Hungarian Method – Additional Problems – Traveling Salesman problem.

UNIT – III : SEQUENCING MODLES

Sequencing Problems – Assumptions – Processing *n* jobs through two machines – Processing *n* jobs through three machines – Processing of two jobs through *m* machines.

UNIT – IV: REPLACEMENT MODELS

Introduction – Replacement of items that deteriorate – Replacement of items whose maintenance and repair cost increase with time – Replacement of items that fail suddenly – group replacement policy.

UNIT – V: NETWORKING ANALYSIS

Project – Project Planning – Project Scheduling – Project Controlling – Activity on Node diagram – Critical Path Method – Program Evaluation and Review Technique

TEXT BOOK

Operations Research, P. K. Gupta and D.S. Hira, , S. Chand & Co, 5th Edition,-2008.

REFERENCES:

1. Operations Research , S.D.Sharma-Kedarnath - Ramnath Delhi 16th Revised Edition, 2010.
2. Introduction to Operations Research, Hiller & Libermann , CBS Publishes, 1st Edition, 1994.

CORE PRACTICAL

Practical 3- JAVA Programming LAB

List of Practical's

1. Implementing Package, inheritances and interfaces
2. Implementing Flow, Border and Grid Layouts
3. Implementing Dialogs , Menu and Frame
4. Implementing User defined Exception Handling
5. Implementing Multithreading
6. Implementing I/O Stream File handling
7. Implementing a Calculator using Swing
8. CRUD operation Using JDBC
9. Client Server using TCP and UDP Socket
10. GUI application with JDBC

ALLIED - 2

FINANCIAL ACCOUNTING - I

Objective:

To gain knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Introduction

Meaning of accounting – objectives of accounting – advantages and limitations of accounting- Accounting concepts and conventions - Methods of accounting -Rules of debit and credit- Journal - Ledger accounts– Trial Balance - Errors and their rectification - Rectification of Errors without suspense a/c - Rectification errors with suspense a/c (effect of rectification on profit and rectification during subsequent accounting year are excluded) - Bank Reconciliation Statement.

Unit - II: Depreciation, Provisions and Reserve

Meaning of depreciation – causes for depreciation – need for charging depreciation – Methods of calculating depreciation: straight line method and written down value method (change in method of depreciation is excluded) – Methods of recording depreciation: by charging depreciation to assets account or by creating provision for depreciation account.

Unit - III: Bills of exchange

Meaning of bill of exchange - features and advantages of bill of exchange- types of bill of exchange: Trade bills and accommodation bills - Accounting treatment of trade bills (accommodation bills are excluded).

Unit - IV: Final accounts

Meaning of final accounts – adjustments in preparation of final accounts – preparation of trading, profit & loss account and balance sheet of sole proprietorship concern.

Unit V: Accounts from incomplete records

Meaning of single entry system – features and limitations of single entry system – Distinction between single entry system and double entry system - Methods of calculation of profit: Statement of affairs method and Conversion method **–** Distinction between statement of affairs and balance sheet.

Note: Questions in section A,B and C shall be in the proportion of 20: 80 between theory and problems

Text books

1. Jain &Narang,Financial Accounting, KalyaniPublishers, New Delhi.
2. T.S. Reddy & Dr. A.Murthy, Financial Accounting, MarghamPublications, Chennai.

Reference books

1. Gupta,R.L&Gupta,V.K,AdvancedAccounting,Sulthan Chand&Sons,NewDelhi.
2. Shukla&Grewal,AdvancedAccounting,S.Chand&Co.NewDelhi.
3. Parthasarathy,S.&Jaffarulla,A.FinancialAccounting,KalyaniPublishers, NewDelhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

SKILL BASED SUBJECT – PAPER 1

DESIGN AND ANALYSIS OF ALGORITHMS

Objective: To build a solid foundation of the most important fundamental subject in computer science. Creative thinking is essential to algorithm design and mathematical acumen and programming skills.

UNIT -I: ALGORITHM AND ANALYSIS

What is an Algorithm? - Algorithm Specification- Performance Analysis- Randomized Algorithms.

UNIT - II: DIVIDE AND CONQUER

General Method - Binary Search - Finding the Maximum and Minimum-Merge Sort - Quick Sort - Selection Sort- Stassen's Matrix Multiplications.

UNIT - III: THE GREEDY METHOD

The General Method - Knapsack Problem – Tree Vertex Splitting - Job Sequencing with Deadlines- Minimum Cost Spanning Trees - Optimal Storage on Tapes - Optimal Merge Pattern - Single Source Shortest Paths.

UNIT - IV: DYNAMIC POGRAMMING

The General Method – Multistage Graphs - All pair shortest path - String Editing - 0/1 Knapsack – Reliability Design - The Traveling Salesperson Problem

UNIT - V: TRAVERSAL, SEARCHING & BACKTRACKING

Techniques for Binary Trees- Techniques for Graphs - The General Method - The 8-Queens Problem – Sum of Subsets- Graph Coloring- Hamiltonian Cycles

TEXT BOOK

Fundamentals of Computer Algorithms, Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, GalgotiaPublications, 1998.

REFERENCE BOOKS:

1. Introduction to Algorithms ,Coremen T.H.,Leiserson C.E. and Rivest R.L., PHI 1998.

2. Introduction to the Design and Analysis of Algorithms, AnanyLevitin, Pearson Education, 2nd Edition.

NON MAJOR ELECTIVE – I

INTRODUCTION TO INFORMATION TECHNOLOGY

Objective:

To enable the student to be proficient with Information Technology with a better knowledge of Computer

UNIT – I

Introduction to Computers: Definition - Characteristics of a Computer - Classification of Computers -Basic Anatomy of the Computer - Applications / Uses of Computers in different fields

UNIT – II

Input and Output Devices: Input Devices - Output Devices - Data Representation - Programming Languages / Computer Languages - **Software**: System Software - Application Software

UNIT – III

Data Communication and Computer Networks: Data Communication - Computer Network - The Uses of a Network - Types of Networks - Network Topologies- Transmission Media: Guided Transmission Media - Wireless Transmission

UNIT – IV

Internet and its Applications : History of Internet - Uses of Internet - Advantages of Internet - ISP - Internet Services - IP Address - Web Browser - URL - DNS - Internet Explorer - Types of internet connections - E-mail - Search Engine.

UNIT – V

Operating System: Evolution of operating systems - Function of Operating System - Classification of Operating –System - Example of Operating System – DOS –Windows – UNIX - Linux

TEXT BOOKS:

1. Alexis Leon and Mathews Leon, "Fundamentals of Information Technology", Vikas Publishing House Pvt. Ltd.
2. Introduction to Information Technology, P.Rizwan Ahmed, Second Edition, Margham Publications, 2016
3. Introduction to Information Technology, PelinAksoy, Laura DeNardis, Cengage Learning India Private Limited.

SEMESTER IV

CORE THEORY PAPER – 6

DATABASE MANAGEMENT SYSTEM

Objective: To incorporate a strong knowledge on databases to students

UNIT - I Database Basics

Introduction: Flat File – Database System – Database – Actionable for DBA. The Entity – Relationship Model: Introduction – The Entity Relationship Model. Data Models: Introduction – Relational Approach – The Hierarchical Approach – The Network Approach.

UNIT – II Relational Algebra

Structure of Relational Databases – Fundamental Relational Algebra Operations –Additional Relational Algebra Opearations - Extended Relational Algebra Operations - Null Values - Modification of the Database - The Tuple Relational Calculus – The Domain Relational Calculus

UNIT – III Normalization

Normalization: Introduction - Normalization – Definition of Functional Dependence (FD) – Normal Forms: 1NF, 2NF, 3NF and BCNF.

UNIT – IV Structured Query Language

Structured Query Language: Features of SQL – Select SQL Operations – Grouping the Output of the Query – Querying from Multiple Tables – Retrieval Using Set operators – Nested Queries. T-SQL – Triggers and Dynamic Execution: Transact-SQL..

UNIT – V Procedural Language

Procedural Language- SQL: PL/SQL Block Structure – PL/SQL Tables. Cursor Management and Advanced PL/SQL: Opening and Closing a Cursor – Processing Explicit Cursor – Implicit Cursor – Exception Handlers – Sub Programs in PL/SQL – Functions – Precaution While Using PL/SQL Functions – Stored Procedure – Object Oriented Technology.

Text Book

1. Rajesh Narang, "Database Management Systems", PHI Learning Private Limited, New Delhi, sixth printing, 2010.

Reference

1. S.K. Singh, "Database Systems – Concepts, Design and Appplications", Dorling Kindersley (India) Pvt. Ltd., Second Impression, 2008

2. Database System Concepts , Abraham Silberchatz, Henry F Korth , S.Sudarshan, McGraw-Hill - 5th Edition - 2006.

CORE THEORY PAPER – 7

ENTERPRISE RESOURCE PLANNING

UNIT - I

Business function and Business process: Functional areas and Business Process - functional area of operations - Business process - Marketing Sales - supply chain management - Accounting and finance - Human Resource - Functional areas of information system - The development of ERP system SAP R/3 - New directions in ERP - significance and benefits of ERP software and systems.

UNIT - II

Marketing information system and sales order process in ERP: sales and Distribution in ERP - Pre sales activities - sales order processing - inventory Sourcing - Delivery - Billing - payment - Customer relationship Management - benefits of CRM.

UNIT - III

Production and supply chain management information system: Production overview - The production planning process - The SAP ERP Approach to production planning - Sales forecasting - sales and operation Planning - Demand management - Material requirement planning in SAP ERP - ERP and supplier - Supply chain

UNIT - IV

Accounting in ERP: Accounting activities - using ERP for accounting Information - operational decision making problem - credit management - Industrial credit management in SAP ERP - product profitability analysis - Management reporting with ERP system - Document flow for customer Service.

UNIT - V

Human resource process in ERP: HR with ERP - Advance HR features - Time management - Payroll - Travel management - Training and Development - Management by objectives - ERP process modeling.

Text Book:

1) ELLEN MONK and BRET WAGNER, ENTERPRISE RESOURCE PLANNING - 3rd edition - MGH.

CORE THEORY PAPER – 8

DECISION SUPPORT SYSTEM

UNIT I

DECISION-MAKING AND COMPUTERIZED SUPPORT-Management Support Systems: An Overview, Decision Making, Systems, Modeling, and Support.

UNIT II

DECISION SUPPORT SYSTEMS-An Overview, Data Management: Warehousing, Access, and Visualization , Modeling and Analysis , Knowledge based Decision Support and Artificial Intelligence , User Interface and Decision Visualization Applications , Constructing a Decision Support System and DSS Research.

UNIT III

COLLABORATION, COMMUNICATION, AND ENTERPRISE SUPPORT SYSTEMS-Networked Decision Support: The Internet, Intranets, and Collaborative Technologies, Group Decision Support Systems, Executive Information and Support Systems.

UNIT IV

FUNDAMENTALS OF EXPERT SYSTEMS AND INTELLIGEN SYSTEMS-Fundamentals of Expert Systems, Knowledge Acquisition and Validation, Knowledge Representation, Inferences, Explanations, and Uncertainty, Building Expert Systems: Process and Tools.

UNIT V

CUTTING-EDGE DECISION SUPPORT TECHNOLOGIES-Neural Computing: The Basics, Neural Computing Applications, Genetic Algorithms, Fuzzy Logic, and Hybrid Intelligent Systems , Intelligent Agents and Creativity , Implementing and Integrating Management Support Systems , Organizational and Societal Impacts of Management Support Systems.

Text Book :

1. Efraim Turban, Jay E. Aronson, "Decision Support Systems and Intelligent Systems", Prentice Hall, New Delhi, 2004

Reference book:

1. George Marakas, "Decision Support Systems in the 21st Century", Prentice Hall, New Delhi, 2003
2. Robert J Thierauf, "User Oriented Decision Support Systems", Prentice Hall, New Delhi

PRACTICAL – IV

RDBMS Lab

1. Table creation and simple Queries
2. Queries using Aggregate Function and Set Operations
3. Table creation with various Joins
4. Nested Sub queries and correlated Sub queries
5. View creation and manipulation
6. PL/SQL program for cursor
7. PL/SQL program for packages
8. PL/SQL program for triggers and its type
9. PL/SQL program for procedures and functions

ALLIED – II

FINANCIAL ACCOUNTING - II

Objective:

To gain a knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Branch accounts

Meaning – objects of branch accounts – accounting in respect of dependent branches: debtors system; stock and debtors system; wholesale branch system and final accounts system - Independent branches – incorporation of branch trial balance in head office books.

Unit - II: Departmental Accounting

Meaning of departments and departmental accounting – Distinction between departments and branches- need for departmental accounting – advantages of departmental accounting - Apportionment of indirect expenses – Inter departmental transfers at cost and selling price - preparation of departmental trading, profit & loss account and balance sheet.

Unit - III: Hire purchase and Instalment purchase systems

Meaning and features of hire purchase system - calculation of interest – books of hire purchaser and books of hire vendor - default and repossession (Hire purchase trading account excluded)

Meaning of instalment system -distinction between hire purchase system and instalment system - calculation of interest – books of buyer and books of seller.

Unit - IV: Partnership accounts (fundamentals and reconstitution of partnership)

Meaning and features of partnership – Partnership deed - calculation of Interest on capital and interest on drawings – preparation of profit & loss appropriation account – preparation of capital accounts (fixed and fluctuating) – admission of a partner – retirement of a partner – death of a partner – treatment of goodwill as per AS 10.

Unit - V: Partnership Accounts (Dissolution of partnership firms)

Dissolution of a firm – insolvency of a partner (Garner Vs Murray rule) – Insolvency of all the partners – Piecemeal distribution: proportionate capital method and maximum loss method.

Note: Questions in section A, B and C shall be in the proportion of 20: 80 between theory and problems.

Text books

1. Jain &Narang ,Financial accounting, Kalyani publishers, New Delhi
2. T.S. Reddy & Dr. A.Murthy, Financial accounting, Margham publications, Chennai

Reference books

1. Gupta,R.L&Gupta,V.K,AdvancedAccounting,Sultan Chand&Sons,NewDelhi.
2. Shukla&Grewal,AdvancedAccounting,S.Chand&Co.NewDelhi.
3. Parthasarathy,S.&Jaffarulla,A.FinancialAccounting,KalyaniPublishers,NewDelhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

SKILLED BASED SUBJECT - II

COMPUTER ORGANISATION AND ARCHITECTURE

Objective: To enable the student to have a better understanding of architecture of computer and prepare the student for higher level of programming

UNIT - I

Instruction Codes – Computer Registers – Computer Instructions – Timing and Control – Instruction Cycle – Memory Reference Instructions – Input-Output and Interrupts.

UNIT - II

Control Memory – Address Sequencing – Micro program Examples – Design of Control Unit.

UNIT - III

Introduction – General Register Organization – Instruction Formats – Addressing Modes.

UNIT – IV

Peripheral Devices – I/O interface – Asynchronous Data Transfer – Modes of Transfer - Direct Memory Access – Input Output Processor (Excluding IBM and Intel IOPs).

UNIT - V

Auxiliary Memory – Main Memory – Auxiliary Memory - Associative Memory – Cache Memory -Virtual Memory.

TEXT BOOK

1. Morris Mano M. Computer System Architecture. New Delhi **:**Prentice Hall of India Private Limited, 2011

REFERENCES

1. William Stallings . Computer Organization and Architecture. 8th edition. Pearson publication, 2010
2. Morris Mano. Digital Login and Computer Design. New Delhi :Prentice Hall of India Private Limited, 2001

NON MAJOR ELECTIVE II

INTERNET AND ITS APPLICATION

Objective: To equip students to basics of Internet usage and prepare them for digital

UNIT- I

Introduction to Computers Programming Language types History of Internet Personal Computers History of World Wide Web- Micro software .NET Java-Web resources.

UNIT – II

Web Browsers- Internet Explorer- connecting to Internet Features of Internet explorer6 Searching the Internet- online help and tutorials- File Transmission Protocol (FTP) Browser settings.

UNIT – III

Attaching a file, Electronic mail Creating an E-mail id Sending and Receiving mails-attaching a file-Instance messaging- other web browsers.

UNIT - IV

Introduction to HTML headers - Linking- Images-special characters and line breaks- unordered lists- simple HTML programs.

UNIT - V

E-marketing consumer tracking Electronic advertising search engine-CRM- credit card Payments- Digital cash – e wallets – smart card.

Textbook

Internet and World Wide Web Third edition H.M.Deital, P.J. Deital and A.B.Goldberg-PHI

Book for Reference

1. The Internet- Complete Reference Harley hahn, Tata McGraw hill
2. Internet and its Applications, P.Rizwan Ahmed, Margham Publication, 2014

SEMESTER V

CORE THEORY PAPER – 9

MOBILE APPLICATIONS DEVELOPMENT

Objectives:

This course aims to provide the students with a detailed knowledge on Mobile Application and Development and covers Android programming from fundamentals to building mobile applications for smart gadgets.

UNIT I Introduction to Mobile Applications:

Native and web applications - Mobile operating systems and applications - Mobile Databases. Android: History of Android - Android Features – OSS – OHA - Android Versions and compatibility - Android devices - Prerequisites to learn Android -– Setting up software – IDE - XML. Android Architecture: Android Stack - Linux Kernel - Android Runtime - Dalvik VM - Application Framework - Android emulator - Android applications.

UNIT II Android development:

Java - Android Studio – Eclipse – Virtualization – APIs and Android tools – Debugging with DDMS – Android File system – Working with emulator and smart devices - A Basic Android Application - Deployment. Android Activities: The Activity Lifecycle – Lifecycle methods – Creating Activity. Intents – Intent Filters – Activity stack.

UNIT III Android Services:

Simple services – Binding and Querying the service – Executing services.- Broadcast Receivers: Creating and managing receivers – Receiver intents – ordered broadcasts. Content Providers: Creating and using content providers – Content resolver. Working with databases: SQLite – coding for SQLite using Android – Sample database applications – Data analysis.

UNIT IV Android User Interface:

Android Layouts – Attributes – Layout styles - Linear – Relative – Table – Grid – Frame. Menus: Option menu – context menu - pop-up menu – Lists and Notifications: creation and display. Input Controls: Buttons-Text Fields-Checkboxes-alert dialogs-Spinners-rating bar-progress bar.

UNIT V Publishing and Internationalizing mobile applications :

Live mobile application development: Game, Clock, Calendar, Convertor, Phone book. App Deployment and Testing: Doodlz app – Tip calculator app – Weather viewer app.

Text Books

1. Barry Burd, "Android Application Development – All-in-one for Dummies", 2nd Edition, Wiley India, 2016.

Reference

1. Paul Deitel, Harvey Deitel, Alexander Wald, " Android 6 for Programmers – An App-driven Approach", 3rd edition, Pearson education, 2016.
2. Jerome (J. F) DiMarzio, "Android – A Programmer"s Guide", McGraw Hill Education, 8th reprint, 2015.
3. http://www.developer.android.com

CORE THEORY PAPER - 10

OPERATING SYSTEM

Objective: Enable the student to get sufficient knowledge on various system resources.

Unit – I Operating System Basics

Basic Concepts of Operating System - Services of Operating System-Classification of Operating System- Architecture and Design of an Operating System-Process Management -Introduction to Process-Process State -PCB - Process Scheduling - Interprocess Communication

Unit –II Operating System Scheduling

CPU Scheduling**:** Introduction - Types of CPU Scheduler - Scheduling Criteria - Scheduling Algorithms - FCFS Scheduling – SJF Scheduling;-Priority Scheduling - Round-Robin Scheduling- Multilevel Queue Scheduling - Deadlock - Basic Concept of Deadlock- Deadlock Prevention - Deadlock Avoidance- Deadlock - Detection and Recovery

Unit- III Memory management

Memory Management - Basic Concept of Memory - Address Binding; Logical and Physical Address Space- Memory Partitioning - Memory Allocation-Protection-Fragmentation and Compaction

Unit – IV Swapping

Swapping- Using Bitmaps - Using Linked Lists- Paging-Mapping of Pages to Frames - Hierarchical Page Tables- Segmentation - Virtual Memory - Basic Concept of Virtual Memory-Demand Paging - Transaction Look aside Buffer (TLB) - Inverted Page Table-Page Replacement Algorithms

Unit –V File Management

File Management - Basic Concept of File-Directory Structure-File Protection-Allocation Methods – Various Disk Scheduling algorithms

Text Books:

Abraham Silberschatz Peter B. Galvin, G. Gagne, “Operating System Concepts”, Sixth Edition, Addison Wesley Publishing Co., 2003.

Reference

1. Operating systems - Internals and Design Principles, W. Stallings, 6th Edition, Pearson
2. Willam-Stalling “Operating System” Fourth Edition, Pearson Education, 2003.

CORE THEORY PAPER - 11
DATA COMMUNICATION & NETWORKS

Objective:

To equip students to basics of Data Communication and prepare them for better computer networking

UNIT I

Introductory Concepts - Network hardware - Network software – Network Architecture - Physical layer - Guided transmission media - Cable television.

UNIT II

Data Link Layer - Design issues - Channel allocation problem - Multiple access protocols - Ethernet - Wireless LAN - 802.11 architecture.

UNIT III

Network Layer : Design issues, Routing Algorithms, Shortest path routing, Flooding, Broadcast & Multicast routing congestion, Control & internetworking.

UNIT IV

Transport Layer - Transport service - Elements of transport protocols - User Datagram Protocol - Transmission Control Protocol.

UNIT V

Application Layer - DNS - Electronic mail - World Wide Web - Multimedia - Network security.

TEXT BOOK

1. Tannenbaum, A.S., 2003 : Computer Networks, Prentice Hall.

REFERENCES

1. Stallings, William, 2008 : Local and Metropolution Area Networks : An Introduction, Macmillian Publishing Co.
2. Black : Data Network, Prentice Hall of India.
3. W. Stallings, "Data and Computer Communication", Pearson Education, Fifth Edition, 2001

CORE PRACTICAL – 5

MOBILE APPLICATIONS DEVELOPMENT – LAB

1. Intent and Activity
2. Using Controls
3. Alert Dialogs
4. List View
5. Options Menu
6. Seek Bars
7. Shared Preferences
8. Status Bar Notifications
9. Tab Widgets Talking Clock.
10. Tween Animation
11. Grid View
12. Internal Storage - Files
13. SQlite - Database
14. Google Map
15. Permissions

CORE PRACTICAL – 6

OPERATING SYSTEM LAB

1. Implementing the Process system calls.
2. Implementing I/O system calls.
3. Implementing IPC using message queues.
4. Implementing CPU& scheduling algorithm for first come first serve scheduling.
5. Implementing CPU scheduling algorithm for shortest job first scheduling.
6. Implementing perform priority scheduling.
7. Implementing CPU scheduling for Round Robin Scheduling.
8. Implementing pipe processing.
9. Implementing first fit, best fit algorithm for memory management.
10. A program to simulate producer-consumer problem using semaphores.
11. A Shell Program to find factorial of a given number
12. A shell program to generate Fibonacci number

Elective – 1

A. DATA MINING

Objective: Enable the student to get sufficient knowledge on mining the data .

UNIT - I: Data Mining Basics

Introduction: Definition of data mining - data mining vs. query tools - machine learning - steps in data mining process - overview of data mining techniques.

UNIT - II: Data Models

Multidimensional Data Model - Data Cube - Dimension Modeling - OLAP Operations - Meta Data - Types of Meta Data.

UNIT - III: Data Editing

Data Pre-Processing And Characterization :Data Cleaning - Data Integration and Transformation - Data Reduction - Data Mining Query Language - Generalization - Summarization - Association Rule Mining

UNIT - IV: Classification

Classification: Classification - Decision Tree Induction - Bayesian Classification - Prediction - Back Propagation - Cluster Analysis - Hierarchical Method - Density Based Method - Grid Based Method - Outlier Analysis.

UNIT - V: Analysis

Cluster analysis: Types of data - Clustering Methods - Partitioning methods - Model based clustering methods - outlier analysis. Advanced topics: Web Mining - Web Content Mining - Structure and Usage Mining - Spatial Mining - Time Series and Sequence Mining.

TEXT BOOKS:

1. PaulrajPonnaiah, "Data Warehousing Fundamentals", Wiley Publishers, 2001.

2. Jiawei Han, MichelineKamber, "Data Mining: Concepts and Techniques",Morgan Kaufman Publishers, 2006.

REFERENCES:

1. UsamaM.Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth RamasamyUthurusamy, "Advances in Knowledge Discover and Data Mining", the M.I.T. Press, 2007.
2. Ralph Kimball, Margy Ross, The Data Warehouse Toolkit, John Wiley and Sons Inc., 2002
3. Alex Berson, Stephen Smith, Kurt Thearling, "Building Data Mining Applications for CRM", Tata McGraw Hill, 2000.
4. Margaret Dunham, "Data Mining: Introductory and Advanced Topics", Prentice Hall, 2002.
5. Daniel T. Larose John Wiley & Sons, Hoboken, "Discovering Knowledge in Data: An Introduction to Data Mining", New Jersey, 2004

B. COMPUTER GRAPHICS

Objectives: To equip students to basics of computer drawing and prepare them for computer modeling of objects

UNIT – I : OVERVIEW OF GRAPHICS SYSTEMS AND OUTPUT PRIMITIVES
Video Display Devices- Raster Scan System- Random Scan Systems- Hard Copy Deices- Graphic Software- Line Drawing Algorithms: DDA- Bresenham's Line -Circle Generating Algorithms

UNIT – II : ATTRIBUTES AND TWO DIMESIONAL TRANSFORMATIONS
Line Attributes- Curve Attributes-Color And Gray Scale Level- Area Fill Attributes- Character Attributes- Inquiry Functions- Basic Transformations - Composite Transformation – Other transformation

UNIT – III : TWO DIMENSIONAL VIEWING AND CLIPPING
The Viewing Pipeline- Window To Viewport Transformation –Clipping Operations- Point Clipping- Line Clipping: Cohen Sutherland- Liang Barsky-Sutherland Hodgeman Polygon Clipping- Text Clipping- Exterior Clipping- Logical Classification Of Input Devices- Interactive Picture Construction

UNIT – IV : THREE DIMENSION TRANSFORMATION, VIEWING AND CLIPPING
Translation-Rotation-Scaling-Viewing Pipeline- Viewing Coordinates- Projections -View Volumes and General Projection Transformation- Clipping -

UNIT – V : VISIBLE SURFACE DETECTION METHODS
Classification of Visible Surface Detection Algorithms - Back Face Detection - Depth Buffer Method - A Buffer Method - Scan Line Method - Depth Sorting Method- BSP Tree Method - Area Sub Division Method - Octree Methods - Ray Casting Method

TEXT BOOK:

Computer Graphics(C version), Donald Hearn and M.Pauline Baker, Pearson- 2nd Edit. 2012.

REFERENCE BOOKS:

1. Interactive Computer Graphics–A top down approach using Open GL, Edward Angel , Pearson, 5th Edition.

2. Computer Graphics, Peter Shirley, Steve Marschner, Cengage Learning, Indian Edition,2009.

C. INFORMATION SECURITY

Objective: To enable the student to understand various methodology available for securing information

UNIT I Information Security Basics

INTRODUCTION -History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II Security Investigation

SECURITY INVESTIGATION - Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

UNIT III Security Analysis

SECURITY ANALYSIS-Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV Security Models

LOGICAL DESIGN-Blueprint for Security, Information Security Poicy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V Security Physical Design

PHYSICAL DESIGN-Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

Text Book

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003

Reference

1. Micki Krause, Harold F. Tipton, " Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
2. Stuart McClure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003
3. Matt Bishop, " Computer Security Art and Science", Pearson/PHI, 2002.

SKILL BASED SUBJECT - 3

SOFTWARE ENGINEERING

Objective:
This course introduces the concepts and methods required for the construction of large software intensive systems.

UNIT-I:
Introduction - Evolving Role of Software - Changing Nature of Software – SoftwareMyths; A Generic View of Process: Layered Technology - Process Models: Waterfall Model - Evolutionary Process Models.

UNIT-II:
Requirements Engineering: Tasks - Initiating the Requirements Engineering Process - Eliciting Requirements - Building the Analysis Model - Requirements Analysis - Data Modeling Concepts.

UNIT-III:
Data Engineering: Design Process and Design Quality - Design Concepts - The Design Model Creating an Architectural Design: Software Architecture - Data Design -Architectural Design - Mapping Data Flow into Software Architecture; Performing User Interface Design: Golden Rules.

UNIT-IV:
Testing Strategies: Strategic Approach to Software Testing- Test Strategies for Conventional and Object Oriented Software - Validation Testing - System Testing -Art of Debugging. Testing Tactics: Fundamentals - White Box- Basis Path - Control Structure - Black Box Testing Methods

UNIT-V:
Project Management: Management Spectrum - People - Product - Process - Project. Estimation: Project Planning Process - Resources - Software Project Estimation - Project Scheduling - Quality Concepts - Software Quality Assurance - Formal Technical Reviews.

TEXT BOOK:
Roger S Pressman, "Software Engineering - A Practitioner's Approach", Sixth Edition, McGraw Hill International Edition, New York: 2005.

REFERENCES:

1. Ian Somerville, "Software Engineering", 7th Edition, Pearson Education, 2006.
2. Mall Rajib, " Software Engineering", 2/E, PHI, 2006.

SEMESTER VI

CORE THEORY PAPER – 12

CLOUD COMPUTING

Objective:

To enable the students to learn the basic functions, principles and concepts of cloud Systems.

UNIT I: UNDERSTANDING CLOUD COMPUTING

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Cloud Services.

UNIT II: DEVELOPING CLOUD SERVICES

Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

UNIT III: CLOUD COMPUTING FOR EVERYONE

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events.

UNIT IV: PROGRAMMING MODEL

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Aneka, CloudSim.

UNIT V: SECURITY IN THE CLOUD

Security Overview - Cloud Security Challenges and Risks - Software-as-a-Service Security- Security Governance - Risk Management - Security Monitoring - Security Architecture Design - Data Security - Application Security - Virtual Machine Security - Identity Management and Access Control - Autonomic Security.

TEXT BOOK:

1. Michael Miller, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, August 2008.

REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
4. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India, 2011.
5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly

CORE THEORY PAPER – 13

OPEN SOURCE PROGRAMMING

Objectives:
To discuss techniques that can be effectively applied in practice about HTML5, JavaScript, PHP , CSS and Linux

UNIT I : INTRODUCTION TO HTML5,JAVA SCRIPT, PHP AND CSS
Introduction to Dynamic Web content- HTTP and HTML- Request and Response Procedure- The Benefits of PHP, JAVA Script, CSS, and HTML5- Introduction to HTML5- The Canvas - The HTML5 Canvas- HTML5 Audio and Video- Introduction to CSS- CSS Rules-Style Types- CSS Selectors- CSS Colors.

UNIT-II : LINUX

Introduction : Linux Essential Commands – File system Concept – Standard Files – The Linux Security Model – Vi Editor – Partitions Creation – Shell Introduction – String Processing – Investigation and Managing Processes – Network Clients – Installing Application.

UNI- III : MYSQL

Introduction to MY SQL – The show Databases and Table – The USE command – Create Database and Tables – Describe Table – Select, Insert, Update, and Delete statement – Some Administrative detail – Table Joins – Loading and Dumping a Database.

UNIT-IV : PHP

PHP Introduction – General Syntactic Characteristics – PHP Scripting – Commenting your code – Primitives, Operations and Expressions – PHP Variables – Operations and Expressions Control -statement – Array – Functions.

UNIT – V PHP

Basic Form Processing – File and Folder Access – Cooking – Sessions – Database Access with PHP – MySQL - MySQL Functions – Inserting Records – Selecting Records – Deleting Records – Update Records.

Text Books

1. "Learning PHP, MySQL, Java Script, CSS and HTML5", Robin Nixon, O'Reilly Publications, 3rd Edition, 2014.
2. Steven Holzner, "HTML Black Book", Dreamtech Press &Paraglyph Press Publishers, 2007
3.

Reference Books

Open Source Software, P.Rizwan Ahmed, Margham Publication, Chennai, 2015

Core Practical

PRACTICAL – VII

ASP.NET Lab

1. Implement Validation Controls
2. Write a Program to implement ad rotator control
3. Write a Program to implement state management techniques
4. Write a Program to implement view State and Session State.
5. Write a Program to displaying data with the grid view
6. Write a Program to implement ASP.Net Server Side Controls.
7. Write a Program to implement ASP.Net Master Pages, Themes and Skins.
8. Write a Program working with forms using ASP.Net
9. Write a Program working with pages using ASP.Net.
10. Write a Program to access data sources through ADO.NET

Core Practical

PRACTICAL – VIII

Open Source Programming Lab

1. Create a web page with Frames and Tables.
2. Create a web page incorporating CSS (Cascading Style Sheets)
3. Write a shell program to find the factorial of an integer positive number
4. Write a shell program for checking whether a given string is a palindrome or not.
5. Create a simple calculator in Java script.
6. Write a JavaScript program to scroll your name in the scroll bar.
7. Develop a program and check message passing mechanism between pages.
8. Develop a program and check file system functions, date &time functions.
9. Create a student database table in MYSQL and manipulate records (insert, delete, update) records in a web browser.
10. Develop a program using cookies and session.

Elective II PAPER – 2

(A) SOFTWARE TESTING

Objective: To make the student more proficient with error free software development

UNIT-I PRINCIPLES OF TESTING

A test in time - The cat and the saint - Test the tests first - The Policemen on the bridge - Phase of software project - Quality, Quality Assurance and Quality Control - Testing, Verification and Validation -Process model to represent different phases - Life cycle models.

UNIT-II BLACK BOX AND WHITE BOX TESTING

White box testing - Challenges - Static testing - Structural testing - Black box testing.

UNIT-III INTEGRATION, SYSTEM AND ACCEPTANCE TESTING

Integration testing - Types - Phase of testing - Scenario testing - Defect bash - System and Acceptance testing: Overview - Functional vs. Non-Functional testing - Functional system testing - Non-functional testing-Acceptance testing.

UNIT-IV PERFORMANCE AND REGRESSION TESTING

Introduction - Factors Governing - Methodology for Performance testing - Tools and Process for Performance Testing - Regression Testing - Types of Regression testing - How to do Regression Testing?

UNIT-V INTERNATIONALIZATION AND ADHOC TESTING

Introduction to Internationalization - Primer on Internationalization - Test phases for Internationalization testing - Enabling testing - Locale testing - Internationalization Validation- Fake language testing - Language testing - Localization testing - Tools used for Internationalization - Challenges and Issues - Overview of Ad Hoc testing - Buddy, Pair, Exploratory, Iterative, Agile and Extreme Testing - Defect Seeding.

TEXT BOOK:

1. Srinivasan Desikan, Gopalaswamy Ramesh, “Software Testing: Principles and Practices”, Pearson Publications, 2006.

REFERENCES:

1. RenuRajani, Pradeep Oak, “Software Testing- Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2004.
2. Boris Beizer, “Software Testing Techniques”, Dream Tech Press, Second Edition, 2003.

Elective II PAPER – 2

(B) MOBILE COMPUTING

Objective: To impart good knowledge of wireless communication to students

UNIT I **WIRELESS COMMUNICATION FUNDAMENTALS**

Cellular systems- Frequency Management and Channel Assignment- types of handoff and their characteristics, dropped call rates & their evaluation -MAC – SDMA – FDMA –TDMA – CDMA – Cellular Wireless Networks.

UNIT II **TELECOMMUNICATION NETWORKS & WIRLESS LAN**

Telecommunication systems – GSM – GPRS - Satellite Networks ,Wireless LAN – IEEE 802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a -802.11b standards – HIPERLAN – Blue Tooth.

UNIT III **MOBILE NETWORK LAYER & TRANSPORT LAYER**

Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR – Alternative Metrics. Traditional TCP, Mobile TCP

UNIT IV **APPLICATION LAYER**

WAP Model- Mobile Location based services -WAP Gateway –WAP protocols – WAP user agent profile- caching model-wireless bearers for WAP - WML – WML Scripts

UNIT V **DATABASE ISSUES**

Database Issues : Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2002.

REFERENCE BOOKS:

1. KavehPahlavan, PrasanthKrishnamoorthy, “Principles of Wireless Networks”, PHI/Pearson Education, 2003.

2. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003..

Elective II PAPER – 2

C. MICROPROCESSORS AND ITS APPLICATIONS

Objective:
To learn the architecture, programming, interfacing and rudiments of system design of microprocessors.

Unit-I : 8085 MICROPROCESSOR AND ARCHITECTURE
Microprocessors - Memory - I/O Devices - Memory Mapped I/O - Pin diagram and internal architecture of 8085 - Registers, ALU, Control & Status Registers - Instruction and Machine Cycles. Interrupts

Unit II : PROGRAMMING THE 8085
Introduction to 8085 Assembly language programming - 8085 instructions - Programming techniques with Additional instructions - Counters and Time Delays - Stack and Subroutines - Code Conversions

Unit-III : 8086 MICROPROCESSOR AND ARCHITECTURE
Pin Details and Internal Architecture of 8086 - Register organization, Bus interface unit, Execution unit, Memory addressing, Memory segmentation. Operating modes - Hardware and Software interrupts - Addressing Modes.

Unit-IV : PROGRAMMING THE 8086
8086 Assembly Language Programming - Implementing Standard Program Structures - String - Procedure and Macros. Instruction Description and Assembler Directives

Unit-V : INTERFACING PERIPHERALS
8255 PPI , 8253/8254 PIT, 8237 DMAC,8259 PIC, 8251 USART.

TEXT BOOK

1. Microprocessor Architecture, Programming and Applications with 8085, Ramesh S.Gaonkar, Penram International Publishing (India) Pvt. Ltd. 4th Ed. (for Units I,II and V)
2. Microprocessors and Interfacing,Douglas V. Hall, Tata McGraw Hill , 2nd Ed. (for Units III and IV)

REFERENCE BOOKS:

1. Assembly Language Programming the IBM PC ,Alan R. Miller, SubexInc, 1987.
2. Advanced Microprocessors and Peripherals, Ray A K ,Bhurchandi K M , TMH.

Elective III PAPER – 3

(A) Internet of Things

Objective: To prepare the student for better application of internet technology.

Unit – I IoT Introduction

Introduction to Internet of Things: Definition – Characteristics of IOT – Physical Design of IoT – Things in IoT – IoT Protocols – Logical Design of IoT – Iot Functional Blocks – IoT Communication Models – IoT Communication APIs – IoT Enabling Technologies

Unit – II Domain Specific IoT - 1

Domain Specific IoT – I : Smart Lighting – Smart Appliances – Intrusion Detection – Smoke / Gas Detection – Smart Parking – Smart Roads – Structural Health Monitoring – Surveillance – Emergency Response – Weather Monitoring –

Unit – III Domain Specific IoT II

Domain Specific IoT – II : Air Pollution Monitoring – Noise Pollution Monitoring – Forest Fire Detection – River Flood Detection – Smart Grids- Smart Vending Machines – Route Generation & Scheduling – Fleet Tracking – Shipment Monitoring –

Unit – IV Domain Specific IoT III

Domain Specific IoT – III: Remote Vehicle Diagnostics – Smart Irrigation - Green House Control – Machine Diagnosis & Prognosis – Indoor Air Quality Monitoring – Health & Fitness Monitoring – Wearable Electronics

Unit – V IoT and M2M

IoT And M2M: M2M – Difference Between Iot And M2M – SDN And NFV For IoT – IoT System Management With NETCONF – YANG : Need For Iot Systems Management – SNMP-Network Operator Requirements – NETCONF – YANG-IoT Systems Management With NETCONF - YANG

Text Books:

1. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam

Dunkels, Morgan Kuffmann.

Reference

1. Internet of Things, P.Rizwan Ahmed, Margham Publications, Chennai.

2. Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally

(B) System Software

Objective: To make the student to become more proficient with system programming

Unit – I LANGUAGE PROCESSORS

Language Processing Activities – Fundamentals of Language Processing – Fundamentals of Language Specification – Language Processor Development Tools.

UNIT II ASSEMBLERS AND MACRO

Elements of Assembly Language Programming – Overview of Assembly Process - Design of a Two – Pass Assembler - Macro Definition and Call – Macro Expansion – Nested Macro Calls.

UNIT III COMPILER I

Scanning: Finite State Automate – Regular Expressions – Building DFA – Performing Semantic Action – Writing a Scanner – Parsing: Parse Tree and Abstract Syntax Trees – Top Down Parsing – Bottom-Up Parsing.

UNIT IV COMPILER II AND INTERPRERTERS

Aspects of Compilation –Memory Allocation - Compilation of Expressions-Compilation of Control Structure-Code Optimization - Interpreters.

UNIT V LINKERS

Relocation and Linking Concepts – Design of a Linker – Self-Relocating Programs – Linking for Overlays - Loader.

TEXT BOOK

D.M. Dhamdhere, “System Programming And Operating Systems”, New Delhi: Tata McGraw-Hill Publishing Company Limited, 1993.

Elective III PAPER – 3

(C) Multimedia Systems

Objective :

This course presents the Introduction to Multimedia, Images & Animation and enable the students to learn the concepts of Multimedia.

UNIT I Introduction to Multimedia:

Introduction to Multimedia PCs – Components of Multimedia – Multimedia Tools Sound and Graphics : Digital Sound – Editing and Mixing sound files – MIDI creation – Tracking Procedure – Interactive and Non Interactive Graphics – High Resolution Graphics – Difference between TV and Computer Display.

UNIT II Video and Animation :

Digital Image concepts – Video Capturing – Scanning Images – Digital Filters Morphing and Warping – Two Dimensional and Three dimensional animation – Animation Tools – Layering technique – Blue Screen technique – Latest movie technologies – Motion Tracking System – Motion Capturing System.

UNIT III Creating Presentation:

Script Writing and creating interactive and non-interactive presentation – Linear and Non Linear Editing – Authoring Tools – File Formates SOUND, VIDEO, ANIMATION, Presentation Images. Multimedia Programming: Text Links – Hyper Text system – Form Creation – File storing - Error Trapping.

UNIT IV Sound Links:

Multimedia interfaces – MCI- API- High Level Multimedia Functions – WAVE , MIDI file processing. Animation : Color Palette – Events – ROPs.

UNIT V Imaging Special Visual Effects :

Bitmap – Brushes – Dissolve –Hotspot Editor – Scorlling. Media Control Interface : Simple Commands – API functions – CD Player – Video Capturing – Form – AVI Play Form.

Text Books :

1. Kaliyaperumal Karthikeyan,"Introduction to Multimedia System", LAP Lambert Academic Publishing, 2011
2. TayVaughan, "Multimedia Making It Work Eighth Edition", Tata McGraw-Hill Publishing Company, 2011
3. ParagHavaldarand Gerald Medioni, "Multimedia Systems", Cengage Learning, 2011
4. S. K. Bansal,"Multimedia Systems", Aph Publishing Corporation, 2011

Skilled Based Subject IV – Paper 4

ASP .NET

Objective: Students to become well aware of .NET technology

UNIT I : ASP.NET Basics

Introduction to ASP.NET: .NET Framework (CLR, CLI, BCL), ASP.NET Basics, ASP.NET Page Structure, Page Life Cycle. Controls: HTML Server Controls, Web Server Controls, Web User Controls, Validation Controls, Custom Web Controls.

UNIT II : Form

Form validation: Client side validation, Server side validation, Validation Controls: Required Field Comparison Range, Calendar Control, Ad rotator Control, Internet Explorer Control. State Management: View State, Control State, Hidden Fields, Cookies, Query Strings, Application State, Session State.

UNIT III : ADO.NET

Architecture of ADO. NET, Connected and Disconnected Database, Create Database, Create connection Using ADO.NET Object model, Connection Class, Command Class, Data Adapter Class, Dataset Class, Display data on data bound controls and Data Grid.

UNIT IV : Database accessing

Database accessing on Web Applications: Data Binding Concept with web, Creating Data Grid, Binding standard web server controls, Display data on web form using Data Bound Controls.

UNIT V : XML

Writing Datasets to XML, Reading datasets with XML. WEB services: Remote method call using XML, SOAP, Web service description language, Building and Consuming a web service, Web Application deployment.

Textbook:

Professional ASP.NET 1.1 Bill Evjen , Devin Rader , Farhan Muhammad, Scott Hanselman , SrivakumarWrox

REFERENCE BOOKS:

1. Introducing Microsoft ASP .NET 2.0 Esposito PHI
2. Professional ADO.NET BipinJoshi, Donny Mack, Doug Seven , Fabio Claudio Ferracchiati, Jan D Narkiewiez Wrox
3. Special Edition Using ASP.NET Richard Leineker Person Education
4. The Complete Reference ASP.NET Matthew MacDonald TMH
5. ASP.NET Black Book DreamTech

THIRUVALLUVAR UNIVERSITY

B.COM. (COMPUTER APPLICATION)

Degree Course

CBCS Pattern

(With effect from 2017-18)

The course of study and the scheme of Examination

S. No.	Part	Study component course title	Ins. Hrs. Week	Credit	Title of the paper	CIA	Uni. Exam	Total
SEMESTER – I								
1	I	Language – I	6	4	Tamil – I / Other Language	25	75	100
2	II	English – I	6	4	English – I	25	75	100
3	III	Core Paper – I	6	4	Financial Accounting – I	25	75	100
4	III	Core Paper – II	4	3	Business Applications & Accounting Software	25	75	100
5	III	Allied – I	6	4	**(To choose one out of 3)** a. Indian Economy – I b. Business Statistics – I c. Consumer Protection and Consumer Rights	25	75	100
6	IV	EVS	2	2	EVS	25	75	100
			30	**21**		**150**	**450**	**600**
SEMESTER – II						**CIA**	**Uni. Exam**	**Total**
1	I	Language – II	6	4	Tamil – II / Other Language	25	75	100
2	II	English – II	4	4	English – II	25	75	100
3	III	Core Paper – III	6	4	Financial Accounting – II	25	75	100
4	III	Core Paper – IV	4	3	Software & Tally Lab	25	75	100
5	III	Allied – II	6	6	**(To choose one out of 3)** a. Indian Economy – II b. Logistic Management c. Business Statistics – II	25	75	100
6	IV	Value Education	2	2	Value Education	25	75	100
7	IV	Soft Skill	2	1	Soft Skill	25	75	100
			30	**21**		**175**	**525**	**700**
SEMESTER – III						**CIA**	**Uni. Exam**	**Total**
1	I	Core Paper – V	6	4	Corporate Accounting – I	25	75	100
2	II	Core Paper – VI	5	4	Business Law	25	75	100
3	III	Core Paper – VII	4	3	Banking Theory, Law & Practice	25	75	100
4	III	Core Paper – VIII	4	3	MIS	25	75	100
5	III	Allied – III	6	4	Mobile Computing	25	75	100
6	IV	Skill based Subject - I	3	3	Elements of Insurance	25	75	100
7	IV	Non-Major - I	2	2	Elements of Accountancy	25	75	100
			30	**23**		**175**	**525**	**700**
SEMESTER – IV						**CIA**	**Uni. Exam**	**Total**

1	III	Core Paper – IX	6	4	Corporate Accounting – II	25	75	100
2	III	Core Paper – X	5	4	Principles of Marketing	25	75	100
3	III	Core Paper – XI	4	3	RDBMS	25	75	100
4	III	Core Paper – XII	4	3	RDBMS Lab	25	75	100
5	III	Allied – IV	6	6	E-Commerce & Its Applications	25	75	100
6	IV	Skill based Subject - II	3	3	Industrial Organisation	25	75	100
7	IV	Non-Major - II	2	2	Advertising and Salesmanship	25	75	100
			30	**25**		**175**	**525**	**700**
SEMESTER – V						**CIA**	**Uni. Exam**	**Total**
1	III	Core Paper – XIII	6	4	Cost Accounting – I	25	75	100
2	III	Core Paper – XIV	5	4	Management Accounting	25	75	100
3	III	Core Paper – XV	6	4	Business Management	25	75	100
4	III	Core Paper – XVI	6	4	Internet & Its Applications	25	75	100
5	III	Elective – I	4	3	**(To choose one out of 3)** a. Entrepreneurial Development b. Practical Auditing c. Income Tax Law & Practice – I	25	75	100
6	IV	Skill based Subject - III	3	3	Computer Application in Business	25	75	100
			30	**22**		**150**	**450**	**600**
SEMESTER – VI						**CIA**	**Uni. Exam**	**Total**
1	III	Core Paper – XVII	6	5	Cost Accounting – II	25	75	100
2	III	Core Paper – XVIII	6	5	Web Technology	25	75	100
3	III	Core Paper – XIX	6	5	Web Technology Lab	25	75	100
4	III	Elective – II	5	3	**(To choose one out of 3)** a. Income Tax Law & Practice – II b. Business Environment c. Services Marketing	25	75	100
5	III	Elective – III	4	3	**(To choose one out of 3)** a. Software Engineering b. Data Mining c. Enterprise Resource Planning	25	75	100
6	IV	Skill based Subject – IV	3	3	Industrial Relations	25	75	100
7		Extension Activities	-	1		100	0	100
			30	**25**		**250**	**450**	**700**

Part	subject	Papers	credit	Total credits	Marks	Total Marks
Part - I	Languages	2	4	8	100	200
Part - II	English	2	4	8	100	200
Part - III	Allied (Odd Semester)	2	4	8	100	200
	Allied (Even Semester)	2	6	12	100	200
	Electives	3	3	9	100	300
	Core	19	(3-7)	73	100	1900
Part - IV	Environmental Science	1	2	2	100	100
	Soft Skills	1	1	1	100	100
	Value Education	1	2	2	100	100
	Language & Others / NME	2	2	4	100	200
	Skill based	4	3	12	100	400
Part - V	Extension Activities	1	1	1	100	100
	Total	**40**		**140**		**4000**

THRUVALLUVAR UNVERSITY
B.COM (COMPUTER APPLICATION)
SYLLABUS
UNDER CBCS
(With effect from 2017-2018)
SEMESTER I
CORE PAPER - 1
FINANCIAL ACCOUNTING – I

Objective:

To gain knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Introduction

Meaning of accounting – objectives of accounting – advantages and limitations of accounting- Accounting concepts and conventions - Methods of accounting - Rules of debit and credit- Journal - Ledger accounts– Trial Balance - Errors and their rectification - Rectification of Errors without suspense a/c - Rectification errors with suspense a/c (effect of rectification on profit and rectification during subsequent accounting year are excluded) - Bank Reconciliation Statement.

Unit - II: Depreciation, Provisions and Reserve

Meaning of depreciation – causes for depreciation – need for charging depreciation – Methods of calculating depreciation: straight line method and written down value method (change in method of depreciation is excluded) – Methods of recording depreciation: by charging depreciation to assets account or by creating provision for depreciation account.

Unit - III: Bills of exchange

Meaning of bill of exchange - features and advantages of bill of exchange- types of bill of exchange: Trade bills and accommodation bills - Accounting treatment of trade bills (accommodation bills are excluded).

Unit - IV: Final accounts

Meaning of final accounts – adjustments in preparation of final accounts – preparation of trading, profit & loss account and balance sheet of sole proprietorship concern.

Unit V: Accounts from incomplete records

Meaning of single entry system – features and limitations of single entry system – Distinction between single entry system and double entry system - Methods of calculation of profit: Statement of affairs method and Conversion method – Distinction between statement of affairs and balance sheet.

Note: Questions in section A, B and C shall be in the proportion of 20: 80 between theory and problems

Text books

1. Jain &Narang, Financial Accounting, Kalyani Publishers, New Delhi.
2. T.S. Reddy & Dr. A. Murthy, Financial Accounting, Margham Publications, Chennai.

Reference books

1. Gupta, R.L & Gupta,V.K, Advanced Accounting, Sulthan Chand & Sons, New Delhi.
2. Shukla & Grewal, Advanced Accounting, S. Chand & Co. New Delhi.
3. Parthasarathy, S. & Jaffarulla, A. Financial Accounting, Kalyani Publishers, New Delhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER – 2

Business Application & Accounting Software

UNIT – I Word and Excel

MS Word: Creating and Editing Documents –Menus, Commands, Toolbars and Icons—Formatting document – Creating Tables – Mail Merger.
MS Excel: Spreadsheet Overview – Menus, Toolbars, Icons-Creating worksheets – Editing and Formatting – excel Formulas and Functions – Creating a Chart Data Forms, Sort, and Filter.

UNIT – II PowerPoint and Access

MS Power Point – Introduction – Menus – Toolbars – Text and Formats – Animation, Art and Sound – Making the presentation template.
MS Access: Database overview – Creating a database – Modifying table and Creating Form – Query – Creating reports – Mailing Labels.

UNIT-III Tally introduction

Introduction to Tally – Company Creation – Alter – Display – Accounts info – Ledger Creation – Voucher Creation – Bank Reconciliation Statement – Bill wise Details – Cost Centre and Cost Category – Multi Currency – Interest calculation – Budgets and Credit Limits – Day Book.

UNIT-IV Inventory

Inventory info – Stock Group – Stock Category – Stock Item – Unit of Measures – Godowns – Inventory vouchers – Re-order level and status – Batch-wise Details – Bill of Material.

UNIT-V Taxation

Statutory and Taxation – Value Added Tax (VAT) – Tax Deducted at Source (TDS) – Tax Collected at Source (TCS) – Service Tax – Security Control and Tally audit – Export and Import – Backup and Restore – Open Database Connectivity.

Text Books:

TEXT BOOKS:

1. MS Office 2000 for Every One - Vikas Publishing House Pvt. Ltd., Sanjay Saxena.
2. MS Office 2000 Professional Fast & Easy – June Slton, BPB publications.
3. Guide to MS Office 2000 PH. - I Loura Acklen.
4. The ABC & MS Office Professional Edition - Guy Hart-Davis.
5. Tally 9.0 – A complete Reference – Tally Solutions (P) Limited.

ALLIED 1

(To choose any 1 out of 3)

PAPER - 1

A. INDIAN ECONOMY - I

Objective

To acquire sufficient knowledge about India's Economic features; occupational structure and the relative shares of the different Sectors. Students should know that India is an emerging economic power in the World market.

UNIT-I

Features of less developed and developing Economies. - Economic and Non-Economic factors impeding Economic development - Concept of growth and development - Indicators - Factors in Economic Development.

UNIT-II

Capital Formation - Human and Physical, Savings and Investment pattern since 1991 - National Income - Methods, trends, limitation - Distribution - Recent trends in National Income - Black Money - Corruption.

UNIT-III

Human Resources - Human Resource Development Size and growth of population-Causes, impact-measures to control population-Recent Population Policy.

UNIT-IV

Agriculture - It's Contribution to Economic Development - Food Problems - Methods of solving it - Agricultural productivity - Land Reforms - Green Revolution

UNIT-V

Agricultural labour – Definition – Features- Problems – Remedies Agricultural Credit - Grameen Bank.

BOOKS FOR REFERENCE:

1. Agrawal, A.N. : Indian Economy, Vikas Publishing House, New Delhi.
2. Alak Ghosh : Indian Economy, The World Press, Kolkata.
3. Arora, R.C. : Integrated Rural Development, S. Chand & Co.,
4. Arthur Lewis : The Theory of Economic Growth.
5. Arun Ghosh : India in Transition, Economic Policy Options, S. Chand & co.,

6.	Bimal Jalan	:	Indian Economic Crisis, Oxford University Press, Chennai.
7.	Bright Singh	:	Economics of Development.
8.	Dewett, Verma & Sharma	:	Indian Economics, S. Chand & Co.,
9.	Dhingra, I.C.	:	Indian Economy, Sultan Chand & Co.,
10.	Hajela & Goswami (E.D.)	:	Economic Reforms and Employment, Indian Economic Association, New Delhi.
11.	Jhingan, M.L.	:	Economics of Development & Planning, Konark Publishers , New Delhi.
12.	Kanka, S.S.	:	Human Resource Management, S. Chand & Co.,
13.	Kindle berger	:	Economic Development.
14.	Minhas	:	Planning for the Poor.
15.	Mongia, J.N. (Editor)	:	India's Economic Policies, Allied Publishers
16.	Pndey, B.N.	:	Role of Science & Technology in Rural and Economic Development of India, S. Chand & Co.,
17.	Pramit Chaudhury	:	The Indian Economy, Poverty and Development, Vikas Publishing House, New Delhi.
18.	Pramod Verma	:	Labour Economics and Industrial Relations, Tata McGraw Hill
19.	Ray, S.K.	:	Economics of Development - Prentice Hall of India.

ALLIED - 1

PAPER - 1

B. BUSINESS STATISTICS – I

Objective

To understand and apply statistical tools in business.

UNIT-I

Statistics - Definitions - Scope and Limitations - Collection of Data - Primary and Secondary Data - Questionnaire - Classification and Tabulation - Diagrammatic and graphical representation of data.

UNIT-II

Measures of Central tendency - Mean - Median - Mode - Harmonic Mean and Geometric Mean,

UNIT-III

Measures of Dispersion - Range - Quartile deviation - Mean Deviation - Standard Deviation - Coefficient of Variation - Lorenz Curve.

UNIT-IV

Measures of Skewness - Karl Pearson's and Bowlay's Coefficient of Skewness - Kurtosis - Characteristics of Kurtosis - Measures - Calculation.

UNIT-V

Statistical Quality Control - Control Charts - X, P, C, R - Charts - Acceptance sampling only.

(Weightage of Marks = Problems - 80%, Theory - 20%)

Text Books:

1. Dr. S.P. Gupta, Business Statistics & Operation Research - Sultan Chand.
2. PA. Navanitham, Business Statistics & Operation Research, Jai Publications, Trichy.
3. S.P. Rajagopalan & R. Sattanathan, Business Statistics & Operation Research 3rd Edition, Vijay Nicole Publications, Chennai.

Reference Books:

1. Dr. S.P. Gupta, Statistical Methods - Sultan Chand.
2. R.S.N. Pillai & Bhagavathi, Statistics.
3. J.K. Sharma, Business Statistics - Pearson Education.
4. B. Agarwal, Basic Statistics - Wiley Eastern.

ALLIED - 1

PAPER - 1

C. CONSUMER PROTECTION AND CONSUMER RIGHTS

Objective:

To make students to acquire basic knowledge of consumer laws, consumer rights and consumer welfare and protection.

Unit - I

Introduction of Consumer Protection Act 1986 – Objectives - Consumer Protection Act 2006 (Amendments) – Salient features.

Unit - II

Definitions of the term: - Consumer – Types of Consumer Appropriate authority – Complainant – Consumer dispute – Restrictive Trade Practice.

Unit - III

The various Consumer Rights: - Right to Safety, Right to Information, Right to Choose, Right to be heard – Right against exploitation – Right to Consumer Education.

Unit - IV

Consumer Production Council: - Composition and Powers of National Commission, State Commission and District Consumer Forum.

Unit - V

Redressal of consumer grievances-Goods & Services covered under Consumer Protection Act-Procedure for filing of complaints with District Forum, State Commission , National Commission.

Books for reference

1. Lecture on Torts and Consumer Protection Laws by Dr. Rega Surya Rao – Asia Law House, Hyderabad.
2. Consumer Protection Laws – By Prof. RakeshKhanna – Central – Law Agency.
3. Consumer Protection (Amendment) Act, 2002. S. Chand & Sons.2012.

SEMESTER – II

CORE PAPER - 3

FINANCIAL ACCOUNTING – II

Objective:

To gain a knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Branch accounts

Meaning – objects of branch accounts – accounting in respect of dependent branches: debtors system; stock and debtors system; wholesale branch system and final accounts system - Independent branches – incorporation of branch trial balance in head office books.

Unit - II: Departmental Accounting

Meaning of departments and departmental accounting – Distinction between departments and branches- need for departmental accounting – advantages of departmental accounting - Apportionment of indirect expenses – Inter departmental transfers at cost and selling price - preparation of departmental trading, profit & loss account and balance sheet.

Unit - III: Hire purchase and Instalment purchase systems

Meaning and features of hire purchase system - calculation of interest – books of hire purchaser and books of hire vendor - default and repossession (Hire purchase trading account excluded)

Meaning of instalment system -distinction between hire purchase system and instalment system - calculation of interest – books of buyer and books of seller.

Unit - IV: Partnership accounts (fundamentals and reconstitution of partnership)

Meaning and features of partnership – Partnership deed - calculation of Interest on capital and interest on drawings – preparation of profit & loss appropriation account – preparation of capital accounts (fixed and fluctuating) – admission of a partner – retirement of a partner – death of a partner – treatment of goodwill as per AS 10.

Unit - V: Partnership Accounts (Dissolution of partnership firms)

Dissolution of a firm – insolvency of a partner (Garner Vs Murray rule) – Insolvency of all the partners – Piecemeal distribution: proportionate capital method and maximum loss method.

Note: Questions in section A, B and C shall be in the proportion of 20: 80 between theory and problems.

Text books

1. Jain & Narang, Financial accounting, Kalyani publishers, New Delhi.
2. T.S. Reddy & Dr. A.Murthy, Financial accounting, Margham publications, Chennai.

Reference books

1. Gupta, R.L & Gupta, V.K, Advanced Accounting, Sultan Chand & Sons, New Delhi.
2. Shukla & Grewal, Advanced Accounting, S.Chand & Co.New Delhi.
3. Parthasarathy, S.& Jaffarulla, A.Financial Accounting, Kalyani Publishers, New Delhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER - 4

Software & Tally Lab

MS.WORD:

1. a. Starting MS-WORD, Creating, Saving, Printing (with options), Closing and Exiting.
   b. Study of Word – Menu / toolbars.
2. a. Create a document, save it and edit the document as follows:
   i) Find and Replace options.
   ii) Cut, Copy, Paste options.
   iii) Undo and Redo options.
   b. Format the document:
   i) Using Bold, Underline and Italic.
   ii) Change Character size sing the font dialog box.
   iii) Formatting paragraph: Center, Left aligns & Right align
   iv) Changing paragraph and line spacing, Using Bullets and Numbering in Paragraphs.
   v) Creating Hanging Paragraphs.
3. Using tap settings enhancing the documents (Header, Footer, Page Setup, Border, Opening & Closing Toolbars, Print Preview).
4. Creating Tables in a document, Selecting Rows & Column sort the record by using tables format painter and Auto Format.
5. Drawing flow chart using (creating main document, data source, inserting merge fields and veiwing merge data, viewing and printing merged letter, using mail merge to print envelope creating mailing labels).

MS-EXCEL

1. a. Create a worksheet, moving/ copying/ inserting/ deleting rows and columns (usage of cut, paste, commands, copying a single cell, copying a range of data, filling up a cell. Undo command, inserting a row, column, deleting rows and columns).
   b. Formatting work sheets.
   1. Bold style.
   2. Italic style.
   3. Font size changing.
   4. Formatting numbers (Auto fill, Selection Command, Currency format, Currency)
   5. Specifying percentage (%) Scientific notations.
   6. Drawing border around cells.
   7. Printing a work sheet (Pring preview, Margin Setting, Header, Footer).
2. a. Database Concept: database, record field and filed name – creating and sorting a data base and maintaining a database (data form).
   b. Using auto filter, advanced filter
   c. Creating subtotals and grad totals - using database fucntions.

3. Creating charts
   - i) Using chart wizard (five steps)
   - ii) Changing the chart type (Pie,Bar, Line)
   - iii) Inserting titles for the axes X. Y
   - iv) Changing colors.
   - v) Printing charts.

4. a. Using date, time, maths functions:
   - i) entering current data.
   - ii) Using date arithmetic (adding and subtracting dates)
   - iii) Date functioins (day, month, second)

   b. Math Functions
   - i) SUM, COUNT, AVERAGE
   - ii) MAX, MIN
   - iii) STDDEV, VAR
   - iv) ABS, EXP, INT
   - v) LOG 10 AND LOG
   - vi) MOD, ROUND, SORT
   - vii) Using auto sum

   c. Logical and Financial Functions
   - i) Logical (IP / AND / OR / NOT)
   - ii) Financial (PMD, FV, NPER, RATE)

5. i) Creating and running a macro.
   - ii) Assigning button to a defined macro.
   - iii) Editing a macro.

MS-POWER POINT:

1. Creating a presentation using auto content wizard.
2. Different views in power point presentation.
3. Setting animation effects / grouping / ungrouping / cropping power / point objects.
4. Printing a presentation / Importing – Exporting files
5. Creating an organisation chart in Power Point.

TALLY:

1. Company Information

a. Company creation
b.Select Company
c. Shut Company
d. Alter Company
e. Split Company Data
f. Backup and Restore

2. Gateway of Tally

a.Accounts info

i) Groups
ii) Ledgers
iii) Voucher Types

b. Inventory info

i) Stock Group
ii) Stock Category
iii) Stock item
iv) Unit of Measures
v) Godown

c. Accounting Vouchers
d. Inventory Vouchers

3. Statutory and Taxation

a. Value Added Tax (VAT)
b. Tax Deducted at Source (TDS)
c. Tax Collected at Source (TCS)
d. Service Tax

4. Display

a. Trial Balance
b. Day Book
c. Accounts Book
d. Statement of Accounts
e. Inventory Books
f. Statement of Inventory
g. Statutory Info
h. Statutory Reports
i. Cash flow and Fund flow

ALLIED - 2

(To choose any 1 out of 3)

PAPER – 2

A. INDIAN ECONOMY II

UNIT-I

Role of Technology - Information Technology BPO in India - their impact on Economic Development – Cyber Crime.

UNIT-II

Role of industries - Cottage & Small Scale industries - Some Large Scale industries (Cotton, Sugar, Iron & Steel, Tea & Petro Chemical) Industrial Policy - 1991 and after - Public sector Enterprises - Dis-investment and Privatisation.

UNIT-III

Transport - Importance of Transport (Roadways, Railways, Shipping and Civil Aviations) to Economic growth - Evaluation of Government in Policy in relation to privatisation policy - Transport Coordination.

UNIT-IV

Planning in India - Strategy of Indian Planning - Resources for Financing Plan - Agriculture and Industrial Development - Planning techniques - Investment Priorities – General Objectives – Targets, Achievements and Failures – 11^{th} and 12^{th} five year plans- NITIAYOG

UNIT-V

Poverty in India - Poverty Eradication Programmes - Recent Employment scheme- Swaraj Bharat Mission - Role of Micro finance - (SHG, Cottage and Household Sector etc.,) - Regional Development Disparities -India's Foreign Trade and Balance of Payments.

ALLIED - 2

PAPER - 2

B. LOGISTIC MANAGEMENT

Objective:

To understand the comprehensive nature of Logistics Management.

UNIT-I

Logistics - definition - scope - functions - objectives of Logistics Management - customer service and logistics.

UNIT-II

Supply Chain - components - role of logistics in supply chain - Warehousing - functions - types - warehouse layout - material handling and logistics - Inventory Management.

UNIT-III

Transportation - infrastructure - freight management - transportation network - route planning - containerization.

UNIT-IV

Logistical packaging - logistics information needs - logistics design for distribution channels - logistics outsourcing.

UNIT-V

Government policies and regulations - Motor Vehicles Act, carriage by air, sea, multi-modal transportation etc., Documentation - Airway Bill, Railway Receipt, Lorry Receipt, Bill of Lading etc.

Text Books:

1. Ronal H. Ballou, Business Logistics / Supply Chain Management, Pearson Education, Prentice Hall, New Delhi - 2001.

Reference Books:

1. Vinod V. Sople, Logistics Management, Pearson Education (Singapore) P. Ltd.,
2. Satis C. Ailawadi, Rakesh Singh, Logistics Management, Prentice Hall of India, New Delhi - 110 001.
3. Sunil Chopra & Peter Meindi, Supply Chain Management / Strategy, Planning and Operation - Pearson Education Asia, New Delhi.
4. B. S. Sahay, Supply Chain Management for Global Competitiveness, Macmillan India Ltd., Delhi.

ALLIED - 2

PAPER - 2

C. BUSINESS STATISTICS – II

Objective

To understand and apply statistical tools in Business.

UNIT-I

Correlation - Definition - Karl Pearson's Coefficient of Correlation - Rank Correlation.

UNIT-II

Regression Equations – Properties of Regression Lines and Coefficients – Standard Error of Estimate.

UNIT-III

Index Number - Definition - Uses - Unweighted Index Number - Simple Aggregate Price Index, Simple Average of Price Relatives Index - Weighted Index - Laspeyre'sPaasche, DorbishBowley's - Marshall Edgeworth, Fisher Ideal Index - Time and Factor Reversal Test - Cost of Living Index.

UNIT-IV

Time Series - Definition and Uses - Components - Semi Average, Moving Average - Method of Least Square - Seasonal Variation - Simple Average Method.

UNIT-V

Probability - Addition and Multiplication Theorem - Permutation and Combination - Baye's Theorem.

(Weightage of Marks = Problems - 80%, Theory - 20%)

Text Books:

1. Dr. S.P. Gupta, Business Statistics & Operation Research - Sultan Chand.
2. PA. Navanitham, Business Statistics & Operation Research, Jai Publications, Trichy.
3. S.P. Rajagopalan& R. Sattanathan, Business Statistics & Operation Research 3rd Edition, Vijay Nicole Publications, Chennai.

Reference Books:

1. Dr. S.P. Gupta, Statistical Methods - Sultan Chand.
2. R.S.N. Pillai&Bhagavathi, Statistics.
3. J.K. Sharma, Business Statistics - Pearson Education.
4. B. Agarwal, Basic Statistics - Wiley Eastern.

SEMESTER – III

CORE PAPER - 5

CORPORATE ACCOUNTING – I

Objective:

To gain comprehensive understanding of all aspects relating to corporate accounting.

Unit - I: Share capital

Meaning and types of shares - Issue and allotment of equity and preference shares- issue at par, premium and at discount – calls in advance – calls in arrears – forfeiture of shares – reissue of forfeited shares – redemption of preference shares – underwriting of shares (Determining the liability of underwriters – firm underwriting)

Unit - II: Debentures

Meaning and types of debentures - Issue of debentures at par, premium and at discount – writing off discount on issue of debentures – issue of debentures as collateral security – issue of debentures for consideration other than cash - redemption of debentures – methods – open market buying – conversion of debentures into shares – sinking fund method – insurance policy method.

Unit - III: Acquisition of Business

Meaning of Acquisition of business – accounting treatment – new set of books to be opened - same set of books to be continued – profit prior to incorporation

Unit - IV: Final accounts

Preparation of Statement of profit & loss and Balance sheet (as per revised schedule VI)

Unit - V: Amalgamation, Absorption, External and Internal reconstruction

Purchase consideration – methods - Amalgamation in the nature of merger or purchase – absorption (AS 14). Alteration of share capital – reduction of share capital (scheme of capital reduction is excluded).

Note: Questions in Sec.A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text Books

1. Jain,S.P & Narang,N.L., Advanced Accounting, Kalyani Publications.
2. ReddyT.S.& Murthy,A, Corporate Accounting, Margham Publications, Chennai.

Reference Books

1. Gupta,R.L & Radhaswamy,M, Advanced Accounts, Sulthan Chand, NewDelhi.
2. Shukla & Grewal & Gupta, Advanced Accounting, S. Chand &Co.,N ew Delhi.
3. Palaniyappan, Corporate Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER - 6

BUSINESS LAW

Objective:

To gain a comprehensive knowledge on all aspects of law as applied to business.

UNIT-I

Contract - Formation and Essential Elements of Contract – Types of Contract and Agreements – Rules as to offer, Acceptance and Consideration – Capacity to Contract – Lawful Object and Free Consent – Quasi Contract.

UNIT-II

Performance of Contract – Devolution of Joint Rights and Liabilities – Discharge of Contract – Breach of Contract and Remedies.

UNIT-III

Indemnity and Guarantee – Features and Distinctions – Extent of Surety's Liability – Rights and Discharge of Surety – Bailment and Pledge – Features – Difference – Rights and Duties of Bailor and Bailee – Law Relating to Lien and Finder of Lost Goods – Rights and Duties of Pawnor and Pawnee – Pledge by Non-Owner.

UNIT-IV

Contract of Agency – Definition and Meaning – Creation – Ratification and Requisites – Rights of Principal and Agent – Relation of Principal with Third Parties – Personal Liability of Agent – Termination of Agency – Irrevocable Agency.

UNIT-V

Sale of Goods Act 1930 – Definition of Sale – Sale Vs Agreement to Sell – Subject Matter – Express and Implied Conditions and Warranties – Caveat Emptor and Exceptions – Performance of Contract – Transfer of Property – Rights of an Unpaid Seller – Sale by Non-owner – Auction Sale.

Text Books:

1. N.D.Kapoor, Business Laws, Sultan Chand & Sons, New Delhi.
2. R.S.N.Pillai & Bagavathi, Business Laws, S. Chand & Co., New Delhi.

Reference Books:

1. M.C.Dhandapani, Business Laws, Sultan Chand & Sons, New Delhi.
2. M.C.Shukla, Mercantile Law, S. Chand& Co., New Delhi.
3. P.C. Tulsian, Business Laws, Tata McGraw Hill, New Delhi.
4. Dr.N.Premavathy, Business Law, Sri Vishnu Publications, Chennai.
5. Dr.N.Premavathy, Business Law (in Tamil), Sri Vishnu Publications, Chennai.
6. Balachandran. V and Thothadri. R, Business Law, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER – 7
BANKING THEORY, LAW AND PRACTICE

Objective:

To study in detail about the Central Bank and Commercial Banking System including the latest directives and decisions of Reserve Bank of India. To study the recent developments in Indian banking system.To acquire the basic knowledge about the banking transactions.

Unit - I

Origin of banks – Banking Regulation Act, 1949 – Roll of Banks and Economic Development – Central Banking and Role of RBI and their functions - Credit Control Measures of Central Bank.

Unit - II

Commercial Banks – Functions – E-Banking – ATM Cards, Debit cards, Personal Identification Number – Online enquiry and update facility – Electronic Fund Transfer – Electronic Clearing System – Credit Creation and Credit Control – Role of SBI in the Economic Development of India.

Unit - III

Types of Bank Accounts - Savings Account, Current Account - Types of Deposit Account – Fixed and Recurring Deposits Account – Procedure for opening of an Account – Types of customers (Individuals, firms and Companies) – Importance of CRM – Customer grievances and redressal – Ombudsman.

Unit - IV

Negotiable instruments – Promissory Note – Bills of Exchange, Cheque, Draft – Definitions, Features – Crossing – Endorsement – Material Alteration – Dishonour of Cheques – Paying Banker – Rights, Duties and Statutory Protection to Paying Banker – Collecting banker – Rights and Duties.

Unit - V

Principles of lending – Types of Loans – Precautions to be taken by a banker while lending against LIC Policies, Shares, Gold, Silver Ornament and Jewellery.

Text Books:

1. Banking Law Theory and Practice – Sundaram and Varshney – Sultan Chand Co.
2. Banking and Financial Systems – B. Santhanam, Margham Publishers.
3. Banking Law Theory and Practice – S.N. Maheswari – Kalyani Publications.
4. Banking Theory Law and Practice, Dr. S. Guruswamy, 3rd Edition, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books:

1. Indian Banking – Parameswaran – S. Chand and Co.
2. Financial Services – Dr. S. Gurusamy, Tata McGraw-Hill Education India.
3. Banking Theory Law Theory and Practice – Dr. S. Gurusamy, Tata McGraw-Hill Education India.

CORE PAPER - 8

MANAGEMENT INFORMATION SYSTEM

Unit-I:

Management Information – Meaning of Information – Information needs of Managers – Web Data basis – Data warehousing – Knowledge management – Information system for decision making.

Unit-II:

Types of Information System – Transaction Processing System – Office Automation System – Decision Support System – Executive Support System – MIS – Evolution of MIS – Computer and MIS.

Unit-III:

System Analysis – System Planning and Mutual Investigation – System Design - The Process and Stages of System Design – Input / Output forms Design – File Organisation – System Implementation.

Unit-IV:

Management Information Needs and Communication links for Marketing system, Production System, Accounting System, Manufacturing System, Inventory Control System and Budget Control System - IS Organisation – Top Management Responsibility – Processing Group Responsibility.

Unit-V:

Development – Maintenance of MIS – Operation of manual Information System – Role of Computer in MIS – Data base Concept – Expert Systems – System Audit.

Text Book:

1. M. Assam – Fundamentals of Management Information System – Vijay Nicole Imprints Private Ltd., Chennai.
2. Effy Oz, "Management Information Systems", Second edition, Thomson Learning Course Technology, 2002.
3. JawadekarW.S, "Management Information Systems", Tata McGraw Hill Publishing Company Ltd, 2002.
4. Kenneth.CLaudon and Jane P. Laudon, "Management Information Systems", Prentice Hall of India Ltd, 2002.

Reference Books:

1. David Knoenke (1989), "Management Information Systems", Tata McGraw Hill, New Delhi.
2. IandonK.C and Landon J.P (2001), "Management Information Systems', Maxwell Macmillan Publishing Company.
3. Murdic Rose and Elaggett, "Information System for Modern Management, Prentice Hall.
4. Robert Schultheis, Mary Sumner, "Management Information Systems" – The Manager's View, Fourth edition, Tata McGraw Hill Edition, 1999

ALLIED - 3

PAPER - 3

MOBILE COMPUTING

Unit I : INTRODUCTION

Mobile Computing – Mobile Computing Vs wireless Networking – Why Go Mobile- Mobile Computing Applications – Characteristics of Mobile computing – Types of Wireless Devices Structure of Mobile Computing Application- Mobile Communication Networks.

Unit II : WIRELESS MAC PROTOCOLS & MOBILE INTERNET PROTOCOL

Wireless MAC Protocols- FDMA TDMA – CDMA – Advantages and Disadvantages- Why Mobile IP- What is Mobile IP-Motivations for Mobile IP- What Mobile IP does-Requirements to Mobile IP- Mobile IP terminologies- Mobile IP features-Key Mechanism in Mobile IP-Data transfer to the mobile system- Data transfer from mobile system- Key Mechanism in Mobile IP-DHCP.

Unit III : MOBILE TELECOMMUNICATION SYSTEM

Global System for Mobile Communication(GSM)-What is GSM-GSM Services- GSM Subscriber Services-GSM Supplementary Services- GSM Architecture- Mobile Station-General packet radio service(GPRS)-GPRS Services-Advantages of GPRS-Applications of GPRS-Universal Mobile Telecommunications System(UMTS).

Unit IV : MOBILE PLATFORMS AND APPLICATIONS

Mobile Device Operating Systems – Special Constraints & Requirements – Commercial Mobile Operating Systems – Windows Mobile- Palm OS- Symbian OS- iOS- Android- Blackberry Operating system-Software Development Kit - M-Commerce – Structure – Pros & Cons –Mobile Payment System – Bluetooth Security-Security Issues.

Unit V : E-BUSINESS, E-COMMERCE & M-COMMERCE

Introduction, Potential Benefits, Limitations, Classifications, Impact of E-Commerce on Business models.

E-Commerce Applications: Entertainment, E-Marketing, E-Advertising, Search Engines, E-Banking, Mobile Commerce, Online Trading, ELearning, E-Shopping.

Text Books:

1. Prasant Kumar Pattinaik, Rajib Mall , "Fundamentals of Mobile Computing", PHI Learning Pvt Ltd, New Delhi, 2012
2. E-Commerce: A Managerial Perspective: Micheal change, etc. A1
3. Electronic Commerce – Security: Greenstein & Feinman Risk Management & Control

SKILL BASED SUBJECT – I

PAPER – 1

ELEMENTS OF INSURANCE

Objective:

To gain a knowledge of insurance and its importance.

UNIT-I

Definition of insurance - classification of Contracts of insurance - marine and non-marine - general principles of law as applied to non-marine insurance.

UNIT-II

Life Assurance - objects of life Assurance - principles of life Assurance - different plans of life Assurance and annuities - policy condition and privilege - assignment and nomination - lapses and revivals - surrender values and loans - claims - double insurance.

UNIT-III

Marine insurance - principles of marine insurance - functions of marine insurance - proximate clause - subrogation and contribution

UNIT-IV

Types of marine policy - clauses in general use - warranties - kinds of marine losses - reinsurance and double insurance.

UNIT-V

Fire insurance - principles of law as applied to fire insurance - the subject matter of fire insurance - fire waste - hazard types of fire policy - cover notes - surveys and inspection average - re-insurance - renewals.

Text and Reference Books:

1. Dr. B. Vardharajan - Insurance Vol 1 and 2. - Tamil Text Book.
2. R.S. Sharma - Insurance Principle & Practice - Vara Bombay, 2006.

A. Murthy - Elements of Insurance Risk management & Insurance - Harrington, 2006 - Tata McGraw Hill pub.

NON-MAJOR ELECTIVE – I

PAPER – 1

ELEMENTS OF ACCOUNTANCY

Objectives:

To facilitate the non- commerce students to have a basic knowledge in Book-Keeping and Accounting.

Unit - I:

Need for Accounting – Definition (AICPA) – Steps – Objectives — Double Entry System - Meaning of Debit and Credit - Advantages – Limitations – Types of Accounts – Accounting Rules – Accounting Terminology – Accounting Concepts and Conventions – Meaning and Types – Accounting Equation.

Unit - II:

Journal – Ledger Accounts – Trial Balance.

Unit - III:

Subsidiary Books – Meaning – Types (no problems from Bills Receivable Book and Bills Payable Book but only theory) – Advantages over Journal – Ledger Accounts – Trial Balance.

Unit - IV:

Errors – Classification – Rectification (Rectification after the preparation of final account is excluded) – Suspense Account – Meaning and Need.

Unit - V:

Closing and Adjustment Entries – Final Accounts with simple Adjustments.

(Weightage: Theory: 25%, Problems: 75%)

Text Books

1. Jain,S.P&Narang,N.L.,AdvancedAccounting,KalyaniPublications.
2. Jaya Charulatha and Baskar, Introduction to Accountancy, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books

1. Gupta,R.L&Radhaswamy,M,AdvancedAccounts,SulthanChand,NewDelhi.
2. Shukla&Grewal&Gupta,AdvancedAccounting,S.Chand&Co.,NewDelhi.

SEMESTER – IV

CORE PAPER – 9

CORPORATE ACCOUNTING – II

Objective:

To gain accounting knowledge in advanced corporate accounting.

Unit - I: Valuation of goodwill and shares

Methods of Valuation of Goodwill – Average Profit Method – Super Profit Method – Capitalisation Method.

Methods of Valuation of Shares- Net Assets Method – Yield Method – Fair Value Method.

Unit - II: Liquidation of companies

Order of Payments – Preferential Creditors – Liquidator's Remuneration - Liquidator's Final Statement of Account - Statement of Affairs and Deficiency Account.

Unit - III: Bank and Insurance Company accounts

NPA – Interest on Doubtful Debts – Rebate on Bills Discounted – Preparation of Bank Profit & Loss Account and Balance Sheet.

Life insurance – Ascertaining Correct Assurance Fund –Revenue Account – Valuation Balance Sheet - Profit & Loss account – Balance Sheet (new format).

General Insurance – Revenue Account – Profit & Loss Account – Balance Sheet (new format).

Unit - IV: Holding company accounts

Capital Profit - Revenue Profit - Cost Of Control - Minority Interest– Elimination Of Common Transactions – Unrealised Profit – Revaluation of Assets and Liabilities – Bonus Shares - Consolidated Balance Sheet (Intercompany Investment is Excluded).

Unit - V: Inflation accounting (Accounting for price level changes)

Limitations of Historical Accounting – Meaning of Inflation Accounting – Methods of Inflation Accounting – CPP Method; Gain or Loss on Monetary Items; Valuation of Cost of Sales and Closing Inventory – CCA Method: COSA; MWCA; Depreciation Adjustment; Gearing Adjustment.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text Books

1. Jain,S.P & Narang,N.L., Advanced Accounting, Kalyani Publications.
2. ReddyT.S.& Murthy,A, Corporate Accounting, Margham Publications, Chennai.

Reference Books

1. Gupta, R.L & Radhaswamy,M, Advanced Accounts, Sulthan Chand, New Delhi.
2. Shukla & Grewal & Gupta, Advanced Accounting, S. Chand & Co., New Delhi.

CORE PAPER - 10
PRINCIPLES OF MARKETING

Objective:

To enable the students to understand the concept and importance of marketing and the developments that have taken place in the field of marketing in the global scenario.

Unit - I Introduction

Meaning of market – classification of markets- meaning and definition of marketing- features of marketing – importance of marketing – difference between marketing and selling – Evolution of marketing concepts - functions of marketing.

Unit - II Market Segmentation and Consumer Behaviour

Meaning and definition of market segmentation – different patterns of market segmentation – Bases for segmenting consumer markets – benefits and limitations of market segmentation

Definition of consumer behaviour - consumer behaviour theories - factors determining consumer behaviour.

Unit - III Marketing Mix and Product policy

Definition and components of marketing mix - four P's of marketing mix - definition of product - features of a product - classification of products - stages in new product development - product life cycle – Branding – advantages of branding a product - packaging – functions of package – labelling – functions of labelling – kinds of labels.

Unit - IV Pricing policy, Channel of distribution and Promotion Mix

Meaning of price – factors affecting price decision – Types of pricing strategies - definition of channel of distribution – features of marketing channels – types of Channel of distribution - factors determining Channel of distribution - functions of wholesalers – types of retailers – promotion mix – Advertising – types of advertising – personal selling – qualities of a good salesman – sales promotion – kinds of sales promotion.

Unit - V Recent trends in Marketing

Social marketing – De-marketing – Re – marketing – Over marketing – Meta marketing – E- Marketing – online retailing – shopping malls.

Text Books:

1. Rajan Nair, Marketing, Sultan Chand & Sons , New Delhi
2. Varshney, Marketing Management, Sultan Chand & Sons , New Delhi.

Reference Books:

1. Jaisankar, Marketing, Margham Publications, Chennai
2. L. Natarajan, Marketing, Margham Publications, Chennai
3. Dr. K. Sundar, Essentials of Marketing, Vijay Nicole Imprints Private Ltd., Chennai.

CORE PAPER – 11

RELATIONAL DATABASE MANAGEMENT SYSTEMS

UNIT-I

Purpose of Database - Overall System Structure - Entity Relationship Model.

UNIT-II

Relational Model - Structure - Formal Query Language - Relational Algebra - Tuple and Domain Relational Calculus.

UNIT-III

Structured Query Language - Basic Structure - Set Operations - Aggregate Functions – Date and Numeric - Modification Of Databases - Joined Relations-DDL - Embedded SQL.

UNIT-IV

Relational Database Design - Pitfalls - Normalisation Using Functional Dependencies - First Normal Form-Second Normal Form-Third Normal Form.

UNIT-V

Oracle - Introduction - SQL (DDL, DML, DCL Commands) - Integrity Constraints - PL/SQL - PL/SQL Block - procedure, function.

Text Books:

1. Singh-Database systems: Concepts, Design & applications, Pearson Education.
2. Abraham Silberschatz, H.F.Korth And S.Sudarshan-Database System Concepts Mcgraw Hill Publication
3. Gerald V.Post - DBMS-Designing And Business Applications - McGraw Hill Publications
4. Michael Abbey And Michael.J.Corey-Oracle- A Beginners guide TMH

CORE PAPER – 12

RDBMS LAB

1. Create a table student_master with the following fields name, regno, dept and year with suitable data types. Use Select command to do the following.

   a) Select the student's name column.
   b) Eliminate the duplicate entry in table.
   c) Sort the table in alphabetical order.
   d) Select all the Students of a particular department.

2. Create a table master_book to contain the information of magazine code, magazine name, and publisher. Write PL/SQL block to perform insert, update, delete operations on the above table.

3. Create a table to contain phone number, user name, address of the phone user. Write a function to search for a address using phone numbers.

4. Create a table to store the salary details of the employees in a company. Declare the Cursor to contain employee number, employee name and net salary . Use Cursor to update the employee salaries.

5. Create a table to contain the information about the voters in a particular constituency. Write a proper trigger to update or delete a row in the table.

6. Create a table to store the details of the Alumni in an institution. Write a PL/SQL block to change address of particular alumni. Write proper exceptions and appropriate error messages.

ALLIED - 2

PAPER - 4

E-COMMERCE AND ITS APPLICATIONS

Unit - I:

Introduction to E-Commerce – Meaning – Working of E-Commerce – Electronic Business – Categories of E-Commerce Application – Global Trading Environment and Adoption of E-Commerce – Product suitability – Comparison between Traditional and Electronic Commerce – Advantages and Disadvantages of E-Commerce.

Unit - II:

Business Models of E-Commerce – Introduction – Major challenges of B2C E-Commerce – Meaning of B2B Exchange – Development of B2B E-Commerce – Types of B2B Markets – Difference between B2C and B2B Commerce.

Unit - III:

Introduction to E-Hub Concept – Introduction to B2G Concept – E-filing.

Unit - IV:

Internet – Internet Operation – Internet Explorer – Creation of E-mail ID, E-mail etiquettes.

Unit - V:

Web Browsing – Role of Website in B2C E-Commerce, Website strategies and goals. Websites Design Principles for E-Commerce websites.

Text Books:

E-Commerce – SrinivasaVallabhan. S.V – Vijay Nicole Imprints Private Ltd.,

Chennai.

SKILL BASED SUBJECT – II

PAPER - 2

INDUSTRIAL ORGANIZATION

Objective:

To gain knowledge of the basic industrial structure and its working.

UNIT-I

Meaning of Industrial Organisation – Industrial Revolution – Industrial Growth – Aggregation, Consolidation, Integration - Mass Production – Importance, Advantages, Limitations – Specialisation – division of labour – its advantages and disadvantages – Industrial growth in India – major industries in India – current scenario.

UNIT-II

Industrial ownership – Sole Proprietorship - Features, merits and demerits – partnership - Features, merits and demerits - Joint Stock Company - Features, merits and demerits - Types – Public Ltd and Private Ltd companies.

UNIT-III

Physical facilities – plant location – need for selection of location – stages in selection of location – plant layout – definition, objectives, advantages, types – factors influencing plant layout – tools used for design of plant layout – principles of a good plant layout.

UNIT-IV

Production management – product design – characteristics of a good product design – design of production system – its types – design of work study – motion study – time study - production planning – objectives, levels – production control – factors determining production control operation – functions of production planning and control.

UNIT-V

Materials management – its meaning, objectives, advantages, functions – purchasing-types of purchasing policy – store keeping – organisation of stores department – inventory control – its objectives, functions, benefits.

Text Book:

1. Dr. A. Murthy, Industrial Organisation, Margham Publications, Chennai.

Reference Books:

1. L Bethel, Atwater, Smith and Stackman, Industrial Organisational Management, McGraw Hill.
2. Kimball & Kimball, Principles of Industrial Organisation, McGraw Hill.
3. Lundy, Effective Industrial Management Eurasia Publishing House (Pvt.) Ltd., New Delhi.

NON-MAJOR ELECTIVE – II

PAPER - 2

ADVERTISING AND SALESMANSHIP

Objectives:

To study the concept of Advertisement and Salesmanship.

To gain knowledge about the role of Advertisement and Salesmanship in boosting the volume of sales.

To study the qualities to be imparted by a salesman in the present global competitive market.

UNIT-I

Origin and Development of Advertising – Objectives – Nature – Functions – Types – Benefits – Difference between Advertising and Publicity – Scope of Advertising – DAGMAR approach.

UNIT-II

Various media of Advertising – Print Media – Newspapers – Magazines – Advantages – Limitations – Radio and TV advertising - Advantages – Limitations.

UNIT-III

Advertisement copy – Characteristics – Clarification – Components – Salesmen Recruitment – Salesmen report – Types – Salesmanship and Psychology.

UNIT-IV

Salesmanship – Characteristics of Salesmanship – Objectives of Personal selling – Advantages – Limitations – Essentials of Effective selling – Advertising and Salesmanship.

UNIT-V

Qualities of Good Salesman – Sales Promotion – Kinds of Sales promotion – Importance of Salesmanship – Types of Salesmen – Methods of Remuneration – Qualities of successful Salesman.

Text Books:

1. Modern Marketing (Principles and Practises) R.S.N. Pillai&Bagavathi, S. Chand & Co. New Delhi
2. Sales and Advertisement Management S Rajkumar, V Rajagopalan, S. Chand & Company Pvt. Ltd.

Reference Books:

1. Advertising (Principles and Practise) ChunawallaK.C. Sethia, Himalaya Publishing House, Delhi.
2. Advertising Management Dr. M.M. Varma, R. K. Agarwal, Forward 300K Depot, New Delhi.
3. Advertising Management Mahendra Mohan, Tata Mcgraw-hill Publishing Company Limited,New Delhi, India.
4. Advertising Marketing and Sales Management G.R. Basotia N. K Sharama, Mangal Deep Jaipur.
3. Essentials of Marketing, Dr. K. Sundar, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

SEMESTER – V

CORE PAPER - 13

COST ACCOUNTING – I

Objective:

To understand the basic concepts and methods of Cost Accounting.

UNIT-I: Nature and Scope of Cost Accounting

Cost Accounting : Nature and Scope – Objectives, Advantages and Limitations – Financial Vs. Cost Accounting - Costing System - Types of Costing and Cost Classification – Cost Sheet and Tenders – Cost Unit – Cost Centre and Profit Centre.

UNIT-II: Material Purchase and Control

Purchase Department and its Objectives – Purchase Procedure – Classification and Codification of Materials, Material Control: Levels of Stock and EOQ – Perpetual Inventory System, ABC and VED Analysis – Accounting of Material Losses.

UNIT-III: Methods of pricing of Material Issues

Cost Price Methods: FIFO, LIFO, Average Price Methods: Simple and Weighted Average Price Methods, Notional Price Methods: Standards Price, and Market Price Methods

UNIT-IV: Labour Cost Control

Labour Turnover: Causes, Methods of Measurement and Reduction of Labour Turnover – Idle and Over Time – Remuneration and Inventive: Time and Piece Rate – Taylor's, Merricks and Gantt's Task – Premium Bonus System – Halsey, Rowan and Emerson's Plans – Calculation of Earnings of Workers.

UNIT-V: Overheads

Classification of Overhead Costs – Departmentalization of Overheads – Allocation Absorption and Appointment of Overhead Costs – Primary and Secondary Distribution of Overheads – Computation of Machine Hour Rate and Labour Hour Rate.

(Weightage of Marks = Problems 80%, Theory 20%)

Text Books:

1. T.S. Reddy &Hari Prasad Reddy – Cost Accounting – Margham Publications, Chennai
2. A.Murthy and S. Gurusamy, Cost Accounting 2nd Edition, Vijay Nicole Imprints Private Ltd., Chennai.

3. A.Murthy and S. Gurusamy, Cost Accounting, Tata McGraw-Hill Publishing Company Ltd. New Delhi.
4. Tulsian P.C. – Cost Accounting – Tata McGraw Hills.

Reference Books:

1. S.P.Jain and Narang – Cost Accounting – Kalyani Publishers, New Delhi
2. S.N.Maheswari – Principles of Cost Accounting – Sultan Chand & sons, New Delhi
3. A.Murthy and S. Gurusamy, Essentials of Cost Accounting, Vijay Nicole Imprints Private Ltd., Chennai.
4. S.P.Iyangar – Cost Accounting – Sultan Chand & Sons, New Delhi.

CORE PAPER - 14

MANAGEMENT ACCOUNTING

Objective:

To enable the students to gain knowledge in the application of accounting to Management.

UNIT-I

Management Accounting: Definition – objectives - Functions – Advantages and limitations – Financial Statement Analysis – Comparative and Common size statements – Trend Analysis.

UNIT-II

Ratio Analysis : Definition – Significance and Limitations – Classification – Liquidity, Solvency, Turnover and Profitability ratios – Computation of Ratios from Financial Statements – Preparation of Financial Statement from Ratios.

UNIT-III

Fund Flow and Cash Flow Analysis: Concept of Funds, Sources and Uses of Funds – Fund Flow Statement – Concept of Cash Flow – Cash Flow Statement as Per AS3.

UNIT-IV

Standard Costing – Variance Analysis – Material – Labour – Overheads – Fixed - Variable Sales Variance.

UNIT-V

Budget and Budgetary Control: Definition – Objectives – Essentials – Uses and Limitations – Preparation of Material Purchase, Production, Sales, Cash and Flexible Budget – Zero Base Budgeting.

(Weightage of Marks - Problems - 80%, theory - 20%)

Reference Books:

1. S.N.Maheswari, Management Accounting – Sultan Chand & Sons, New Delhi.
2. A.Murthy and S.Gurusamy, Management Accounting, Tata Mc-Graw Hill Publishing Company, New Delhi.

Reference Books:

1. Manmohan&Goyal, Management Accounting – SahithiyaBhavan, Agra.
2. S.P.Gupta, Management Accounting – Sultan Chand & Sons, New Delhi.
3. R.S.N.Pillai&Bhagavathi, Management Accounting – S. Chand& Co. Ltd., New Delhi.
4. T.S.Reddy&Hari Prasad Reddy, Management Accounting – Margham Publications, Chennai.

CORE PAPER - 15

BUSINESS MANAGEMENT

Objective:

To understand the basic principles of Business Management.

UNIT-I

Management – Meaning – Definition – Nature – Importance – Distinction between Administration and Management – Scope – Principles and Functions of Management.

UNIT-II

Planning – Meaning – Nature – Importance – Advantages and Limitations – Process of Planning – Types of Plans – MBO – Forecasting – Decision Making.

UNIT-III

Organising – Meaning – Definition – characteristics – Importance – Types – Authority and Responsibility – Centralisation and Decentralisation and Departmentation.

UNIT-IV

Directing – Meaning – Definition – Characteristics – Directing Process – Span of Supervision – Motivation – Leadership - Communication.

UNIT-V

Controlling – Definition – Principles – Controlling process – Types of Controls – Control Techniques - Coordination.

Reference Books:

1. Dr. C.B. Gupta, Business Management –Sultan Chand & Sons
2. Jayashankar, Business Management –Margham Publications, Chennai.

Reference Books:

3. Koontz, Weihrich and Aryasri, Principles of Management, Tata McGraw hill
4. Dr.H.C. Das Gupta, Principles & Practice of Management &SahityaBhawan. Agra
5. Lallan Prasad &S.S.Gulshan, Management principles and Practices &S. Chand& Co.
6. Dr.N.Premavathy, Principles of Management, Sri Vishnu Publications, Chennai.

CORE PAPER - 16

INTERNET AND ITS APPLICATIONS

UNIT-I

Introduction to Computers - Programming Language types – History of Internet – Personal Computers - History of World Wide Web – Micro Software .NET Java – Webresoures.

UNIT-II

Web Browsers – Internet Explorer – Connecting to Internet – Types of Internet connection – Features of Internet Explorer6 – Searching the Internet – Online help and tutorials – File Transmission Protocol (FTP) – Browser settings.

UNIT-III

Attaching a file – Electronic Mail – Creating an E-mail ID – Sending and Receiving Mails – Attaching a File – Instance Messaging – Other Web browsers.

UNIT-IV

Introduction to HTML headers – Linking – Images – Types of computer viruses – Ill-effect of Viruses – Remedy for Viruses.

UNIT-V

E-marketing – Consumer tracking – Electronic advertising search engine – CRM – Credit Card payments – Digital cash and e-wallets – Micro Payments – Smart Card.

Text Book:

Internet and World Wide Web, Third Edition, H.M. Deital, P.J. Deital and A.B. Goldberg – PHI

Reference Book:

Harley Hahn, The Internet – Complete Reference, Tata McGraw Hill.

ELECTIVE– I

(To choose any 1 out of 3)

PAPER - 1

A. ENTREPRENEURIAL DEVELOPMENT

Objective:

To encourage students to become entrepreneurs.

UNIT-I

Meaning of Entrepreneur – Entrepreneur and Enterprise – Entrepreneur and Manager – Entrepreneur and Intrapreneur – Qualities (Traits) of True Entrepreneur – Characteristics of Entrepreneur – Types of Entrepreneurs – Functions of an Entrepreneur – Roles of Entrepreneurs in the Economic Development.

UNIT-II

Establishing an Enterprise – Project Identification – Selection of the Product – Project Formulation – Assessment of Project Feasibility – Preparation of Project Report – Selection of Site (Location).

UNIT-III

Selection of Types of Organization – Sole Proprietorship – Partnership Joint Stock Company – Factors Influencing the Choice of Organization – Sources of Project Finance – Sources of Long Term Finance – Sources of Short Term Finance.

UNIT-IV

Incentives and Subsidies – Meaning of Incentives and Subsidies – Need and Problems – Incentives for Development of Backward Area – Incentives for SSI Units in Backward Areas – Taxation Benefits to SSI Units – Subsidies and Incentives in Tamil Nadu.

UNIT-V

Women Entrepreneurs – Concept – Functions and Role – Problems of Women Entrepreneurs – Suggestions for Development of Women Entrepreneurs – Rural Entrepreneurship – Need – Problems – How to Develop Rural Entrepreneurship.

Text Books:

1. C.B. Gupta, Entrepreneurship development in India – Sultan Chand.
2. Gupta C.B and SrinivasanN.P. Entrepreneurial Development, Sultan Chand & Sons, New Delhi.

Reference Books:

1. P Sarvanavel, Entrepreneurial development – Ess Pee kay Publishing House.
2. S.S. Khanka, Entrepreneurial Development, S. Chand & Co., New Delhi.

ELECTIVE–I

PAPER - 1

B. PRACTICAL AUDITING

Objective:

To gain knowledge of the principles and practice of auditing.

UNIT-I

Meaning and Definition of Auditing – Nature and Scope of Auditing – Accountancy and Auditing, Auditing and Investigation – Objectives of Auditing – Limitations of Audit – Advantages of Audit – Classification of Audit

UNIT-II

Meaning and Definition of Audit Programme – Advantages and Disadvantages – Audit File, Audit Note Book, Audit Working Papers – Purposes and Importance of Working Papers – Internal Check – Meaning, Object of Internal Check – Features of Good Internal Check System – Auditors duty with regards to Internal Check System – Internal Check and Internal Audit.

UNIT-III

Vouching – Meaning – Objects – Importance of Vouching – Meaning of Voucher – Vouching of Cash Receipts and Vouching of Cash Payments – Vouching of Trading Transactions.

UNIT-IV

Verification and Valuation of assets and liabilities – Meaning and objects of verification – Vouching and verification – Verification and Valuation of different kinds of Assets and Liabilities.

UNIT-V

The Audit of Limited Companies – Necessity of Company Audit – Qualification and Disqualification of Auditors – Appointment – Removal – Remuneration – Status of Auditors – Rights – Powers – Duties and Liability of Auditors – Auditor's Report – Importance and Contents.

Text Books:

1. B.N. Tandon, Sultan Chand – A handbook of practical auditing
2. B.N. Tandon, Sudharsanam, Sundharabahu – S Chand – Practical auditing.
3. Sundar. K and Pari. K, Vijay Nicole Imprints Private Ltd., Chennai.

Reference Books:

1. Sharma, SahityaBhavan, Agra – Auditing
2. Dr.N.Premavathy, Practical Auditing, Sri Vishnu Publications, Chennai.
3. Dr.N.Premavathy, Practical Auditing (in Tamil), Sri Vishnu Publications, Chennai.

ELECTIVE–I

PAPER – 1

C. INCOME TAX LAW AND PRACTICE - I

Objective:

To enable the students to have a knowledge of law of practice of Income tax.

Unit - I: Introduction

Income Tax Act 1961- Basic Concepts – Assessment Year – Previous Year – Person – Assessee – Income – Gross Total Income – Total Income - Agricultural Income – Casual Income – Capital and Revenue Receipts – Capital and Revenue Expenditures – Exempted Incomes u/s 10.

Residential status of an individual- Residential status of a HUF – Residential status of a firm and association of persons – Residential status of a company – incidence of tax liability.

Unit - II: Salaries

Meaning and features of Salary – Allowances – Perquisites – Profits in lieu of Salary – Provident Fund and its types – payments exempted u/s 10: Leave travel concession; gratuity; pension; leave encashment; retrenchment compensation; VRS – Deductions from salary: EA and professional tax- deduction u/s 80C- taxable salary

Unit - III: Income from House Property

Annual value – Determination of annual value- Income from let out house property – Income from self-occupied house property – Deductions allowed from Income from house property u/s 24.

Unit - IV: Profit and Gains of Business or profession and depreciation

Meaning of business and profession – deductions expressly allowed – expenses expressly disallowed – treatment/ admissibility of certain expenses and incomes – income from business- income from profession.

Meaning of depreciation – conditions for depreciation – actual cost – written down value – computation of allowable depreciation.

Unit - V: Income tax authorities

CBDT – powers – Director General of income tax – Chief commissioner of income tax – Assessing officer – appointment – Jurisdiction – powers relating to search and seizure.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text books

1. Gaur & Narang, Income Tax Law & Practice, Kalyani Publishers.
2. Dr. A. Murthy, Income Tax Law & Practice, Vijay Nicole Imprints Pvt. Ltd. Chennai
3. Reddy,T.S. & Hariprasad Reddy,Y,Income Tax Theory, Law & Practice, Margham Publications, Chennai.

Reference books

1. Mehrotra-Income Tax Law & Accounts, Sahithiya Bhavan Publications.
2. Vinod, K. Singhania, Students Guide to Income Tax, Taxman Publications Pvt. Ltd.

SKILL BASED SUBJECT – III

PAPER - 3

COMPUTER APPLICATION IN BUSINESS

Objective:

To provide basic knowledge of computer applications in business.

UNIT-I

Introduction to Computer – Characteristics of a Computer – History of Computer – Computer generation - Hardware – Software – System Software and application software.

UNIT-II

MS - Word Processing: Starting MS word - MS word environment - working with word documents, text, tables - checking spelling and grammar - printing a documents.

UNIT-III

MS Excel - MS Excel Sheet - MS Excel environment - Working with Excel workbook - worksheet - Formulas and functions - Inserting charts - printing in Excel.

UNIT-IV

MS Power Point - Starting MS Power Point - MS power point environment - working with power point - working with different views – designing, presentation & printing in Power Point.

UNIT-V

Electronic Commerce - Types - Advantages and Disadvantages - Electronic data interchange (EDI) working of EDI - EDI benefits & Limitations - SMART card - SMART card applications.

TEXT BOOK

1. Ananthi Sheshasaayee: Computer Application in Business and Management, Margam Publication.
2. Leon & Leon, Computer Applications in Business, Vijay Nicholes Imprint Pvt. Ltd.,– Chennai

REFERENCE BOOK

3. A. Zakiudeen Ahmed: Computer Application in Business, Margam Publication.

SEMESTER – VI

CORE PAPER - 17

COST ACCOUNTING - II

Objective:

To understand the basic concepts and methods of Cost Accounting.

UNIT-I

Job, Batch, Contract Costing: Job Costing – definition – Features – Procedure – WIP – Cost Accumulation, Batch Costing – EBQ, Contract Costing – Definition, Features, Work Certified and Uncertified – Incomplete Contact – Escalation Clause – Cost Plus Contract – Contract Account

UNIT-II

Process Costing : Definition – Features – Job Vs Process Costing – Process Account – Losses – By Products and Joint Products – WIP – Equivalent Units and its Calculation - Closing WIP with or without Process Loss.

UNIT-III

Operating Costing (Transport Costing): Cost Unit – Cost Classification – Operating Cost sheet.

UNIT-IV

Marginal Costing: Definition – Advantages and Limitation – Break Even Point – Margin of Safety – P/V Ratio – Key factor – Make or Buy Decision – Selection of Product Mix – Changes in Selling Price – Foreign Market Offer – Desired Level of Profit.

UNIT-V

Reconciliation of Cost and Financial Accounts.

(Weightage of Marks = Problems - 80%, Theory - 20%)

Text Books:

1. T.S. Reddy &Hari Prasad Reddy – Cost Accounting – Margham Publications, Chennai
2. A.Murthy and S. Gurusamy, Cost Accounting 2nd Edition, Vijay Nicole Imprints Private Ltd., Chennai.
3. A.Murthy and S. Gurusamy, Cost Accounting, Tata McGraw-Hill Publishing Company Ltd. New Delhi.
4. Tulsian P.C. – Cost Accounting – Tata McGraw Hills.

Reference Books:

1. S.P.Jain and Narang – Cost Accounting – Kalyani Publishers, New Delhi
2. S.N.Maheswari – Principles of Cost Accounting – Sultan Chand & sons, New Delhi
3. S.P.Iyangar – Cost Accounting – Sultan Chand & Sons, New Delhi.

CORE PAPER – 18

WEB TECHNOLOGY

UNIT-I

Internet Basic - Introduction to HTML - List - Creating Table - Linking document Frames - Graphics to HTML Doc.

UNIT-II

Style sheet - Style sheet basic - Add style to document - Creating Style sheet rules - Style sheet properties - Font - Text - List - Color and background color - Box - Display properties.

UNIT-III

Introduction - Object in HTML - Event Handling - Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Build in Object - User defined object.

UNIT-IV

HTML server controls - Anchor, Tables, Forms, Files. Basic Web server Controls- L.able, Textbox, Button, Image, Links, Check & Radio button, Hyperlink. Data List Web Server Controls - Check box list, Radio button list, Drop down list, List box, Data grid, Repeater.

UNIT-V

Request and Response Objects, Cookies, Working with Data - OLEDB connection class, command class, transaction class, data adaptor class, data set class.

Reference Books:

1. Deitel&Deitel ,internet & world wide web How to program, Pearson Education
2. I. Bayross, Web Enable Commercial Application Development Using HTML, DHTML, Javascript, Pen CGI, BPB Publications, 2000
3. J. Jaworski, Mastering Javascript, BPB Publications, 1999
4. T. A. Powell, Complete Reference HTML (Third Edition),TMH, 2002
5. G. Buczek, ASP.NET Developers Guide, TMH, 2002

CORE PAPER - 19

WEB TECHNOLOGY LAB

1. Create a simple page introducing yourself how old you are, what you do, what you like and dislike. Modify the introduction to include a bullet list of what you do and put list the 5 things you like most and dislike as numbered lists. Create another page about your favorite hobby and link it to (and from) your main page. Center something, and put a quote on one of your pages
2. Put an existing image on a web page. Create a table, use a heading and at least one use of row span/col. span. Color a page and some text within the page. Link to another site
3. Create a new file called index. html.
   - ❖ Put the normal HTML document structure tags in the file.
   - ❖ Give it a title.
   - ❖ At the bottom of the page (i.e. the last thing between the body tags) put the following:
     - ♦ A horizontal rule.
     - ♦ A Link to your e-mail Address (With your name between the tag) ; remember to put the link to your E- Mail address within address tags.
     - ♦ A line break.
     - ♦ The date. (I have this same structure at the bottom of this page).
     - ♦ Above this block (which is called the footer), put a title in heading tags.
     - ♦ Add some text describing yourself (you can split this into multiple headings and Paragraphs if you wish).
4. Write a script to create an array of 10 elements and display its contents.
5. Create a document that accepts the user's name in a text field form and displays the sanie the next time when the user visits the site informing him that he has accessed the site for the second time, and so on.

ELECTIVE– II

PAPER - 2

A. INCOME TAX LAW AND PRACTICE – II

Objective:

To enable the students to have a knowledge of law of practice of Income tax.

Unit I: Capital gains

What are capital assets? – what are not capital assets? – kinds of capital assets – transfer u/s 2 (47) – cost of acquisition – cost of improvement – computation of short term capital gain - computation of long term capital gain – exemptions from capital gains.

Unit II: Income from other sources

Specific incomes chargeable to tax – general incomes chargeable to tax – Interest on securities – Interest exempt from tax u/s 10 (15) - deductions allowed from Income from other sources – computation of income from other sources.

Unit III: Clubbing of Incomes and Set off and carry forward of losses

Income transfer without asset transfer – cross transfer –transfer for the benefit of son's wife – capital gain on an asset gifted before marriage – gifted money used for construction of house by spouse – income including losses – clubbing of business income – clubbing of minor's income – computation of total income.

Provisions relating to set off of losses- Provisions relating to set off and carry forward of losses – unabsorbed depreciation – order of set off – computation of total income.

Unit IV: Agricultural Income and Deductions from gross total income

Meaning of agricultural income – types of agricultural income – income from growing and manufacturing rubber - income from growing and manufacturing coffee - income from growing and manufacturing tea – income of a sugar mill growing its own sugarcane – computation of tax of an assessee having agricultural income.

Permissible deductions from gross total income – section 80C, 80CCC, 80CCD, 80D, 80DD, 80DDB, 80E, 80G, 80GG, 80GGA, 80QQB, 80RRB, 80U.

Unit V: Assessment of Individuals and Assessment procedures

Sources of income of an individual – computation of total income and tax liability of an individual.

Filing of returns – permanent account number (PAN) –Usage of PAN – TDS - types of assessment – self assessment – Best judgement assessment – Income escaping assessment (reassessment) – Advance payment of tax

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text books

1. Gaur & Narang, Income Tax Law & Practice, Kalyani Publishers.
2. Murthy.A,IncomeTaxLaw&Practice,VijayNicoleImprintsPvt.Ltd.Chennai
3. Reddy, T.S. &Hariprasad Reddy, Y, Income Tax Theory, Law & Practice, Margham Publications, Chennai.

Reference books

1. Mehrotra-Income Tax Law & Accounts, Sahithiya Bhavan Publications.
2. Vinod, K.Singhania, Students Guide to Income Tax, Taxman Publications Pvt. Ltd.

ELECTIVE–II

PAPER - 2

B. BUSINESS ENVIRONMENT

UNIT-I

The concept of Business Environment - Its nature and significance - Brief overview of political - Cultural - Legal - Economic and social environments and their impact on business and strategic decisions.

UNIT-II

Political Environment - Government and Business relationship in India - Provisions of Indian constitution pertaining to business

UNIT-III

Social Environment - Cultural heritage - Social attitudes - impact of foreign culture - castes and communities - Joint family systems - Linguistic and Religious groups - Types of Social Organization

UNIT-IV

Economic Environment - Economic Systems and their impact of Business - Macro Economic Parameters like GDP - Growth Rate - Population - Urbanization - Fiscal deficit - Plan investment - Per capita Income and their impact on business decisions

UNIT-V

Financial Environment - Financial System - Commercial banks - RBI - IDBI - Non-Banking Financial Companies NBFC's

Text Books:

1. Dr. S. Sankaran - Business Environment. Margham Publications, Chennai
2. Aswathappa - Business Environment, Himalaya Pub. House, 2009.

Reference Books:

1. Dasgupta and Sengupta - Government and Business in India.
2. Srinivasan K - Productivity and Social Environment.
3. International Business Environment - Prentice - Hall of India.
3. Dhanabakiyam & M. Kavitha, Business Environment, Vijay Nicole Imprints Pvt. Ltd. Chennai.

ELECTIVE–II

PAPER - 2

C. SERVICES MARKETING

Objective:

To enable the students to acquire a deep knowledge in services marketing.

UNIT-I

Concept of service – Meaning, definitions – Components and types – Service Vs goods – Service Marketing mix characteristics – Advertising – objectives – Advertising message and media selection – merits – personal selling – process - Advantages

UNIT-II

Physical evidence – Essential and peripheral evidence – Guidelines for physical evidence – Managing demand and supply Capacity constraints – demand patterns – Capacity planning and types – Managing capacity to match demand – Managing demand to match capacity

UNIT-III

Pricing in services – objectives – types of pricing – characteristics and factors affecting pricing decisions – customer relationship marketing – objectives and requisites – benefits

UNIT-IV

Quality of service – five dimensions of quality – Gap analysis and causes for customer gap – key factors leading to Customer Gap – Provider Gaps

UNIT-V

Marketing of Services by Insurance business – Banks – Education – Tourism – Transport.

REFERENCE BOOKS:

1. S.M.Jha, Services Marketing, Himalaya Publications, New Delhi
2. M.K.Rampal & S.L.Gupta, Services Marketing, Galgotta Pub. House
3. Dr.B.Baly, Services Marketing, S. Chand & Co., New Delhi
4. Vasanthi Venugopal & Raghu V.N, Services Marketing, Himalaya Publications, New Delhi.
5. Dr.L.Natarajan, Services Marketing, Margham Publications, Chennai.

ELECTIVE–III

(To choose any 1 out of 3)

PAPER – 3

A. SOFTWARE ENGINEERING

UNIT-I:
Introduction - Evolving Role of Software - Changing Nature of Software – Software Myths; a Generic View of Process: Layered Technology - Process Models: Waterfall Model - Evolutionary Process Models.

UNIT-II:
Requirements Engineering: Tasks - Initiating the Requirements Engineering Process - Eliciting Requirements - Building the Analysis Model - Requirements Analysis - Data Modeling Concepts.

UNIT-III:
Data Engineering: Design Process and Design Quality - Design Concepts - The Design Model Creating an Architectural Design: Software Architecture - Data Design -Architectural Design - Mapping Data Flow into Software Architecture; Performing User Interface Design: Golden Rules.

UNIT-IV:
Testing Strategies: Strategic Approach to Software Testing- Test Strategies for Conventional and Object Oriented Software - Validation Testing - System Testing -Art of Debugging. Testing Tactics: Fundamentals - White Box- Basis Path - Control Structure - Black Box Testing Methods

UNIT-V:
Project Management: Management Spectrum - People - Product - Process - Project. Estimation: Project Planning Process - Resources - Software Project Estimation - Project Scheduling - Quality Concepts - Software Quality Assurance - Formal Technical Reviews.

TEXT BOOK:

1. Roger S Pressman, "Software Engineering - A Practitioner's Approach", Sixth Edition, McGraw Hill International Edition, New York: 2005.

REFERENCES:

1. Ian Somerville, "Software Engineering", 7th Edition, Pearson Education, 2006.
2. Mall Rajib," Software Engineering", 2/E, PHI, 2006.

ELECTIVE–III
PAPER - 3
B. DATA MINING

UNIT-I

Data Mining - Introduction - Meaning- importance of Data mining - various kinds of data - Data Mining Functionalities – Various kinds of Patterns - Pattern Interesting Classification of Data mining Systems - Data mining Task Primitives – Integration of Data Mining System – Major issues in Data Mining.

UNIT-II

Data Processing - Process the Data Descriptive Data Summarization – Measuring Central Tendency Dispersion of Data Graphic Displays of –Basic Descriptive Data Summaries Data Cleaning Data Integration and Transformation data Reduction Data Discrimination - Concept Hierarchy Generation

UNIT-III

Data Warehouse OLAP Technology An overview - Data Warehouse Multidimensional Data Model Data Warehouse Architecture Data Warehouse Implementation from Data Warehouse to Data mining

UNIT-IV

Mining – Frequent Patterns Associations Correlations - Basic Concepts Road Map Efficient Scalable Frequent Item set Mining methods Mining – Various Kinds of Association rules Analysis - Association mining to Correlation Constrain Based Association mining

UNIT-V

Applications Trends - Data mining Applications Data mining – System Products Research Prototype Additional Themes on Data Mining Social impact of Data mining Trends in Data mining

Text Book:

1. **Data Mining** (Concepts and Techniques) Second Ed (Chapter 1,2,3,5,11)

Author: Jiawei Han and Micheline Kamber **Publishers:** Morgan Kaufmann Publishers (An imprint of Elsevier)

Reference Books:

1. Data Mining (Next Generation Challenges and Future Directions) Author: Karguta, Joshi, Sivakumar & Yesha **Publishers:** Printice Hall of India (2007)
2. Data Mining (Practical Machine Learning Tools and Techniques (Second Edition) **Author:** Ian H. Witten &Eibe Frank **Publishers:** Morgan Kaufmann Publishers (An imprint of Elsevier)
3. Data Warehousing, Data mining & OLAP (Edition 2004) **Author:** Alex Benson, Stephen V. Smith **Publishers:** Tata McGraw – Hill

ELECTIVE–III

PAPER – 3

C. ENTERPRISE RESOURCE PLANNING

UNIT - I

Business function and Business process: Functional areas and Business Process - functional area of operations - Business process - Marketing Sales - supply chain management - Accounting and finance - Human Resource - Functional areas of information system - The development of ERP system SAP R/3 - New directions in ERP - significance and benefits of ERP software and systems.

UNIT - II

Marketing information system and sales order process in ERP: sales and Distribution in ERP - Pre sales activities - sales order processing - inventory Sourcing - Delivery - Billing - payment - Customer relationship Management - benefits of CRM.

UNIT - III

Production and supply chain management information system: Production overview - The production planning process - The SAP ERP Approach to production planning - Sales forecasting - sales and operation Planning - Demand management - Material requirement planning in SAP ERP - ERP and supplier - Supply chain

UNIT - IV

Accounting in ERP: Accounting activities - using ERP for accounting Information - operational decision making problem - credit management - Industrial credit management in SAP ERP - product profitability analysis - Management reporting with ERP system - Document flow for customer Service.

UNIT - V

Human resource process in ERP: HR with ERP - Advance HR features - Time management - Payroll - Travel management - Training and Development - Management by objectives - ERP process modeling.

Reference Book:

1) ELLEN MONK and BRET WAGNER, ENTERPRISE RESOURCE PLANNING - 3rd edition - MGH.

SKILL BASED SUBJECT – IV

PAPER – 4

INDUSTRIAL RELATIONS

Objective: To enable the students to learn the concepts of Industrial Relations including trade unions, collective bargaining and various labour enactments.

Unit - I: Industrial Relations (IR)

Concept of Industrial Relations; Nature of Industrial Relations; Objectives of IR; Factors affecting IR in changing Environment, Evolution of IR in India; Role of State; International Dimensions of IR.

Unit - II: Trade Union

Trade Union: Origin and growth, unions after Independence, unions in the era of liberalization; Factors affecting growth of Trade Unions in India, Major Provisions of Trade Union Act 1926.

Unit - III: Collective Bargaining and Worker's Participation in Management

Collective Bargaining: Meaning, Nature, Types, Process and Importance of Collective Bargaining Status of Collective Bargaining in India, Functions and role of Trade Unions in Collective bargaining.

Workers' Participation in Management: Consent, practices in India, Works Committees, Joint management councils; Participative Management and co-ownership; Productive Bargaining and Gain Sharing.

Unit - IV: The Industrial Disputes Act, 1947:

Definitions of Industry, workman, and Industrial Dispute; Authorities under the Act; Procedure, Powers and Duties of Authorities; Strikes and Lock outs; Lay-off and Retrenchment; Provisions relating to Layoff, Retrenchment, and closure.

Unit - V: The Factories Act, 1948:

Provisions relating to Health, Safety, Welfare facilities, working hours, Employment of young persons, Annual Leave with wages.

Text Books:

1. B. Nandhakumar, *Industrial Relations and Labour Welfare and Labour Laws* - Vijay Nicole Imprints Private Ltd., Chennai.
2. JP Sharma, *Simplified Approach to Labour Laws*, Bharat Law House (P) Ltd.

Reference Books:

1. PK Padhi, *Industrial Relations and Labour Law*, PHI Learning.
2. Arun Monalppa, *Industrial Relations and Labour Law*, McGraw Hill Education.
3. SC Srivastav, *Industrial Relations and Labour Law*, Vikas Publishing House.
4. C.S. Venkata Ratnam, *Industrial Relations*, Oxford University Press.
5. P.L. Malik's *Handbook of Labour and Industrial Law*, Vol 1 and Vol 2, Eastern Book Company.

******

Question Paper Pattern:

Pattern	Total Questions	To answer	Marks per Question	Total Marks
Section A	10	10 (All)	2	20
Section B	8	5	5	25
Section C	5	3	10	30

Instructions to Paper Setter:

Section-A: Minimum 2 Questions to be asked from each of the five Units

Section-B: Minimum 1 Question to be asked from each of the five Units.

Section-C: 1 Question to be asked from each of the five Units.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. BIOCHEMISTRY

DEGREE COURSE

UNDER CBCS

(With effect from 2017 - 2018)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper-1	6	4	Cell Biology	25	75	100
	III	Core Practical	Practical-1	3	0		0	0	0
4	III	Allied -1	Paper-1	4	4	Chemistry I	25	75	100
	III	Allied	Practical - 1	3	0		0	0	0
5	IV	Environmental Studies		2	2	Environmental Studies	25	75	100
				30	**18**		**125**	**375**	**500**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
6	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
7	II	English	Paper-2	4	4	English	25	75	100

8	III	Core Theory	Paper-2	6	4	Bio molecules	25	75	100
9	III	Core Practical	Practical-1	3	4	1. Experiment Involving Titrimetric Procedures 2. Qualitative Analysis	25	75	100
10	III	Allied-1	Paper-2	4	4	Chemistry II	25	75	100
11		Allied Practical - 1	Practical-1	3	2	Chemistry – I & II	25	75	100
12	IV	Value Education		2	2	Value Education	25	75	100
13	IV	Soft Skill		2	1	Soft skill	25	75	100
				30	**25**		**200**	**600**	**800**

S.NO.	**Part**	**Study Components** **Course Title**		**Ins. Hrs / week**	**Credit**	**Title of the Paper**	**Maximum Marks**		
		SEMESTER III					**CIA**	**Uni. Exam**	**Total**
14	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
15	II	English	Paper-3	6	4	English	25	75	100
16	III	Core Theory	Paper-3	3	3	Biochemical Techniques I	25	75	100
17	III	Allied-2	Paper-3	4	4	(Choose one out of two) 1.Microbiology – I 2. Zoology - I	25	75	100

		Allied Practical - 2	Practical-2	3	0		0	0	0
18	IV	Skill Based Subject	Paper-1	3	3	Fundamentals of Computer	25	75	100
19	IV	Non-Major Elective	Paper-1	2	2	Health and Nutrition	25	75	100
				30	**20**		**150**	**450**	**600**
		SEMESTER IV					**CIA**	**Uni. Exam**	**Total**
20	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
21	II	English	Paper-4	6	4	English	25	75	100
22	III	Core Theory	Paper-4	3	3	Biochemical Techniques II	25	75	100
23	III	Core Practical	Practical-2	3	4	1. Biochemical Preparations 2. Chromatographic Separation 3. Preparation of buffers 4. Colorimetric Estimation	25	75	100
24	III	Allied-2	Paper-4	4	4	Choose one out of two 1.Microbiology – II 2. Zoology - II	25	75	100
25	III	Allied Practical - 2	Practical-2	3	2	Microbiology – I & II/ Zoology – I & II	25	75	100
26	IV	Skill Based Subject	Paper-2	3	3	Computer Applications	25	75	100
27	IV	Non-Major Elective	Paper-2	2	2	First Aid	25	75	100
				30	**26**		**200**	**600**	**800**

S.NO.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER V					**CIA**	**Uni. Exam**	**Total**
28	III	Core Theory	Paper-5	6	6	Enzymes & Intermediary Metabolism	25	75	100
	III	Core Practical	Practical-3	3	0		0	0	0
29	III	Core Theory	Paper-6	6	5	Genetics and Molecular Biology	25	75	100
		Core Practical	Practical-4	3	0		0	0	0
30	III	Core Theory	Paper-7	5	4	Human Physiology & Nutritional Biochemistry	25	75	100
31	III	Elective	Paper-1	4	3	Medical Laboratory Technology-I	25	75	100
32	IV	Skill Based Subject	Paper-3	3	3	Bio Statistics-I	25	75	100
				30	**21**		**125**	**375**	**500**
		SEMESTER VI					**CIA**	**Uni. Exam**	**Total**
33	III	Core Theory	Paper-8	6	6	Clinical Biochemistry	25	75	100
34	III	Core Theory	Paper-9	6	6	Bio Technology	25	75	100
35	III	Core Practical	Practical-3	5	5	1. Colorimetric Estimation 2. Experiments on Enzymes 3.Biotechnology Experiments 4.Demonstration Experiments	25	75	100
36	III	Elective	Paper-2	4	3	Medical Laboratory Technology-II	25	75	100
37	III	Elective	Paper-3	3	3	Immunology	25	75	100
38	III	Elective Practical	Practical-4	3	3	Medical Laboratory Technology	25	75	100

39	IV	Skill based Subject	Paper-4	3	3	Bio Statistics-II	25	75	100
40	V	Extension Activities		0	1		100	0	100
		TOTAL		**30**	**30**		**275**	**525**	**800**

Part	**Subject**	**Papers**	**Credit**	**Total credits**	**Marks**	**Total Marks**
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	4	8	100	200
	Allied (Even Semester)	2	6	8	100	200
	Allied Practical	2	2	4	100	200
	Electives	3	3	9	100	300
	Elective Practical	1	3	3	100	100
	Core	9	(3-7)	42	100	900
	Core Practical	3		14	100	300
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	10	100	400
Part V	Extension	1	1	1	100	100
	Total	**40**		**140**		**4000**

University practical Examination marks

Subject	Exam Hrs	CIA	Uni. Exam	Total Marks
Core practical I	6	25	75	100
Core practical II	6	25	75	100
Core practical III	6	25	75	100
Elective practical IV	6	25	75	100
Allied Practical I	3	25	75	100
Allied practical II	3	25	75	100

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.SC. BIOCHEMISTRY

SYLLABUS
UNDER CBCS
(With effect from 2017 - 2018)

SEMESTER I

PAPER - 1

CELL BIOLOGY

UNIT - I

An overall view of cells - origin and evolution of cells. Cell theory. Classifications of cell - Prokaryotic and Eukaryotic cells. Differences between prokaryotic and eukaryotic cells. Molecular composition of Cells - Water, Carbohydrates, Lipids, Nucleic acids and Proteins.

UNIT - II

Cell membrane- Fluid Mosaic Model of membrane structure. Membrane proteins and their properties. Membrane carbohydrates and their role. Transport across membranes- diffusion, active and passive transport.

UNIT - III

Endoplasmic reticulum - types, structure and functions. Golgi apparatus- structures and functions. Lysosomes- structure and functions, Ribosomes - types, structure and functions.

UNIT - IV

Mitochondria: Structure and function. Cytoskeleton: Types of filaments and their functions. Microtubules: Chemistry and function (esp. cilia and flagella)

UNIT – V

Chromosome-chromatin structure, the cell cycle - phases of cell cycle. Meiotic and mitotic cell divisions, cell- cell communications, cell recognition, cell adhesion and cell functions.

References:

1. Cell biology structure and functions-David and Sadava, Jones Bartlett publishers.
2. Molecular Cell Biology - Lodish, Berk, Zipursky, Baltimore, Freeman.
3. Cytology-P.S. Verma, V.K. Agarwal, S. Chand Publications.
4. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan Worth Publishers.
5. Biochemistry - Garrett Grishmam. 3rd edition. International student's edition.
6. Biochemistry by L . Veerakumari , MJP publishers,Chennai-5.

ALLIED

CHEMISTRY – I

OBJECTIVE:

- Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications wherever necessary are to be taught for I- Semester.

UNIT – I

1.1General Metallurgy - Extraction of Metals - Minerals and Ores- Difference between Minerals and Ores – Minerals of Iron, Aluminum and Copper - Ore Dressing or Concentration of Ores - Types of Ore Dressing- Froth Floatation process, Gravity separation and Magnetic separation.

1.2 Calcination, Smelting, Roasting, Fux, Slag - Definition - Reduction methods - Goldschmidt Aluminothermic process and Carbon Reduction method - Refining of Metals - Electrolytic, Van Arkel and Zone Refining.

1.3 Ores of Titanium and Cobalt - Extraction of Titanium and Cobalt.

UNIT – II

2.1 Cycloalkanes - Preparation – Wurtz reaction and Dieckmann's condensation - Properties of Cycloalkanes – Substitution and Ring opening reactions.

2.2 Polarisation - Inductive effect, Mesomeric effect and Steric effect (Acid and Base Strength).

2.3Stereoisomerism – Types - Cause of Optical Activity – Enantiomers - Diastereomers - Meso form - Optical Activity of Lactic acid and Tartaric acid - Racemisation and Resolution – Definition and Methods - Geometrical isomerism – Definition and example - Maleic and Fumaric acid – Differences.

UNIT – III

3.1 Chemical Kinetics – Rate of a reaction – Definition of Order and Molecularity – Distinction between Order and Molecularity - Derivation of First order rate equation - Half Life Period of first order reaction.

3.2 Catalysis - Catalyst - Autocatalyst - Enzyme catalyst - Promoters - Catalytic poisons – Active Centre - Differences between Homogeneous and Heterogeneous Catalysis - Industrial Applications of Catalysts.

3.3 Photochemistry – Grothus-Draper's law – Stark-Einstein's law - Quantum yield – Photosynthesis - Phosphorescence – Fluorescence.

UNIT – IV

4.1 VSEPR Theory – Hybridisation and Shapes of simple molecules BF_3, PCl_5, SF_6 and XeF_6.

4.2 Fuels – Classification of Fuels - Calorific value of Fuels – Water gas, Carbureted Water gas and Producer gas – Composition and Uses - Non-Conventional fuels - Need of Solar Energy - Applications - Biofuels – Oil gas, Natural gas and LPG – Uses.

4.3 Osmosis - Osmotic pressure - Reverse osmosis – Definition - Desalination of Sea water.

UNIT – V

5.1Nuclear Chemistry – Atomic number, Mass number - Isotopes, Isobars and Isotones – Definition and Examples - Definition of Half life period - Nuclear Binding Energy, Mass Defect and N/P ratio - Nuclear Fission and Nuclear Fusion (Elementary idea) - Applications of Radioisotopes in Medicine, Agriculture and Industries – Carbon Dating.

5.2 Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking – Naphthalene – Preparation – Haworth's method – Properties – Oxidation, Reduction and Uses of Naphthalene - Structure of Naphthalene (Structural elucidation not necessary).

5.3 Conductors, Insulators, Semiconductors, N- and P- Type Semiconductors – Definitions and Examples.

SEMESTER II

PAPER – 2

BIOMOLECULES

UNIT-I: Carbohydrates

Classification of carbohydrates, stereo isomerism and optical isomerism of sugars, anomeric form and mutarotation. Occurrence, structure and biological importance of mono, di and polysaccharides (esp. starch, glycogen and cellulose). Reaction of Carbohydrates due to the presence of hydroxyl, aldehyde and ketone groups.

UNIT-II: Proteins

Classification and structure of amino acids based on structure. Introduction, classification of proteins based on solubility, size and shape. Structure of proteins - primary, secondary, tertiary and quaternary.

UNIT-III: Lipids

Introduction, definition, classification and functions of Lipids - simple lipids, compound lipids - phospholipids (esp. lecithin cephalin, phospotidyl inositol and phospotidyl serine) and derived lipids - steroid (cholesterol).

UNIT-IV: Nucleic acids

Nature of genetic material, structure of purine and pyrimidine nucleotides. Composition of DNA and RNA-Watson crick model of DNA. Types of nucleic acid (DNA and RNA).

Properties of nucleic acids-Tm, denaturation and renaturation, hypo and hyper chromicity.

UNIT-V: Vitamins

Dietary Sources, deficiency manifestation and biological functions of fat soluble and water soluble vitamins.

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan Worth Publishers.
2. Harper's Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C.Kannan , MJP Publishers,Chennai-5.

CORE PRACTICAL - I

Objectives

1. Students should know the principles, theory and calculations of each experiment.

2. They should know to prepare all the solutions by themselves. They should standardize their solutions individually.

1. EXPERIMENT INVOLVING TITRIMETRIC PROCEDURES

a. Estimation of amino acids by formal titration.

b. Estimation of ascorbic acid by titrimertic method using 2, 6-dichlorophenol indo phenol.

c. Determination of saponification value of edible oil.

d. Determination of Acid number of edible oil.

e. Estimation of reducing sugar from biological fluids by Benedict's titrimertic method.

f. Iodine number of oil.

2. QUALITATIVE ANALYSIS.

a. Reactions of simple sugars including glucose, fructose, galactose, mannose, pentose, maltose, sucrose, lactose, starch, glycogen and dextrin.

b. Reactions of proteins - solubility, Biuret, Millon's, Xanthoproteic test, denaturation by heat, pH change and precipitation by acidic reagents. Color reactions of amino acids like tryptophan, tyrosine, cysteine, methionine, arginine, proline and histidine.

c. Reactions of lipids - solubility, saponification tests for unsaturations, Liebermann-Burchard test for Cholesterol.

ALLIED – 2

CHEMISTRY – II

OBJECTIVE:

- Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins, Medicinal Chemistry, Corrosion and Applications wherever necessary are to be taught for II- semester.

UNIT – I

1.1 Coordination Chemistry - Nomenclature of Coordination Compounds - Ligands, Central Metal Ion and Complex Ion – Definition and Examples – Coordination Number - Werner's Theory of Coordination Compounds - Chelates - Functions and Structure of Haemoglobin and Chlorophyll.

1.2 Industrial Chemistry - Fertilisers and Manures – Biofertilisers - Organic Manures and their importance - Role of NPK in plants - Preparation and Uses of Urea, Ammonium Nitrate, Potassium Nitrite and Super Phosphate of Lime.

1.3 Contents in Match Sticks and Match Box - Industrial making of Safety Matches – Preparation and Uses of Chloroform, DDT, Gammexane and Freons.

UNIT – II

2.1 Carbohydrates - Definition and Examples - Classification – Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate.

2.2 Amino Acids – Definition and Examples - Classification of Amino Acids - Preparation - Gabriel Phthalimide Synthesis – Properties – zwitterion and Isoelectric point - Structure of Glycine.

2.3 Proteins – Definition - Classification of Proteins based on Physical properties and Biologcal functions - Primary and Secondary Structure of Proteins (Elementary Treatment only) – Composition of RNA and DNA and their Biological role - Tanning of Leather - Alum (Aluminum chloride tanning) - Vegetable tanning – Chrome Tanning.

UNIT – III

3.1 Electrochemistry - Electrolytes – Definition and Examples – Classification - Specific and Equivalent Conductance - their determination – Variation of Specific and Equivalent conductance with Dilution – Ostwald's Dilution Law and its Limitations.

3.2 Kohlrausch's Law - Determination of Dissociation Constant of weak Electrolytes using Conductance measurement - Conductometric titrations.

3.3 pH – Definition and pH determination by indicator method - Buffer solutions - Buffer action - Importance of buffers in the living systems.

UNIT – IV

4.1Paints - Components of Paint – Requisites of a Good Paint - Pigments – Classification of Pigments on the basis of Colour – Examples - Dyes – Definition – Chromophores and Auxochromes – Examples - Colour and Dyes - Classification based on Constitution and Application – Examples.

4.2 Vitamins – Definition – Classification – Water Soluble and Fat Soluble – Occurrence - Biological Activities and Deficiency Diseases caused by Vitamin A, B, C, D, E and K - Hormones – Definition and Examples – Biological Functions of Insulin and Adrenaline.

4.3 Chromatography - Principles and Applications of Column and Paper chromatography- R_f value.

UNIT – V

5.1 Drugs - Sulpha Drugs – Preparation and Uses of Sulphapyridine and Sulphadiazine - Mode of Action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicol and Streptomycin - Drug Abuse and Their Implication - Alcohol – LSD.

5.2 Anaesthetics - General and Local Anaesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS.

5.3 Electrochemical Corrosion and its Prevention – Electroplating – Applications.

ALLIED PRACTICAL

CHEMISTRY

VOLUMETRIC ANALYSIS

1. Estimation of HCl – Standard sulphuric acid.
2. Estimation of Borax - Standard Sodium Carbonate.
3. Estimation of NaOH – Standard Oxalic Acid.
4. Estimation of $FeSO_4$ – Standard FAS.
5. Estimation of Oxalic acid – Standard $FeSO_4$.
6. Estimation of FAS – Standard Oxalic Acid.
7. Estimation of Oxalic acid – Standard Oxalic Acid.
8. Estimation of Fe^{2+} using Diphenylamine / N- Phenyl Anthranilic acid as indicator.

ORGANIC ANALYSIS

Systematic Analysis of Organic Compounds containing One Functional Group and Characterisation by Confirmatory Tests.

Reactions of Aromatic Aldehyde, Carbohydrates, Mono and Dicarboxylic acids, Phenol, Aromatic Primary Amine, Amide and Diamide.

REFERENCE BOOKS

- Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).
- Inorganic Chemistry - B. R.. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications (2013).
- Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
- Text Book of Inorganic Chemistry – R. Gopalan, Universities Press – 2012.
- Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
- Advanced Organic Chemistry - Bahl and Arun Bahl - Sultan Chand and Co. Ltd – 2012.
- Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
- A Text Book of Organic Chemistry K. S. Tewari, N. K. Vishol, S. N. Mehrotra- Vikas Publishing House – 2011.
- Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishal Publishing Company – 2013.
- Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha andU. N. Dash - Sultan Chand & Co – 2006.
- Understanding chemistry – C. N. R. Rao, Universities Press – 2011.

SEMESTER III

PAPER – 3

BIOCHEMICAL TECHNIQUES – I

UNIT - I

Units of measurements of solutes in solution, e.g. Normality, Molality, Molarity, Ionic strength, Millimoles. Osmosis, Osmotic pressure, Osmolarity and its application. Concept of isotonic, hyper and hypotonic solution and its importance in biology.

UNIT - II

Concept of pH, pOH, buffer and its application, buffer capacity. Henderson - Hasselbalch equation and its importance. Buffer in body fluids, Red blood cells, white blood cells, tissues and its role.

UNIT - III

Principle, instrumentation and applications of hydrogen electrode, glass electrode in determination of pH. Principle, instrumentation and applications of Clark oxygen electrode.

UNIT - IV

General principle of chromatography. Partition and adsorption chromatography. Principle, operation procedure and applications of paper chromatography and their types. Principle, instrumentation, application of thin layer chromatography, ion exchange chromatography, and molecular gel exclusion chromatography and its application in separation of macromolecules.

UNIT – V: Basic principle of centrifugation techniques, sedimentation rate, Svedberg unit / sedimentation coefficient. Preparative ultracentrifuge, Differential centrifugation, density gradient centrifugation, rate zonal, isopycnic, equilibrium centrifugation. Analytical ultracentrifuge method - determination of molecular weight by sedimentation in an ultra centrifuge.

References:

1. A Biochemical Guide to Principles and techniques of Practical Biochemistry- Keith Wilson and Kenneth Goulding, Cambridge Press.
2. Principles and Techniques of Practical Biochemistry- Keith Wilson And John Walker, Cambridge Press.
3. Introduction to Practical Biochemistry - Shawney, Randhir Singh, Naraso Pub, N. Delhi.
4. Analytical Biochemistry - R.B. Turner, Elsevier, N.Y.
5. Biochemistry Laboratory: Modern theory and techniques -Rodney Boyer, Prentice Hall
6. Instrumental methods of chemical analysis - Chatwal -Anand, Himalayan Publication.
7. Biophysical Chemistry - Upadhyay and Upadhyay Nath, Himalayan Publication.

ALLIED - 3

1. MICROBIOLOGY – I

UNIT - I

Definition and scope of Microbiology, History and Recent Developments, Spontaneous generation, Biogenesis, Contribution of Louis Pasteur, Leewen Holk, Lazzarn - Spallanzani, John Tyndall, Joseph Lister, Robert Koch, Microscopy - Simple, Compound, Light Microscopy Dark ground, Phase contrast, Flurescence and Election microscopy.

UNIT - II

Five Kingdom consept cell Theory, Binomial Nomendature of microbes, species concept, classical approach with examples, Anatomy of Prokaryotes and Eukaryotes, ultra structure and function of cellwall and cell organelles.

UNIT - III

Culture Techniques, Media preparation, Preservation of cultures, Aerobic and Anaerobic culture techniques, Microbial morphology - wet mount, Hanging drop staining methods, Dyes, Simple - Differential and Special staining techniques Acid fast staining spore stain, Capsule stain, staining for met achromatic Granules, Development of Laboratory Techniques for pure and Mixed culture.

UNIT - IV

Antimicrobial chemotheraphy - Antibiotics - source, classification mode of action - Antimicrobial resistance - Tests for Sensitivity to Antimircrobial agents and its Quality control classical techniques of Microbial identification - Morphological, Physiological and Biochemical properties.

UNIT - V

Measurement of microbial growth Batch and continuous culture, Growth Determination - Growth curve. Structural characteristics of algae - Cholrella, Fungi - Mucor and Protozoa - Entamoeba.

ALLIED – 3

2. ZOOLOGY I

Objective:

To acquire knownledge about different kinds of animal species.

To study the systematic and fuctional morphology of invertebrates and chordates.

UNIT – I:
Type study includes life history.

Protozoa - Entamoeba, **Porifera** - Sycon. **Coelenterata** - Obelia geniculata. **Platyhelminthes** - Teania solium.

UNIT - II

Annelida - Earthworm, **Arthropoda** - Prawn, **Mollusca** - Fresh water mussel, **Echinodermata** - Sea star.

UNIT – III:
Type study includes Morphology, digestive system, respiratory system, circulatory system and urinogenital system of Chordate.

Chordata - Genaral charters, **Prochordata:** Morphology of Amphioxus. **Vertebrates: Pisces** - Shark.

UNIT - IV

Amphibia: Frog, **Reptiles:** Calotes

UNIT - V

Aves: Pigeon, **Mammalia:** Rabbit.

REFERENCES:

1. Ayyar, E.K. and T.N. Ananthakrishnan. 1992. Manual of Zoology. Vol I & II, S. Viswanathan (printers and publishers) Pvt. Ltd., Madras, 891 p.
2. Kotpal series, 1998 - 1992. Rastogi Publications, Meerut.
3. Jordan E.L. and P.S. Verma. 1993. Invertebrate Zoology 12th edition, S. Chand & Co., Ltd., New Delhi.
4. Jordan, E.L., and P.S. Verma. 1995. Chordate Zoology and Elements of Animal Physiology, S. Chand & Co., Ltd., New Delhi.

SKILL BASED SUBJECT

PAPER – 1

FUNDAMENTALS OF COMPUTER

UNIT - I

Computer fundamentals - Introduction, Definition, importance and advantages. Binary number system, types of computer, computer language, package, operating system, network. Differences between computer and human being.

UNIT - II

Classification of computers - digital, analog, hybrid, micro, mini and super computers. Generations of computer, personal and advanced computers and their types. Microsoft windows - windows fundamental. Managing the file system, printing in windows, windows accessories, control panel.

UNIT - III

Memory unit- primary and Auxiliary. Computer hardware - Input unit, Central processing Unit (CPU), output unit, UPS and external modem. MS Word - Introduction, starting MS Word, Standard menus–file, edit, view, Formatting a text, layouts, inserting a diagram, graph, page numbers, borders, bullet and numbering, spelling and grammar, letter and mailing, mail merge, tables and its applications.

UNIT - IV

MS Excel - Introduction, starting MS excel, creating a worksheet, page setup, print area, paste special, formula. Insert and formatting - cells, rows, columns and sheets. Functions, hyperlink, pivot charts, sorting, filters, header and footers, formula bars, status bar, options and its application.

UNIT - V

MS Power point- - Introduction, power point file types, creating a presentation, using color schemes, viewing a presentation, managing slide shows , adding pictures, transaction effects, animations, action setting and action buttons and its application.

References:

1. Computer fundamental, V.K. Jain

2. Working in Microsoft office, Ron Mansfield

NON MAJOR ELECTIVE

PAPER – 1

HEALTH AND NUTRITION

UNIT-I

Introduction and definition of food and Nutrition. Basic Food groups-Energy yielding, Body Building, Protective Foods. Basic concepts of Energy Expenditure, Unit of Energy, Calorific values of Proteins, Carbohydrates and Fats. BMR.

UNIT-II

Physiolgical role and Nutritional significance of Carbohydrates, Proteins, Lipids, Vitamins and Minerals. Biological value of Proteins (Animal and Plant), Single cell Proteins.

UNIT-III

Composition of Balanced Diet, RDA for Infants, Children, Adolescent, Adult male, female, Pregnant, Lactating women and Old age.

UNIT-IV

Food processing, Food Preservation. Principles of Diet therapy, therapeutic diets for Anaemia, heart diseases, obesity and Diabetes Mellitus.

UNIT-V

Protein Malnutrition (Kwashiorkar), Undernutrition (Marasmus) their preventive and curative measures. Deficiency diseases of Vitamins.

References

1. Text Book of Physiology and Nutrition-M.Swaminathan.
2. Human Nutrition &Dietetics-Davidson and Passemore.
3. Nutrition and Dietetics-Shubangini Joshi.

SEMESTER IV

PAPER – 4

BIOCHEMICAL TECHNIQUES – II

UNIT - I

Principles of electrophoresis, factors affecting electrophoretic mobility - sample, electric field, supporting medium, composition of buffer. Sodium dodecyl sulphate, polyacrylamide gel electrophoresis (SDS- PAGE) and its application. Determination of molecular weight of protein by SDS PAGE.

UNIT - II

Principle, methodology and application of immuno electrophoresis. Tiselius moving boundary electrophoresis and its application in serum protein separation. Principle, methods and application of Agarose gel electrophoresis.

UNIT - III

Basic principle of electromagnetic radiation, energy, wavelength, wave number, frequency. Absorption and emission spectra. Beer Lambert's law. Basic principle, instrumentation, application of colorimetry techniques. Principle, instrumentation, application of UV- visible spectroscopy.

UNIT - IV

Principle and instrumentation of spectrofluorimetry techniques. Principle, instrumentation and application in atomic absorption spectroscopy. Principle and instrumentation of flame photometry. Application in analysis of trace elements- sodium and potassium.

UNIT - V

Radiation, type of radioactive decay, half-life, unit of radioactivity. Detection and measurement of radioactivity - Methods based upon ionization (GM Counter), excitation (Scintillation counter). Application of radioisotopes in the elucidation of metabolic pathyways, clinical scanning and radio dating, RIA. Biological hazards of radiation and safety measures in handling radio isotopes.

References :

1. A Biochemical Guide to Principles and the techniques of Practical Biochemistry- Keith Wilson and Kenneth Goulding, Cambridge Press.
2. Principles and Techniques of Practical Biochemistry- Keith Wilson And John Walker, Cambridge Press.
3. Introduction to Practical Biochemistry - Shawney, Randhir Singh, Narosa Pub, N.Delhi.
4. Analytical Biochemistry - R.B. Turner, Elsevier, N.Y.
5. Biochemistry Laboratory: Modern theory and techniques -Rodney Boyer, Prentice Hall
6. Instrumental Methods of chemical analysis - Chatwal -Anand,Himalayan Publication.
7. Biophysical Chemistry - Upadhyay and Upadhyay Nath, Himalayan Publication.

CORE PRACTICAL – II

1. BIOCHEMICAL PREPARATIONS

a. Isolation of Lecithin from egg yolk.

b. Isolation of Cholesterol from egg yolk and its estimation.

c. Isolation of Starch from potato.

d. Isolation of Casein and Lactalbumin from milk.

e. Isolation of Lipids by Folch's methods.

f. Isolation of Chromosomal DNA from liver cells.

2. CHROMATOGRAPHIC SEPARATION

a. Paper chromatographic separation and detection of aminoacid & Simple sugars.

b. Chromatographic separation of Chlorophyll & Carotenes of flower pigments by using Column chromatography.

c. Verification of Chargaff's rule by paper chromatography (Demonstration only).

3. PREPARATION OF BUFFERS

Phosphate buffer, Tris buffer and Citrate buffer.

4. COLORIMETRIC ESTIMATION

a) Estimation of Amino acid by Ninhydrin method.

b) Estimation of Protein by Biuret method.

c) Determination of DNA by Diphenylamine method.

d) Determination of RNA by Orcinol method.

ALLIED - 4

1. MICROBIOLOGY – II

UNIT - I

Soil Microbiology - Soil structure, Soil formation, Characterisation of Soil Types and importance, Biofertilizers.

UNIT - II

Aquatic Microbiology, Sewage Treatment - Physiological and Biological. Microbes in air, Distribution and Source of Airborne Organisms.

UNIT - III

Food Microbiology, Microbial Spoilage of food, food preservation techniques, Microbes in Milk and their source, Pasteurisation techniques. Industrial Production - Pencillin.

UNIT - IV

Morphology, Classification, Characteristics Pathogenecity, Laboratory diagnosis and prevention of Infections caused by following organisms mycobacteria, dermatophytes, Hepatitis, Entamoeba histolytica, Antigens - Antibody reactions.

UNIT - V

Biotechnology - Definition of a Gene, structure, Cloning Techniques, Genomic library. Nan technology - SCP production. Gene Theraphy methods.

ALLIED

2. ZOOLOGY II

Objective:

To study the principles of cell biology, genetics, developmental biology, physiology, ecology and evolution.

UNIT - I

Cell Biology - structure of animal cell, **Genetics:** molecular structure of gene - gene function, sex linked inheritance. Genetic Engineering and its application.

UNIT - II

Embryology - cleavage and gastrulation of Amphioxus.

Human Physiology: Digestion, Circulation - blood components, structure of heart, heart function.

UNIT - III

Diseases of Circulatory system - blood pressure, heart disease - Ischemia, Myocardial Infarction, Rheumatic heart disease, stroke.

Excretion - structure of kidney and mechanism of urine formation.

UNIT - IV

Environmental Biology - Biotic factors and Abiotic factors, food chain and food web. Pollution - Environmental degradation, (Air, Water and Land) - Green house effect - Bioremediation, Biodegradation - Global warming - acid rain.

UNIT - V

Evolution: Theories of Lamarkism & Darwinism.

REFERENCES:

1. Ekambaranatha Ayyar, and Ananthakrishnan, T.N. 1993. Outlines of Zoology, Vol I & II, Viswanathan and Co, Madras.
2. Sambasiviah, I, Kamalakara Rao, A.P., Augustine Chellappa, S. 1983. Text book of Animal Physiology, S. Chand & Co., New Delhi.
3. Verma and Agarwal. 1983. Text book of animal Ecology, S. Chand & Co., New Delhi.
4. Verma and Agarwal and Tyagi. 1991. Chordate Embryology, S. Chand & Co., New Delhi.
5. Rastogi and Jayaraj. 2000. Text book of Genetics. Rastogi publications, Meerut.
6. Verma and Agarwal. 2000. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Co., New Delhi.

ALLIED PRACTICAL

1. MICROBIOLOGY – I & II

1. Clearing of glassware, sterilization techniques.

2. Gram stain, Motility (Hanging drop)

3. Enumeration of soil microbes.

4. Enumeration of sewage microbes.

5. Assessment of milk quality by MBET test.

6. Streak plate, pour plate techniques.

7. Isolation of puncture techniques.

8. Wet mount preparation fungal material.

9. Serial dilation techniques.

10. Slant preparation.

11. Study of SCP, blue greens algee

12. Assessment of Air quality

13. Plant viral diseases like TMV, Tomato milting HIV, Virus structure diseases.

14. Micro photographs in Biotechnology of Microbes and Microbial products demonstration and identification.

15. Diseases like Tuberculosis, Chorine beefier diphtheria demonstration identification.

16. Medically important pathogens micro photographs demonstration.

17. Root Nodules Rhizobium isolation and identification methods.

ALLIED PRACTICAL

2. ZOOLOGY

I MAJOR PRACTICAL

DISSECTIONS

Cockroach: Digestive and nervous system

Prawn: Nervous system

II MINOR PRACTICAL

MOUNTING

1. Mouth parts of **Mosquito** and **Honey bee**

2. **Earthworm** - Body setae

3. Placoid scales of **shark**

III SPOTTERS

Entamoeba, Sycon, Obelia, Taenia solium (entire, scolex) earthworm (entire, Pineal setae) Prawn (entire), Fresh water mussel, Sea star, Amphioxus - Entire, Amphioxus - T.S. through pharynx, Shark, Frog, Calotes, Pigeon, feathers of pigeon and Rabbit.

Sphygnomanometer, Stethoscope, Rain gauge.

REFERENCES:

1. Verma. P.S. 2011. A manual of practical Zoology - INVERTEBRATES. Chand & Co., Ltd., Ram Nagar, New Delhi.
2. Verma. P.S. 2011. A manual of practical Zoology - CHORDATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

SKILL BASED SUBJECT

PAPER – 2

COMPUTER APPLICATIONS

UNIT - I

Operating system - MS DOS, DOS Features, MS DOS opening and closing, DOS commands, Batch Files. Windows XP- opening and closing, background setting, date and time adjustment, note pad, word pad, painting. Unix features and commands.

UNIT - II

Introduction to telecommunication, Networking. Internet - Introduction, Importance, requirements for internet. Electronic mailing, chatting, search engine, web pages.

Multimedia - Introduction, applications, components and its uses. Multimedia design, multimedia concept.

UNIT – III

Computer maintenance - causes of failure, components failure, temperature and humidity, dust and other particle, power line problems. Downloading software and files, copying CD/DVD. Computer virus- introduction, types, symptoms, virus avoiding methods, antivirus programs.

UNIT – IV

Computer application in banking, industries, educational institutions, hospitals, Research institutions - ISRO, BARC. Network - local area network, wide area network.

UNIT – V

HTML – Introduction – history – basic tags – tables – frames – images – anchor tags – hyperlinking documents – web browsers.

References :

1. Computer fundamental, V.K. Jain

2. Multimedia, System design, Prabhat k. Andleigh, Kiran Thakrar.

3. Internet & World Wide Web, third edition, Dietel, Dietel, Gold Berg.

4. Rastogi.S.C, Namita -Mendiratta and Parag Rastogi, (2004) BioInformatics – Concepts, Skills and applications.

5. Mani.K and Vijayraja (2005), BioInformatics – A practical approach

NON MAJOR ELECTIVE

PAPER – 2

FIRST AID

Unit I

First Aid: Important Rules of First Aid, First Aid Box. Injuries (Head, Spinal, Eye, Ear), Sprains and Strains.

Unit II

Cuts and Abrasions, Bleeding, Fractures, Dislocations of bones, Burns, Amputations, Nose bleeds, Electric Shock, Radiation burns.

Unit III

Common medical emergencies - First aid during Chest pain, Stroke, Seizures, Breathing difficulties, Epilepsy.

Unit IV

Common medical emergencies - First aid during Diabetic emergencies, Choking, Fainting, Heart attack, Low Blood Pressure.

Unit V

Poisonous Bites (Insects and Snakes) and Stings (Honey bee) - Animal bites (Dog) – Some Common Poisons and their antidotes – Acid Poisoning – Alkali Poisoning – Poisoning by Disinfectant.

Reference

1. Jayashree Ghosh – A Textbook of Pharmaceutical Chemistry, 1st Ed – S.S. Chand & Company

SEMESTER V

PAPER – 5

ENZYMES AND INTERMEDIARY METABOLISM

UNIT-I: Enzymes

Definition, units, various classifications, nomenclature, specificity, isoenzymes, factors affecting enzyme activity - pH, temperature, enzyme concentration. Lock and key mechanism, Induced Fit theory. Michaelis Menten equation, Line weaver Burk plot. Enzyme inhibition - Competitive, Non competitive and Uncompetitive (Concepts with example) inhibition.

UNIT-II: Carbohydrates Metabolism

Role of high energy compounds-Electron transport chain and Oxidative phosphorylation. Glycolysis, Glycogenesis and glycogenolysis, Citric acid cycle, Gluconeogenesis, HMP shunt.

UNIT III: Lipid Metabolism

Oxidation of fatty acids – Beta oxidation, alpha oxidation and omega oxidation. Oxidation of fatty acids with odd number of carbon atoms. Ketogenesis. Biosynthesis of saturated fatty acids and unsaturated fatty acids. Biosynthesis and degradation of triacyl glycerol and phospholipids. Biosynthesis and degradation of cholesterol.

UNIT-IV: Protein Metabolism

Degradation of proteins, Oxidative, Non-oxidative, deamination and decarboxylation of amino acids, Urea Cycle and Creatinine formation.

UNIT-V: Nucleic acid Metabolism

Biosynthesis and degradation of purine and pyrimidine nucleotides, uricotelic and urotelic system, inhibitors of nucleotides biosynthesis.

References:

1. Enzymes - Dixon and Webb
2. Understanding enzymes - Palmer
3. Enzyme kinetics – Segel, I.H.
4. Lehninger's principles of Biochemistry - Nelson and Cox
5. Lippincott's Biochemistry - P.C. Champe
6. Harper's Biochemistry - Murray
7. Biochemistry - Voet and Voet

PAPER – 6

GENETICS AND MOLECULAR BIOLOLGY

UNIT-I

Mendelian genetics: Mendel's law of inheritance, test cross, back cross and law of incomplete dominance.

UNIT-II

Definition of gene, organization of genes and non coding DNA in prokaryotes. Eukaryotes – unique, moderately repetitive and highly repetitive DNA sequence, satellite DNA. Cot value. DNA is the genetic material - experimental evidence – Griffith, McLeod, McCarty and Avery, Hershey – Chase experiments. Definition and types of replication, experimental proofs for semi-conservative replication. Replication in prokaryotes and inhibitors of replication - requirements and mechanism of prokaryotic DNA-Replication.

UNIT-III

Prokaryotic transcription-RNA polymerases, role of sigma factor, initiation, elongation and termination. (Rho - dependent and independent). Post transcriptional modification in prokaryotes. Post-transcriptional modifications of mRNA, rRNA and tRNA. Inhibitors of transcription. Reverse transcription.

UNIT-IV

Translational activation of amino acids, initiation, elongation and termination of protein synthesis in prokaryotes. Inhibitors of protein synthesis. Post translational modification of proteins. Genetic code - definition, deciphering and salient features of genetic code. Composition of prokaryotic and eukaryotic ribosomes. Structure of t-RNA. Coding and non coding strands of DNA. Role of signal peptides.

UNIT - V

DNA repair mechanism-excision, SOS and UV repair. Prokaryotic gene regulation – Operon concept, Lac operon, positive and negative control. Gene mutation types - point, transition, transversion, frame shift, insertion and deletion.

References:

1. Genes VIII 2004. Benjamin Lewin, Oxford Univ press.
2. Cell and Molecular Biology - 3rd Edition (2002).G Karp. John Wiley and Sons N.Y
3. Molecular cell biology - David Freifielder 2nd Edition, Narosa publishing House.
4. Lehninger's principle of Biochemistry (2000), Nelson and Cox.
5. Harper's Biochemistry - Rober K. Murray, Daryl K.Grammer, McGrawHill, Lange Medical Books
6. Biochemistry of Nucleic acids - Adam et al
7. Molecular biology - SC Rastogi CBS publishing 2nd Edition
8. Cell biology and Genetics - P.S. Verma and V.K.Agarwal, S. Chand publication
9. Advanced molecular cell biology - R.M.Twyman.W.wisden Viva book House Yadav - Ist Edition 1998.
10. Genetics - Manju yadav Ist Edition 2003, Discovery publishing House.

PAPER – 7

HUMAN PHYSIOLOGY AND NUTRITIONAL BIOCHEMISTRY

UNIT-I: Respiratory and Circulatory Systems

Respiratory System: Components of transport of Oxygen and Carbon dioxide, Role of hemoglobin in transport. Mechanism of respiration, Chloride shift, Bohr's effect.

Circulatory System: Structure and functions of Heart, Blood vessels and its types, cardiac cycle, factors controlling blood pressure, electrocardiogram.

UNIT-II: Digestive and Excretory systems

Digestive system: Components of Digestive system, Digestion, absorption of carbohydrates, proteins and lipids. Mechanism of HCl formation, Role of various enzymes involved in digestive process.

Excretory System: Physiology of excretion, Kidney, GFR, Urine formation, Urine concentration, Micturition, Renin-Angiotensin system.

UNIT-III: Endocrine and Nervous systems

Endocrine glands: Hormones and its types, Functions of hormones. Brief outline of various endocrine hormones and their functions.

Nervous System: Brain, spinal cord, nerve cells, and nerve fibers. Synapse, chemical and electrical synapses, nerve impulses, action potential and neurotransmission.

UNIT-IV: Nutrition and Dietary Systems

Definition of food nutrition, basic food groups, Physiological role and nutritional significance of carbohydrates, protein, lipids, vitamins and minerals. Protein calorific malnutrition – Aetiology, management of Marasmus and Kwashiorkor. Nutrigenetics, Nutrigenomics (brief outline).

UNIT-V: Nutritive and Calorific Value of Food

Unit of energy measurements of food stuffs by Bomb colorimeter, calorific value and RQ of food stuffs. Basic metabolic rate (BMR) - its measurements and influencing factors, SDA of food. Essential amino acids. Nutritive value of protein. Composition of balanced diet for infants, pregnancy and lactating women and old age.

References :

1. Human physiology, 2nd edition- BJ Mejer, HS Meij, AC Meyer, AITBs publishers and distributors.
2. Cell physiology by Giese, 5th edition, W.B saunderscompany, Tokyo, Japan.
3. A text book of animal physiology, KA Goel, KV Sastri, Rastogi publications Meerut.
4. Animal physiology and Biochemistry- RA Agarval, Anil. K, Srivastava, Kausshal Kumar, S. Chand & Co.
5. A Hand Book of Basic Human physiology- K. Saradha subramanyam, S. Chand & Co., Ltd.
6. Guide to physiology- Y. Rajakshmi, S. Chand & Co., Ltd.

ELECTIVE

PAPER – 1

MEDICAL LABORATORY TECHNOLOGY – I

UNIT-I: Laboratory care and instrumentation

Code of conduct for laboratory personnel - safety measures in the laboratory-chemical/Reagents, labelling, storage and usage. First Aid in laboratory accidents - Precautions and first aid equipments.

UNIT-II: Laboratory equipments

Working of microscope - Phase contrast, Fluorescence, Electron microscope. Centrifuge, analytical balance, colorimeter - Usage and care. Glass wares, serological water bath, incubator.

Reporting laboratory tests and keeping records. Sterilization, preparation of reagents. General approach to quality control, quality control of quantitative data.

UNIT-III: Urine Analysis

Composition, collection, preservation, gross examination, interfering factors, chemical examination. Significance of sugar in urine, ketone bodies in urine, bile pigments, hematuria, uric acid, microscopic examination of the urinary sediment.

UNIT- IV: Stool Examination

Specimen collection- inspection of faeces- odour, pH, Interfering substance. Test for occult blood, faecal fat, microscopic examination of stool specimen.

UNIT-V: Clinical Hematology

Collection of blood - Anticoagulant, preservation, Estimation of Hb, PCV, WBC, RBC, Platelets, ESR. Clotting time, bleeding time - normal value, clinical interpretation.

SKILLED BASED SUBJECT

PAPER – 3

BIOSTATISTICS – I

UNIT - I

Nature and scope of statistical methods and their limitations. Collection, classification, tabulation of statistical data.. Organization of data - Individual series, discrete series, continuous series / class interval. Diagrammatic and graphical representation of statistical data (bar diagram, line diagram, pictogram, histogram & horizontal and vertical bar diagram).

UNIT - II

Measure of central tendency - Introduction, Characteristics of a good average, Mean, Median, Mode (Raw, Discrete & Continuous data) Merits and demerits.

UNIT - III

Measure of Dispersion- Introduction, definition, classification & properties. Range - Introduction, definition, location of range in individual, discrete, continuous series, merits and demerits of Range. Standard deviation, Variance, Coefficient of Variation.

UNIT - IV

Probability - Introduction, Definition, Kinds of Probabilities. Sample Space - Addition and Introduction, definition of mean deviation, quartile deviation – simple problems. Permutation and Combination - Definition, Factorial symbol, formula with example.

UNIT - V

Correlation Analysis - Introduction, Definition, uses, correlation and causation, kinds of correlation. Types of correlation - Positive and negative, linear and non linear, simple and multiple, partial and total correlation.

Books for References:

1. Sundar Rao - Biostatistics.

2. Daniel - Biostatistics, John wiley & sons

3. Lewis, A. E (1971) - Biostatistics

4. Gupta S.P,(1997) Biostatistical Methods, S. Chand & Sons

5. Sundar Rao P.S.S, Jesudian.G& Richard.J [1987], An Introduction for Biostatistics [2nd edition] Prestographit, vellore, India

6. Biostatistics - P. Rama Krishna, Saras Publication [1995].

7. elhance D.N [1972], Fundamentals of statistics kitab mahal, allahabad.

8. Lewis, A.E [1971]- Bio-Statistics.

9. Daniel: Biostatistics, John Wiley 7 Sons.

10. Zar. J - BioStatistical analysis, prentice Hall of India.

SEMESTER VI

PAPER – 8

CLINICAL BIOCHEMISTRY

UNIT-I: Diseases related to carbohydrate metabolism

Regulation of blood sugar, Glycosuria - types of glycosuria. Oral glucose tolerance test in normal and diabetic condition. Diabetes mellitus and Diabetes insipidus - hypoglycemia, hyperglycemia. Ketonuria, ketosis.

UNIT-II: Diseases related to lipid and lipoproteins metabolism

Lipids and lipoproteins: Classification, composition, mode of action.Cholesterol - Factors affecting blood cholesterol level. Dyslipoproteinemias, IHD, atheroscelorosis- risk factor, fatty liver.

UNIT-III: Inborn errors of metabolism

Introduction - clinical importance, phenyl ketonuria, cystinuria, alkaptonuria, Fanconi's syndrome, galactosemia, albinism, tyrosinemia and hemophilia.

UNIT-IV: Organ function test

Liver function tests: Metabolism of bilirubin, jaundice - types, differential diagnosis. Liver function test - Icteric index, Vandenberg test, plasma protein changes, PT.

Renal function tests: Clearance test – Urea, Creatinine, Inulin, PAH test, Concentration and dilution test.

Gastric function tests: Collection of gastric contents, examination of gastric residuum, FTM, stimulation test, tubeless gastric analysis.

UNIT-V: Clinical enzymology

Functional and non-functional plasma enzymes. Isoenzymes with examples. Enzyme patterns in acute pancreatitis, liver damage, bone disorder, myocardial infarction and muscle wasting.

References:

1. Text book of Clinical Biochemistry - Carl A. Burdis and Edward R Ashwood
2. Text book of Medical Biochemistry - Dr. M.N. Chatterjee and rane shinde
3. Clinical chemistry in diagnosis and treatment - Philip D. Mayne
4. Clinical chemistry – William Hoffman
5. Clinical Biochemistry with clinical correlation – Devin, Wiley
6. Practical clinical biochemistry – Harold Varley, CBS, New Delhi

PAPER – 9

BIOTECHNOLOGY

UNIT – I

Biotechnology: Definition and scope, types and branches of biotechnology. Enzymes for in vitro manipulation - Restriction endonucleases, SI nucleases, DNA ligases, Alkaline phosphatase, Reverse transcriptase, DNA polymerase, polynucleotide kinase, terminal transferase. Use of Linkers and Adapters. Cloning vectors, Plasmids - properties of ideal vectors and its types – pBR322, pUC18, pUC19. Bacteriophage ʎ, Cosmid, YAC, and Shuttle vector.

UNIT - II

Methods of gene transfer - transfection, microinjection, electroporation. Recombinant selection and screening methods, Insertional inactivation. Blotting Techniques - Southern, Northern and Western blotting techniques, DNA hybridization techniques, PCR.

UNIT - III

Plant tissue culture - Media composition, nutrients, growth regulators, initiation and differentiation. Callus and suspension culture. Micro propagation, Somatic embryogenesis and somoclonal variation. Protoplast isolation, protoplast fusion and regeneration of plants.

UNIT - IV

Equipments and requirements for animal cell culture - laminar flow, CO_2 incubator, natural media, synthetic media, substrate for cell culture, substrate treatment, disaggregation of tissues, Cell lines – types and properties.

UNIT - V

Applications of genetic engineering: Transgenic plants, transgenic mice (SCID and KNOCK OUT mice), transgenic sheep, transgenic fish, diagnostic and therapeutic applications of monoclonal antibodies.

References:

1. Concept in biotechnology - D. Balasubraniam et al., Universal press India 1996.
2. Plant tissue culture - Razdan, Oxford IBH Publisher.
3. Animal cell culture - Freshney, IRL Press.
4. Animal Biotechnology - 2005. A.K. Srivastava, R.K. Singh and M.P. Yadav Oxford & IBH.
5. Molecular biotechnology 2006 - Channarayappa Univ. Press
6. Molecular Biology & Biotechnology - H.D. Kumar(1997), Vivas publishing house Pvt .Ltd
7. Molecular biotechnology - principle and application of recombinant DNA 3rd edition Bernard, R. Glick Jack, J. Pasternak 2003, Library of Congress cataloging in publication data.
8. A text book of Biotechnology - R. C. Dubey, S. Chand & co
9. Biotechnology - Prakash S. Lohar, MJP publisher, Chennai -5.

CORE PRACTICAL – III

COLORIMETRIC ESTIMATION

1. Estimation of creatinine by Jaffe's method.
2. Estimation of urea by Diacetyl monoxine method.
3. Estimation of glucose by Folin Wu method
4. Estimation of glucose by O- Toludine method

EXPERIMENTS ON ENZYMES

1. Effect of pH, temperature and substrate concentration and determination of Km for amylase and Urease.
2. Assay of activity of alkaline phosphatase in serum.
3. Assay of serum Transaminases (SGOT, SGPT).

BIOTECHNOLOGY EXPERIMENTS

1. Preparation of media – liquid, solid, slant
2. Culture techniques – streak plate, pour plate, spread plate
3. Immuno diffusion – single diffusion

DEMONSTRATION EXPERIMENTS

1. Separation of proteins by SDS-PAGE
2. Isolation of plasmid DNA and separation by electrophoresis

ELECTIVE

PAPER – 2

MEDICAL LABORATORY TECHNOLOGY – II

UNIT - I: Blood Banking

Blood grouping- ABO System, ABO Grouping, Rh typing. Coomb's test. Blood transfusion - Blood donors, donor screening, drawing of blood, compatibility testing, cross matching, blood transfusion complications.

UNIT - II: CSF and Other Body Fluids

Cerebrospinal fluid analysis. Semen analysis, sputum examination, pregnancy test - Interpretation.

UNIT - III: Endocrine Function Test

Thyroid function test - thyroid hormones and its function. Clinical disorder - diagnosis.T_4, ^{131}I Uptake, TSH, Stimulation test, FT_4, FTI, TSH, TBG.

UNIT - IV: Medical Parasitology

Amoebiasis, malarial parasites – life cycle, pathogenesis of malaria – acute and chronic filariasis – diagnosis.

UNIT - V Medical Microbiology

Culturing of organisms from various specimens. Culture media and antibiotic sensitivity test (pus, urine, stool, sputum, throat swab, gram staining, Ziehl –Neilson staining (TB, Lepra bacilli). Safety procedure in microbiological techniques.

References:

1. Medical Laboratory Technology - K. Mukherjee. Vol. I, II, III. Tata Mcgraw-Hill Publishing Company Ltd.
2. Medical Laboratory Technology – V.H. Talib
3. Clinical Laboratory practices in CMC procedure, CMC, Vellore.
4. Medical Lab Technology - Ramnik Sood.

ELECTIVE

PAPER – 3

IMMUNOLOGY

UNIT - I

Immunity: Types of immunity-Innate and Acquired immunity, Humoral and cell mediated immune response, primary and secondary lymphoid organs, structure of T, B and NK cell, structure and function of Neutrophils, Eosinophils and Basophils, Macrophages – Phagocytosis and inflammation.

UNIT - II

Antigens: Properties, Specificity, Immunogenicity, antigenic determinants, haptens and adjuvants, Major Histocompatibility Complex [MHC]. Antibodies: Properties, Structure, Classes, Subclasses of Immunoglobins, Monoclonal antibodies - Production and its applications, complement pathways.

UNIT - III

Allergy and Hypersensitivity – types – I, II, III and IV and their clinical manifestations. Autoimmunity, mechanism of autoimmunity, Autoimmune diseases – Rheumatoid arthritis and Myasthenia gravis.

UNIT - IV

Transplantation – Immunologic response, Graft vs Host reaction, mechanism and prevention of graft rejection (skin), immunosuppressive drugs. Immunology of malignancy: Tumour antigens, immune response in malignancy and immunotherapy of cancer.

UNIT - V

Antigen and antibody interactions - precipitation and agglutination reactions, Precipitation in gel (Ouchterlony procedure, radial immunodiffusion, Immuno electrophoresis), Electro immunediffusion. RIA and ELISA.

References:

1. Immunology - J. Kannan, MJP Publishers, Chennai-5
2. Immunology - Roitt Ivan, Jonathan Brastoff, David Male, 1993.
3. Immunology - Janis Kuby, 4th edition, 2000.
4. Immunology - An introduction, Tizarrd, R. 1995.
5. Fundamentals of Immunology - Lippincot Praven publications, 4th edition.
6. Essential and clinical Immunology - Halen chapel, Mansal Haney, Siraj Misbah and Nial Snowdan.
7. Immunology - Geoffrey Zubay, W.M.C, Brown publishers, 4th edition 1992.
8. Immunology - The immune system in health and disease, 3rd edition.

ELECTIVE PRACTICAL

MEDICAL LABORATORY TECHNOLOGY

1. HAEMATOLOGY

Hematology – Haemoglobin by Sahli's method, RBC count, PCV, ESR, Total and differential WBC count, Platelet count, Blood grouping, ABO system, Rh System, Clotting time, Bleeding time.

Serology – VDRL, CRP, RA, HIV, HBsAg, Pregnancy test.

2. MICROBIOLOGY

Sterilization and disinfection, culture, gram staining, media preparation, antibiotic sensitivity testing

3. URINE AND FAECES ANALYSIS

1. Collection of urine and faecal samples
2. Faecal analysis to detect fats, undigested food and blood
3. Qualitative analysis of urine for normal and pathological conditions.

References:

1. Practical clinical Biochmistry - Harold Varley, CBS, New delhi
2. Medical Laboratory Technology – Kanai L. Mukherjee, Tata McGraw Hill Publication and co. ltd., Vol, I, II, III
3. Clinical chemistry – Ranjana Chawla
4. laboratory Manual in Biochemistry – Jayaraman
5. Biochemical methods – S.Sadasivan And Manickam
6. Introduction to practical biochemistry – David T. Plummer.

SKILLED BASED SUBJECT
PAPER – 4
BIOSTATISTICS – II

UNIT - I

Theoretical Distribution – Definition, Type of Theoretical Distribution, Binomial distribution and Poisson distribution- Definition, characteristics and Properties. Normal distribution, normal curve, standard Normal distribution - characteristics and Properties.

UNIT - II

Regression Analysis – Introduction, Definition, uses, types of regression- Positive and negative, linear and non linear, simple and multiple, partial and total. Regression equation – Regression equation of X on Y and Y on X.

UNIT - III

F-test and it's application, testing of Hypothesis – Null hypothesis, alternative hypothesis, standard error.

UNIT – IV

Chi- Square test- Introduction, Characteristics of Chi- Square test, Assumption, degree of freedom, application of chi- square test, t-test – Application and its Uses.

UNIT - V

Analysis of Variance- Introduction, techniques of Analysis of variance (ANOVA) – One way and two way classification, steps involved in analysis.

Books for References:

1. Sundar Rao- Biostatistics.
2. Daniel – Biostatistics, John wiley & sons
3. Lewis, A. E (1971) – Biostatistics
4. Gupta S.P,(1997) Biostatistical Methods, S. Chand & Sons
5. Sundar Rao P.S.S, Jesudian.G& Richard.J [1987], An Introduction for Biostatistics [2nd edition]
1. Prestographit, vellore, India
6. Biostatistics – P. Rama Krishna, Saras Publication [1995].
7. elhance D.N [1972], Fundamentals of statistics kitab mahal, allahabad.
8. Lewis, A.E [1971]- Bio-Statistics.
9. Daniel: Biostatistics, John Wiley & Sons.
10. Zar. J – BioStatistical analysis, prentice Hall of India.s

THIRUVALLUVAR UNIVERSITY

B.Sc., CHEMISTRY DEGREE COURSE

CBCS PATTERN
(With effect from 2017 - 2018)
The Course of Study and the Scheme of Examinations

S.NO.	Part	Study Components / Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper-1	6	6	General Chemistry - I	25	75	100
	III	Core Practical	Practical-1	3	0	Volumetric Analysis	0	0	0
4	III	Allied -1	Paper-1	4	4	**Any one from** 1. Physics –I 2. Botany –I 3. Zoology –I 4. Biochemistry – I 5. Mathematics – I*	25	75	100
	III	Allied Practical	Practical-1	3	0	Allied practical-1	0	0	0
5	IV	Environmental Studies		2	2	Environmental studies	25	75	100
				30	**20**		**125**	**375**	**500**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
6	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
7	II	English	Paper-2	4	4	English	25	75	100
8	III	Core Theory	Paper-2	6	5	General Chemistry - II	25	75	100
9	III	Core Practical	Practical-1	3	3	Volumetric Analysis	25	75	100
10	III	Allied-1	Paper-2	4	4	**Any one from** 1. Physics –II 2. Botany –II 3. Zoology –II 4. Biochemistry – II 5. Mathematics – II*	25	75	100
11	III	Allied Practical	Practical-1	3	2	Allied practical-1	25	75	100

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
12	IV	Value Education		2	2	Value Education	25	75	100
13	IV	Soft Skill		2	1	Soft Skill	25	75	100
				30	**25**		**150**	**650**	**800**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
14	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
15	II	English	Paper-3	6	4	English	25	75	100
16	III	Core Theory	Paper-3	3	3	General Chemistry – III	25	75	100
	III	Core Practical	Practical-2	3	0	Inorganic Qualitative Analysis & Preparations	0	0	0
17	III	ALLIED-2	Paper-3	4	4	**Any one from** 1. Physics –I 2. Botany –I 3. Zoology –I 4. Biochemistry – I 5. Mathematics – I*	25	75	100
	III	Allied Practical	Practical-2	3	0	Allied practical-II	0	0	0
18	IV	Skill Based Subject	Paper-1	3	3	Water Treatment and Analysis	25	75	100
19	IV	Non-Major Elective	Paper-1	2	2	Medicinal Chemistry	25	75	100
				30	**20**		**150**	**450**	**600**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
20	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
21	II	English	Paper-4	6	4	English	25	75	100
22	III	Core Theory	Paper-4	3	3	General Chemistry - IV	25	75	100
23	III	Core Practical	Practical-2	3	3	Inorganic Qualitative Analysis & Preparations	25	75	100
24	III	Allied-2	Paper-4	4	4	**Any one from** 1. Physics –II 2. Botany –II 3. Zoology –II 4. Biochemistry – II 5. Mathematics – II*	25	75	100
25	III	Allied Practical	Practical-2	3	2	Allied practical-II	25	75	100
26	IV	Skill Based Subject	Paper-2	3	3	Food Chemistry	25	75	100
27	IV	Non-Major Elective	Paper-2	2	2	Chemistry in Every Day Life	25	75	100
				30	**25**		**200**	**600**	**800**

S.NO.	Part	Study Components / Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
28	III	Core Theory	Paper-5	4	4	Inorganic Chemistry - I	25	75	100
	III	Core Practical	Practical-3	3	0	Gravimetric Estimation	0	0	0
29	III	Core Theory	Paper-6	4	4	Organic Chemistry – I	25	75	100
	III	Core Practical	Practical-4	3	0	Organic Analysis and Preparations	0	0	0
30	III	Core Theory	Paper-7	4	4	Physical Chemistry – I	25	75	100
	III	Core Practical	Practical-5	3	0	Physical Chemistry	0	0	0
31	III	Elective	Paper-1	3	3	**Any one from** A. Analytical chemistry – I B. Basis of computer programming in C and its applications in Chemistry C. Organic Synthesis	25	75	100
32	III	Elective	Paper - 2	3	3	**Any one from** A. Pharmaceutical Chemistry B. Polymer Chemistry C. Green Chemistry	25	75	100
33	IV	Skill Based Subject	Paper - 3	3	3	Applied chemistry	25	75	100
				30	**21**		**150**	**450**	**600**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
34	III	Core Theory	Paper-8	5	5	Inorganic Chemistry – II	25	75	100
35	III	Core Practical	Practical-3	3	3	Gravimetric Estimation	25	75	100
36	III	Core Theory	Paper-9	5	4	Organic Chemistry – II	25	75	100
37	III	Core Practical	Practical-4	3	3	Organic Analysis & Preparations	25	75	100
38	III	Core Theory	Paper-10	5	4	Physical Chemistry – II	25	75	100
39	III	Core Practical	Practical-5	3	3	Physical Chemistry Experiments	25	75	100
40	III	Elective	Paper-3	3	3	**Any one from** A. Analytical chemistry - II B. Textile chemistry C. Nano Chemistry	25	75	100
41	IV	Skill based Subject	Paper-4	3	3	Agriculture and Leather Chemistry	25	75	100
42	V	Extension Activities		-	1	Extension Activities	100	0	100
		TOTAL		**30**	**29**		**300**	**600**	**900**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester) *	2	4	8	100	200
	Allied (Even Semester) *	2	4	8	100	200
	Allied Practical (Even Semester)	2	2	4	100	200
	Electives	3	3	9	100	300
	Core (Theory & Practicals)	15	(3-6)	57	100	1500
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**42**		**140**		**4200**

* **Allied Mathematics**:

	Ins. Hrs/Week	Credit	CIA	University	Total Marks
Paper-1	7	4	25	75	100
Paper-2	7	6	25	75	100

if Mathematics is one of the Allied Subjects total no. of papers will be 41.

THIRUVALLUVAR UNIVERSITY

B.Sc., CHEMISTRY SYLLABUS UNDER CBCS

(With effect from 2017 - 2018)

SEMESTER I

PAPER – 1 GENERAL CHEMISTRY – I

Objective:

Basic concepts regarding Atomic Structure, Periodic Properties, Bonding Concepts, Ionic Bond, VSEPR and MO Theories, Nomenclature of Organic Compounds, Hybridisation, Reaction Intermediates, States of Matter, Principle of Volumetric Analysis, Related Problems and Applications wherever necessary are to be taught for I- Semester.

UNIT-I ATOMIC STRUCTURE

1.1 Quantum numbers n, l, m and s – Pauli's exclusion principle – Energy distribution and orbitals - Hund's rule of maximum multiplicity - Aufbau's principle - Electronic Configuration of elements - Stability of Half-filled and completely filled orbitals.

1.2 Classification of elements – General characteristics of s, p, d and f- Block elements – Periodicity of properties- Definition and Periodicity of the following properties – Atomic radii and Ionic radii - Factors affecting the Atomic radii and Ionic radii.

1.3 Ionisation potential, Electron affinity and Electronegativity - Factors affecting the Ionisation potential, Electron affinity and Electronegativity – Pauling scale – Mulliken electronegativity scale – Applications of Electronegativity regarding the Bonding nature.

UNIT- II CHEMICAL BONDING

2.1 Ionic bond - Conditions for the formation of ionic bond - General properties – Energetics of formation of NaCl from Na^+ and Cl^- - Hydration energy, Lattice energy and their applications – Born-Haber cycle - Fajan's rule - Characteristics of Electrovalent compounds.

2.2 Valence Bond Theory - Conditions for the formation of covalent bond - General properties - Polarity of bonds - Orbital overlap - Bond lengths and Bond energies - Hybridisation - Sigma and Pi bonds - VSEPR theory - Geometries of BF_3 , NH_3 , H_2O, PCl_5 and SF_6 molecules - Partial ionic character of covalent bond - Percentage of ionic character.

2.3 Molecular Orbital theory – Bonding and Anti-bonding orbitals - Relative order of Energies of molecular orbitals - MO diagram of H_2, He_2, O_2, N_2, F_2 and CO - Bond Order - Stability and Magnetic properties of the molecules - Comparison of VB and MO theories.

UNIT- III BASIC CONCEPTS OF ORGANIC CHEMISTRY

3.1 Classification of Organic Compounds – Nomenclature of Organic Compounds – Functional Groups - Homologous Series - IUPAC Recommendations for Naming Simple Aliphatic and Alicyclic Compounds.

3.2 Basic concepts of bonding in organic chemistry - Hybridisation – Definition – Geometry of Molecules - Methane, Ethane, Ethylene, Acetylene and Benzene - Electron displacement effects - Inductive - Inductomeric - Electromeric – Mesomeric Effect - Resonance - Hyperconjugation and Steric Effects.

3.3 Cleavage of bonds - Homolytic and Heterolytic fission of carbon-carbon bond – Methods to determine the Reaction Mechanism - Reaction intermediates - Structure and Stability of Carbocations, Carbanions and Free radicals.

UNIT-IV STATES OF MATTER

4.1 Gaseous state - Kinetic gas equation - Derivation - Gas laws from the kinetic gas equation - Kinds of velocities - Mean, RMS, Most Probable Velocities - Calculation of molecular velocities - Maxwell's distribution of Molecular Velocities (No derivation) - Effect of Temperature on velocity distribution - Equipartition of energy - Heat capacity on molecular basis - Virial equation of state - Boyle temperature - Coefficient of Compressibility and Thermal expansion.

4.2 Liquid state - Density – Diffusion - Viscosity – Evaporation - Surface tension - Effect of temperature on surface tension - Parachor - Definition and Applications only - Coefficient of Viscosity - Effect of Temperature and Pressure - Liquid crystals - Classification and Molecular arrangements.

4.3 Solid State - Crystal lattices - Laws of Crystallography - Symmetry elements in crystals - Seven crystal systems - Unit cell - Space lattice - Bravais lattices - Law of Rational Indices - Miller indices.

UNIT-V PRINCIPLES OF VOLUMETRIC ANALYSIS

5.1 Definitions of Molarity, Molality, Normality and Mole Fraction - Their Calculations - Definition and Examples for Primary and Secondary standards - Calculation of Equivalent Weight of Acid, Base, Oxidising Agent, Reducing Agent and Salts.

5.2 Principles of Volumetric Analysis - Theories of Acid- Base, Redox, Complexometric Iodometric and Iodimetric titrations.

5.3 Theories of indicators - Acid-base indicators - Choice of indicators - Redox, Metal ion and Adsorption indicators.

ALLIED

1. PHYSICS - I

UNIT – I: PROPERTIES OF MATTER

Elasticity : Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula .

Surface Tension: Surface Tension – Surface Tension and interfacial surface tension by the method of drops.

UNIT – II: HEAT

Heat: Specific heat – Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power.
Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Super conductors. Type I and II – Meisner Effect – Helium I and II.

UNIT – III: ELECTRICITY AND MAGNETISM

Electricity: Potentiometer – Principle – Calibration of low range voltmeter – Measurement of internal resistance of cell – measurement of an unknown resistance.

Magnetism – Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer in Tan C position and the vibration magnetometer.

UNIT – IV: SOUND AND ACOUSTICS OF BUILDING

Sound: Transverse vibration of strings – Velocity and frequency of vibrations of a stretched string – laws – sonometer – A.C. Frequency – Steel Wire – Brass wire.

Ultrasonics – Production by Piezo – electric method – properties and uses.
Acoustics of buildings: Reverberation – Reverberation time – Sabine's formula (definition only) – Sound absorption co-efficient of surface – conditions for the perfect acoustics.

UNIT – V: OPTICS

Interference: Air Wedge – Description – Test for optical flatness of glass plate – Determination of diameter of a thin wire by air wedge.

Diffraction: Theory of transmission grating – Normal Incidence – Determination of Wavelength of monochromatic source and Wavelength of mercury line using a grating by normal Incidence.

Fibre optics: principle-classification of optical fibres-fibre optic communication system block diagram.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Introduction to Fibre optics- K.Thyagarajan and Ajay Ghatak,Cambridge,University Press(1999).

ALLIED

3. ZOOLOGY I

Objective:

To acquire knownledge about different kinds of animal species.

To study the systematic and fuctional morphology of invertebrates and chordates.

UNIT – I:
Type study includes life history.

Protozoa - Entamoeba, **Porifera** - Sycon. **Coelenterata** - Obelia geniculata. **Platyhelminthes** - Teania solium.

UNIT - II

Annelida - Earthworm, **Arthropoda** - Prawn, **Mollusca** - Fresh water mussel, **Echinodermata** - Sea star.

UNIT – III:
Type study includes Morphology, digestive system, respiratory system, circulatory system and urinogenital system of Chordate.

Chordata - Genaral charters, **Prochordata:** Morphology of Amphioxus. **Vertebrates: Pisces** - Shark.

UNIT - IV

Amphibia: Frog, **Reptiles:** Calotes

UNIT - V

Aves: Pigeon, **Mammalia:** Rabbit.

REFERENCES:

1. Ayyar, E.K. and T.N. Ananthakrishnan. 1992. Manual of Zoology. Vol I & II, S. Viswanathan (printers and publishers) Pvt. Ltd., Madras, 891 p.

2. Kotpal series, 1998 - 1992. Rastogi Publications, Meerut.

3. Jordan E.L. and P.S. Verma. 1993. Invertebrate Zoology 12th edition, S. Chand & Co., Ltd., New Delhi.

4. Jordan, E.L., and P.S. Verma. 1995. Chordate Zoology and Elements of Animal Physiology, S. Chand & Co., Ltd., New Delhi.

4. BIOCHEMISTRY I

UNIT-I: Chemistry of Carbohydrates

Definition and Classification of carbohydrate. Monosaccharides - occurrence, structure; physical and chemical properties, linear and ring forms (Haworth formula) for glucose and fructose. Disaccharides - occurrence, structure; physical and chemical properties of sucrose and lactose. Polysaccharides - occurrence, structure, physical and chemical properties of starch.

UNIT-II: Chemistry of amino acids

Definition and classification of amino acids. Reaction with ninhydrin, common properties of amino acids, amphoteric nature, isoelectric point, isoelectric pH and Zwitter ion.

UNIT-III: Chemistry of Proteins

Classification based on solubility, shape and size. Physical properties: salting in and salting out, denaturation, peptide bond. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT-IV: Chemistry of Lipids

Definition, classification and functions of lipids. Occurrence, chemistry and biological functions of simple lipids, compound lipids (e.g. phospholipids) and derived lipids: steroids (e.g. cholesterol). Physical property-emulsification. Chemical property-saponification. Functions of bile acids and bile salts.

UNIT-V: Chemistry of Nucleic acids

Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNA and its biological functions. Structure, types and functions of RNA: tRNA, mRNA and rRNA. Differences between DNA and RNA.

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan , MJP Publishers, Chennai - 5.

5. MATHEMATICS – I*

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ.

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates-Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.
3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

SEMESTER II

PAPER – 2

GENERAL CHEMISTRY - II

OBJECTIVES:

- Basic knowledge on s- and p- Block Elements, Group Study, Hydrocarbons, Cycloalkanes, Dienes, Quantum Chemistry, Thermochemistry, First Law of Thermodynamics, Derivation of Equations, Related Problems, Reaction Mechanism and Applications wherever necessary are to be taught for II- Semester.

UNIT-I s- and p- Block Elements

1.1 Alkali metals - Li, Na, K, Rb and Cs - Occurrence - Comparative study of Elements with respect to Oxides, Halides, Hydroxides and Carbonates - Exceptional property of Lithium - Diagonal Relationship of Li with Mg.

1.2 Alkaline earth metals - Be, Mg, Ca, Sr and Ba - Occurrence - Comparative study of the elements with respect to Oxides, Hydroxides, Halides, Sulphates and Carbonates - Exceptional property of Beryllium - Diagonal relationship of Be with Al - Comparison of Alkaline Earth Metals with Alkali Metals - Magnesium acting as bridge element between II A and II B groups - Magnesium resembles Zinc.

1.3 p- Block elements - Boron family - Group discussion - Anomalous behaviour of Boron - Diagonal Relationship between Boron and Silicon - Electron deficiency and Electron acceptor behaviour of Boron trihalides - Bonding in Diborane (Hydrogen-bridge structure) - Preparation, Properties, structure and Uses of Borazine - $NaBH_4$ - Preparation and Uses.

UNIT-II HYDROCARBONS

2.1 Alkanes - Methods of preparation of alkanes - Wurtz method, Kolbe's method and Reduction of alkyl halides - Physical and Chemical Properties of alkanes - Mechanism of Free Radical Substitution in alkanes – Halogenation and Reactivity.

2.2 Alkenes - Properties of alkenes – Electrophilic and Free radical addition - Addition reactions of Alkenes with mechanism - Addition of Hydrogen, Halogens, Hydrogen Halide (Markownikoff''s rule) - Hydrogen bromide (Peroxide effect) - Sulphuric Acid, Water, BH_3, Ozonolysis, Hydroxylation with $KMnO_4$ - Allylic substitution by NBS.

2.3 Alkynes - Acidity of alkynes - Addition of hydrogen - Hydroboration - Hydrohalogenation - Addition of hypohalous acid, Hydration - Addition of water with $HgSO_4$ catalyst - Oxidation with $KMnO_4$ – Ozonolysis - Formation of Acetylides.

UNIT-III DIENES AND CYCLOALKANES

3.1 Dienes – Classification - Conjugated, Isolated and Cumulative Dienes - Stability of Dienes - 1, 2- and 1, 4- Addition reactions of H_2 and HX with mechanisms – Synthesis of dienes – 1, 3 - Butadiene, Isoprene and Chloroprene - Diels-Alder reaction.

3.2 Cycloalkanes - Preparation using Wurtz's reaction, Dieckmann's ring closure and Reduction of aromatic hydrocarbons - Substitution and Ring opening reactions.

3.3 Stability of Alkanes, Alkenes and Cycloalkanes - Bayer's strain theory - Theory of Strainless rings.

UNIT-IV QUANTUM CHEMISTRY AND THERMOCHEMISTRY

4.1 Planck's Quantum theory of radiation - Photoelectric Effect - Compton Effect - Wave mechanical concept of the atom - de Broglie's relationship – Davisson and Germer experiment - Wave nature of electron - Heisenberg's Uncertainty Principle.

4.2 Schrodinger wave equation (Without derivation) - Significance of wave functions ψ and ψ^2 - Shapes of s, p and d- orbitals.

4.3 Thermodynamics - Definition and Explanation of terms - System, Boundary, Surroundings - Homogeneous and Heterogeneous systems - Isolated system - Closed system - Open system - Intensive and Extensive properties - State of a system - Independent state variables - Dependent state variables - Thermodynamic functions - State and Path functions.

UNIT-V THERMODYNAMICS

5.1 Thermodynamic processes - Types of processes - Cyclic - Reversible – Irreversible - Isothermal – Adiabatic Process - Exact and Inexact Differentials - Concept of Heat and Work - Zeroth Law of Thermodynamics.

5.2 First law of Thermodynamics - Statement and Equation – C_p and C_v Relationship - Calculation of W, Q, ΔE and ΔH for the Expansion of Ideal Gases under Reversible, Isothermal and Adiabatic Conditions.

5.3 Thermochemistry - Heat of a reaction - Exothermic and Endothermic reactions - Calculation of ΔH from ΔE and vice versa - Thermochemical equations - Bond dissociation energy - Calculation from thermochemical data - Variation of Heat of a reaction with temperature - Kirchoff's Equation and Its significance.

CORE PRACTICAL

Paper – 1

VOLUMETRIC ANALYSIS

Acidimetry

1. Estimation of Borax - Standard Sodium Carbonate

2. Estimation of Sodium Hydroxide - Standard Sodium Carbonate

3. Estimation of HCl – Standard Oxalic Acid.

Iodometry

4. Estimation of Copper - Standard Copper Sulphate

5. Estimation of Potassium Dichromate - Standard Potassium Dichromate

Complexometry

6. Estimation of Magnesium using EDTA.

7. Estimation of Zinc using EDTA

Dichrometry

8. Estimation of Ferrous Iron using Diphenyl amine / N- pPhenylanthranillic acid as indicator.

Precipitation titration

9. Estimation of Chloride in neutral medium (Demonstration experiment).

Permanganometry

10. Estimation of Ferrous Sulphate – Standard FAS.

11. Estimation of Oxalic Acid – Standard Oxalic Acid.

- Students must write Short Procedure for the given estimation in Ten Minutes during the examination and submit the Paper for Evaluation.

ALLIED – 2

1. PHYSICS II

UNIT – I: WAVE MECHANICS

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

UNIT – II : NUCLEAR PHYSICS

Particle accelerators – cyclotron, particle detectors – GM Counter Artificial Transmutation – Rutherford's Experiment – The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions.

Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy – Conservation of Parity – Quantities conserved and quantities not conserved in a nuclear reaction.

UNIT – III : ENERGY PHYSICS

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

UNIT – IV: CRYSTALLOGRAPHY

Crystallography : The crystal structure – Unit Cell –Bravais lattice- structures of simple cubic-BCC and FCC- co ordination number, packing factor calculation for the above structures –Hexogonal closed packed(HCP) structure -Miller indices – concept of Reciprocal Vectors.

UNIT – V: ELECTRONICS

Electronics: Transistor characteristics in common base and common emitter mode- Transistor single stage amplifier- Expression for input impedence, output impedence and current gain.
Digital Electronics : NAND and NOR as universal building blocks- De Morgan's theorem –statement and proof- Fabrication of diodes and transistors using Monolithic technology– limitations.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
9. Introduction to Solid State Physics – C. Kittel, 5^{th} Edition Wiley Eastern Ltd.
10. Renewable & Sustainable energy sources – Agarwal.

3. ZOOLOGY II

Objective:

To study the principles of cell biology, genetics, developmental biology, physiology, ecology and evolution.

UNIT - I

Cell Biology - structure of animal cell, **Genetics:** molecular structure of gene - gene function, sex linked inheritance. Genetic Engineering and its application.

UNIT - II

Embryology - cleavage and gastrulation of Amphioxus.

Human Physiology: Digestion, Circulation - blood components, structure of heart, heart function.

UNIT - III

Diseases of Circulatory system - blood pressure, heart disease - Ischemia, Myocardial Infarction, Rheumatic heart disease, stroke.

Excretion - structure of kidney and mechanism of urine formation.

UNIT - IV

Environmental Biology - Biotic factors and Abiotic factors, food chain and food web. Pollution - Environmental degradation, (Air, Water and Land) - Green house effect - Bioremediation, Biodegradation - Global warming - acid rain.

UNIT - V

Evolution: Theories of Lamarkism & Darwinism.

REFERENCES:

1. Ekambaranatha Ayyar, and Ananthakrishnan, T.N. 1993. Outlines of Zoology, Vol I & II, Viswanathan and Co, Madras.
2. Sambasiviah, I, Kamalakara Rao, A.P., Augustine Chellappa, S. 1983. Text book of Animal Physiology, S. Chand & Co., New Delhi.
3. Verma and Agarwal. 1983. Text book of animal Ecology, S. Chand & Co., New Delhi.
4. Verma and Agarwal and Tyagi. 1991. Chordate Embryology, S. Chand & Co., New Delhi.
5. Rastogi and Jayaraj. 2000. Text book of Genetics. Rastogi publications, Meerut.
6. Verma and Agarwal. 2000. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Co., New Delhi.

4. BIOCHEMISTRY II

UNIT-I: Metabolism

Glycolysis, TCA cycle and its energetics, HMP shunt pathway. Deamination, transamination reaction, transaminase enzymes, Urea cycle.

UNIT-II: Metabolic Disorders

Diabetes mellitus, Glycogen storage diseases, Glycosuria, Ketosis, Jaundice, Phenyl ketonuria, Alkaptonuria. Dehydration: definition, causes, symptom and prevention.

UNIT-III: Enzymes

Definition, classification of enzymes with one example. Mechanism of enzyme action - Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Enzyme inhibition: competitive, uncompetitive and non competitive. Biological functions of enzymes.

UNIT-IV: Molecular Biology

Central dogma of molecular biology. DNA and RNA act as genetic material. Replication: Definition, types, mode of action of replication, mechanism of replication. General mechanism of transcription and translation. Genetic code.

UNIT-V: Vitamins

A brief outline of source, requirement, biological function and deficiency of Vitamins (fat soluble and water soluble vitamins).

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Robert K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan, MJP Publishers, Chennai-5.

5. MATHEMATICS – II*

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume -Fourier series for functions in $(0,2\pi)$ and $(-\pi, \pi)$.

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Guass, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

ALLIED PRACTICAL

1. PHYSICS

(Any 15 Experiments)

1. Young's modulus – non uniform bending – pin and microscope.
2. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
3. Ridigity modulus – Torsional oscillation method (without symmetric masses).
4. Determination of Co-efficient of Viscosity – Graduated Burette.
5. Surface Tension and Interfacial Tension – By drop weight method.
6. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
7. Sonometer – Determining A.C. Frequency. (Screw Gauge is given).
8. Sonometer – frequency of tuning fork.
9. Newton's Rings – Radius of Curvature.
10. Air Wedge – Determination of thickness of thin wire.
11. Spectrometer Grating – Minimum Deviation – Mercury Lines.
12. Spectrometer – Refractive Index of a liquid – Hollow Prism.
13. Potentiometer – Calibration of High Range Ammeter.
14. Potentiometer – Calibration of Low Range Voltmeter.
15. Determination of M and B_H using Deflection Magnetometer in Tan C position and vibration magnetometer.
16. Figure of merit and voltage sensitiveness of table galvanometer.
17. Construction of AND, OR gates using diodes and NOT by transistors.
18. Zener diode – Voltage Regulation.
19. NAND / NOR as universal gate.
20. Demorgan's theorem verification.

3. ZOOLOGY

I - MAJOR PRACTICAL

DISSECTIONS

Cockroach: Digestive and nervous system

Prawn: Nervous system

II - MINOR PRACTICAL

MOUNTING

1. Mouth parts of **Mosquito** and **Honey bee**

2. **Earthworm** - Body setae

3. Placoid scales of **shark**

III - SPOTTERS

Entamoeba, Sycon, Obelia, Taenia solium (entire, scolex) earthworm (entire, Pineal setae) Prawn (entire), Fresh water mussel, Sea star, Amphioxus - Entire, Amphioxus - T.S. through pharynx, Shark, Frog, Calotes, Pigeon, feathers of pigeon and Rabbit.

Sphygnomanometer, Stethoscope, Rain gauge.

REFERENCES:

1. Verma. P.S. 2011. A manual of practical Zoology - INVERTEBRATES. Chand & Co., Ltd., Ram Nagar, New Delhi.
2. Verma. P.S. 2011. A manual of practical Zoology - CHORDATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

ALLIED PRACTICAL

4. BIOCHEMISTRY I & II

PRACTICAL I

Volumetric Estimation

1. Estimation of HCl using Na2CO3 as link and NaOH as primary standard.

2. Estimation of Iron in Ferrous Ammonium Sulphate using potassium permanganate as link solution and oxalic acid as primary standard.

3. Estimation of Glucose by Benedict's method.

4. Estimation of Glycine by formal titration.

5. Estimation of Ascorbic acid.

SEMESTER – III

PAPER – 3

GENERAL CHEMISTRY – III

OBJECTIVE:

Basic concepts regarding the Principles of Inorganic Analysis and Applications of Qualitative Analysis, Types of Solvents, p- Block Elements, Group Study, Aromaticity, Electrophilic and Nucleophilic Substitution Reactions, Elimination Reactions, Reaction Mechanism, Second Law of Thermodynamics, Derivation of Equations, Related Problems and Applications wherever necessary are to be taught for III semester.

UNIT-I

1.1 Semimicro Techniques - Principles of Acid-Base Equilibria - Common ion effect - Solubility Product and its Applications in Qualitative Analysis - Principles of Inorganic Analysis.

1.2 Reactions involved in the Separation and Identification of Cations and Anions in Qualitative analysis - Spot test reagents - Aluminon, Cupferon, DMG, Thiourea, Magneson, Alizarin and Nessler's reagent.

1.3 Types of solvents - Protic and Aprotic solvents - Amphiprotic / Amphoteric solvents - Aqueous and Non-aqueous solvents - Liquid Ammonia as a solvent.

UNIT-II

2.1 Carbon family – Group study - Comparative study of Elements with respect to Valency, Oxides, Halides, Hydrides and Oxyacids - Catenation - Comparison of Properties of Carbon and Silicon – Silicates - Classification and Structure - Silicones- Preparation, Properties and Uses.

2.2 Nitrogen family - Group study - Comparative study of N, P, As, Sb and Bi with respect to Oxides, Oxyacids, Halides and Hydrides – Hydrazine and Hydroxylamine - Preparation, Properties, Structure and Uses.

2.3 Oxygen family - Group study - Comparative study of O, S, Se and Te with respect to Catenation, Oxides, Halides, Hydrides and Oxyacids - Anomalous Behaviour of Oxygen - Oxyacids of Sulphur (Structure only) - Peracids of Sulphur - Preparation, Properties and Structure - Differences Between Permonosulphuric Acid and Perdisulphuric Acid.

UNIT-III

3.1 Aromaticity - Modern Theory of Aromaticity - Huckel's (4n +2) Rule and Its Simple Applications to Benzenoid and Non- benzenoid Compounds.

3.2 Electrophilic substitution reactions in Aromatic Compounds - Mechanisms of Nitration, Halogenations, Sulphonation, Friedel-Crafts Acylation and Alkylation.

3.3 Directive influence - Orientation - Ortho/Para ratio - Nuclear and Side chain Halogenation.

UNIT-IV

4.1 Aliphatic Nucleophilic Substitutions - Mechanisms of S_N1, S_N2 and S_Ni Reactions – Effect of Structure of Substrate, Solvent, Nucleophile and Leaving Group.

4.2 Elimination reactions - Mechanism of E1 and E2 reactions - Hoffmann and Saytzeff''s rules - Cis and Trans Eliminations.

4.3 Aromatic Nucleophilic Substitutions - Unimolecular Nucleophilic Substitution, Bimolecular Nucleophilic Substitution and their Mechanism.

UNIT-V

5.1 Second Law of Thermodynamics - Need for the II Law of Thermodynamics - Spontaneous Process – Criteria of Spontaneity - Different Forms of Statements of the Second Law – Cyclic Process – Definition - Heat Engines.

5.2 Carnot's cycle - Efficiency - Carnot's theorem (Statement only) - Concept of Entropy - Definition and Mathematical Statement - Randomness and Entropy – Standard Entropy - Derivation of Entropy from Carnot Cycle.

5.3 Entropy change of an Ideal Gas during Isothermal Process - Entropy changes in Cyclic, Reversible and Irreversible Processes - Entropy Changes in Physical Transformations - Calculation of Entropy Changes with Changes in T, V and P - Entropy of Mixing of Ideal Gases – Physical Significance of Entropy.

ALLIED

1. PHYSICS - I

UNIT – I: PROPERTIES OF MATTER

Elasticity : Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula .

Surface Tension: Surface Tension – Surface Tension and interfacial surface tension by the method of drops.

UNIT – II: HEAT

Heat: Specific heat – Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power.
Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Super conductors. Type I and II – Meisner Effect – Helium I and II.

UNIT – III: ELECTRICITY AND MAGNETISM

Electricity: Potentiometer – Principle – Calibration of low range voltmeter – Measurement of internal resistance of cell – measurement of an unknown resistance.

Magnetism – Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer in Tan C position and the vibration magnetometer.

UNIT – IV: SOUND AND ACOUSTICS OF BUILDING

Sound: Transverse vibration of strings – Velocity and frequency of vibrations of a stretched string – laws – sonometer – A.C. Frequency – Steel Wire – Brass wire.

Ultrasonics – Production by Piezo – electric method – properties and uses.
Acoustics of buildings: Reverberation – Reverberation time – Sabine's formula (definition only) – Sound absorption co-efficient of surface – conditions for the perfect acoustics.

UNIT – V: OPTICS

Interference: Air Wedge – Description – Test for optical flatness of glass plate – Determination of diameter of a thin wire by air wedge.

Diffraction: Theory of transmission grating – Normal Incidence – Determination of Wavelength of monochromatic source and Wavelength of mercury line using a grating by normal Incidence.

Fibre optics: principle-classification of optical fibres-fibre optic communication system block diagram.

Books for Study & Reference

9. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
10. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
11. Allied Physics – Prof. Dhanalakshmi and others.
12. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
13. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
14. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
15. Modern Physics – R. Murugesan S. Chand & Co. (2004).
16. Introduction to Fibre optics- K.Thyagarajan and Ajay Ghatak,Cambridge,University Press(1999).

ALLIED

3.ZOOLOGY I

Objective:

To acquire knownledge about different kinds of animal species.

To study the systematic and fuctional morphology of invertebrates and chordates.

UNIT – I:
Type study includes life history.

Protozoa - Entamoeba, **Porifera** - Sycon. **Coelenterata** - Obelia geniculata. **Platyhelminthes** - Teania solium.

UNIT - II

Annelida - Earthworm, **Arthropoda** - Prawn, **Mollusca** - Fresh water mussel, **Echinodermata** - Sea star.

UNIT – III:
Type study includes Morphology, digestive system, respiratory system, circulatory system and urinogenital system of Chordate.

Chordata - Genaral charters, **Prochordata:** Morphology of Amphioxus. **Vertebrates: Pisces** - Shark.

UNIT - IV

Amphibia: Frog, **Reptiles:** Calotes

UNIT - V

Aves: Pigeon, **Mammalia:** Rabbit.

REFERENCES:

1. Ayyar, E.K. and T.N. Ananthakrishnan. 1992. Manual of Zoology. Vol I & II, S. Viswanathan (printers and publishers) Pvt. Ltd., Madras, 891 p.

2. Kotpal series, 1998 - 1992. Rastogi Publications, Meerut.

3. Jordan E.L. and P.S. Verma. 1993. Invertebrate Zoology 12th edition, S. Chand & Co., Ltd., New Delhi.

4. Jordan, E.L., and P.S. Verma. 1995. Chordate Zoology and Elements of Animal Physiology, S. Chand & Co., Ltd., New Delhi.

4. BIOCHEMISTRY I

UNIT-I: Chemistry of Carbohydrates

Definition and Classification of carbohydrate. Monosaccharides - occurrence, structure; physical and chemical properties, linear and ring forms (Haworth formula) for glucose and fructose. Disaccharides - occurrence, structure; physical and chemical properties of sucrose and lactose. Polysaccharides - occurrence, structure, physical and chemical properties of starch.

UNIT-II: Chemistry of amino acids

Definition and classification of amino acids. Reaction with ninhydrin, common properties of amino acids, amphoteric nature, isoelectric point, isoelectric pH and Zwitter ion.

UNIT-III: Chemistry of Proteins

Classification based on solubility, shape and size. Physical properties: salting in and salting out, denaturation, peptide bond. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT-IV: Chemistry of Lipids

Definition, classification and functions of lipids. Occurrence, chemistry and biological functions of simple lipids, compound lipids (e.g. phospholipids) and derived lipids: steroids (e.g. cholesterol). Physical property-emulsification. Chemical property-saponification. Functions of bile acids and bile salts.

UNIT-V: Chemistry of Nucleic acids

Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNA and its biological functions. Structure, types and functions of RNA: tRNA, mRNA and rRNA. Differences between DNA and RNA.

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan , MJP Publishers, Chennai - 5.

5.MATHEMATICS – I*

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ.

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates-Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

6. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
7. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.
8. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai
9. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
10. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

SKILL BASED SUBJECT

PAPER – 1

WATER TREATMENT AND ANALYSIS

Objective:

- To impart knowledge about the various methods of Water Analysis and Treatment of Water.

UNIT-I

1.1 Introduction - Characteristics of water - Alkalinity - Hardness - Unit of hardness – Total solids - Oxidation - Transparency - Silica content.

1.2 Purification of Water for drinking purpose - Potability of water – Clarification - Coagulation - Contact and Electrochemical Coagulation.

1.3 Sterilisation and Disinfection of water - Precipitation - Aeration - Ozonisation - Chlorination.

UNIT-II

2.1 Water Softening Methods - Clark's process - Lime soda process - Modified lime soda process - Permutit or Zeolite process - Ion exchange process - Demineralisation of water.

2.2 Determination of Hardness of water - Titration method - Complexometric method using EDTA - Expressing Hardness.

2.3 Equivalents of Calcium Carbonate - Problems to determine Temporary and Permanent Hardness.

UNIT-III

3.1 Hard water and Industries - Industrial water treatment - Boiler feed water method of Softening - Prevention of plumbo solvency - Scales in boilers - Consequences - Internal conditioning methods.

3.2 Desalination of Brackish water - Elecrodiaysis - Reverse osmosis - Removal of Fe, Mn and Silicic acid.

3.3 Effluent Treatment of Water from Paper Industry, Petrochemicals, Fertilizer industry and Power station.

UNIT-IV

4.1 Water analysis - Sampling of Water for analysis - Chemical Substances affecting Potability - Colour, Turbidity, Odour, Taste, Temperature, pH and Electrical Conductivity.

4.2 Analysis of Solids present in water - Suspended Solids - Dissolved Solids - Total Acidity - Alkalinity - Free CO_2 - Free Chlorine - Ca, Mg, Fe, Mn, Ag and Zn.

4.3 Water in Industry – Pollution of Water by Fertilisers, Detergents, Pesticides and Industrial wastes.

UNIT-V

5.1 Analysis of Chemical Substances Affecting Health - NH_3, Nitrate, Nitrite, Cyanide, Sulphate, Sulphide, Chloride and Fluoride.

5.2 Measurement of Toxic Chemical Substances - Analysis of Chemical Substances indicative of Pollution - Dissolved oxygen - Biochemical Oxygen Demand (BOD) - Chemical Oxygen Demand (COD)

5.3 Bacteriological Examination of Water - Total Count Test - E. coli test - E. coli index - Most Probable Number method - Biological Examination of Water - Physical Examination of Water - Radioactivity of Water - Methods of removing Radioactivity from Water.

Reference Books

1. Industrial Chemistry (Including Chemical - Engineering) - B. K. Sharma - Goel Publishing House, Meerut (1987).

2. Pollution Control in Process Industries - S. P. Mahajan - Tata McGraw Hill Publishing Company Ltd., New Delhi (1991).

3. Water Pollution and Management - C. K. Varashney - Wiley Eastern Ltd., Chennai -20 (1991).

NON-MAJOR ELECTIVE

PAPER – 1

MEDICINAL CHEMISTRY

Objectives:

- To learn the basic idea of Drugs and Names of Common Drugs, Blood, Blood Pressure, Diabetes, AIDS, Vitamins, Indian Medicinal Plants and First Aid.

UNIT-I

1.1 Clinical Health and Biochemical Analysis - Definition of Health - WHO standard.

1.2 Sterilisation of Surgical Instruments - Biochemical Analysis of Urine and Serum.

1.3 Blood – Composition of Blood - Blood grouping and Rh factor.

UNIT-II

2.1 Common Drugs - Antibiotics, Antipyretics and Analgesics - Examples, Uses and Side effects.

2.2 Anti-inflammatory agents, Sedatives, Antiseptics and Antihistamines - Examples, Uses and Side effects.

2.3 Tranquilizers, Hypnotics and Antidepressant drugs - Definition, Examples, Uses and Side effects.

UNIT-III

3.1 Vital Ailments and Treatment - Blood pressure - Hypertension and Hypotension.

3.2 Diabetes, Cancer, AIDS - Causes, Symptoms and Treatment.

3.3 Vitamins – Classification of Vitamins – Sources and Deficiency diseases caused by Vitamins.

UNIT-IV

4.1 Indian Medicinal Plants - Palak, Vallarai, Kizhanelli and Thumbai - Chemical Constituents and Medicinal Uses.

4.2 Hibiscus, Adadodai, Thoothuvalai – Chemical Constituents and Medicinal Uses.

4.3 Nochi, Thulasi, Aloe Vera - Chemical Constituents and Medicinal Uses.

UNIT- V

5.1 First Aid and Safety - Treatment of Shock, Haemorrage, Cuts and Wounds.

5.2 Burns - Classification - First Aid.

5.3 Asbestos, Silica, Lead Paints, Cement, Welding fumes and Gases - Hazard alert and Precautions for Safety.

Reference Books

1. Applied Chemistry, Jayashree Ghosh - S. Chand and Company Ltd., 2006

2. Biochemistry, S. C. Rastogi - Tata McGraw Hill Publishing Co., 1993.

3. Medicinal Plants of India, Rasheeduz Zafar - CBS Publishers and Distributors, 2000.

4. Hawk's Physiological Chemistry, B. L. Oser - Tata-McGraw Hill Publishing Co. Ltd.

5. Practical Pharmaceutical Chemistry, A. H. Beckett and J. B. Stenlake - Vol. I - CBS Publishers and Distributors, 2000.

SEMESTER – IV

PAPER – 4

GENERAL CHEMISTRY – IV

OBJECTIVE:

Noble gases, Carboxylic Acids, Amines, Alcohols, Phenols, Naphthols, Important Name Reactions, Mechanism, Thermodynamics, Derivation of Equations, Partial Molar Properties, Chemical Potential, Related Problems and Applications are to be taught for IV semester.

UNIT-I

1.1 Noble gases - Electronic Configurations – Position of Noble Gases in the Periodic Table - Chemical inertness of Noble gases – Reason.

1.2 Compounds of Xenon - Hybridization and Geometry of XeF_2, XeF_4, XeF_6 and $XeOF_4$ (Preparation, Properties – Not necessary).

1.3 Clathrates - Definition and Applications - Uses of Noble gases.

UNIT-II

2.1 Monocarboxylic acids – Acetic acid and Benzoic acid – Preparation by Grignard method – Conversion of Acids to their derivatives – Amide, Ester, Anhydride and Acid Chloride – Strength of Carboxylic Acids – Effect of Substituents on the Strength of Acids.

2.2 Dicarboxylic acids – Oxalic acid, Malonic acid, Succinic acid, Glutaric acid and Adipic acid - Preparation – Properties – Action of Heat on Dicarboxylic acids.

2.3 Amines – Ethylamine and Aniline – Preparation – Basicity of Amines – Effect of Substituents on Basicity - Reactivity of Amines – Distinction between Primary, Secondary and Tertiary Amines.

UNIT-III

3.1 Alcohols – Preparation by Grignard method – Oxidation of alcohols – Difference between Primary, Secondary and Tertiary alcohols – Preparation and Properties of Allyl alcohol.

3.2 Phenols - Acidic character of phenols - Kolbe's reaction, Reimer-Tiemann reaction, Gattermann , Lederer-Manasse, Houben-Hoesh, Friedel-Crafts, Schotten-Baumann and Liebermann's Nitroso Reaction.

3.3 Preparation, Properties and Uses of Alpha- and Beta- Naphthols.

UNIT-IV

4.1 Free energy and Work function - Gibbs free energy – Helmholtz free energy – Relationship between Gibbs free energy and Helmholtz free energy – Their variations with Temperature, Pressure and Volume – Free energy change as criteria for Equilibrium and Spontaneity.

4.2 Maxwell's Relations – Thermodynamic Equation of State.

4.3 Gibbs-Helmholtz equation - Derivation and Applications - Clausius-Clapeyron equation - Derivation and Applications.

UNIT-V

5.1 Third Law of Thermodynamics - Entropy at Absolute Zero - Nernst Heat Theorem – Statement of III law of thermodynamics – Planck's formulation of III law of thermodynamics.

5.2 Evaluation of Absolute Entropy from Heat Capacity Measurements - Exceptions to III law – Applications of III law.

5.3 Partial molar properties - Chemical Potential – Definition - Effect of Temperature and Pressure on Chemical Potential - Gibbs-Duhem equation.

CORE PRACTICAL

PAPER – 2

INORGANIC QUALITATIVE ANALYSIS AND PREPARATION

Analysis of mixture containing two cations and two anions (One will be an interfering anion). Semimicro methods using the conventional scheme are to be adopted.

Cations to be studied

Lead, Copper, Bismuth, Cadmium, Iron, Aluminium, Zinc, Manganese, Cobalt, Nickel, Barium, Calcium, Strontium, Magnesium and Ammonium.

Anions to be studied

Carbonate, Sulphide, Sulphate, Nitrate, Chloride, Bromide, Fluoride, Borate, Oxalate and Phosphate.

Preparation of Inorganic compounds

- Tetraamminecopper(II) Sulphate
- Tris(thiourea)copper(I) Chloride
- Potassium trioxalatoferrate(II)
- Ferrous Ammonium Sulphate
- Microcosmic Salt
- Manganese(II) Sulphate

References

- Vogel's Text Book of Quantitative Chemical Analysis, 5th Edition, ELBS/ Longman, England, 1989.
- Inorganic Semimicro Qualitative Analysis, V. V. Ramanujam.

ALLIED – 4

1.PHYSICS II

UNIT – I: WAVE MECHANICS

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

UNIT – II : NUCLEAR PHYSICS

Particle accelerators – cyclotron, particle detectors – GM Counter Artificial Transmutation – Rutherford's Experiment – The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions.

Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy – Conservation of Parity – Quantities conserved and quantities not conserved in a nuclear reaction.

UNIT – III : ENERGY PHYSICS

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

UNIT – IV: CRYSTALLOGRAPHY

Crystallography : The crystal structure – Unit Cell –Bravais lattice- structures of simple cubic-BCC and FCC- co ordination number, packing factor calculation for the above structures –Hexogonal closed packed(HCP) structure -Miller indices – concept of Reciprocal Vectors.

UNIT – V: ELECTRONICS

Electronics: Transistor characteristics in common base and common emitter mode- Transistor single stage amplifier- Expression for input impedence, output impedence and current gain.
Digital Electronics : NAND and NOR as universal building blocks- De Morgan's theorem –statement and proof- Fabrication of diodes and transistors using Monolithic technology– limitations.

Books for Study & Reference

11. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
12. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
13. Allied Physics – Prof. Dhanalakshmi and others.
14. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
15. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
16. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
17. Modern Physics – R. Murugesan S. Chand & Co. (2004).
18. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
19. Introduction to Solid State Physics – C. Kittel, 5^{th} Edition Wiley Eastern Ltd.
20. Renewable & Sustainable energy sources – Agarwal.

3. ZOOLOGY II

Objective:

To study the principles of cell biology, genetics, developmental biology, physiology, ecology and evolution.

UNIT - I

Cell Biology - structure of animal cell, **Genetics:** molecular structure of gene - gene function, sex linked inheritance. Genetic Engineering and its application.

UNIT - II

Embryology - cleavage and gastrulation of Amphioxus.

Human Physiology: Digestion, Circulation - blood components, structure of heart, heart function.

UNIT - III

Diseases of Circulatory system - blood pressure, heart disease - Ischemia, Myocardial Infarction, Rheumatic heart disease, stroke.

Excretion - structure of kidney and mechanism of urine formation.

UNIT - IV

Environmental Biology - Biotic factors and Abiotic factors, food chain and food web. Pollution - Environmental degradation, (Air, Water and Land) - Green house effect - Bioremediation, Biodegradation - Global warming - acid rain.

UNIT - V

Evolution: Theories of Lamarkism & Darwinism.

REFERENCES:

7. Ekambaranatha Ayyar, and Ananthakrishnan, T.N. 1993. Outlines of Zoology, Vol I & II, Viswanathan and Co, Madras.
8. Sambasiviah, I, Kamalakara Rao, A.P., Augustine Chellappa, S. 1983. Text book of Animal Physiology, S. Chand & Co., New Delhi.
9. Verma and Agarwal. 1983. Text book of animal Ecology, S. Chand & Co., New Delhi.
10. Verma and Agarwal and Tyagi. 1991. Chordate Embryology, S. Chand & Co., New Delhi.
11. Rastogi and Jayaraj. 2000. Text book of Genetics. Rastogi publications, Meerut.
12. Verma and Agarwal. 2000. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Co., New Delhi.

4.BIOCHEMISTRY II

UNIT-I: Metabolism

Glycolysis, TCA cycle and its energetics, HMP shunt pathway. Deamination, transamination reaction, transaminase enzymes, Urea cycle.

UNIT-II: Metabolic Disorders

Diabetes mellitus, Glycogen storage diseases, Glycosuria, Ketosis, Jaundice, Phenyl ketonuria, Alkaptonuria. Dehydration: definition, causes, symptom and prevention.

UNIT-III: Enzymes

Definition, classification of enzymes with one example. Mechanism of enzyme action - Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Enzyme inhibition: competitive, uncompetitive and non competitive. Biological functions of enzymes.

UNIT-IV: Molecular Biology

Central dogma of molecular biology. DNA and RNA act as genetic material. Replication: Definition, types, mode of action of replication, mechanism of replication. General mechanism of transcription and translation. Genetic code.

UNIT-V: Vitamins

A brief outline of source, requirement, biological function and deficiency of Vitamins (fat soluble and water soluble vitamins).

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Robert K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan, MJP Publishers, Chennai-5.

5.MATHEMATICS – II*

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume -Fourier series for functions in $(0,2\pi)$ and $(-\pi, \pi)$.

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Guass, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

6. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
7. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
8. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
9. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
10. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

ALLIED PRACTICAL - 2

1.PHYSICS

(Any 15 Experiments)

21. Young's modulus – non uniform bending – pin and microscope.
22. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
23. Ridigity modulus – Torsional oscillation method (without symmetric masses).
24. Determination of Co-efficient of Viscosity – Graduated Burette.
25. Surface Tension and Interfacial Tension – By drop weight method.
26. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
27. Sonometer – Determining A.C. Frequency. (Screw Gauge is given).
28. Sonometer – frequency of tuning fork.
29. Newton's Rings – Radius of Curvature.
30. Air Wedge – Determination of thickness of thin wire.
31. Spectrometer Grating – Minimum Deviation – Mercury Lines.
32. Spectrometer – Refractive Index of a liquid – Hollow Prism.
33. Potentiometer – Calibration of High Range Ammeter.
34. Potentiometer – Calibration of Low Range Voltmeter.
35. Determination of M and B_H using Deflection Magnetometer in Tan C position and vibration magnetometer.
36. Figure of merit and voltage sensitiveness of table galvanometer.
37. Construction of AND, OR gates using diodes and NOT by transistors.
38. Zener diode – Voltage Regulation.
39. NAND / NOR as universal gate.
40. Demorgan's theorem verification.

Allied Practical
3. ZOOLOGY

I - MAJOR PRACTICAL

DISSECTIONS

Cockroach: Digestive and nervous system

Prawn: Nervous system

II - MINOR PRACTICAL

MOUNTING

1. Mouth parts of **Mosquito** and **Honey bee**

2. **Earthworm** - Body setae

3. Placoid scales of **shark**

III - SPOTTERS

Entamoeba, Sycon, Obelia, Taenia solium (entire, scolex) earthworm (entire, Pineal setae) Prawn (entire), Fresh water mussel, Sea star, Amphioxus - Entire, Amphioxus - T.S. through pharynx, Shark, Frog, Calotes, Pigeon, feathers of pigeon and Rabbit.

Sphygnomanometer, Stethoscope, Rain gauge.

REFERENCES:

3. Verma. P.S. 2011. A manual of practical Zoology - INVERTEBRATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

4. Verma. P.S. 2011. A manual of practical Zoology - CHORDATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

ALLIED PRACTICAL

4. BIOCHEMISTRY I & II

PRACTICAL I

Volumetric Estimation

1. Estimation of HCl using Na2CO3 as link and NaOH as primary standard.

2. Estimation of Iron in Ferrous Ammonium Sulphate using potassium permanganate as link solution and oxalic acid as primary standard.

3. Estimation of Glucose by Benedict's method.

4. Estimation of Glycine by formal titration.

5. Estimation of Ascorbic acid.

SKILL BASED SUBJECT

PAPER – 2

FOOD CHEMISTRY

Objective:

- To impart knowledge about Different Foods, Their Nutritive Values and Food Preservation.

UNIT-I

1.1 Cereals - Definition – Classification - Processing - Structure of Cereals - Composition and Nutritive value – Pulses - Definition - Classification - Processing - Structure of Pulses - Composition and Nutritive Value - Toxic Constituents in Pulses - Medicinal value of Cereals and Pulses.

1.2 Sugar - Structure and Properties - Nutritive value - Sugar composition in different food items.

1.3 Sugar related products - Classification and Nutritive value - Artificial sweeteners – Examples – Saccharin and Cyclamate - Advantages and Disadvantages.

UNIT-II

2.1 Vegetables and Fruits - Classification - Composition and Nutritive values.

2.2 Fungi and Algae as food - Enzymatic Browning and Non- enzymatic Browning.

2.3 Nutritive value of some common foods - Milk, Egg and Soyabeans.

UNIT-III

3.1 Beverages - Definition - Examples – Classification.

3.2 Fruit Beverages - Milk Based Beverages - Malted Beverages - Examples – Alcoholic and Non-Alcoholic Beverages – Examples.

3.3 Appetizers - Definition - Classification - Examples - Water - Functions and Deficiency.

UNIT-IV

4.1 Food Preservatives - Definition - Classification - Food Spoilage - Definition - Prevention.

4.2 Methods of Preservation - Classification - Low and High temperature – Preservatives – Examples.

4.3 Dehydration - Osmotic pressure - Food irradiation.

UNIT-V

5.1 Food Additives - Definition – Artificial sweeteners – Saccharin and Cyclamate - Classification - Their functions - Chemical substances.

5.2 Packaging of Foods – Classification - Materials used for Packaging.

5.3 Food Colours – Restricted use – Spurious Colours – Taste Enhancers – MSG – Vinegar.

Reference Books

- Food Science – B. Srilakshmi, III Edition, New Age International Publishers, 2005.
- Food Chemistry - Lilian Hoagland Meyer, CBS Publishers & Distributors, 2004.
- Food Science, Nutrition and Health – Brian A. Fox, Allan G. Cameron, Edward Arnold, London.
- Fundamentals of Foods and Nutrition - Mudambi R. Sumathi, and Rajagopal, M. V., - Wiley Eastern Ltd., Madras.
- Handbook of Food and Nutrition - M. Swaminathan - Bangalore Printing and Publishing Co. Ltd., Bangalore.

NON – MAJOR ELECTIVE

PAPER – 2

CHEMISTRY IN EVERY DAY LIFE

Objectives:

- To know the basics of Chemistry in our life
- To know about the Food Colours, Plastics, Drugs etc.,

UNIT- I

1.1 General Survey of Chemicals used in everyday life.

1.2 Cosmetics - Talcum Powder, Tooth pastes, Shampoos, Nail Polish and Perfumes - General formulation - Preparation - Hazards of Cosmetic use.

1.3 Soaps and Detergents – Types - Preparation and Uses.

UNIT-II

2.1 Food and Nutrition - Carbohydrates, Proteins, Fats and Minerals – Examples.

2.2 Vitamins – Definitions – Classification - Sources and their Physiological importance - Balanced diet.

2.3 Adulterants in Milk, Ghee, Oil, Coffee Powder, Tea, Asafoetida, Chilli Powder, Pulses and Turmeric Powder - Identification.

UNIT-III

3.1Food colours used in food - Soft drinks and its Health hazards.

3.2 Food Preservatives – Definition – Examples - Methods of preservation - Low and High temperature.

3.3 Dehydration - Osmotic pressure - Food irradiation.

UNIT-IV

4.1 Plastics, Polythene, PVC, Bakelite, Polyesters, Resins and their Applications.

4.2 Natural Rubber - Synthetic rubbers - Vulcanisation - Preparation and its Applications.

4.3 Antipyretics, Analgesics, Anaesthetics, Sedatives – Definition - Examples and Uses.

UNIT-V

5.1 Gobar gas – Production – Feasibility and Importance of Biogas with special reference to Rural India.

5.2 Fertilizers – Definition – Classification - Urea, NPK and Super phosphates - Need - Uses and Hazards.

5.3 Sweetening agents – Sucrose and Glucose – Artificial Sweetening agents – Saccharin – Cyclamate – Advantages and Disadvantages.

Reference Books

1. Chemical Process Industries - Norris Shreve Joseph A. Brine .Jr.

2. Perfumes, Cosmetics and Soaps - W. A. Poucher (Vol 3).

3. Environmental Chemistry - A. K. DE.

4. Industrial Chemistry, B. K. Sharma- Goel publishing house Meerut.

5. Food Science - B. Srilakshmi - III Edition - New Age International Publishers, 2005.

6. Food Chemistry, Lillian Hoagland Meyer - CBS publishers & distributors, 2004.

7. Fundamental Concepts of Applied Chemistry - Jayashree Ghosh, S. Chand & Co

Ltd., New Delhi – 2010.

8. Applied chemistry - K. Bagavathi Sundari - MJP Publishers (2006).

SEMESTER – V
PAPER – 5
INORGANIC CHEMISTRY – I

Objectives:

- To study about the Halogens and Related compounds.
- To give students a firm grounding in Co-ordination chemistry and Solid state Chemistry.

UNIT-I

1.1 Halogens – Group discussion - Comparative study of F, Cl, Br, I and At - Reactivities – Comparison of Fluorine with Oxygen.

1.2 Classification of Halides - Exceptional properties of Fluorine - Oxyacids of Halogens (Structure only).

1.3 Interhalogen compounds - Preparation, Properties and Geometry of AX, AX_3, AX_5 and AX_7 type of Compounds – Pseudohalogens - Cyanogen and Thiocyanogen – Comparison of Pseudohalogens and Halogens - Basic Properties of Iodine - Evidences.

UNIT-II

2.1 Coordination compounds - Definition of terms used - Classification of Ligands - Chelation and Effect of Chelation - Applications of Complexes - Coordination Number and Stereochemistry of Complexes.

2.2 IUPAC Nomenclature of Complexes - Isomerism in Complexes - Ionisation isomerism, Hydrate Isomerism, Linkage Iomerism, Ligand Isomerism, Coordination Isomerism and Polymerisation Isomerism.

2.3 Geometrical and Optical Isomerism in 4- and 6- Coordinated Complexes – Werner's theory of Coordination Compounds.

UNIT-III

3.1 Sidgwick's Theory - EAN rule - Theory of Bonding - Valence Bond Theory – Postulates of VBT – Hybridisation, Geometry and Magnetic properties - Failure of VBT.

3.2 Crystal field theory - Spectrochemical series - Splitting of d - orbitals in Octahedral, Tetrahedral and Square Planar Complexes - Crystal Field Stabilisation Energy - Calculation of CFSE In Octahedral and Tetrahedral Complexes.

3.3 Low Spin and High Spin Complexes – Explanation of Magnetic Properties, Colour and Geometry Using CFT.

UNIT-IV

4.1 Comparison of VBT and CFT.

4.2 Applications of Coordination Compounds in Qualitative and Quantitative Analysis - Estimation of Nickel using DMG and Aluminium using Oxine – Detection of Potassium ion – Separation of Copper and Cadmium ions.

4.3 Bonding, Hybridization and Structure of Carbonyls of Ni, Cr, Fe, Co, Mn, W and V.

UNIT-V

5.1 The nature of the Solid State – Amorphous and Crystalline – Differences - Close Packing in Crystals – Examples for Cubic, BCC and FCC Lattices - Bragg's law – Application of XRD to Crystal studies – Structure of NaCl, CsCl, CaF_2 and ZnS.

5.2 Band theory of Solids, Metals, Semiconductors and Insulators.

5.3 Defects in solids – Scottky Defect and Frenkel Defect – Metal Excess and Metal Deficiency Defects - Conductors in Ionic Solids – Electrical and Magnetic properties.

PAPER – 6

ORGANIC CHEMISTRY – I

Objectives:

- To effectively impart knowledge about Carbohydrates, Stereochemistry, Conformational Analysis, Nitroalkanes and Heterocyclic chemistry.
- To make the students more inquisitive in learning the Mechanistic details in Organic Chemistry through the teaching of the named reactions.

UNIT- I

1.1 Carbohydrates - Classification – Aldoses and Ketoses, Reducing and Non-reducing Sugars - Reactions of Glucose and Fructose - Osazone formation, Mutarotation and their Mechanism - Structural elucidation of Glucose and Fructose - Pyranose and Furanose forms – Haworth's method.

1.2 Determination of Ring Size- Haworth Projection Formula - Configuration of Glucose and Fructose - Epimerization - Chain lengthening and chain shortening of Aldoses - Inter conversion of Aldoses and Ketoses – Uses of Glucose.

1.3 Disaccharides and Polysaccharides - Reactions and Structural elucidation of Sucrose and Maltose - Properties, Structure and Uses of Starch and Cellulose.

UNIT- II

2.1 Stereoisomerism – Definition - Classification into Optical and Geometrical isomerism. Conditions for Optical Activity – Asymmetric centre – Chirality – Achiral molecules - Meaning of (+) and (-) and D- and L- notations – Elements of symmetry - Projection formulae - Fischer, Flying Wedge, Sawhorse and Newmann projection formulae - Notation

of optical isomers - Cahn - Ingold - Prelog rules - R, S notation of Optical isomers with one Asymmetric carbon atoms – Erythro and Threo representations.

2.2 Optical activities in Compounds not containing Asymmetric Carbon Atoms - Biphenyl, Allenes and Spiranes - Racemisation - Methods of Racemisation (By substitution and Tautomerism) – Resolution - Methods of Resolution (Mechanical, Biochemical and Conversion To Diastereomers) - Asymmetric Synthesis (Partial and Absolute Synthesis) - Walden inversion.

2.3 Geometrical isomerism - Cis - Trans, Syn - Anti and E-Z Notations - Geometrical Isomerism In Maleic and Fumaric Acids and Unsymmetrical Ketoximes - Methods of Distinguishing Geometrical Isomers using Melting Points, Dipole Moment, Dehydration, Cyclisation, Heat of Hydrogenation and Combustion.

UNIT- III

3.1 Conformational analysis - Introduction of terms - Conformations, Configuration, Dihedral Angle, Torsional Strain - Differences between Conformational isomers and Configurational isomers.

3.2 Conformational analysis of Ethane and n-Butane including energy diagrams.

3.3 Conformations of Cyclohexane (Chair, Boat and Twist-Boat forms) - Axial and Equatorial bonds - Ring flipping showing Axial and Equatorial bonds Interconversions – Conformations of Methyl Cyclohexane, Dimethyl Cyclohexane and their stability - 1,2 and 1,3 - Interactions.

UNIT- IV

4.1 Nitroalkanes – Preparation – Properties – Structure – Nitro-Acinitro Tautomerism – Uses of Nitroalkanes – Differences between Primary, Secondary and Tertiary Nitroalkanes.

4.2 Reagents and their Applications in Organic Chemistry – Anhydrous $AlCl_3$, P_2O_5, H_2/ Pd- $BaSO_4$, Zn/ Hg- HCl and Ag_2O.

4.3 Mechanism of Aldol, Perkin and Benzoin condensations - Knoevenagel, Claisen, Wittig, Cannizzaro, Reformatsky and Michael addition reactions.

UNIT- V

5.1 Heterocyclic compounds - Huckel's rule – Aromaticity of Heterocyclic compounds - Preparation, Properties, Structure and Uses of Furan, Pyrrole and Thiophene.

5.2 Preparation and properties of Pyridine and Piperidine - Comparative study of Basicity of Pyrrole, Pyridine and Piperidine with Amines – Nucleophilic and Electrophilic substitution reactions of Pyridine.

5.3 Condensed Five and Six Membered Heterocyclic Compounds - Preparation of Indole, Quinoline and Isoquinoline – Fischer-Indole synthesis, Skraup Quinoline synthesis and Bischler-Napieralski synthesis - Electrophilic substitution reactions.

PAPER- 7

PHYSICAL CHEMISTRY – I

Credits: 4 **Hours/ Week: 4**

Objectives:

- To impart knowledge about the Solutions, Phase Rule and its Applications, Colligative properties, Chemical Equilibrium, Phase Rule and its Applications, Electrochemistry and its Applications.

Unit-I Solutions

1.1 Solutions of liquids in liquids - Raoult's law – Vapour pressure of ideal solutions – Activity of a component in an ideal solution – Gibbs-Duhem-Margules equation – Thermodynamics of Ideal Solutions.

1.2 Vapour pressure of Non-ideal solutions – Fractional distillation of Binary liquid solutions – Azeotropic mixtures - Distillation of immiscible liquids - Partially miscible liquids - Phenol - Water, Triethylamine – Water and Nicotine – Water systems.

1.3 Nernst distribution law – Definition - Thermodynamic derivation – Applications.

Unit-II Phase rule

2.1 Definition of the terms - Phase, Components and Degrees of freedom – Derivation of Gibbs phase rule

2.2 Applications of phase rule - One component system - Water and Sulphur system – Reduced phase rule - Two components system - Simple eutectic system – Lead-silver system, KI-water system - Freezing mixtures.

2.3 Thermal analysis and cooling curves, Compound formation with congruent melting point – Zn-Mg, $FeCl_3$- Water system - Compound formation with incongruent melting point - Na-K System.

Unit-III Colligative properties and Chemical Equilibrium

3.1 Colligative properties - Lowering of vapour pressure - Osmosis and osmotic pressure - Thermodynamic Derivation of Elevation of boiling point and Depression of freezing point – Determination of molar mass – Van't Hoff factor.

3.2 Chemical Equilibrium - Law of Chemical Equilibrium - Thermodynamic derivation of Law of Chemical Equilibrium.

3.3 Van't Hoff Reaction Isotherm - Temperature Dependence of Equilibrium Constant – Van't Hoff Isochore - Le Chatelier's Principle and Its Applications.

UNIT-IV Electrochemistry - I

4.1 Specific conductance and Equivalent conductance - Measurement of equivalent conductance - Variation of Equivalent Conductance and Specific Conductance with Dilution – Ostwald's Dilution Law and Its Limitations.

4.2 Debye-Huckel's theory of Strong Electrolytes - Onsagar equation (No derivation) - Verification and Limitations - Kohlrausch law and its Applications.

4.3 Migration of ions - Ionic Mobility - Ionic Conductance - Transport Number and its determination – Hittorff's method and Moving Boundary method.

UNIT- V Electrochemistry - II

5.1 Applications of Conductometric Measurements - Determination of Degree of Dissociation of Weak Electrolytes, Ionic Product of water - Solubility Product of sparingly soluble salt - Conductometric Titrations.

5.2 Concept of pH - Buffer solutions, Buffer action - Henderson equation - Applications of Buffer Solutions.

5.3 Hydrolysis of Salts - Expressions for Hydrolysis Constant, Degree of Hydrolysis and pH of aqueous salt solutions.

ELECTIVE

PAPER – 1

A. ANALYTICAL CHEMISTRY – 1

Objective:

- To impart knowledge about Data Analysis, Purification of organic compounds, Different Spectroscopic Techniques and their Application.

UNIT – I

1.1. Data analysis – Types of errors – Correction of determinate errors - Idea of Significant Figures and their Importance with examples – Precision and Accuracy – Methods of expressing Accuracy.

1.2. Error analysis – Minimising errors – Methods of expressing Precision – Average deviation – Standard Deviation and Confidence Limit.

1.3. Purification of Solid Organic Compounds – Solvent extraction – Recrystalisation - Use of immiscible solvents – Soxhlet extraction – Crystallisation – Use of miscible solvents – Fractional Crystallisation and Sublimation.

UNIT – II

2.1 Purification of liquids – Experimental Techniques of Distillation – Fractional Distillation – Vacuum Distillation – Steam Distillation – Tests of Purity.

2.2 Gravimetric Analysis – Characteristics of Precipitating Agents – Condition of Precipitation – Types of Precipitants – Purity of Precipitate – Co-precipitation and Post precipitation – Precipitation from Homogeneous Solution – Digestion and Washing of precipitate – Ignition of precipitate – Uses of Sequestering Agents.

2.3 Definition of spectrum – Electromagnetic radiation – Quantization of different forms of energies in molecules (Translational, Rotational, Vibrational and Electronic) – Born-Oppenheimer approximation – Condition of energy of absorption of various types of spectra.

.**UNIT – III**

3.1 Microwave Spectroscopy – Theory of Microwave Spectroscopy – Selection Rule – Calculation of Moment of Inertia and Bond Lengths of Diatomic molecules – Effect of Isotopic Substitution.

3.2 UV – Visible Spectroscopy – Absorption laws - Calculations involving Beer- Lambert's law – Instrumentation – Photocalorimeter and Spectrophotometer – Block diagrams with description of components – Theory of Electronic Spectroscopy.

3.3 Types of Electronic Transitions – Chromophore and Auxochromes – Absorption bands and Intensity – Factors influencing Position and Intensity of Absorption Bands - Frank-Condon Principle – Applications.

UNIT – IV

4.1 IR Spectroscopy – Principle – Theory of IR spectra – Vibrational Degrees of Freedom - Modes of Vibration of Diatomic Molecules –Triatomic linear (CO_2) and Non-linear Molecules (H_2O) - Stretching and Bending vibrations – Symmetric and Asymmetric Stretching vibrations - Selection rules.

4.2 Expression for Vibrational Frequency (Derivation not needed) – Calculation of Force constant – Factors influencing Vibrational Frequencies - IR Spectrophotometer - Instrumentation – Source, Monochromator, Cell, Detectors, Recorders and Sampling Techniques.

4.3 Applications of IR Spectroscopy – Identification of Functional Groups - Interpretation of the spectra of Alcohols, Aldehydes, Ketones and Esters (Aliphatic and Aromatic) - Hydrogen bonding.

UNIT – V

5.1 Raman Spectroscopy - Rayleigh and Raman scattering – Selection rule – Raman shift - Stokes and Anti-stokes lines - Differences between Raman and IR Spectroscopy.

5.2 Raman Spectrophotometer - Instrumentation – Block diagram – Components and their Functions – Advantages of using Laser in Raman Spectroscopy – Applications – Structural elucidation in the study of Inorganic and Organic Compounds.

5.3 Rotational-Raman spectra of Non - Centrosymmetric molecules - Mutual exclusion principle (CO_2 and N_2O) - Applications – Structural diagnosis.

Reference Books

- Elements of Analytical Chemistry – R. Gopalan, P. S. Subramanian, K. Rengarajan – S. Chand and sons (1997).
- Fundamentals of Analytical Chemistry – D. A. Skoog and D. M. West, Holt Reinhard and Winstor Publications – IV Edition (1982).
- Principles of Instrumental Methods of Analysis – D. A. Skoog and Saunders, College Publications, III Edition (1985).
- Analytical Chemistry – S. M. Khopkar – New age Insternational Publishers.
- Instrumental Methods of Chemical Analysis – Chatwal - Anand, Himalaya Publishing House (2000).
- Analytical Chemistry – R. Gopalan, Sultan Chand.
- Analytical Chemistry – S. Usharani, Macmillan.
- Instrumental Methods of Analysis – 7^{th} Edition – H. H. Willard, L. L. Merit. J. Dean and F. A. Settle –Wadsworth Publishing Company Limited, Belmont, California, USA, 1988.
- Physico- Chemical Techniques of Analysis – P. B. Janarthanan – Vol. I & II – Asian Publishing.
- Instrumental Methods of Chemical Analysis – B. K. Sharma – Goel Publications.
- Applications of Absorption Spectroscopy of Organic Compounds - Prentice Hall, John R. Dyer.
- Spectroscopic Identification of Organic Compounds – R. M. Silverstein, G. C. Bassler and T. C. Morill – John Wiley and Sons.

PAPER – 1

B. BASICS OF COMPUTER PROGRAMMING IN C AND ITS APPLICATIONS IN CHEMISTRY

Objective:

- To introduce the basics of computers.
- To learn C language and its applications in solving problems in Chemistry.

Unit-I

1.1 Basic Computer Organisation, Processor and Memory – Main Memory, Secondary Storage Devices and Storage Hierarchy.
1.2 Software – Relationship between Hardware and Software – Types of Software.
1.3 Planning the Computer Program – Algorithm and Flowcharts - Basics of Operating Systems.

Unit-II

2.1 Computer Languages – Machine Language, Assembly Language, Assembler, Compiler, Interpreter and Programming Languages.
2.2 C language – Introduction - C Compiler - Operating Systems and Preprocessor Directives.
2.3 Variables, Constants, Operators, Input and Output Functions.

Unit-III

Control Structures – Conditional, Looping, Goto, Break, Switch and Continue Statements, Functions, Arrays And Pointers.

Unit-IV

4.1 Applications in Chemistry – Calculation of the Radius of the first Bohr orbit for an Electron.

4.2 Calculation of Half-life Time for an integral order reaction - Calculation of Molarity, Molality and Normality of a solution.

4.3 Calculation of Pressure of Ideal Gases and Van der Waal's gases - Calculation of Electronegativity of an Element using Pauling's relation.

Unit-V

5.1 Applications in Chemistry - Calculation of Empirical Formulae of Hydrocarbons - Calculation of Reduced Mass of a few Diatomic Molecules.

5.2 Determination of the Wave Numbers of Spectral lines of Hydrogen atom - Calculation of Work of Expansion in Adiabatic Process.

5.3 Calculation of pH, Solubility Product and Bond Energy using Born-Lande equation - Calculation of Standard Deviation and Correlation Coefficient.

Reference Books

- Computers in Chemistry, K. V. Raman, 8th Edition, Tata McGraw Hill Publishers, 2005.
- Programming with C, Venugopal and Prasad, 11th Edition, 1971. .
- Programming in C, E. Balaguruswamy, 2nd Edition, 1989.

PAPER – 1

C. ORGANIC SYNTHESIS

Objectives

- To know the Basics of Retrosynthesis.
- To impart knowledge about the Ring Synthesis.

UNIT-I

DISCONNECTION APPROACH

1.1 An introduction to Synthons and Synthetic Equivalent.

1.2 Disconnection Approach - Functional Group Interconversions.

1.3 The importance of the Order of Events in Organic Synthesis - One group C-X and Two group C-X disconnections – Chemoselectivity - Reversal of Polarity.

UNIT-II

PROTECTING GROUPS

2.1 Principle of Protection of Alcoholic group and Amino group.

2.2 Principle of Protection of Carbonyl group and Carboxyl group.

2.3 Activation of Functional Groups.

UNIT-III

ONE GROUP C-C DISCONNECTIONS

3.1 Alcohols and Carbonyl Compounds.

3.2 Regioselectivity and Alkene Synthesis.

3.3 Uses of Acetylenes and Aliphatic Nitro Compounds in Organic Synthesis.

UNIT-IV

TWO GROUP C-C DISCONNECTIONS

4.1 Diels-Alder Reaction - 1, 3 - Difunctionalised Compounds.

4.2 α, β- Unsaturated Carbonyl Compounds - Control in Carbonyl Condensations.

4.3 1, 5 - Difunctionalised Compounds - Michael Addition and Robinson Annulation reactions.

UNIT-V

RING SYNTHESIS

5.1 Saturated Heterocyclic Compounds.

5.2 Synthesis of 3-, 4- and 6- Membered Rings Aromatic Heterocycles in Organic Synthesis.

5.3 Application of the above in the Synthesis of Camphor, Longifoline, Cortisone and Reserpine.

Reference Books

- Some Modern Methods of Organic Synthesis, W. Carruthers, Cambridge University Press, UK.
- Advanced Organic Chemistry, F. A. Carey and R. J. Sundberg, Part- B, Plenium Press.
- Modern Synthetic Reactions. H. O. House and W. A. Benjamin,

ELECTIVE

PAPER – 2

A. PHARMACEUTICAL CHEMISTRY

Objective:

- To effectively impart knowledge about Various Diseases and Their Treatment, Importance of Indian Medicinal Plants and Different Types of Drugs. Preparation, Synthesis and Structural Determination are not required for the Compounds mentioned.

UNIT-I

1.1 Definition of the following terms - Drug, Pharmacophore, Pharmacology, Pharmacopoeia, Bacteria, Virus, Chemotherapy and Vaccine.

1.2 Causes, Symptoms and Treatment for Jaundice, Cholera, Malaria and Filaria - First Aid for Accidents - Antidotes for Poisoning.

1.3 Organic Pharmaceutical Aids - Their Role as Preservatives, Antioxidants, Colouring, Flavouring and Sweetening agents – Examples.

UNIT-II

2.1 Causes, Detection and Control of Anaemia and Diabetes - Diagnostic tests for Sugar, Salt and Cholesterol in Serum and Urine.

2.2 Blood - Composition of Blood and Blood Plasma – RBC – Structure and Functions - Functions of Haemoglobin – WBC - Structure and Functions - Rh Factor – Blood Coagulation – Identification and Estimation of Cholesterol in Blood - Blood Pressure – Hypertension and Hypotension - Normal, High and Low to Control.

2.3 Indian Medicinal Plants and Their Uses - Tulasi, Neem, Kizhanelli, Mango, Semparuthi, Adadodai and Thoothuvelai.

UNIT-III

3.1 Antibacterials - Sulpha drugs – Sulphanilamide Derivatives – Mode of action of Sulpha drugs - Examples - Prontosil, Sulphathiazole and Sulphafurazole – Uses - Antibiotics - Definition – Gram positive and Gram negative bacteria - Uses of Ampicillin, Streptomycin and Tetracyclines.

3.2 Antiseptics and Disinfectants - Definition and Distinction - Phenolic compounds, Chloro compounds and Cationic surfactants.

3.3 Vitamins – Definition – Classification of Vitamins – Sources and Uses – Deficiency Diseases caused by Vitamins.

UNIT-IV

4.1 Analgesics – Definition - Classification - Narcotic and Non- narcotic – Antipyretic analgesics – Mechanism of action - Morphine and its derivatives - Pethedine and Methadone - Salicylic acid derivatives – Antipyretics and Antiinflammatory Agents - Definition and Actions – Aspirin, Paracetamol, Ibuprofen - Disadvantages and Uses.

4.2 Anaesthetics – Definition – Classification - Local and General – Volatile – Uses of volatile liquids as Inhalation Anaesthetics – Chloroform - Gaseous Anaesthetics - Nitrous Oxide, Ether and Cyclopropane - Uses and Disadvantages – Intravenous Anaesthetic Agents – Thiopental sodium, Methohexitol and Propanidid.

4.3 Drugs affecting CNS - Definition, Distinction and Examples for Tranquilizers, Sedatives (Phenobarbital, Diazepam) - Hypnotics, Psychedelic Drugs – LSD, Hashish- Their effects.

UNIT-V

5.1 Antineoplastic Drugs - Causes and Types of Cancer - Treatment of Cancer – Antineoplastic Agents – Antimetabolites - AIDS - AZT, DDC.

5.2 Hormones – Definition - Classification – Physiological Functions of Insulin, Adrenaline, Thyroxin and Oxytacin.

5.3 Sex hormones – Androsterone, Testosterone, Progesterone and Estrogen - Biological functions – Disorders of Hyposecretion and Hypersecretion of Hormones.

Reference Books

1. A Text Book of Pharmaceutical Chemistry - Jayashree Ghosh - S. Chand Company Ltd, 2015.
2. Pharmaceutical Chemistry - S. Lakshmi - Sultan Chand, 2011.
3. Pharmacology and Pharmatherapeutics - R. S. Satoskar - Popular Prakashan - Vol.I and Vol. II.
4. Medicinal Chemistry - Asuthosh Kar - New Age International Publishers, 2007.
5. A Text Book of Synthetic Drugs - O. D. Tyagi - Ammol Publications.
6. Introduction to Biological Chemistry - J. Awapara, Prentice Hall.
7. A Text Book of Biochemistry - Ambika.S.
8. Biochemistry - A. L. Leninger, II Edition, Kalyani Publishers, Ludhiana, 1998.
9. Essentials of Biological Chemistry - James Fanley - East West Press.
10. Medicinal Chemistry - Gurdeep Chatwal – Himalaya Publishers House, 2012.
11. Medicinal Chemistry - Ahluwalia – Ane Books, 2008.
12. A Text Book of Pharmaceutical Chemistry – Viva Books Private Ltd., New Delhi, 2009.
13. Medicinal Plants of India – Rasheeduz Zafar – CBS Publishers and Distributors, 2000.

ELECTIVE

PAPER – 2

B. POLYMER CHEMISTRY

Objective:

- To impart Knowledge about the Types of Polymers, Polymerization Techniques, Commercial Polymers and their Applications.

UNIT-I

1.1 Introduction to Polymers – Monomers, Oligomers, Polymers and their Characteristics - Classification of Polymers – Addition and Condensation Polymers – Natural and synthetic – Linear, Branched, Cross-Linked and Network – Plastics – Elastomers – Fibres – Homopolymers and Copolymers.

1.2 Bonding in Polymers – Primary and Secondary bond forces in Polymers – Cohesive energy and Decomposition of Polymers.

1.3 Chain Growth Polymerisation – Cationic, Anionic and Free radical polymerisation – Stereoregular polymers – Ziegler Natta polymers – Step Growth Polymers.

UNIT-II

2.1 Polymerization Techniques - Bulk, Solution, Suspension and Emulsion Polymerisation - Melt Polycondensation - Polymer Processing – Calendering - Die Casting and Rotational Casting.

2.2 Molecular weight of polymers – Number average – Weight average – Sedimentation and Viscosity – Average molecular weight - Molecular weight and Degree of Polymerisation – Methods of determination of Molecular Weight – Gel permeation chromatography – Ultracentrifugation.

2.3 Reactions – Hydrolysis – Hydrogenation –Addition – Substitution –Cross linking – Vulcanisation – Cyclisation.

UNIT-III

3.1 Plastics and Resins – Definitions – Thermoplastic and Thermosetting Resins – Constituents of Plastic Fibres – Dyes, Pigments, Plasticisers, Lubricants and Catalysts.

3.2 Important Thermoplastic Resins – Acrylics, Polyvinyl and Cellulose Derivatives - Important Thermosetting Resins – Phenolic resins – Epoxy resins.

3.3 Adhesives – Shellac resins – Vegetable glues and Animal glues.

UNIT-IV

4.1 Chemistry of Commercial Polymers - General methods of Preparation and Uses of the following - Teflon, Polyethylene, PTFE, Polystyrene, Polycarbonates and PVC.

4.2 Textile fibres – Definition and Polymer requirement for fibres – Polyamides – Nylon 66 - Nylon 6 – Polyesters – Terylene – Cellulose acetate – Viscose rayon.

4.3 Natural and Synthetic Rubber – Constitution of Natural rubber – Natural Rubber – Isoprene – Synthetic Rubber - Butyl, Buna, Buna- S, SBR, Thiocol, Neoprene, Polyurethane and Silicone Rubber – Ebonite.

UNIT-V

5.1 Advances in Polymers - Biopolymers, Biomaterials, Polymers in Medical Field, High temperature and Fire Resistant Polymers – Applications of Silicones.

5.2 Conducting Polymers – Elementary idea – Examples – Polysulphur Nitriles,

Polyparaphenylene, Polypyrrole, Polythiophene, Polyaniline and Polyacetylene.

5.3 Acrylic polymers – Polmers of Acrylic Acid, Methacrylic Acid and Polyacrylates.

Reference Books

1. Text Book of Polymer Science, F. W. Bill Meyer, Jr. John, Wiley & Sons - 1984.
2. Polymer Science – V, R. Gowarikar, N. V. Viswanathan, Jayader Sreedhar - Wiley Eastern Ltd., New Delhi - 2005
3. Polymer Chemistry, B. K. Sharma - Goel Publishing House, Meerut - 1989.
5. Polymer Chemistry – M. G. Arora, M. S. Vadar - Anmol Publications (p) Ltd., New Delhi -1998.
6. Polymer Chemistry - An introduction - M. P. Stevens, Oxford - 2002.

ELECTIVE

PAPER – 2

C. GREEN CHEMISTRY

Objective:

- To impart knowledge about Green Solvents, Green Techniques, Green Catalysts and Green Reactions.

UNIT-I Green Chemistry – Introduction

1.1 Need for Green Chemistry – Principles of Green Chemistry – Atom economy – Definition with example (Ibuprofen synthesis) – Green oxidants – Hydrogen peroxide.

1.2 Green synthesis – Evaluation of the type of the reaction – Rearrangements (100 % Atom economic) - Addition reaction (100 % Atom economic).

1.3 Organic reactions by Sonication method – Apparatus required – Examples of Sonochemical Reactions (Heck, Hundsdiecker and Wittig reactions).

UNIT-II Green Solvents

2.1 Selection of Solvents – Aqueous Phase Reactions - Diels-Alder reaction in water – Catalysis in water (Aerobic Oxidation of Alcohols catalysed by Pd (II) / Bathophenanthroline).

2.2 Reactions in ionic liquids - Simple preparation – Types – Properties and Applications – Ionic liquids in Organic Reactions (Heck reaction, Suzuki reactions, Epoxidation), Industrial (Battery) and Analytical Chemistry (Matrices for MALDI-TOF MS, Gas Chromatography Stationary Phases) – Advantages and Disadvantages.

2.3 Solid Supported Synthesis - Supercritical CO_2 – Preparation, Properties and Applications (Decaffeination, Dry cleaning) – Environmental impact.

UNIT-III Green Techniques

3.1 Microwave and Ultrasound Assisted Green Synthesis – Apparatus required – Examples

of MAOS (Synthesis of Fused Anthroquinones, Leukart reductive Amination of Ketones) – Advantages and Disadvantages of MAOS – Aldol condensation – Cannizzaro condensation - Diel's-Alder reaction – Strecker's synthesis.

3.2 Photochemical reactions using Sunlight – Photoreduction of Benzophenone to Benzopinacol using Sunlight - Photochemical alternative to Friedel- Crafts reaction.

3.3 Nanoparticles - Introduction – Types of Nanoparticles – Techniques to prepare Nanoparticles – Top down and Bottom up approaches – Common growth methods.

UNIT-IV Green Catalysis

4.1 Green Catalysis - Heterogeneous catalysis – Uses of Zeolites, Silica, Alumina, Clay supported catalysis – Biocatalysis – Enzymes and Microbes.

4.2 Phase Transfer Catalysis (PTC) – Principles, Catalysts and Lipophility of ions – Two phase systems – Solid-Liquid, Liquid-Liquid, Gas-Liquid – Triphase systems – Inverted PTC – Applications in Synthesis.

4.3 Micellar Catalysis, Surfactants and Synthesis in water – Principles, Materials and Synthetic Applications.

UNIT- V Green Reactions

5.1 Acetylation of Primary Amine, Base catalysed Aldol condensation (Synthesis of Dibenzalpropanone), Halogen addition to C = C bond (Bromination of Trans- Stilbene), [4+2] Cycloaddition reaction (Diels-Alder reaction between Furan and Maleic acid).

5.2 Rearrangement reaction (Benzil- Benzilic acid rearrangement), Coenzyme catalyzed Benzoin condensation (Thiamine hydrochloride catalysed synthesis of Benzoin), Pechmann condensation for Coumarin synthesis (Clay catalysed Solid State Synthesis of 7- Hydroxy- 4- methylcoumarin).

5.3 Electrophilic Aromatic Substitution Reactions (Nitration of phenol, Bromination of Acetanilide) – Green oxidation reactions (Synthesis of adipic acid, Preparation of Manganese (III) acetylacetonate) – Zeolite catalyzed Friedel-Crafts acylation.

Books for Study

- Green Chemistry: Environmental Friendly Alternatives, Rs. Sanghi and M. M. Srinivatava, Narosa Publishing House, New Delhi.
- Green Chemistry, V. Ahluwalia, Narosa, New Delhi (2011).
- Nanotechnology, S. Shanmugam, MJP Publishers, Chennai. (2010).
- A Handbook on Nanochemistry, Patrick Salomon, Dominant Publishers and Distributers, New Delhi.
- Nanobiotechnology, S. Balaji, MJP Publishers, Chennai (2010).
- Nano: The Essentials, T. Pradeep, Tata Mc-Graw Hill, New Delhi (2007).

Books for Reference

- Methods and Reagents for Green Chemistry, P. Tundo, A. Perosa and F. Zechini, John Wiley & Sons Inc., New Jercy, (2007).
- The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).
- Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).
- Nanochemistry, G. B. Segreev, Elsevier, Science, New York, (2006)

SKILL BASED SUBJECT

PAPER – 3

APPLIED CHEMISTRY

Objective:

- To impart Knowledge about Petrochemicals, Paper Technology, Sugar Industry, Explosives, Photography and Diary Chemistry,

UNIT I

1.1 Petroleum - Origin – Composition of Petroleum - Inorganic, Engler and Modern theories – Classification – Refining (Simple Refinery) – Cracking – Thermal and Catalytic – Knocking – Octane Rating – Antiknock Compounds – Cetane Rating – Synthetic Petrol – LPG.

1.2 Gobar Gas – Production – Feasibility and Importance of Biogas with special reference to Rural India.

1.3 Petrochemicals – Elementary study – Definition - Chemicals from Natural Gas, Petroleum, Light naphtha and Kerosene – Origin – Composition - Synthetic Gasoline.

UNIT II

2.1 Paper technology – Introduction – Manufacture of pulp – Various raw materials used for the preparation of pulp - Preparation of Sulphite pulp, Soda pulp and Rag pulp.

2.2 Various processes - Beating, Refining, Filling, Sizing and Colouring.

2.3 Manufacture of Paper – Calendering – Uses.

UNIT III

3.1 Sugar industry - Sugar industries in India – Sugarcane and sugar beet - Manufacture of cane sugar – Extraction of juice – Concentration – Separation of crystals.

3.2 Recovery of Glucose from Molasses – Defection – Sulphitation – Carbonation – Testing and Estimation of Sugar – Double Sulphitation Process.

3.3 Preparation of Bagasse – Use of Bagasse for Manufacture of Paper and Electricity -

Preparation of Alcohol from Molasses - Preparation of Absolute Alcohol - Manufacture of Wine, Beer, Methylated Spirit and Power Alcohol.

UNIT IV

4.1 Explosives – Primary, Low and High Explosives – Single compound explosives - Binary explosives – Plastic explosives – Dynamites – Blasting explosives - Preparation and Uses of Lead Azide, Nitroglycerine, Nitrocellulose, TNT, Cordite, Picric Acid and Gun Powder – Introduction to Rocket Propellants.

4.2 Photography – Chemical Principle – Preparation of Sensitive Emulsion – Exposure – Developing – Fixing and Printing – Colour photography – Xerographic copying.

4.3 Coal – Classification by rank – Proximate and Ultimate analysis – Low and High Temperature Carbonisation – Otto-Hoffmann's by-product - Distillation of Coal Tar.

UNIT V

5.1 Milk – Definition – Physico-Chemical properties of milk - Constituents of milk and Their Physico-chemical Properties.

5.2 Chemical change taking place in Milk due to Processing Parameters - Boiling, Pasteurisation, Sterilisation and Homogenisation.

5.3 Definition and Composition of Creams, Butter, Ghee and Ice Creams - Milk Powder - Definition, Need for making powder - Principles involved in Drying process - Spray drying and Drum drying.

Reference Books

1. Fundamental Concepts of Applied Chemistry - Jayashree Ghosh - 1st Edition, S. Chand & Co. Ltd, New Delhi, 2006.
2. Milk and Milk Products - Clarence Henry Eckles, Willes Barnes Combs, Harold Macy - 4th Edition, Tata McGraw Hill Publishing Company Ltd, Reprint 2002.
3. Industrial Chemistry - B. K. Sharma - 13th Edition, Goel Publishing House, 2008.

SEMESTER – VI
PAPER – 8
INORGANIC CHEMISTRY – II

Objectives:

- To impart knowledge about Nuclear chemistry, Radioactivity, Metallurgy, Chemistry of f- Block Elements, Organometallic Compounds and Bio-inorganic Chemistry.

UNIT-I NUCLEAR CHEMISTRY

1.1 Introduction - Composition of Nucleus – Fundamental Particles of Nucleus - Nuclear Forces operating between the Nucleons - N/P ratio – Nuclear Stability - The whole number rule and Packing fraction.

1.2 Isotopes, Isobars and Isotones – Detection and Separation of isotopes

1.3 Nuclear Binding Energy - Mass defect - Simple calculations involving Mass Defect and Binding Energy per Nucleon - Magic Numbers – Liquid drop model - Shell model.

UNIT-II RADIOACTIVITY

2.1 Natural Radioactivity – Properties of Alpha, Beta and Gamma rays - Detection and measurement of Radioactivity - Radioactive series including Neptunium series – Soddy's Group Displacement Law.

2.2 Rate of disintegration and Half - Life period – Derivation - Average life period - Artificial Radioactivity - Induced Radioactivity - Uses of Radioisotopes - Hazards of radiations.

2.3 Nuclear fission - Nuclear energy - Nuclear reactors - Nuclear fusion -Thermonuclear reactions - Energy source of the Sun and Stars – Comparison of Nuclear Fission and Nuclear Fusion.

UNIT-III METALLURGY

3.1 General metallurgy and Metallurgical processes – Methods of Concentration – Gravity separation, Froth floatation process, Magnetic separation – Reduction methods – Smelting, Calcination, Goldschmidt Aluminothermic process - Purification methods – Zone refining, Van Arkel method and Electrolytic refining.

3.2 Comparative study of Ti, V, Cr, Mn and Fe group elements with special reference to Occurrence, Oxidation States, Magnetic Properties and Colour.

3.3 Ocurrence and Extraction of Ti, Mo, W and Co - Preparation and Uses of Ammonium Molybdate and $V_2 O_5$.

UNIT-IV INNER TRANSITION ELEMENTS

4.1 General Characteristics of f- Block elements – Position of Lanthanides in the periodic table – Separation of Lanthanides (Ion exchange method).

4.2 Comparative study of Lanthanides and Actinides - Occurrence, Oxidation states, Magnetic properties, Colour and Spectra.

4.3 Lanthanide Contraction – Causes and Consequences - Comparison between Lanthanides and Actinides – Positon of Actinides in the periodic table – Extraction of Thorium and Uranium

UNIT-V ORGANOMETALLIC COMPOUNDS AND BIOINORGANIC CHEMISTRY

5.1 Organometallic Compounds - Definition - Nomenclature – Classification – Organo-Lithium and Organo-Boron Compounds - Preparation, Properties, Structure and Uses.

5.2 Biological Functions of Iron, Copper and Zinc – Biologically Important Compounds – Myoglobin, Cytochrome, Haemoglobin and Ferritin.

5.3 Binary Metallic Compounds – Hydrides, Borides, Carbides and Nitrides – Classification - Preparation, Properties, Structure and Uses.

CORE PRACTICAL

PAPER – 3

GRAVIMETRIC ESTIMATION

1. Estimation of Sulphate as Barium Sulphate.
2. Estimation of Barium as Barium Sulphate.
3. Estimation of Barium as Barium Chromate.
4. Estimation of Lead as Lead Chromate.
5. Estimation of Calcium as Calcium Oxalate Monohydrate.

References

- Qualitative Inorganic Analysis, A.I. Vogel – 7th Edition, Prentice Hall.
- Quantitative Chemical Analysis, A.I. Vogel – 6th Edition, Prentice Hall.

PAPER - 9

ORGANIC CHEMISTRY – II

Objectives:

- To kindle interest in students in learning Bio-organic chemistry through the introduction of topics such as Proteins, Nucleic acids, Terpenes, Alkaloids etc.
- To generate Keen Interest and Thinking in Understanding the Mechanisms of Molecular Rearrangements and Synthetic Applications of Acetoacetic Ester, Benzene Diazonium Chloride, Grignard Reagents and Diazomethane.

UNIT- I Molecular rearrangements

1.1 Rearrangements - Classification – Anionotrpic, Cationotropic and Free Radical Rearrangements - Intermolecular and Intramolecular Rearrangements – Examples – Cross over experiment – Differences between Intermolecular and Intramolecular rearrangements.

1.2 Mechanisms, Evidences, Migratory Aptitude, Intermolecular or Intramolecular nature of the following rearrangements - Pinacol-Pinacolone, Benzil-Benzilic acid and Beckmann rearrangement.

1.3 Mechanism of Hoffmann, Curtius, Baeyer-Villiger, Claisen (Sigmatropic), Fries rearrangement, Cope and Oxy-Cope rearrangements.

UNIT-II Amino acids and Polypeptides

2.1 Amino acids – Classification - Essential and Non- Essential amino acids – Acidic, Basic and Neutral Amino Acids – Alpha, Beta and Gamma- Amino acids - Preparation of alpha amino acids – Gabriel's Phthalimide synthesis, Strecker synthesis and Erlenmeyer Azlactone synthesis - Glycine, Alanine and Tryptophan.

2.2 General properties of Amino acids - Reactions of Amino acids due to Amino group and Carboxyl group - Zwitterions - Isoelectric point.

2.3 Peptides - Synthesis - Bergmann Method - Structural Determination of Polypeptides - End Group Analysis – N-Terminal and C-Terminal Amino Acids Determination.

UNIT- III Proteins and Nucleic Acids

3.1 Proteins - Definition - Classification based on Physical Properties, Chemical Properties and Physiological Functions - Primary and Secondary Structure of Proteins - Helical and Beta Sheet Structures (Elementary Treatment Only) – Denaturation of Proteins.

3.2 Nucleic acids – Nucleoproteins - Definition - Types of Nucleic Acids – RNA and DNA - Nucleoside, Nucleotide, Degradation of Nucleotide Chain - Components of RNA and DNA.

3.3 Differences between DNA and RNA - Structures of Ribose and 2- Deoxyribose – Double Helical Structure of DNA - Biological functions of Nucleic Acids - Elementary ideas on Replication and Protein Synthesis.

UNIT-IV Chemistry of Natural Products

4.1 Antibiotics – Definition – Structural elucidation of Penicillin and Chloramphenicol – Uses of Penicillin and Chloramphenicol.

4.2 Alkaloids – Classification – Isolation of alkaloids – General methods of Determination of structure of Alkaloids - Synthesis and Structural Elucidation of Piperine, Coniine and Nicotine.

4.3 Terpenoids – Definition - Classification - Isoprene rule - Synthesis and Structural elucidation of Citral, Menthol and Alpha- pinene.

UNIT- V Organo-Synthetic Reagents

5.1 Acetoacetic ester – Preparation by Claisen ester condensation – Reactions – Synthetic Applications.

5.2 Benzene diazonium chloride – Preparation from aniline – Synthetic Applications – Coupling reactions.

5.3 Grignard Reagents – Preparation – Synthetic Applications – Diazomethane – Preparation by Von-Pechmann method – Synthetic Applications.

CORE PRACTICAL

PAPER – 4

ORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS

Analysis of organic compounds containing one functional group and characterisation with a derivative.

Reactions of the following Functional Groups:

Aldehyde, Ketone, Carboxylic Acid (Mono and Di), Ester, Carbohydrate (Reducing and Non-Reducing), Phenol, Aromatic Primary Amine, Amide, Nitro Compounds, Diamide and Anilide.

Organic Preparations

Acylation

1. Acetylation of Salicylic acid or Aniline.
2. Benzoylation of Aniline or Phenol.

Nitration

3. Preparation of m- Dinitrobenzene
4. Preparation of p- Nitroacetanilide

Halogenation

5. Preparation of p- Bromoacetanilide
6. Preparation of 2,4,6-Tribromophenol

Diazotisation /Coupling

7. Preparation of Methyl Orange

Oxidation

8. Preparation of Benzoic Acid from Toluene or Benzaldehyde.

Hydrolysis

9. Hydrolysis of Ethyl Benzoate (Or) Methyl Salicylate (Or) Benzamide.

Reference Books

- Vogel's Text Book of Chemical Analysis
- Practical Chemistry - A. O. Thomas - Scientific Book Center, Cannanore.
- Practical Chemistry - 3 Volumes - S. Sundaram and others.
- Text Book of Practical Organic Chemistry – A. I. Vogel, A. R. Tatchell, B. S. Furnis, A. J. Hannaford and P.W. G. Smith – 5^{th} Edition - 1996.
- Comprehensive Practical Organic Chemistry - Preparation and Quantitative Analysis - V. K. Ahluwalia, Renu Agarwal – Universities Press – 2013.

PAPER- 10

PHYSICAL CHEMISTRY – II

Objectives:

- To impart Knowledge about Electrochemistry, Surface Chemistry, Photochemistry, Chemical Kinetics and Theories of reaction rates.

UNIT- I Electrochemistry - III

1.1 Galvanic cells - Daniel cell - Reversible and Irreversible Cells – EMF of a Cell and its Measurement - Standard Weston Cadmium Cell – Evaluation of Thermodynamic Quantities.

1.2 Derivation of Nernst equation for Electrode Potential and Cell emf –Types of reversible electrodes - Electrode reactions - Electrode potentials.

1.3 Reference electrodes - Standard Hydrogen Electrode - Standard Electrode Potential - Sign conventions - Electrochemical Series and its Applications.

UNIT- II Electrochemistry - IV

2.1 Liquid Junction Potential - Concentration cells With Transference and Without Transference.

2.2 Applications of Concentration cells - Valency of ions, Solubility and Solubility Product - Activity Coefficient of electrolytes - Determination of pH using Hydrogen, Quinhydrone and Glass electrodes – Potentiometric titrations.

2.3 Polarisation - Overvoltage – Storage Cells - Decomposition potential - Lead Storage Battery - Fuel Cells (H_2-O_2 Cell) - Mechanism of Discharging and Recharging Fuel Cells.

UNIT- III Chemical Kinetics

3.1 Definitions of the terms – Order and Molecularity – Rate of the reaction - Derivations of expressions for Zero, First, Second and Third order rate equations - Study of kinetics by Volumetric, Polarimetric and Spectrophotometric methods - Methods of Determination of Order of a reaction.

3.2 Effect of Temperature on reaction rate - Arrhenius equation - Theories of reaction rates – Bimolecular Collision Theory – Lindmann's theory of Unimolecular Reactions.

3.3 ARRT - Thermodynamic treatment of ARRT – Eyring equation - Comparison of Collision Theory and ARRT.

UNIT- IV Surface Chemistry

4.1 Adsorption – Characteristics of adsorption – Physisorption and Chemisorption – Differences between Physical and Chemical Adsorption - Applications of Adsorption – Adsorption of Gases by Solids – Different Types of Isotherms - Freundlich adsorption isotherm - Langmuir theory of adsorption – Derivation.

4.2 Catalysis – Definition - General Characteristics of Catalytic Reactions – Acid-Base catalysis – Enzyme catalysis – Michaelis-Menton Equation – Effect of Temperature and pH on Enzyme Catalysis.

4.3 Homogeneous catalysis – Function of a catalyst in terms of Gibb's free energy of activation - Heterogeneous catalysis - Kinetics of Unicellular Surface Reactions.

UNIT- V Photochemistry

5.1 Laws of photochemistry - Grothus-Draper law, Stark-Einstein's law – Primary and Secondary processes – Quantum yield and its determination.

5.2 Qualitative description of Fluorescence, Phosphorescence, Luminescence, Chemiluminescence, Bioluminescence and Photosensitized Reactions.

5.3 Kinetics of Photochemical Reactions - H_2-Cl_2 and H_2-Br_2 reactions - Photodimerisation of Anthracene

REFERENCE BOOKS

INORGANIC CHEMISTRY

1. Inorganic Chemistry – P. L. Soni - Sultan Chand (2006).
2. Principles of Inorganic Chemistry - B. R. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications (2013).
3. Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
4. Inorganic Chemistry: Principles of Structure and Reactivity - J. E. Huheey, E. A. Keiter, R. I. Keiter and O. K. Medhi – 2006.
5. Concise Inorganic Chemistry - J. D. Lee - III edition - Von Nostrand.
6. Industrial Chemistry - B. K. Sharma - Goel Publications (1983).
7. Industrial Chemistry R. K. Das - Kalyani Publications, New Delhi (1982).
8. Coordination Chemistry - S. F. A. Kettle - ELBS (1973).
9. Coordination Chemistry - K. Burger - Butterworthy (1973).
10. Vogel's Handbook of Quantitative Inorganic Analysis - Longman.
11. Text Book of Qualitative Inorganic Analysis - A. I. Vogel - III edition (1976).
12. Source Book on Atomic Energy – S. Glasstone- East-West Press Pvt. Ltd. (1967).
13. Nuclear and Radiochemistry - John Wiley and Sons (1964).
14. Nuclear Chemistry - H. J. Arnikar - Wiley Eastern Co., - II edition (1987).
15. Advanced Inorganic Chemistry - Cotton and Wilkinson - V Edition - Wiley and Sons (1988).
16. Text Book of Inorganic Chemistry – R. Gopalan – Universities Press – 2012.
17. Modern Inorganic Chemistry – R. D. Madan - S. Chand Publications, Reprint, 2014.

ORGANIC CHEMISTRY

1. Organic Chemistry - R. T. Morrison and Boyd – Pearson – 2010.
2. Organic Chemistry - I. L. Finar - Volume I and II - Pearson Education.
3. Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
4. Advanced Organic Chemistry - Bahl and Arun Bahl - S. Chand and Co. Ltd. – 2012.

5. Stereochemistry, Conformations and Mechanisms - Kalsi – 2nd Edition, Wiley Eastern Ltd., Chennai – 1993.
6. Organic Chemistry of Natural Products - Volume I and II - O. P. Agarwal - Goel Publishing House
7. A Guide Book to Mechanisms in Organic Chemistry - Peter Sykes - Pearson Education - 2006.
8. Stereochemistry of Organic Compounds - D. Nasipuri - New Age International Publishers..
9. Chemistry of Natural Products - Gurdeep Chatwal- Himalaya Publishing House.
10. Reactions and Reagents - O. P. Agarwal- Goel Publishing House.
11. Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
12. A Text Book of Organic Chemistry, K. S. Tewari, N. K. Vishnoi, S. N. Mehrotra - Vikas Publishing House - 2011.
13. Modern Organic Chemistry- M. K. Jain and S. C. Sharma- Vishnoi Publications, 2014.
14. Reaction, Mechanism and Structure - Jerry March - John Wiley and Sons, NY -1992.
15. Organic Chemistry - Bruice - Pearson Education.
16. Text Book of Organic Chemistry – C. N. Pillai – Universities Press – 2009.
17. Organic Reaction Mechanisms - Parmar and Chawla – S. Chand & Co.
18. Organic Chemistry – I. L. Finar - 6th Edition, Pearson Education, 2008.
19. A Guide Book to Mechanisms in Organic Chemistry – Peter Sykes - Pearson Education, 2006
20. Stereochemistry of Carbon Compounds- E. I. Eliel – Tata Mcgrow Hill Education – 2000.
21. Organic Chemistry - T. W. Graham Solomon, C. B. Fryhle – S. A. Dnyder – John Wiley & Sons – 2014.
22. Advanced Organic Reaction Mechanism (Problems and Solutions) – N. Tewari – Books and Allied (P) Ltd – 2005.
23. Advanced Organic Stereochemistry (Problems and Solutions) – N Tewari - Books and Allied (P) Ltd – 2010.

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1. Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishnal Publishing Co., - 2013.
2. Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha and U. N Dash - Sultan Chand & Co., – 2006.
3. Physical Chemistry - Negi and Anand – Eastern Wiley Pvt.Ltd..
4. Physical Chemistry - Kundu and Jain - S. Chand & Co.
5. Physical Chemistry - K. L. Kapoor - Macmillan - 4 volumes.
6. Elements of Physical Chemistry - Glasstone and Lewis - Macmillan.
7. Text book of Physical Chemistry - S. Glasstone - Macmillan (India) Ltd.
8. Fundamentals of Physical Chemistry - Maron and Landor - Colier - Macmillan.
9. Physical Chemistry - G. W. Castellan - Narosa publishing house - 2004.
10. Physical Chemistry - Walter J. Moore - Orient Longman – 1972.
11. Numerical Problems on Physical Chemistry, Gashal - Books and Allied (P) Ltd.,
12. Universal General Chemistry, C.N.R. Rao, Macmillan.
13. Group Theory and its Chemical Applications - P. K. Bhattacharya - Himalaya Publishing House.
14. Text book of Physical Chemistry – M. V. Sangaranarayanan, V. Mahadevan, Universities Press - 2011.
15. General and Physical Chemistry – Dr. A. Arunabhasan, Books of Allied (P) Ltd., - Ghosal – 2009.

CORE PRACTICAL

PAPER – 5

PHYSICAL CHEMISTRY EXPERIMENTS

1. Kinetics

Determination of the Order of the following reactions

a) Acid catalysed Hydrolysis of an Ester (Methyl or Ethyl acetate)

b) Saponification of an Ester (Methyl or Ethyl Acetate)

c) Iodination of Acetone.

2. Molecular weight of a solute - Rast's method using Naphthalene or Diphenyl as Solvents.

3. Heterogeneous equilibria

a) *Phenol-Water system – CST

b) Effect of impurity – 2 % NaCl or Succinic acid solutions on Phenol -Water system - Determination of the Concentration of the given solution

4. **Determination of the Transition Temperature** of the given salt hydrate. $Na_2S_2O_3.5H_2O$, $CH_3COONa.3H_2O$, $SrCl_2.6H_2O$, $MnCl_2.4H_2O$

5. **Electrochemistry**

Conductivity

a) Determination of Cell Constant and Equivalent Conductivities ofthe solutions of two different concentrations.
b) Conductometric titration of a Strong Acid against a Strong Base.

6. Potentiometric titration of a Strong Acid against a Strong Base.

7. Colorimetry- Determination of unknown concentration using Photoelectric colorimeter.

8. Determination of pKa of acetic acid using pH Meter.

***Need not be given in examination.**

Students must write Short Procedure / Formula with explanation in Ten Minutes for evaluation during the university practical examination.

ELECTIVE

PAPER – 3

A. ANALYTICAL CHEMISTRY – II

Objective:

- To impart knowledge about Different Chromatographic and Spectroscopic Techniques.

UNIT – I

1.1Chromatography – Principles and Techniques of Column, Paper and Thin Layer Chromatography – Column Chromatography – Preparation of Column - Adsorption - Adsorbents – Elution – Recovery of Substances.

1.2 TLC - Choice of Adsorbent and Solvents – Preparation of Chromatogram and Applications - R_f value - Paper Chromatography – Solvents used – Factors affecting R_f value – Separation of Amino Acid Mixtures – Radial Paper Chromatography - Applications.

1.3 lon exchange chromatography – Principle – Experimental Techniques – Types of Resins – Reqirement of a Good Resin – Action of Ion Exchange Resins – Experimental Techniques and Applications – Separation of Zinc- Magnesium, Cobalt - Nickel and Cadmium - Zinc ions.

UNIT – II

2.1 High Pressure Liquid Chromatography and Gas Chromatography – Principle and Applications.

2.2 Gas Chromatography – Mass Spectrophotometer (GC-MS) - Liquid Chromatography - Mass Spectrophotometer (LC-MS) - Principle and Applications.

2.3 Polarography – Principle – DME – Advantages and Disadvantages – Ilkovic equation and its significance (No Derivation) - Polarography as an Analytical tool in Quantitative and Qualitative Analysis – Amperometric Titrations.

UNIT – III

3.1 NMR Spectroscopy – Principle of Nuclear Magnetic Resonance – Basic Instrumentation.

3.2 Number of Signals – Chemical Shift – Shielding and Deshielding – Factors influencing Chemical Shift - Spin-Spin Coulpling and Coupling constants - TMS as NMR standard.

3.3 Splitting of Signals – NMR Spectra of simple Organic Molecules – Applications in Structural Elucidation.

UNIT – IV

4.1 Mass Spectroscopy – Basic principles of Mass Spectrum - Instrumentation – Molecular ion peak- Base peak - Metastable peak - Isotopic peak and their Uses.

4.2 Fragmentation – Factors affecting Cleavage Patterns - Nitrogen rule – Ring rule – McLafferty rearrangement - Determination of Molecular Formulae with examples.

4.3 Mass spectrum of simple organic compounds – Identification – Alcohols, Aldehydes and Aromatic hydrocarbons.

UNIT – V

5.1 ESR Spectroscopy – Condition – Selection Rule for Transition - Theory of ESR Spectra – Basic Instrumentation - ESR Spectrometer – Components and their Functions - Hyperfine splitting – ESR Spectra of simple radicals – CH_3, CD_3, Naphthalene radical ions only – Applications in structural elucidation.

5.2 Thermoanalytical methods – Principle involved in Thermogravimetric analysis (TGA) and Differential Thermal Analysis (DTA) – Instrumentation- Discussion of Various Components with Block Diagram.

5.3 Characteristics of TGA ($CaC_2O_4.H_2O$, $CuSO_4.5H_2O$) and DTA curves – Factors Affecting TGA and DTA Curves – Thermometric Titrations – Principle and Applications.

Reference Books

1. Analytical Chemistry – S. M. Khopkar – New Age International Publishers – 1998.
2. Analytical Chemistry – R. Gopalan – Sultan Chand & Sons – 2002.
3. Chemical Analysis: An Instrumental Approach – A. K. Srivastava and P. C. Jain.
4. Spectroscopic Identification of Organic Compounds – R. M. Silverstein, G. C. Basseler & T. C. Morill.
5. Organic Spectroscopy – W. Kemp.
6. Spectroscopic Methods in Organic Chemistry – D. Williams & I. Fleming.
7. Fundamentals of Moleculars Spectroscopy – 4th Edition, C. N. Banwell and E. M. McCash – Tata McGrow Hill Publishers, New Delhi - 2006.
8. Applications of Absorption Spectroscopy of Organic Compounds – John R. Dyer.
9. Introduction to Molecular Spectroscopy – Barrow.
10. Spectroscopy of Orgnic Compounds - P. S. Kalsi.
11. Instrumental Methods of Chemical Analysis – B. K. Sharma – Goel Publications – 2000.
12. Fundamentals of Analytical Chemistry: An introduction – D. A. Skoog, D. M. West – Thomson – 2004.
13. Analytical Chemistry: Theory and Practice – U. N. Dash.
14. Vibrational Spectroscopy - D. N. Sathyanarayanan – New Age International Publishers – 2000.
15. Fundamentals of Spectroscopy – Y. R. Sharma – S. Chand – 2008.
16. Fundamentals of Molecular Spectroscopy – 4^{th} Edition – C. N. Banwell and E. M. McCash – Tata McGrow Hill, New Delhi – 2006.
17. Elementary Organic Spectroscopy – Principles and Chemical Applications – Y. R. Sharma, S. Chand & Company Private Limited, V Revised Edition – 2013.

ELECTIVE PAPER – 2

B. TEXTILE CHEMISTRY

Objective:

- To impart knowledge about the Production, Properties and Applications of Natural and Synthetic Fibres, Colour and Constitution, Classification of Dyes and Concept of Dyeing in Textile Industry.

UNIT – I

1.1 General Classification of Fibres – Chemical structure – Production – Properties – Count, Denier, Tex, Staple Length, Spinning Properties, Strength, Elasticity and Creep.

1.2 Applications of the following Natural Cellulose Fibres (Cotton and Jute).

1.3 Natural Protein Fibres (Wool and Silk) – General characteristics.

UNIT – II

2.1 Chemical Structure, Production and properties of the following Synthetic Fibres - Man-made Cellulose Fibres (Rayon and Modified cellulose fibres).

2.2 Polyamide Fibres (Different types of Nylons) - Preparation – Nylon degradation – Polyester Fibres – Preparation - Degradation – Polyacrylonitrile fibre - Preparation and Properties – Viscose fibre - Preparation and Properties.

2.3 Identification tests for Cellulose, Cotton, Wool, Silk, Rayon, Acrylic, Viscose, Polyamide and Polyester Fibres.

UNIT – III

3.1 Impurities in Raw Cotton and Grey Cloth, Wool and Silk.

3.2 General principles of the Removal, Scouring - Purpose, Alkali Scouring and Acid Scouring – Bleaching (Methods - Hypochlorite, Peroxide and Bleaching Powder) - Desizing (Hydrolytic and Enzymatic), Kier Boiling and Chemicking.

3.3 Dyeing of Polyester and Blends – Functions of Dispersing agents - Fibre swelling – Carrier dyeing - High temperature dyeing - Selection of dyestuff.

UNIT – IV

4.1 Colour and Constitution – A general treatment – Chromophores – Auxochromes - Bathochromes and Hypsochromes.

4.2 Classification of dyes – Acidic, Basic, Direct, Mordant, Azoic, Ingrain, Vat and Reactive Dyes - Classification as per Chemical constitution – Azo dyes – Triphenyl Methane Dyes, Phthalein Dyes, Indigo and Anthraquinone Dyes.

4.3 Structure, Preparation and Uses – Methyl Orange, Phenolphthalein and Malachite Green.

UNIT – V

5.1 Dyeing - Dyeing of Wool and Silk – Fastness properties of dyed materials.

5.2 Dyeing of Nylon, Terylene and other Synthetic Fibres – Finishing – Finishes given to Fabrics – Mechanical finishes on Cotton, Wool and Silk.

5.3 Method used in process of Mercerizing – Anticrease and Antishrink finishes – Water Proofing.

References

- Chemical Technology of Fibrous Materials - F. Sadov, M. Horchagin and A. Matetshy, Mir Publishers.
- The Identification of Textile Fibres - Bruno Nuntak.
- Introduction to Textile Science - 3rd edition, Maryory L. Joseph.
- Textile Chemistry – Vol. II, R. H. Peters, Elsevier, Amsterdam.
- Dyeing and Chemical Technology of Textile Fibres – 5th Edition, E. R. Trotman, Charles Griffin &Co Ltd.
- Chemistry of dyes & Principles of Dyeing – V. A. Shenai, Sevak Publications.
- Scouring and Bleaching, E. R. Trotman, Charles Griffin & Co Ltd.
- Text Book of Applied Chemistry - K. Kapur.
- A Students Text Book of Textile Science – A. J. Hall.

ELECTIVE

PAPER – 3

C. NANO CHEMISTRY

Objectives:

- To introduce the Basics of Nanotechnology.
- To learn the Instrumental Techniques used in Characterisation of Nanomaterials.

UNIT-I Basics of Nanochemistry

Introduction – Definition – Length scales – Importance of Nanoscale and its Technology – Self Assembly of Materials – Self Assembly of Molecules – Porous solids, Nanowires, Nanomachines and Quantum Dots.

UNIT-II Nanoparticles

Introduction – Types of Nanoparticles – Preparation, Properties and Uses of Gold, Silicon, Silver, Zinc Oxide, Iron Oxide, Alumina and Titania Nanoparticles.

UNIT-III Synthetic Techniques

Techniques to Synthesise Nanoparticles – Top down and Bottom up Approaches – Common Growth Methods – Characterisation of Nanoparticles – Applications and Toxic effects of Nanomaterials.

UNIT-IV Nanomaterials

Preparation, Properties and Applications of Carbon Nanotubes, Nanorods, Nanofibres and Nanoclays.

UNIT-V Instrumental Techniques

Electron Microscopes – Scanning Electron Microscopes (SEM) – Transmission Electron Microscopes (TEM) – Scanning Probe Microscopy – Atomic Force Microscopy (AFM) – Scanning Tunneling Electron Microscope (STEM) – Basic Principles only.

Books for Study

- Nanotechnology, S. Shanmugam, MJP Publishers, Chennai (2010).
- A Handbook on Nanochemistry, Patrick Salomon, Dominant Publishers and Distributers, New Delhi.
- Nanobiotechnology, S. Balaji, MJP Publishers, Chennai (2010).

Books for Reference

- The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).
- Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).
- Nanochemistry, G. B. Segreev, Elsevier, Science, New York, (2006).
- Nano: The Essentials, T. Pradeep, Tata Mc-Graw Hil Publishers, New Delhi (2007).
- Text Book of Nanoscience and NanoTechnology, P. Shankar Baldev Raj, B. B. Rath and James Murday – 2014.

SKILL BASED SUBJECT

PAPER – 4

AGRICULTURE AND LEATHER CHEMISTRY

OBJECTIVE:

- To learn about Soil fertility and Productivity, Soil Chemistry, Insecticides, Leather Industry and Treatment of Tannery Effluents.

Unit-I Soil Chemistry

1.1 Soil – Introduction - Classification - Properties of Soil – Physical properties – Components – Structure and Texture - Soil-Water, Soil-Air and Soil-Temperature.

1.2 Chemical properties - Soil Minerals, Soil Colloids, Soil Reaction and Buffering – Analysis of Soil - Soil pH – Determination of Soil pH – Effect of pH on Plants – Buffering of soil - Soil acidity, Soil salinity and Soil alkalinity.

1.3 Soil Fertility – Carbon and Nitrogen cycle - Acid, Alkaline and Saline soils – Their Formation - Reclamation – Liming agents.

UNIT-II Fertilisers and Manures

2.1 Fertilisers – Definition - Classification – Requirements of a Good fertiliser - Nitrogen fertiliser – Urea – Preparation and Uses – Potash fertiliser – KCl, K_2SO_4 and KNO_2 - Preparation and Uses – Phosphorus fertiliser – Phosphatic slag, Superphophate of lime and Triple Superphosphate - Preparation and Uses- NPK fertiliser - Advantages– Role of Micronutrients.

2.2 Manures – Compost – Composting - Methods of Composting - Farmyard Manure, Vermicompost, Composted Coconut Coir Pith, Press mud and Poultry manure – Applications.

2.3 Types of pollutions caused by Fertilisers - Ill effects of Fertilisers and their Control.

UNIT-III Insecticides and Fungicides

3.1 Insecticides – Definition - Classification of Insecticides - Stomach poisons - Contact poisons and Fumigants - Insecticides - Organic Insecticides - DDT - Gammexane - Malathion – Parathion.

3.2 Fungicides – Inorganic Fungicides – Sulphur compounds – Copper compounds – Mercuric compounds – Organic Fungicides – Dithiocarbamates – Dithane M – Bordeaux mixture.

3.3 Herbicides - Rodenticides - Pesticides in India - Adverse Environmental Effects of Pesticides.

UNIT- IV Leather Chemistry

4.1 Introduction - Constituents of Animal Skin - Preparing Skins and Hides – Leather processing – Process before Tannage – Flaying, Curing, Drying, Pickling, Cleaning and Soaking - Liming and Degreasing.

4.2 Manufacture of Leather - Leather Tanning methods - Vegetable Tanning – Chemistry of Chrome Tanning and Mineral Tanning – Deliming.

4.3 Dyeing of Leather and Fat Liquoring - Leather Finishing - Oil Tanning - By products.

UNIT- V Tannery Effluents

5.1 Tannery effluents - Pollution and its control - Water pollution and Air pollution - Waste Management.

5.2 Treatment of Tannery Effluents - Primary, Secondary and Tertiary treatment - Pollution Prevention.

5.3 Effect of Tannery Effluents on Agriculture – Organic Amendments - Reclamation of Tannery Effluents Affected Soil.

Reference Books

- Industrial Chemistry by B. K. Sharma - Goel Publishing House, Meerut.
- Applied Chemistry by K. Bagavathi Sundari, MJP Publishers, 2006.
- Fundamental Concept of Applied Chemistry by Jayashree Ghosh, S. Chand & Company Ltd.,
- The Nature and Properties of Soils - IX Edition - Nyle. C. Bready - S. Chand.
- Soils and Soil Fertility - Louis M. Thompson - and Frederick. R. Troch - Tata Mc Graw Hill Publishing Co.
- Text Book of Soil Science - T. D. Biswas and S. K. Mukerjee - II Edition.
- Soil Science - A. Sankara.
- Fundamentals of Leather Science - Wood roffe Publications of CLRI - Chennai.
- Nature and Properties of Soils - Harry, O. Buckman.

SCHEME OF VALUATION FOR PRACTICAL EXAMINATIONS

PRACTICAL – I

VOLUMETRIC ANALYSIS

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 marks

Record: 15 Marks

Procedure: 10 Marks

Error upto 2 % : 50

2.1 – 3 % : 40

3.1 – 4 % : 30

4.1 – 5 % : 20

>5 % : 10

For incomplete or wrong calculation deduct 20 % of total marks scored.

For no calculation deduct 40 % of total marks scored.

For each arithmetic error deduct 1 mark.

CORE PRACTICAL – II

INORGANIC QUALITATIVE ANALYSIS AND PREPARATION

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 marks

Record: 15 Marks

Preparation: 20 (Quantity- 15 Marks; Quality- 5 marks)

Analysis: 40 Marks.

Each radical with procedure: 10 Marks

(Spotting for each radical - 5 Marks; Fixing the group - 5 Marks)

PRACTICAL - III

GRAVIMETRIC ANALYSIS

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 marks

Record: 15 Marks

Procedure: 10 Marks

Error upto 2 % : 50

2.1 – 3 % : 40

3.1 – 4 % : 30

4.1 – 5 % : 20

>5 % : 10

a. Among the duplicate results, the value more favorable to the candidate must be taken.

b. When no duplicate result is given deduct 5 marks.

c. If the two results differ by more than 2 % deduct 5 marks.

d. For each independent arithmetical error deduct 1 mark.

e. For incomplete or wrong calculation deduct 20 %.

f. For no calculation deduct 40 %.

g. If the experiment is not completed due to an accident, award 5 marks.

PRACTICAL - IV

ORGANIC ANALYSIS

Internal assessment: 25 Marks

External assessment: 75 marks

Total: 100 marks

Record: 15 Marks

Preparation: 15 (quantity: 10 & quality: 5)

Analysis: 45

Preliminary reaction: 4

Aliphatic/ Aromatic: 4

Saturated/ Unsaturated: 4

Tests for elements: 9

Functional groups: 10

Confirmatory tests: 10

Derivative/Coloured reaction: 4

PHYSICAL CHEMISTRY PRACTICALS

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 Marks

Record: 15 Marks

Experiment: 45 Marks

Manipulation, Tabulation and Calculation: 15 Marks

1) **Kinetics**

Graph	: 10 Marks
Below a factor of 10	: 35
By a factor of 10	: 25
More than a factor of 10	: 15

2) <u>Molecular weight</u>

Error upto 10 %: 45

20 %: 35

30 %: 25

> 30 %: 15

3) <u>Effect of electrolyte on CST</u>

Graph: 10

Error upto 10 %: 35

20 %: 25

30 %: 15

> 30: 10

4) <u>Transition temperature</u>

Graph: 10

Error upto 2^{o}C difference: 35

7^{o}C difference: 25

> 7^{o}C difference: 15

5) <u>Conductance</u>

<u>Equivalent conductance: 25 marks</u>		**<u>Cell constant : 20 marks</u>**	
Error upto 10 %	: 25	Error upto 10 %	: 20
Upto 15 %	: 15	Upto 15 %	: 15
>15 %	: 10	>15 %	: 10

6) <u>Conductometric titration</u>

Graph: 10

Upto 2 % : 35

2.1 to 3 % : 30

3.1 to 4 % : 25

4.1 to 5 % : 20

> 5% : 15

THIRUVALLUVAR UNIVERSITY

B.Sc. COMPUTER SCIENCE

DEGREE COURSE

CBCS PATTERN

(With effect from 2017 - 2018)

The Course of Study and the Scheme of Examinations

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper - 1	6	6	Digital Logic & Programming in C	25	75	100
4	III	Core Practical	Practical-1	3	2	Programming in C Lab	25	75	100
5	III	ALLIED 1	Paper-1	7	4	**(to choose any one)** 1. Mathematics I 2. Mathematical Foundations I	25	75	100
6	IV	Environ. Studies		2	2	Environmental Studies	25	75	100
				30	**22**		**150**	**450**	**600**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
7	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8	II	English	Paper-2	4	4	English	25	75	100
9	III	Core Theory	Paper-2	6	6	C++& Data Structures	25	75	100
10	III	Core Practical	Practical-2	3	2	C++ and Data Structure lab	25	75	100
11	III	Allied 1	Paper-2	7	6	**(to choose any one)** 1. Mathematics II 2. Mathematical Foundations II	25	75	100
12	IV	Soft skill		2	1	Soft skill	25	75	100

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
13	IV	Value Education		2	2	Value Education	25	75	100
				30	**25**		**175**	**525**	**700**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
14	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
15	II	English	Paper-3	6	4	English	25	75	100
16	III	Core Theory	Paper-3	3	3	Java Programming	25	75	100
17	III	Core Practical	Practical-3	3	3	Java Programming Lab	25	75	100
18	III	Allied II	Paper-3	4	4	**(to choose any one)** 1. Physics I 2. Statistical Methods and their Applications	25	75	100
19	III	Allied II	Practical	3	0	Physics / Statistics Practical	0	0	0
20	IV	Skill Based Subject I	Paper-1	3	3	Design & Analysis of Algorithm	25	75	100
21	IV	Non-Major Elective I	Paper-1	2	2	Introduction to Information Technology	25	75	100
				30	**23**		**175**	**525**	**700**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
22	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
23	II	English	Paper-4	6	4	English	25	75	100
24	III	Core Theory	Paper-4	3	3	Database Management Systems	25	75	100
25	III	Core Practical	Practial-4	3	3	RDBMS Lab	25	75	100
26	III	Allied II	Paper-4	4	4	**(to choose any one)** 1. Physics II	25	75	100

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title							
						2. Statistical Methods and their Applications II			
27	III	Allied Practical	Practical	3	2	Physics / Statistics practicals	25	75	100
28	IV	Skill Based Subject II	Paper-2	3	3	Computer Organisation and Architecture	25	75	100
29	IV	Non-Major Elective II	Paper-2	2	2	Internet and its Applications	25	75	100
				30	**25**		**200**	**600**	**800**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
30	III	Core Theory	Paper-5	6	3	Mobile Application Development	25	75	100
31	III	Core Theory	Paper-6	6	3	Operating System	25	75	100
32	III	Core Theory	Paper – 7	4	2	Data Communication & Network	25	75	100
33	III	Core Practical	Practical-5	4	3	Mobile Applications Development - Lab	25	75	100
34	III	Core Practical	Practical-6	4	3	Operating System - Lab	25	75	100
35	III	Elective I	Paper-1	3	3	1. Data Mining 2. Computer Graphics 3. Information Security	25	75	100
36	IV	Skill Based Subject III	Paper-3	3	3	Software Engineering	25	75	100
				30	**20**		**175**	**525**	**700**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
37	III	Core Theory	Paper-8	7	5	Cloud Computing	25	75	100
38	III	Core Theory	Paper-9	6	4	Open Source Programming	25	75	100
39	III	Core	Practical-	4	3	ASP .NET Lab	25	75	100

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title							
		Practical	7						
40	III	Core Practical	Practical-8	4	3	Open Source Programming - Lab	25	75	100
41	III	Elective II	Paper-2	3	3	1. Software Testing 2. Mobile Computing 3. Microprocessor	25	75	100
42	III	Elective III	Paper-3	3	3	1. Internet of Things 2. System Software 3. Multimedia Systems	25	75	100
43	IV	Skill Based Subject IV	Paper-4	3	3	ASP .NET	25	75	100
44	V	Extension Activities		0	1		100	0	100
				30	**25**		**275**	**525**	**800**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	4	8	100+100 (I + III SEM)	200
	Allied (Even Semester)	2	6+4	10	100+100 (II + IV SEM)	200
	Allied Practical	1	2	2	100	100
	Electives	3	3	9	100	300
	Core	9	(3-6)	35	100	900
	Core Practical	8	(2-3)	22	100	800
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**43**		**140**		**4300**

THIRUVALLUVAR UNIVERSITY

B.Sc. COMPUTER SCIENCE

SYLLABUS
UNDER CBCS
(with effect from 2017 - 2018)

SEMESTER I

PAPER – 1
Digital Logic & Programming in C

Objective:

Provide basic knowledge on Digital Electronics to understand the working principles of Digital computer and to develop programming skill using C language.

UNIT I: Number systems and Boolean algebra

Number Systems - Decimal, Binary, Octal, Hexadecimal and their inter conversions, - Binary Arithmetic -1's complement, 2's complement and 9's complement .Binary codes - BCD, Excess-3, Graycode.

Boolean Algebra: Boolean Laws - Simplification of Boolean Functions - Logic gates and Truth Table – Universal Gates (NAND and NOR) - The K-map method up to five variables, don't care conditions, POS & SOP forms.

UNIT-II: Combinational and Sequential Circuits

Combinational Logic: Half/Full adder/subtractor, code conversion, Multiplexers, de multiplexers, encoders, decoders, Combinational design using MUX & DEMUX. BCD adder, magnitude comparator.

Sequential logic: Flip flops (RS, Clocked RS, D, JK, JK Master Slave)-Counters & types Synchronous and Asynchronous counters- Registers, Shift registers and their types.

UNIT –III: C Basics and Control constructs

C fundamentals- Operators- Constants- Expression – Library functions- Decision making and branching- Switch- FOR,WHILE, DO WHILE loops-continue-break

Unit IV: Arrays, Functions and Structures

Arrays-Multi dimensional arrays- User defines functions- Call by Value and reference-Recursion- Storage classes- Structures and Union –Self referential structures

Unit – V: Pointers and Files

Pointers- Pointer operations and Arithmetic- File management in C : File opening and closing- - I/O operations on files - Error handling during I/O operations - Random access to files - Command line arguments

Text Book:

1. Morris Mono M. "**Digital Logic and Computer Design**",PHI Latest Pub. Ed. (Unit I and 2)
2. ReemaThareja,**" Programming in C "** Oxford University Press 2014

Reference Book

1. Albert Paul Malvino, Donald P Leach, **Digital principles and applications** TMH, 1996.
2. Balagurusamy," Programming in C" TMH

CORE PRACTICAL – I

PROGRAMMING IN C - LAB

1. Summation of Series: Sin(x) (Compare with built in functions)
2. Summation of Series Cos(x) (Compare with built in functions)
3. Counting the no. of vowels, consonants, words, white spaces in a line of text
4. Reverse a string & check for palindrome without built in string function
5. ${}^{n}P_{r}$, ${}^{n}C_{r}$ in a single program using function
6. Matrix Addison, subtraction and multiplication
7. Linear Search of a number in an array
8. Sorting an array in ascending and descending order
9. Finding maximum and minimum of list of numbers
10. Call by value and call by reference of functions
11. Employee pay bill using structure
12. Preparing an EB bill using file

ALLIED

1. MATHEMATICS – I

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ.

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians - Concepts of polar co-ordinates - Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.
3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

2. MATHEMATICAL FOUNDATIONS - I

Objectives

To know about Logical operators, validity of arguments, set theory and set operations, relations and functions, Binary operations, Binary algebra, Permutations & Combinations, Differentiation, Straight lines, pair of straight lines, Circles, Parabola, Ellipse, Hyperbola.

UNIT-I: SYMBOLIC LOGIC

Proposition, Logical operators, conjunction, disjunction, negation, conditional and bi-conditional operators, converse, Inverse, Contra Positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

UNIT-II: SET THEORY

Sets, set operations, venndiagram, Properties of sets, number of elements in a set, Cartesian product, relations & functions,

Relations : Equivalence relation. Equivalence class, Partially and Totally Ordered sets,

Functions: Types of Functions, Composition of Functions.

UNIT-III: BINARY OPERATIONS

Types of Binary Operations: Commutative, Associative, Distributive and identity, Boolean algebra: simple properties. Permutations and Combinations.

UNIT-IV: DIFFERENTIATION

Simple problems using standard limits,

$\lim_{x \to a} \frac{x^n - a^n}{x - a}$, $\lim_{x \to 0} \frac{\sin x}{x}$, $\lim_{x \to 0} \frac{\tan x}{x}$, $\lim_{x \to 0} \frac{e^x - 1}{x}$, $\lim_{n \to \infty} (1+1/n)^n$, $\lim_{n \to 0} (1+n)^{1/n}$

Differentiation, successive differentiation, Leibnitz theorem, partial differentiation, Applications of differentiation, Tangent and normal, angle between two curves.

UNIT-V: TWO DIMENSIONAL ANALYTICAL GEOMETRY

Straight Lines - Pair Straight Lines

Text Book.

P.R. Vittal, Mathematical Foundations – Maragham Publication,

Chennai.

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V.Sundaram& Others, Dircrete Mathematical Foundation - A.P.Publication, sirkali.
3. P.Duraipandian& Others, Analytical Geometry 2 Dimension - Emerald publication 1992 Reprint.
4. Manicavachagompillay&Natarajan. Analytical Geometry part I - Two Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

SEMESTER II

CORE THEORY PAPER – 2

C++ AND DATA STRUCTURE

Objective: To develop Object oriented programming skills using C++ and to introduce data structure concepts.

UNIT-I: Object Oriented Concepts and C++

C++ Fundamentals - Operators, Expressions and Control Structures: If,If..Else, Switch - Repetitive Statements- for,while,do..while - Input and Output in C++ - manipulators-manipulators with parameters. - Pointers and arrays

UNIT-II: Functions and Classes

Functions in C++ - Main Function - Function Prototyping - Parameters Passing in Functions - Values Return by Functions - inline Functions - Function Overloading.
Classes and Objects; Constructors and Destructors; and Operator Overloading - Type of Constructors

UNIT – III: Inheritance, Polymorphism & Files

Inheritance : Single Inheritance - Multilevel inheritance - Multiple inheritance - Hierarchical Inheritance - Hybrid Inheritance - Polymorphism - Working with Files : Classes for File Stream Operations - Opening and Closing a File - End-of-File Detection - Updating a File - Error Handling during File Operations .

UNIT-IV: Fundamental Data Structures

Definition of a Data structure - primitive and composite Data Types, Stacks (Array) - Operations –Linked Stack-Operations- Applications of Stack (Infix to Postfix Conversion).

Queue (Array)- operations-Linked Queue- Operations- - Singly Linked List - Operations, Application of List (Polynomial Addition)-. Doubly Linked List - Operations.

UNIT-V : Trees and Graphs

Trees: Binary Trees –Binary Search Tree- Operations - Recursive Tree Traversals-Recursion. Graph - Definition, Types of Graphs, Graph Traversal –Dijkstras shortest path- DFS and BFS.

Text Books

1. Mastering in C++, K.R.Venugopal, Raj Kumar, T.Ravisankar – McGraw Hill, 2011.
2. C++ Plus Data Structure by Nell Dale, Narosa Publications, 2000

Reference Books:

1. Reema Thareja, Object Oriented Programming with C++, Oxford University Press, 2015
2. Balagurusamy, C++ programming, TMH.
3. Fundamentals of Data Structures in C++ by Ellis Horowitz, Sartaj Sahni and Dinesh Mehtha, Second Edition, University Press
4. Data Structures using C++ by Varsha H.Patil. Oxford University Press, 2012

PRACTICAL – II

C++ & DATA STRUCTURE - LAB

1. Implementing classes, object, constructors and member functions for calculating area and perimeter of a circle.
2. Implementing function overloading (Find area/volume of rectangle, circle, sphere, cylinder, cone etc).
3. Implementing operator over loading(Addition, subtraction, multiplication of matrices)
4. Implementing single, multiple, hierarchical inheritance.
5. Implementing sequential file operations using error handling functions.
6. Implementing PUSH, POP operations of stack using Arrays.
7. Implementing add, delete operations of a queue using Arrays.
8. Implementing Infix to postfix conversion of an expression using stack
9. Implementing Binary search tree recursive traversals (in-order, pre-order, post-order).
10. Implementing Polynomial addition using linked list.

ALLIED - 2

1. MATHEMATICS – II

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume - Fourier series for functions in $(0,2\pi)$ and $(-\pi, \pi)$.

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Guass, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

2. MATHEMATICAL FOUNDATIONS II

Objectives

To know about Matrix Operations, Symmetric, Skew-Symmetric, Hermitian, Skew-Hermitian, Orthogonal, Unitary Matrices. Rank of a Matrix Solutions of linear equations Consistency and Inconsistency, Characteristic roots and Characteristics Vectors, Cayley - Hamilton Theorem, Integration of rational functions, Integration by parts, Reduction formulae, Area and volume using integration, Planes, Straight lines, Spheres, Curves, Cylinders.

UNIT-I: MATRICES

Multiplication of matrices, Singular and Non-Singular matrices, Adjoint of a Matrix, Inverse of a matrix Symmetric and Skew-Symmetric, Hermitian and Skew-Hermition, Orthogonal and unitary matrices, Rank of a matrix, Solution of Simultaneous Linear equations by

(i) Cramer's rule.

(ii) Matrix Inversion Method.

UNIT-II: MATRICES

Test for Consistency and Inconsistency of linear equations, (Rank Method), characteristic roots and characteristic vectors, Cayley - Hamilton theorem, matrix of linear transformations: reflection about the x, y axes and the line y=x, rotation about the origin through an angle, expansion or compression, shears, translation.

UNIT-III

Integration Simple problems, integration of rational function involving algebraic expressions of the form

$$\frac{1}{\sqrt{ax^2+bx+c}}, \frac{1}{\sqrt{ax^2+bx+c}\sqrt{ax^2+bx+c}}, \frac{px+q}{\sqrt{ax^2+bx+c}}, \frac{px+q}{\sqrt{ax^2+bx+c}\sqrt{ax^2+bx+c}}, \sqrt{px+q}$$

integrations using simple substitutions integrations involving trigonometric functions of the form

$$\frac{1}{a+b\cos x}, \frac{1}{a^2\sin^2 x+b^2\cos^2 x},$$ Integration by parts.

UNIT-IV

Properties of definite integrals. Reduction formulae for

$\int x^n e^{ax} dx$, $\int \sin^n x dx$, $\int \cos^n x dx$, $\int x^m (1-x)^n dx$, applications of integration for (i) Area under plane caurves, (ii) Volume of solid of revolution.

UNIT-V: ANALYTICAL GEOMETRY OF THREE DIMENSION

Planes, straight lines.

Text Book.

P.R.Vittal, Mathematical Foundations - Margham Publication, Chennai.

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V.Sundaram& Others, Dircrete Mathematical Foundation - A.P.Publication, sirkali.
3. P.Duraipandian& Others, Analytical Geometry 3 Dimension – Emerald publication 1992 Reprint.
4. Manicavachagompillay&Natarajan. Analytical Geometry part II - three Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

SEMESTER III

CORE THEORY PAPER – 3

JAVA Programming

Objectives:

To improve Object Oriented Programming gathered already through an independent platform.

Unit – I: BASICS, ESSENTIALS, CONTROL STATEMENT AND CLASSES & OBJECTS

Computer and its Languages – Stage, Origin and Features for Java - JDK–OOP; Java Essentials: Program – API - Variables& Literals - Data Types - String Class – Operators - Type conversion - Constants - Scope – Comments - Keyboard Input; Control Statements: Conditional Statements – Looping Statements - Break and Continue Statements; Classes and Objects: Modifiers - Arguments - Constructors - Packages and import - Static Class - Overloaded Methods and Constructors - Returning Objects – to String() - this reference –Enumeration - Garbage Collection.

Unit – II: ARRAYS, INHERITANCE, INTERFACES AND PACKAGES

Arrays - Three or More Dimensions; Inheritance: Basics - Calling the Super class Constructor - Overriding Super class Methods - Inheritance from Subclasses – Polymorphism -Abstract Classes and Methods - Interfaces: Fields - Multiple inheritance - Interface inheritance; Packages: Creating packages – Accessing package from other packages- Access Specifier.

Unit – III: STRING HANDLING, EXCEPTION HANDLING AND MULTI THREADING

String Handling: Basics - Operations –String Methods - String Buffer class - String Builder – to String method -String Tokenizer class. Exception Basics: try and catch block - Multiple catch block - Nested try - throws keyword - Throw vs Throws - Final Vs Finally Vs Finalize - Method Overriding - Custom Exception - Multithreading: Life Cycle - Methods in Thread - thread application – Thread priority – Synchronization - Inter-thread communication - Suspending, Resuming, and Stopping Threads;

Unit – IV: APPLET AND GUI APPLICATION

Applets: Basis - Lifecycle - Applet classes - Application – Graphics; AWT-I: GUI Programming - AWT classes - Windows fundamentals- Creating Windows - Dialog Boxes - Layout Managers - Radio Buttons and Check Boxes – Borders- Swing

Unit – V: JAVA DATABASE CONNECTIVITY

JDBC - Types of Drivers- Architecture- Classes and Interfaces - Developing JDBC Application - New Database and Table with JDBC - Working with Database Metadata.

Text Book

1. S.Sagayaraj, R.Denis, P.Karthik & D.Gajalakshmi, "Java Programming", Universities Press, 2017

References

1. Patrick Naughton and Herbert Schildt. "The Complete Reference JAVA 2". 3rd Edition. Tata McGraw-Hill Edition, 1999.
2. Muthu C. "Programming with JAVA". 2nd Edition. Vijay Nicole Imprints, 2011.
3. Ken Arnold Gosling and Davis Holmen. "The Java Programming Language". 3rd Edition. Addition Wesley Publication.

Core Practical

Practical 3- JAVA Programming LAB

List of Practical's

1. Implementing Package, inheritances and interfaces
2. Implementing Flow, Border and Grid Layouts
3. Implementing Dialogs , Menu and Frame
4. Implementing User defined Exception Handling
5. Implementing Multithreading
6. Implementing I/O Stream File handling
7. Implementing a Calculator using Swing
8. CRUD operation Using JDBC
9. Client Server using TCP and UDP Socket
10. GUI application with JDBC

ALLIED - 3

1. PHYSICS - I

UNIT – I: PROPERTIES OF MATTER

Elasticity : Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula .

Surface Tension: Surface Tension – Surface Tension and interfacial surface tension by the method of drops.

UNIT – II: HEAT

Heat: Specific heat – Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power.
Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Super conductors. Type I and II – Meisner Effect – Helium I and II.

UNIT – III: ELECTRICITY AND MAGNETISM

Electricity: Potentiometer – Principle – Calibration of low range voltmeter – Measurement of internal resistance of cell – measurement of an unknown resistance.

Magnetism – Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer in Tan C position and the vibration magnetometer.

UNIT – IV: SOUND AND ACOUSTICS OF BUILDING

Sound: Transverse vibration of strings – Velocity and frequency of vibrations of a stretched string – laws – sonometer – A.C. Frequency – Steel Wire – Brass wire.

Ultrasonics – Production by Piezo – electric method – properties and uses.
Acoustics of buildings: Reverberation – Reverberation time – Sabine's formula (definition only) – Sound absorption co-efficient of surface – conditions for the perfect acoustics.

UNIT – V: OPTICS

Interference: Air Wedge – Description – Test for optical flatness of glass plate – Determination of diameter of a thin wire by air wedge.

Diffraction: Theory of transmission grating – Normal Incidence – Determination of Wavelength of monochromatic source and Wavelength of mercury line using a grating by normal Incidence.

Fibre optics: principle-classification of optical fibres-fibre optic communication system block diagram.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Introduction to Fibre optics- K.Thyagarajan and Ajay Ghatak,Cambridge,University Press(1999).

ALLIED

2. STATISTICAL METHODS AND THEIR APPLICATIONS I

Objective
To understand and computing statistical Methods by which to develop the programming Skills.

UNIT-I
Introduction - scope and limitations of statistical methods - classification of data - Tabulation of
data - Diagrammatic and Graphical representation of data - Graphical determination of Quartiles ,Deciles and Percentiles.

UNIT-II
Measures of location : Arithmetic mean, median, mode, geometric mean and Harmonic mean and their properties.

UNIT-III
Measures of dispersion : Range, Quartile deviation, mean deviation, Standard deviation, combined Standard deviation, and their relative measures.

UNIT-IV
Measures of Skewness Karl Pearson's, Bowley's, and kelly's and co-efficient of Skewness and kurtosis based on moments.

UNIT-V
Correlation - Karl Pearson - Spearman's Rank correlation - concurrent deviation methods.
Regression Analysis: Simple Regression Equations.

Note : The proportion between theory and problems shall be 20:80

Books for Reference:
1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII
3. Elements of Statistics - Mode . E.B. - Prentice Hall
4. Statistical Methods - Dr. S.P. Gupta - Sultan Chand & Sons

Skill Based Subject –Paper 1

DESIGN AND ANALYSIS OF ALGORITHMS

Objective: To build a solid foundation of the most important fundamental subject in computer science. Creative thinking is essential to algorithm design and mathematical acumen and programming skills.

UNIT -I: ALGORITHM AND ANALYSIS

What is an Algorithm? - Algorithm Specification- Performance Analysis- Randomized Algorithms.

UNIT - II: DIVIDE AND CONQUER

General Method - Binary Search - Finding the Maximum and Minimum-Merge Sort - Quick Sort - Selection Sort- Stassen's Matrix Multiplications.

UNIT - III: THE GREEDY METHOD

The General Method - Knapsack Problem – Tree Vertex Splitting - Job Sequencing with Deadlines - Minimum Cost Spanning Trees - Optimal Storage on Tapes - Optimal Merge Pattern - Single Source Shortest Paths.

UNIT - IV: DYNAMIC POGRAMMING

The General Method – Multistage Graphs - All pair shortest path - String Editing - 0/1 Knapsack – Reliability Design - The Traveling Salesperson Problem

UNIT - V: TRAVERSAL, SEARCHING & BACKTRACKING

Techniques for Binary Trees- Techniques for Graphs - The General Method - The 8-Queens Problem – Sum of Subsets- Graph Colouring- Hamiltonian Cycles

TEXT BOOK

Fundamentals of Computer Algorithms, Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Galgotia Publications, 2015.

REFERENCE BOOKS:

1. Introduction to Algorithms ,Coremen T.H.,Leiserson C.E. and Rivest R.L., PHI 1998.

2. Introduction to the Design and Analysis of Algorithms, AnanyLevitin, Pearson Education, 2nd Edition.

Non- Major Elective-1 Paper-1

Introduction to Information Technology

Objectives:

To enable the student to be proficient with Information Technology with a better knowledge of Computer

UNIT – I Introduction to Computers:

Definition - Characteristics of a Computer - Classification of Computers - Basic Anatomy of the Computer - Applications / Uses of Computers in different fields

UNIT – II Input and Output Devices:

Input Devices - Output Devices - Data Representation - Programming Languages / Computer Languages - Software: System Software - Application Software

UNIT – III Data Communication and Computer Networks:

Data Communication - Computer Network - The Uses of a Network - Types of Networks - Network Topologies- Transmission Media: Guided Transmission Media - Wireless Transmission

UNIT – IV Internet and its Applications:

History of Internet - Uses of Internet - Advantages of Internet - ISP - Internet Services - IP Address - Web Browser - URL - DNS - Internet Explorer - Types of internet connections - E-mail - Search Engine.

UNIT – V Operating System:

Evolution of operating systems - Function of Operating System - Classification of Operating –System - Example of Operating System – DOS –Windows – UNIX - Linux

TEXT BOOKS:

1. Alexis Leon and Mathews Leon, "Fundamentals of Information Technology", Vikas Publishing House Pvt. Ltd.
2. Introduction to Information Technology, P.Rizwan Ahmed, Second Edition, Margham Publications, 2016
3. Introduction to Information Technology, PelinAksoy, Laura DeNardis, Cengage Learning India Private Limited.

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SEMESTER IV

CORE THEORY PAPER – 4

DATABASE MANAGEMENT SYSTEM

Objective: To incorporate a strong knowledge on databases to students

UNIT - I Database Basics

Introduction: Flat File – Database System – Database – Actionable for DBA. The Entity – Relationship Model: Introduction – The Entity Relationship Model. Data Models: Introduction – Relational Approach – The Hierarchical Approach – The Network Approach.

UNIT – II Relational Algebra

Structure of Relational Databases – Fundamental Relational Algebra Operations – Additional Relational Algebra Opearations - Extended Relational Algebra Operations - Null Values - Modification of the Database - The Tuple Relational Calculus – The Domain Relational Calculus

UNIT – III Normalization

Normalization: Introduction - Normalization – Definition of Functional Dependence (FD) – Normal Forms: 1NF, 2NF, 3NF and BCNF.

UNIT – IV Structured Query Language

Structured Query Language: Features of SQL – Select SQL Operations – Grouping the Output of the Query – Querying from Multiple Tables – Retrieval Using Set operators – Nested Queries. T-SQL – Triggers and Dynamic Execution: Transact-SQL..

UNIT – V Procedural Language

Procedural Language- SQL: PL/SQL Block Structure – PL/SQL Tables. Cursor Management and Advanced PL/SQL: Opening and Closing a Cursor – Processing Explicit Cursor – Implicit Cursor – Exception Handlers – Sub Programs in PL/SQL – Functions – Precaution While Using PL/SQL Functions – Stored Procedure – Object Oriented Technology.

Text Book

1. Rajesh Narang, "Database Management Systems", PHI Learning Private Limited, New Delhi, sixth printing, 2010.

Reference

1. S.K. Singh, "Database Systems – Concepts, Design and Appplications", Dorling Kindersley (India) Pvt. Ltd., Second Impression, 2008

2. Database System Concepts , Abraham Silberchatz, Henry F Korth , S.Sudarshan, McGraw-Hill - 5th Edition - 2006.

Core Practical

Practical 4- RDBMS LAB

1. Table creation and simple Queries
2. Queries using Aggregate Function and Set Operations
3. Table creation with various Joins
4. Nested Sub queries and correlated Sub queries
5. View creation and manipulation
6. PL/SQL program for cursor
7. PL/SQL program for packages
8. PL/SQL program for triggers and its type
9. PL/SQL program for procedures and functions

ALLIED - 2

1. PHYSICS II

UNIT – I: WAVE MECHANICS

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

UNIT – II : NUCLEAR PHYSICS

Particle accelerators – cyclotron, particle detectors – GM Counter Artificial Transmutation – Rutherford's Experiment – The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions.

Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy – Conservation of Parity – Quantities conserved and quantities not conserved in a nuclear reaction.

UNIT – III : ENERGY PHYSICS

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

UNIT – IV: CRYSTALLOGRAPHY

Crystallography : The crystal structure – Unit Cell –Bravais lattice- structures of simple cubic-BCC and FCC- co ordination number, packing factor calculation for the above structures –Hexogonal closed packed(HCP) structure -Miller indices – concept of Reciprocal Vectors.

UNIT – V: ELECTRONICS

Electronics: Transistor characteristics in common base and common emitter mode- Transistor single stage amplifier- Expression for input impedence, output impedence and current gain.
Digital Electronics : NAND and NOR as universal building blocks- De Morgan's theorem –statement and proof- Fabrication of diodes and transistors using Monolithic technology–limitations.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
9. Introduction to Solid State Physics – C. Kittel, 5^{th} Edition Wiley Eastern Ltd.
10. Renewable & Sustainable energy sources – Agarwal.

ALLIED

2. STATISTICAL METHODS AND THEIR APPLICATIONS II

Objective
To understand and computing statistical Methods by which to develop the programming Skills.

UNIT-I
Curve fitting by the methods of least squares -
$Y = a x + b$, $Y = a x^2 + b x + c$, $Y = a x^b$, $Y = a e^{bx}$

UNIT-II
Sample Space - events - probability - Addition and Multiplication Theorem - conditional probability -Baye's Theorem. Mathematical expectation Addition and Multiplication theorem, Chebychev's Inequality.

UNIT-III
Standard distributions - Binomial, Poisson, Normal distribution and fitting of these distributions.

UNIT-IV
Test of Significance- small sample and large sample test based on mean, S.D. correlation and
proportion - confidence interval.

UNIT-V
Analysis of variance - One and Two way classifications - Basic principle of design of Experiments - Randomisation, Replication and Local control - C.R.D., R.B.D. and L.S.D.

Books for Reference:
1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Fundamental of Applied Statistics - S.C. Gupta & V.K. Kapoor – Sultan Chand
3. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII
4. Elements of Statistics - Mode . E.B. – Prentice Hall

ALLIED PRACTICAL

1. PHYSICS
(Any 15 Experiments)

1. Young's modulus – non uniform bending – pin and microscope.
2. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
3. Ridigity modulus – Torsional oscillation method (without symmetric masses).
4. Determination of Co-efficient of Viscosity – Graduated Burette.
5. Surface Tension and Interfacial Tension – By drop weight method.
6. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
7. Sonometer – Determining A.C. Frequency. (Screw Gauge is given).
8. Sonometer – frequency of tuning fork.
9. Newton's Rings – Radius of Curvature.
10. Air Wedge – Determination of thickness of thin wire.
11. Spectrometer Grating – Minimum Deviation – Mercury Lines.
12. Spectrometer – Refractive Index of a liquid – Hollow Prism.
13. Potentiometer – Calibration of High Range Ammeter.
14. Potentiometer – Calibration of Low Range Voltmeter.
15. Determination of M and B_H using Deflection Magnetometer in Tan C position and vibration magnetometer.
16. Figure of merit and voltage sensitiveness of table galvanometer.
17. Construction of AND, OR gates using diodes and NOT by transistors.
18. Zener diode – Voltage Regulation.
19. NAND / NOR as universal gate.
20. Demorgan's theorem verification.

ALLIED PRACTICAL

2. STATISTICAL METHODS AND THEIR APPLICATIONS - Practical

ALLIED PRACTICAL

1. Formation of uni-variate and bi-variate frequency distribution
2. Diagrams and Graphs
3. Measures of Location
4. Measures of Dispersion
5. Skewness and Kurtosis
6. Correlation and Regression
7. Curve Fitting : $y = ax+b$, $y=ax^2+bx+c$, $y=ax^b$, $y=ae^{bx}$
8. Fitting of distributions - Binomial, Poisson, Normal
9. Test of significance small sample and large sample tests
10. Analysis of Variance: one way classification, Two way classification and Design of Experiments - C.R.D, R.B.D & L.S.D

BOOKS FOR REFERENCE:

1. Statistical Methods by S.P. Gupta, Sultan chand & Sons
2. Fundamental of Applied Statistics - S.C. Gupta & V.K. Kapoor

Note:
Use of Scientific Calculator shall be permitted for Practical Examination. Statistical Table may be provided to the students at the Examination Hall.

Skill Based Subject II –Paper 2

Computer Organisation and Architecture

Objective: To enable the student to have a better understanding of architecture of computer and prepare the student for higher level of programming

UNIT - I

Instruction Codes – Computer Registers – Computer Instructions – Timing and Control – Instruction Cycle – Memory Reference Instructions – Input-Output and Interrupts.

UNIT - II

Control Memory – Address Sequencing – Micro program Examples – Design of Control Unit.

UNIT - III

Introduction – General Register Organization – Instruction Formats – Addressing Modes.

UNIT – IV

Peripheral Devices – I/O interface – Asynchronous Data Transfer – Modes of Transfer - Direct Memory Access – Input Output Processor (Excluding IBM and Intel IOPs).

UNIT - V

Auxiliary Memory – Main Memory – Auxiliary Memory - Associative Memory – Cache Memory -Virtual Memory.

TEXT BOOK

1. Morris Mano M. Computer System Architecture. New Delhi **:**Prentice Hall of India Private Limited, 2011

REFERENCES

1. William Stallings . Computer Organization and Architecture. 8th edition. Pearson publication, 2010
2. Morris Mano. Digital Login and Computer Design. New Delhi :Prentice Hall of India Private Limited, 2001

NON MAJOR ELECTIVE II PAPER II

INTERNET AND ITS APPLICATIONS

Objective: To equip students to basics of Internet usage and prepare them for digital world

UNIT - I Internet Basics

Introduction to Computers Programming Language types History of Internet Personal computers History of World Wide Web- Micro software .NET Java-Web resources.

UNIT - II Web Browsers

Web Browsers - Internet Explorer - connecting to Internet Features of Internet explorer6 Searching the Internet- online help and tutorials - File Transmission Protocol (FTP) Browser settings.

UNIT - III E-Mail

Attaching a file, Electronic mail creating an E-mail id sending and Receiving mails - attaching a file - Instance messaging - other web browsers.

UNIT - IV HTML

Introduction to HTML headers – Linking - Images-special characters and line breaks unordered lists- simple HTML programs.

UNIT - V Digital Cash

E-marketing consumer tracking Electronic advertising search engine – CRM - credit card payments Digital cash and e-wallets micro payments- smart card

Text book

Internet and World Wide Web Third edition H.M.Deitel, P.J. Deitel and A.B.Goldberg - PHI Reference

The Internet- Complete Reference Harley hahn, Tata McGraw Hill

SEMESTER V

CORE THEORY PAPER – 5

MOBILE APPLICATIONS DEVELOPMENT

Objective:

This course aims to provide the students with a detailed knowledge on Mobile Application and Development and covers Android programming from fundamentals to building mobile applications for smart gadgets.

UNIT I Introduction to Mobile Applications:

Native and web applications - Mobile operating systems and applications - Mobile Databases. Android: History of Android - Android Features – OSS – OHA - Android Versions and compatibility - Android devices - Prerequisites to learn Android -– Setting up software – IDE - XML. Android Architecture: Android Stack - Linux Kernel - Android Runtime - Dalvik VM - Application Framework - Android emulator - Android applications.

UNIT II Android development:

Java - Android Studio – Eclipse – Virtualization – APIs and Android tools – Debugging with DDMS – Android File system – Working with emulator and smart devices - A Basic Android Application - Deployment. Android Activities: The Activity Lifecycle – Lifecycle methods – Creating Activity. Intents – Intent Filters – Activity stack.

UNIT III Android Services:

Simple services – Binding and Querying the service – Executing services.- Broadcast Receivers: Creating and managing receivers – Receiver intents – ordered broadcasts. Content Providers: Creating and using content providers – Content resolver. Working with databases: SQLite – coding for SQLite using Android – Sample database applications – Data analysis.

UNIT IV Android User Interface:

Android Layouts – Attributes – Layout styles - Linear – Relative – Table – Grid – Frame. Menus: Option menu – context menu - pop-up menu – Lists and Notifications: creation and display. Input Controls: Buttons-Text Fields-Checkboxes-alert dialogs-Spinners-rating bar-progress bar.

UNIT V Publishing and Internationalizing mobile applications :

Live mobile application development: Game, Clock, Calendar, Convertor, Phone book. App Deployment and Testing: Doodlz app – Tip calculator app – Weather viewer app.

Text Books

Barry Burd, "Android Application Development – All-in-one for Dummies", 2nd Edition, Wiley India, 2016.

Reference:

1. Paul Deitel, Harvey Deitel, Alexander Wald, " Android 6 for Programmers – An App-driven Approach", 3rd edition, Pearson education, 2016.
2. Jerome (J. F) DiMarzio, "Android – A Programmer"s Guide", McGraw Hill Education, 8th reprint, 2015.
3. http://www.developer.android.com

CORE THEORY PAPER - 6

OPERATING SYSTEM

Objective: Enable the student to get sufficient knowledge on various system resources.

Unit – I Operating System Basics

Basic Concepts of Operating System - Services of Operating System-Classification of Operating System- Architecture and Design of an Operating System-Process Management -Introduction to Process-Process State -PCB - Process Scheduling - Interprocess Communication

Unit –II Operating System Scheduling

CPU Scheduling**:** Introduction - Types of CPU Scheduler - Scheduling Criteria - Scheduling Algorithms - FCFS Scheduling – SJF Scheduling;-Priority Scheduling - Round-Robin Scheduling- Multilevel Queue Scheduling - Deadlock - Basic Concept of Deadlock- Deadlock Prevention - Deadlock Avoidance- Deadlock - Detection and Recovery

Unit- III Memory management

Memory Management - Basic Concept of Memory - Address Binding; Logical and Physical Address Space- Memory Partitioning - Memory Allocation-Protection-Fragmentation and Compaction

Unit – IV Swapping

Swapping- Using Bitmaps - Using Linked Lists- Paging-Mapping of Pages to Frames - Hierarchical Page Tables- Segmentation - Virtual Memory - Basic Concept of Virtual Memory- Demand Paging - Transaction Look aside Buffer (TLB) - Inverted Page Table-Page Replacement Algorithms

Unit –V File Management

File Management - Basic Concept of File-Directory Structure-File Protection-Allocation Methods – Various Disk Scheduling algorithms

Text Books:

Abraham Silberschatz Peter B. Galvin, G. Gagne, “Operating System Concepts”, Sixth Edition, Addison Wesley Publishing Co., 2003.

Reference

1. Operating systems - Internals and Design Principles, W. Stallings, 6th Edition, Pearson
2. Willam-Stalling “Operating System” Fourth Edition, Pearson Education, 2003.

CORE THEORY PAPER – 7

DATA COMMUNICATION & NETWORKS

Objective:

To equip students to basics of Data Communication and prepare them for better computer networking

UNIT I

Introductory Concepts - Network hardware - Network software – Network Architecture - Physical layer - Guided transmission media - Cable television.

UNIT II

Data Link Layer - Design issues - Channel allocation problem - Multiple access protocols - Ethernet - Wireless LAN - 802.11 architecture.

UNIT III

Network Layer : Design issues, Routing Algorithms, Shortest path routing, Flooding, Broadcast & Multicast routing congestion, Control & internetworking.

UNIT IV

Transport Layer - Transport service - Elements of transport protocols - User Datagram Protocol - Transmission Control Protocol.

UNIT V

Application Layer - DNS - Electronic mail - World Wide Web - Multimedia - Network security.

TEXT BOOK

1. Tannenbaum, A.S., 2003 : Computer Networks, Prentice Hall.

REFERENCES

1. Stallings, William, 2008: Local and Metropolution Area Networks: An Introduction, Macmillian Publishing Co.
2. Black: Data Network, Prentice Hall of India.
3. W. Stallings, "Data and Computer Communication", Pearson Education, Fifth Edition, 2001

Core Practical – 5

Mobile Applications Development – Lab

1. Intent and Activity
2. Using Controls
3. Alert Dialogs
4. List View
5. Options Menu
6. Seek Bars
7. Shared Preferences
8. Status Bar Notifications
9. Tab Widgets Talking Clock.
10. Tween Animation
11. Grid View
12. Internal Storage - Files
13. SQlite - Database
14. Google Map
15. Permissions

Core Practical – 6

Operating System Lab

1. Implementing the Process system calls.
2. Implementing I/O system calls.
3. Implementing IPC using message queues.
4. Implementing CPU& scheduling algorithm for first come first serve scheduling.
5. Implementing CPU scheduling algorithm for shortest job first scheduling.
6. Implementing perform priority scheduling.
7. Implementing CPU scheduling for Round Robin Scheduling.
8. Implementing pipe processing.
9. Implementing first fit, best fit algorithm for memory management.
10. A program to simulate producer-consumer problem using semaphores.
11. A Shell Program to find factorial of a given number
12. A shell program to generate Fibonacci number

Elective – 1 Paper – 1

A. DATA MINING

Objective: Enable the student to get sufficient knowledge on various system resources.

UNIT - I: Data Mining Basics

Introduction: Definition of data mining - data mining vs. query tools - machine learning - steps in data mining process - overview of data mining techniques.

UNIT - II: Data Models

Multidimensional Data Model - Data Cube - Dimension Modeling - OLAP Operations - Meta Data - Types of Meta Data.

UNIT - III: Data Editing

Data Pre-Processing and Characterization: Data Cleaning - Data Integration and Transformation - Data Reduction - Data Mining Query Language - Generalization - Summarization - Association Rule Mining

UNIT - IV: Classification

Classification: Classification - Decision Tree Induction - Bayesian Classification - Prediction - Back Propagation - Cluster Analysis - Hierarchical Method - Density Based Method - Grid Based Method - Outlier Analysis.

UNIT - V: Analysis

Cluster analysis: Types of data - Clustering Methods - Partitioning methods - Model based clustering methods - outlier analysis. Advanced topics: Web Mining - Web Content Mining - Structure and Usage Mining - Spatial Mining - Time Series and Sequence Mining.

TEXT BOOKS:

1. PaulrajPonnaiah, “Data Warehousing Fundamentals”, Wiley Publishers, 2001.

2. Jiawei Han, MichelineKamber, “Data Mining: Concepts and Techniques”,Morgan Kaufman Publishers, 2006.

REFERENCES:

1. Usama M. Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth Ramasamy Uthurusamy, "Advances in Knowledge Discover and Data Mining", the M.I.T. Press, 2007.
2. Ralph Kimball, Margy Ross, The Data Warehouse Toolkit, John Wiley and Sons Inc., 2002
3. Alex Berson, Stephen Smith, Kurt Thearling, "Building Data Mining Applications for CRM", Tata McGraw Hill, 2000.
4. Margaret Dunham, "Data Mining: Introductory and Advanced Topics", Prentice Hall, 2002.
5. Daniel T. Larose John Wiley & Sons, Hoboken, "Discovering Knowledge in Data: An Introduction to Data Mining", New Jersey, 2004

B. COMPUTER GRAPHICS

Objectives: To equip students to basics of computer drawing and prepare them for computer modelling of objects

UNIT – I : OVERVIEW OF GRAPHICS SYSTEMS AND OUTPUT PRIMITIVES

Video Display Devices- Raster Scan System- Random Scan Systems- Hard Copy Deices- Graphic Software- Line Drawing Algorithms: DDA- Bresenham's Line -Circle Generating Algorithms

UNIT – II : ATTRIBUTES AND TWO DIMESIONAL TRANSFORMATIONS

Line Attributes- Curve Attributes-Color And Gray Scale Level- Area Fill Attributes- Character Attributes- Inquiry Functions- Basic Transformations - Composite Transformation – Other transformation

UNIT – III : TWO DIMENSIONAL VIEWING AND CLIPPING

The Viewing Pipeline- Window To Viewport Transformation –Clipping Operations- Point Clipping- Line Clipping: Cohen Sutherland- Liang Barsky-Sutherland Hodgeman Polygon Clipping- Text Clipping- Exterior Clipping- Logical Classification Of Input Devices- Interactive Picture Construction

UNIT – IV : THREE DIMENSION TRANSFORMATION, VIEWING AND CLIPPING

Translation-Rotation-Scaling-Viewing Pipeline- Viewing Coordinates- Projections -View Volumes and General Projection Transformation- Clipping -

UNIT – V : VISIBLE SURFACE DETECTION METHODS

Classification of Visible Surface Detection Algorithms - Back Face Detection - Depth Buffer Method - A Buffer Method - Scan Line Method - Depth Sorting Method- BSP Tree Method -Area Sub Division Method - Octree Methods - Ray Casting Method

TEXT BOOK:

Computer Graphics(C version) , Donald Hearn and M.Pauline Baker, Pearson- 2nd Edit. 2012.

REFERENCE BOOKS:

1. Interactive Computer Graphics–A top down approach using Open GL, Edward Angel , Pearson, 5th Edition.

2. Computer Graphics, Peter Shirley, Steve Marschner, Cengage Learning, Indian Edition,2009

C. INFORMATION SECURITY

Objective: To enable the student to understand various methodology available for securing information

UNIT I Information Security Basics

INTRODUCTION -History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II Security Investigation

SECURITY INVESTIGATION - Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

UNIT III Security Analysis

SECURITY ANALYSIS-Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV Security Models

LOGICAL DESIGN-Blueprint for Security, Information Security Poicy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V Security Physical Design

PHYSICAL DESIGN-Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

Text Book

1. Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, Vikas Publishing House, New Delhi, 2003

Reference

1. Micki Krause, Harold F. Tipton, “ Handbook of Information Security Management”, Vol 1-3 CRC Press LLC, 2004.
2. Stuart McClure, Joel Scrambray, George Kurtz, “Hacking Exposed”, Tata McGraw-Hill, 2003
3. Matt Bishop, “Computer Security Art and Science”, Pearson/PHI, 2002.

Skill Based Subject 3 Paper – 3

SOFTWARE ENGINEERING

Objective:
This course introduces the concepts and methods required for the construction of large software intensive systems.

UNIT-I:
Introduction - Evolving Role of Software - Changing Nature of Software – Software Myths; A Generic View of Process: Layered Technology - Process Models: Waterfall Model - Evolutionary Process Models.

UNIT-II:
Requirements Engineering: Tasks - Initiating the Requirements Engineering Process - Eliciting Requirements - Building the Analysis Model - Requirements Analysis - Data Modelling Concepts.

UNIT-III:
Data Engineering: Design Process and Design Quality - Design Concepts - The Design Model Creating an Architectural Design: Software Architecture - Data Design - Architectural Design - Mapping Data Flow into Software Architecture; Performing User Interface Design: Golden Rules.

UNIT-IV:
Testing Strategies: Strategic Approach to Software Testing- Test Strategies for Conventional and Object Oriented Software - Validation Testing - System Testing -Art of Debugging. Testing Tactics: Fundamentals - White Box- Basis Path - Control Structure - Black Box Testing Methods

UNIT-V:
Project Management: Management Spectrum - People - Product - Process - Project. Estimation: Project Planning Process - Resources - Software Project Estimation - Project Scheduling - Quality Concepts - Software Quality Assurance - Formal Technical Reviews.

TEXT BOOK:
Roger S Pressman, ”Software Engineering - A Practitioner’s Approach”, Sixth Edition, McGraw Hill International Edition, New York: 2005.

REFERENCES:

1. Ian Somerville, “Software Engineering”, 7th Edition, Pearson Education, 2006.
2. Mall Rajib,” Software Engineering”, 2/E, PHI, 2006.

SEMESTER VI

CORE THEORY PAPER – 8

CLOUD COMPUTING

Objective:

To enable the students to learn the basic functions, principles and concepts of cloud Systems.

UNIT I: UNDERSTANDING CLOUD COMPUTING

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Cloud Services.

UNIT II: DEVELOPING CLOUD SERVICES

Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

UNIT III: CLOUD COMPUTING FOR EVERYONE

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events.

UNIT IV: PROGRAMMING MODEL

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Aneka, CloudSim.

UNIT V: SECURITY IN THE CLOUD

Security Overview - Cloud Security Challenges and Risks - Software-as-a-Service Security- Security Governance - Risk Management - Security Monitoring - Security Architecture Design - Data Security - Application Security - Virtual Machine Security - Identity Management and Access Control - Autonomic Security.

TEXT BOOK:

1. Michael Miller, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, August 2008.

REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.

4. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India, 2011.

5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly

CORE THEORY PAPER – 9

OPEN SOURCE PROGRAMMING

Objective:
To discuss techniques that can be effectively applied in practice about HTML5, JavaScript, PHP, CSS and Linux

UNIT I: INTRODUCTION TO HTML 5, JAVA SCRIPT, PHP AND CSS
Introduction to Dynamic Web content- HTTP and HTML- Request and Response Procedure- The Benefits of PHP, JAVA Script, CSS, and HTML5- Introduction to HTML5- The Canvas -The HTML5 Canvas- HTML5 Audio and Video- Introduction to CSS- CSS Rules-Style Types- CSS Selectors- CSS Colors.

UNIT-II: LINUX

Introduction : Linux Essential Commands – File system Concept – Standard Files – The Linux Security Model – Vi Editor – Partitions Creation – Shell Introduction – String Processing – Investigation and Managing Processes – Network Clients – Installing Application.

UNI- III: MYSQL

Introduction to MY SQL – The show Databases and Table – The USE command – Create Database and Tables – Describe Table – Select, Insert, Update, and Delete statement – Some Administrative detail – Table Joins – Loading and Dumping a Database.

UNIT-IV: PHP

PHP Introduction – General Syntactic Characteristics – PHP Scripting – Commenting your code – Primitives, Operations and Expressions – PHP Variables – Operations and Expressions Control -statement – Array – Functions.

UNIT – V PHP

Basic Form Processing – File and Folder Access – Cooking – Sessions – Database Access with PHP – MySQL - MySQL Functions – Inserting Records – Selecting Records – Deleting Records – Update Records.

Text Books

1. "Learning PHP, MySQL, Java Script, CSS and HTML5", Robin Nixon, O'Reilly Publications, 3rd Edition, 2014.
2. Steven Holzner, "HTML Black Book", Dreamtech Press &Paraglyph Press Publishers, 2007

Reference Books

Open Source Software, P.Rizwan Ahmed, Margham Publication, Chennai, 2015

Core Practical

PRACTICAL – VII

ASP.NET Lab

1. Implement Validation Controls
2. Write a Program to implement ad rotator control
3. Write a Program to implement state management techniques
4. Write a Program to implement view State and Session State.
5. Write a Program to displaying data with the grid view
6. Write a Program to implement ASP.Net Server Side Controls.
7. Write a Program to implement ASP.Net Master Pages, Themes and Skins.
8. Write a Program working with forms using ASP.Net
9. Write a Program working with pages using ASP.Net.
10. Write a Program to access data sources through ADO.NET

Core Practical

PRACTICAL – VIII

Open Source Programming Lab

1. Create a web page with Frames and Tables.
2. Create a web page incorporating CSS (Cascading Style Sheets)
3. Write a shell program to find the factorial of an integer positive number
4. Write a shell program for checking whether a given string is a palindrome or not.
5. Create a simple calculator in Java script.
6. Write a JavaScript program to scroll your name in the scroll bar.
7. Develop a program and check message passing mechanism between pages.
8. Develop a program and check file system functions, date &time functions.
9. Create a student database table in MYSQL and manipulate records (insert, delete, update) records in a web browser.
10. Develop a program using cookies and session.

Elective II PAPER – 2

(A) SOFTWARE TESTING

Objective: To make the student more proficient with error free software development

UNIT-I PRINCIPLES OF TESTING

A test in time - The cat and the saint - Test the tests first - The Policemen on the bridge - Phase of software project - Quality, Quality Assurance and Quality Control - Testing, Verification and Validation -Process model to represent different phases - Life cycle models.

UNIT-II BLACK BOX AND WHITE BOX TESTING

White box testing - Challenges - Static testing - Structural testing - Black box testing.

UNIT-III INTEGRATION, SYSTEM AND ACCEPTANCE TESTING

Integration testing - Types - Phase of testing - Scenario testing - Defect bash - System and Acceptance testing: Overview - Functional vs. Non-Functional testing - Functional system testing - Non-functional testing-Acceptance testing.

UNIT-IV PERFORMANCE AND REGRESSION TESTING

Introduction - Factors Governing - Methodology for Performance testing - Tools and Process for Performance Testing - Regression Testing - Types of Regression testing - How to do Regression Testing?

UNIT-V INTERNATIONALIZATION AND ADHOC TESTING

Introduction to Internationalization - Primer on Internationalization - Test phases for Internationalization testing - Enabling testing - Locale testing - Internationalization Validation- Fake language testing - Language testing - Localization testing - Tools used for Internationalization - Challenges and Issues - Overview of Ad Hoc testing - Buddy, Pair, Exploratory, Iterative, Agile and Extreme Testing - Defect Seeding.

TEXT BOOK:

1. Srinivasan Desikan, Gopalaswamy Ramesh, “Software Testing: Principles and Practices”, Pearson Publications, 2006.

REFERENCES:

1. Renu Rajani, Pradeep Oak, “Software Testing- Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2004.
2. Boris Beizer, “Software Testing Techniques”, Dream Tech Press, Second Edition, 2003.

(B) MOBILE COMPUTING

Objective: To impart good knowledge of wireless communication to students

UNIT I :WIRELESS COMMUNICATION FUNDAMENTALS

Cellular systems- Frequency Management and Channel Assignment- types of handoff and their characteristics, dropped call rates & their evaluation -MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.

UNIT II :TELE COMMUNICATION NETWORKS & WIRLESS LAN

Telecommunication systems – GSM – GPRS - Satellite Networks ,Wireless LAN – IEEE 802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a -802.11b standards – HIPERLAN – Blue Tooth.

UNIT III: MOBILE NETWORK LAYER & TRANSPORT LAYER

Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR – Alternative Metrics. Traditional TCP, Mobile TCP

UNIT IV: APPLICATION LAYER

WAP Model- Mobile Location based services -WAP Gateway –WAP protocols – WAP user agent profile- caching model-wireless bearers for WAP - WML – WML Scripts

UNIT V: DATABASE ISSUES

Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2002.

REFERENCE BOOKS:

1. KavehPahlavan, PrasanthKrishnamoorthy, “Principles of Wireless Networks”, PHI/Pearson Education, 2003.

2. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003..

(C) MICROPROCESSORS AND ITS APPLICATIONS

Objective:
To learn the architecture, programming, interfacing and rudiments of system design of microprocessors.

Unit-I: 8085 MICROPROCESSOR AND ARCHITECTURE
Microprocessors - Memory - I/O Devices - Memory Mapped I/O - Pin diagram and internal architecture of 8085 - Registers, ALU, Control & Status Registers - Instruction and Machine Cycles. Interrupts

Unit II: PROGRAMMING THE 8085
Introduction to 8085 Assembly language programming - 8085 instructions - Programming techniques with Additional instructions - Counters and Time Delays - Stack and Subroutines - Code Conversions

Unit-III: 8086 MICROPROCESSOR AND ARCHITECTURE
Pin Details and Internal Architecture of 8086 - Register organization, Bus interface unit, Execution unit, Memory addressing, Memory segmentation. Operating modes - Hardware and Software interrupts - Addressing Modes.

Unit-IV: PROGRAMMING THE 8086
8086 Assembly Language Programming - Implementing Standard Program Structures - String - Procedure and Macros. Instruction Description and Assembler Directives

Unit-V: INTERFACING PERIPHERALS
8255 PPI , 8253/8254 PIT, 8237 DMAC,8259 PIC, 8251 USART.

TEXT BOOK

1. Microprocessor Architecture, Programming and Aplications with 8085, Ramesh S. Gaonkar, Penram International Publishing (India) Pvt. Ltd. 4th Ed. (for Units I,II and V)
2. Microprocessors and Interfacing, Douglas V. Hall, Tata McGraw Hill, 2nd Ed. (for Units III and IV)

REFERENCE BOOKS:

1. Assembly Language Programming the IBM PC ,Alan R. Miller, SubexInc, 1987.
2. Advanced Microprocessors and Peripherals, Ray A K ,Bhurchandi K M , TMH.

Elective III PAPER – 3

(A) Internet of Things

Objective: To prepare the student for better application of internet technology.

Unit – I IoT Introduction

Introduction to Internet of Things: Definition – Characteristics of IOT – Physical Design of IoT – Things in IoT – IoT Protocols – Logical Design of IoT – Iot Functional Blocks – IoT Communication Models – IoT Communication APIs – IoT Enabling Technologies

Unit – II Domain Specific IoT - 1

Domain Specific IoT – I : Smart Lighting – Smart Appliances – Intrusion Detection – Smoke / Gas Detection – Smart Parking – Smart Roads – Structural Health Monitoring – Surveillance – Emergency Response – Weather Monitoring –

Unit – III Domain Specific IoT II

Domain Specific IoT – II : Air Pollution Monitoring – Noise Pollution Monitoring – Forest Fire Detection – River Flood Detection – Smart Grids- Smart Vending Machines – Route Generation & Scheduling – Fleet Tracking – Shipment Monitoring –

Unit – IV Domain Specific IoT III

Domain Specific IoT – III: Remote Vehicle Diagnostics – Smart Irrigation - Green House Control – Machine Diagnosis & Prognosis – Indoor Air Quality Monitoring – Health & Fitness Monitoring – Wearable Electronics

Unit – V IoT and M2M

IoT And M2M: M2M – Difference Between Iot And M2M – SDN And NFV For IoT – IoT System Management With NETCONF – YANG : Need For Iot Systems Management – SNMP- Network Operator Requirements – NETCONF – YANG-IoT Systems Management With NETCONF - YANG

Text Books:

1. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam

Dunkels, Morgan Kuffmann.

Reference

1. Internet of Things, P.Rizwan Ahmed, Margham Publications, Chennai.

2. Designing the Internet of Things, Adrian McEwen (Author), Hakim Cassimally

(B) System Software

Objective: To make the student to become more proficient with system programming

Unit – I LANGUAGE PROCESSORS

Language Processing Activities – Fundamentals of Language Processing – Fundamentals of Language Specification – Language Processor Development Tools.

UNIT II ASSEMBLERS AND MACRO

Elements of Assembly Language Programming – Overview of Assembly Process - Design of a Two – Pass Assembler - Macro Definition and Call – Macro Expansion – Nested Macro Calls.

UNIT III COMPILER I

Scanning: Finite State Automate – Regular Expressions – Building DFA – Performing Semantic Action – Writing a Scanner – Parsing: Parse Tree and Abstract Syntax Trees – Top Down Parsing – Bottom-Up Parsing.

UNIT IV COMPILER II AND INTERPRERTERS

Aspects of Compilation –Memory Allocation - Compilation of Expressions-Compilation of Control Structure-Code Optimization - Interpreters.

UNIT V LINKERS

Relocation and Linking Concepts – Design of a Linker – Self-Relocating Programs – Linking for Overlays - Loader.

TEXT BOOK

D.M. Dhamdhere, “System Programming And Operating Systems”, New Delhi: Tata McGraw-Hill Publishing Company Limited, 1993.

(C) Multimedia Systems

Objective :

This course presents the Introduction to Multimedia, Images & Animation and enable the students to learn the concepts of Multimedia.

UNIT I Introduction to Multimedia:

Introduction to Multimedia PCs – Components of Multimedia – Multimedia Tools Sound and Graphics : Digital Sound – Editing and Mixing sound files – MIDI creation – Tracking Procedure – Interactive and Non Interactive Graphics – High Resolution Graphics – Difference between TV and Computer Display.

UNIT II Video and Animation:

Digital Image concepts – Video Capturing – Scanning Images – Digital Filters Morphing and Warping – Two Dimensional and Three dimensional animation – Animation Tools – Layering technique – Blue Screen technique – Latest movie technologies – Motion Tracking System – Motion Capturing System.

UNIT III Creating Presentation:

Script Writing and creating interactive and non-interactive presentation – Linear and Non Linear Editing – Authoring Tools – File Formates SOUND, VIDEO, ANIMATION, Presentation Images. Multimedia Programming: Text Links – Hyper Text system – Form Creation – File storing - Error Trapping.

UNIT IV Sound Links:

Multimedia interfaces – MCI- API- High Level Multimedia Functions – WAVE, MIDI file processing. Animation: Color Palette – Events – ROPs.

UNIT V Imaging Special Visual Effects:

Bitmap – Brushes – Dissolve –Hotspot Editor – Scorlling. Media Control Interface: Simple Commands – API functions – CD Player – Video Capturing – Form – AVI Play Form.

Text Books :

1. Kaliyaperumal Karthikeyan,“Introduction to Multimedia System”, LAP Lambert Academic Publishing, 2011
2. TayVaughan,“Multimedia Making It Work Eighth Edition”,Tata McGraw-Hill Publishing Company, 2011
3. ParagHavaldarand Gerald Medioni,“Multimedia Systems”, Cengage Learning, 2011
4. S. K. Bansal,“Multimedia Systems”,Aph Publishing Corporation, 2011

Skilled Based Subject IV

ASP .NET

UNIT I : ASP.NET Basics

Introduction to ASP.NET: .NET Framework (CLR, CLI, BCL), ASP.NET Basics, ASP.NET Page Structure, Page Life Cycle. Controls: HTML Server Controls, Web Server Controls, Web User Controls, Validation Controls, Custom Web Controls.

UNIT II: Form

Form validation: Client side validation, Server side validation, Validation Controls: Required Field Comparison Range, Calendar Control, Ad rotator Control, Internet Explorer Control. State Management: View State, Control State, Hidden Fields, Cookies, Query Strings, Application State, Session State.

UNIT III: ADO.NET

Architecture of ADO .NET, Connected and Disconnected Database, Create Database, Create connection Using ADO.NET Object model, Connection Class, Command Class, Data Adapter Class, Dataset Class, Display data on data bound controls and Data Grid.

UNIT IV: Database accessing

Database accessing on Web Applications: Data Binding Concept with web, Creating Data Grid, Binding standard web server controls, Display data on web form using Data Bound Controls.

UNIT V: XML

Writing Datasets to XML, Reading datasets with XML. WEB services: Remote method call using XML, SOAP, Web service description language, Building and Consuming a web service, Web Application deployment.

Textbook:

Professional ASP.NET 1.1 Bill Evjen , Devin Rader , Farhan Muhammad, Scott Hanselman , Srivakumar

REFERENCE BOOKS:

1. Introducing Microsoft ASP .NET 2.0 Esposito PHI
2. Professional ADO.NET BipinJoshi,Donny Mack, Doug Seven , Fabio Claudio Ferracchiati, Jan D NarkiewiezWrox
3. Special Edition Using ASP.NET Richard Leineker Person Education
4. The Complete Reference ASP.NET Matthew MacDonald TMH
5. ASP.NET Black Book Dream Tech

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. PHYSICS

DEGREE COURSE
CBCS PATTERN

(With effect from 2017 – 2018)

The Course of Study and the Scheme of Examinations

S. NO.	Part	Study Components Course Title		Ins. Hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper-1	6	6	Properties of Matter and Acoustics	25	75	100
	III	Core Practical	Practical-1	3	0		0	0	0
4	III	Allied-1	Paper-1	4	4	Chemistry I or Biochemistry I	25	75	100
	IV	Allied Practical	Practical-1	3	0		0	0	0
5	IV	Environmental Studies		2	2	Environmental Studies	25	75	100
				30	**20**		**125**	**375**	**500**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English	Paper-2	4	4	English	25	75	100
10	III	Core Theory	Paper-2	6	5	Thermal Physics and Statistical Methods	25	75	100
11	III	Core Practical	Practical-1	3	3	Any 16 Experiments given in syllabus	25	75	100
12	III	Allied-1	Paper-2	4	4	Chemistry II or Biochemistry II	25	75	100
13	IV	Allied Practical	Practical-1	3	2		25	75	100
14	IV	Value Education		2	2	Value Education	25	75	100
15	IV	Soft Skill		2	1	Soft Skills	25	75	100
				30	**25**		**200**	**600**	**800**

S. NO.	Part	Study Components / Course Title		Ins. Hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
16	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
17	II	English	Paper-3	6	4	English	25	75	100
18	III	Core Theory	Paper-3	3	3	Electricity and magnetism	25	75	100
19	III	Core Practical	Practical-2	3	0		0	0	0
20	III	Allied-2	Paper-3	7	4	Mathematics I	25	75	100
22	IV	Skill Based Subject	Paper-1	3	3	Electrical Appliances	25	75	100
23	IV	Non-Major Elective	Paper-1	2	2	Renewable Energy Sources	25	75	100
				30	**20**		**150**	**450**	**600**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
24	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
25	II	English	Paper-4	6	4	English	25	75	100
26	III	Core Theory	Paper-4	3	3	Mechanics	25	75	100
27	III	Core Practical	Practical-2	3	3	Any 16 Experiments given in syllabus	25	75	100
28	III	Allied-2	Paper-4	7	6	Mathematics II	25	75	100
30	IV	Skill Based Subject	Paper-2	3	3	Electronics Appliances	25	75	100
31	IV	Non-Major Elective	Paper-2	2	2	Basic Physics	25	75	100
				30	**25**		**175**	**525**	**700**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
32	III	Core Theory	Paper-5	6	6	Optics	25	75	100
33	III	Core Theory	Paper-6	6	5	Atomic Physics and Spectroscopy	25	75	100
34	III	Core Theory	Paper-7	6	5	Basic Electronics	25	75	100
35	III	Core Practical	Practical-3	3	0	General	0	0	0
36	III	Core Practical	Practical-4	3	0	Electronics	0	0	0
38	III	Elective I	Paper-1	3	3	Group (A) or (B) or (C)	25	75	100
39	IV	Skill Based Subject III	Paper - 3	3	3	Astro Physics	25	75	100
				30	**22**		**125**	**375**	**500**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
34	III	Core Theory	Paper-8	5	4	Nuclear Physics and Radiation Physics	25	75	100

S. NO.	Part	Study Components / Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
	III	Core Theory	Paper-9	5	4	Relativity, Quantum Mechanics and Mathematical Physics	25	75	100
35	III	Core Theory	Paper-10	5	4	Solid State Physics	25	75	100
36	III	Core Practical	Practical-3	6	3	Any 20 Experiments given in syllabus	25	75	100
37	III	Core Practical	Practical-4		3	Electronics	25	75	100
40	III	Elective	Paper-2	3	3	Group (A) or (B) or (C)	25	75	100
	III	Elective	Paper-3	3	3	Group (A) or (B) or (C)	25	75	100
	IV	Skill based Subject	Paper-4	3	3	Instrumentation Techniques	25	75	100
	V	Extension Activities		-	1		100	-	100
		TOTAL		**30**	**28**		**300**	**600**	**900**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	4	8	?00	200
	Allied (Even Semester)	2	4	10	?00	200
	Allied Practical	1	2	2	100	100
	Electives	3	3	9	100	300
	Core Theory	10	(3-7)	45	100	1000
	Core Practical	4	3	12	100	400
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**40**		**140**		**4000**

ELECTIVE SUBJECTS

Students can choose any one of the groups (Elective I, II & III)

GROUP A

Elective 1: Digital Electronics
Elective 2: Applied Electronics
Elective 3: Microprocessor and its Applications – 8085

GROUP B

Elective 1: Materials Science
Elective 2: Applied Electronics
Elective 3: Laser and Fibre Optic Communication

GROUP C

Elective 1: Fundamentals of Nano Materials and its Characterization
Elective 2: Applied Electronics
Elective 3: Medical Physics

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. PHYSICS

SYLLABUS
UNDER CBCS
(With effect from 2017 - 2018)

SEMESTER I

PAPER – 1

PROPERTIES OF MATTER AND ACOUSTICS

UNIT – I: ELASTICITY

Hooke's law – Stress-strain diagram – Elastic moduli – Relation between elastic constants – Poisson's Ratio – Expression for Poisson's ratio in terms of elastic constants – Work done in stretching and work done in twisting a wire – Twisting couple on a cylinder – Determination of Rigidity modulus by static torsion – Torsional pendulum – Determination of Rigidity modulus and moment of inertia and q, n, σ by Searles method.

UNIT – II: BENDING OF BEAMS

Bending of beams – Expression for bending moment – Cantilever – Expression for depression at the loaded end – oscillations of a Cantilever – Expression for time period – Determination of Young's modulus by cantilever oscillations Non-uniform bending – Determination of young's modulus by Koenig's method – Uniform bending – Expression for elevation – Experiment to determine young's modulus using pin and microscope method.

UNIT – III : FLUIDS

Surface Tension: Synclastic and anticlastic surface – Excess of pressure – Application to spherical and cylindrical drops and bubbles – variation of surface tension with temperature – Jaegar's method-Applications of surface tension.

Viscosity : Viscosity – Rate flow of liquid in a capillary tube – Poiseuille's formula – Determination of coefficient of viscosity of a liquid – Variations of viscosity of a liquid with temperature- lubrication- Applications of viscosity.

SOUND

UNIT – IV : WAVES AND OSCILLATIONS

Simple harmonic motion – free, damped, forced vibrations and resonance – Fourier's Theorem – Application to saw tooth wave and square wave – Intensity and loudness of sound – Decibels – Intensity levels – musical notes – musical scale.

Acoustics of buildings : Reverberation and time of reverberation – Absorption coefficient – Sabine's Formula – measurement of reverberation time – Acoustic aspects of halls and auditoria.

UNIT – V: ULTRASONICS

Ultrasonic waves – Production – Piezo electric crystal method – Magnetostriction Method – Properties – Deductions – Attenuation – Diffraction – Acoustic Grating – Velocity of ultrosonics in liquids – application of ultrasonics – Medical, Industrial and Scientific – Non destructive testing (NDT) – Classification of ultrasonic testing – Pulse echo method – Sources of ultrasound – clinical applications of different scans.

Books for study:

1. Properties of matter by Murugeshan R, S Chand & Co. Pvt. Ltd., New Delhi.
2. Properties of matter by Brij Lal & Subramaniam, N Eurasia Publishing Co., New Delhi, 1989.
3. Text book of sound by Brij Lal & Subramaniam, N Vikas Publishing House, New Delhi, 1982.
4. Text book of sound by M N Srinivasan – Himalaya Publications (1991).
5. Science and Technology of Ultrasonics by Baldevraj, Narosa [2004].

Books for reference:

1. Elements of Properties of Matter by Mathur D S, Shymlal Charitable Trust, New Delhi, 1993.
2. Fundamentals of General Properties of Matter by Gulati H R, R Chand & Co. New Delhi, 1982.
3. Waves & Oscillations by Subrahmanyam N & Brij Lal, Vikas Publishing House Pvt. Ltd., New Delhi, 1994.
4. A Textbook of Sound by Khanna D R & Bedi R S, Atma Ram & Sons, Jew Delhi 1985.
5. Fundamentals of Physics, 6^{th} Edition by D Halliday, R Resnick and J Walker, Wiley NY 2001.
6. Physics, 4^{th} Edition vols, I, II & II Extended by D Halliday, R Resnick and K S Krane, Wiley NY 1994.
7. CRC Handbook of Physics & Chemistry, 80^{th} ED., CR5 Press, NY, 1999.
8. The Feynman Lectures on Physics, Vols. I, II and III, by R P Feynman, RB Leighton and M Sands, Narosa, New Delhi, 1998.

ALLIED

PAPER – 1

CHEMISTRY – I

OBJECTIVE:

- Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications wherever necessary are to be taught for I- Semester.

UNIT – I

1.1General Metallurgy - Extraction of Metals - Minerals and Ores- Difference between Minerals and Ores – Minerals of Iron, Aluminum and Copper - Ore Dressing or Concentration of Ores - Types of Ore Dressing- Froth Floatation process, Gravity separation and Magnetic separation.

1.2 Calcination, Smelting, Roasting, Fux, Slag - Definition - Reduction methods - Goldschmidt Aluminothermic process and Carbon Reduction method - Refining of Metals - Electrolytic, Van Arkel and Zone Refining.

1.3 Ores of Titanium and Cobalt - Extraction of Titanium and Cobalt.

UNIT – II

2.1 Cycloalkanes - Preparation – Wurtz reaction and Dieckmann's condensation - Properties of Cycloalkanes – Substitution and Ring opening reactions.

2.2 Polarisation - Inductive effect, Mesomeric effect and Steric effect (Acid and Base Strength).

2.3Stereoisomerism – Types - Cause of Optical Activity – Enantiomers - Diastereomers - Meso form - Optical Activity of Lactic acid and Tartaric acid - Racemisation and Resolution – Definition and Methods - Geometrical isomerism – Definition and example - Maleic and Fumaric acid – Differences.

UNIT – III

3.1 Chemical Kinetics – Rate of a reaction – Definition of Order and Molecularity – Distinction between Order and Molecularity - Derivation of First order rate equation - Half Life Period of first order reaction.

3.2 Catalysis - Catalyst - Autocatalyst - Enzyme catalyst - Promoters - Catalytic poisons – Active Centre - Differences between Homogeneous and Heterogeneous Catalysis - Industrial Applications of Catalysts.

3.3 Photochemistry – Grothus-Draper's law – Stark-Einstein's law - Quantum yield – Photosynthesis - Phosphorescence – Fluorescence.

UNIT – IV

4.1 VSEPR Theory – Hybridisation and Shapes of simple molecules BF_3, PCl_5, SF_6 and XeF_6.

4.2 Fuels – Classification of Fuels - Calorific value of Fuels – Water gas, Carbureted Water gas and Producer gas – Composition and Uses - Non-Conventional fuels - Need of Solar Energy - Applications - Biofuels – Oil gas, Natural gas and LPG – Uses.

4.3 Osmosis - Osmotic pressure - Reverse osmosis – Definition - Desalination of Sea water.

UNIT – V

5.1Nuclear Chemistry – Atomic number, Mass number - Isotopes, Isobars and Isotones – Definition and Examples - Definition of Half life period - Nuclear Binding Energy, Mass Defect and N/P ratio - Nuclear Fission and Nuclear Fusion (Elementary idea) - Applications of Radioisotopes in Medicine, Agriculture and Industries – Carbon Dating.

5.2 Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking – Naphthalene – Preparation – Haworth's method – Properties – Oxidation, Reduction and Uses of Naphthalene - Structure of Naphthalene (Structural elucidation not necessary).

5.3 Conductors, Insulators, Semiconductors, N- and P- Type Semiconductors – Definitions and Examples.

ALLIED - 1

PAPER - 1

BIOCHEMISTRY I

UNIT-I: Chemistry of Carbohydrates

Definition and Classification of carbohydrate. Monosaccharides - occurrence, structure; physical and chemical properties, linear and ring forms (Haworth formula) for glucose and fructose. Disaccharides - occurrence, structure; physical and chemical properties of sucrose and lactose. Polysaccharides - occurrence, structure, physical and chemical properties of starch.

UNIT-II: Chemistry of amino acids

Definition and classification of amino acids. Reaction with ninhydrin, common properties of amino acids, amphoteric nature, isoelectric point, isoelectric pH and Zwitter ion.

UNIT-III: Chemistry of Proteins

Classification based on solubility, shape and size. Physical properties: salting in and salting out, denaturation, peptide bond. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT-IV: Chemistry of Lipids

Definition, classification and functions of lipids. Occurrence, chemistry and biological functions of simple lipids, compound lipids (e.g. phospholipids) and derived lipids: steroids (e.g. cholesterol). Physical property-emulsification. Chemical property-saponification. Functions of bile acids and bile salts.

UNIT-V: Chemistry of Nucleic acids

Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNA and its biological functions. Structure, types and functions of RNA: tRNA, mRNA and rRNA. Differences between DNA and RNA.

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan , MJP Publishers,Chennai-5.

SEMESTER II

PAPER – 2

THERMAL AND STATISTICAL PHYSICS

UNIT – I : TRANSMISSION OF HEAT

Conduction in solids : Thermal conduction – thermal conductivity of a good conductor – theory and determination – Forbe's method – thermal conductivity of a poor conductor – theory and determination – Lee's disc method – Derivation of Wiedmann – Franz law and its limitations – practical applications of conduction of heat.

Black body radiation : Stefan – Boltzmann law – determination of Stefan's constant – laboratory method – distribution of energy in the spectrum of a black body – results – Planck's quantum theory of radiation – solar constant – temperature of the Sun – Solar Spectrum.

UNIT – II: LOW TEMPERATURE PHYSICS

Joule – Kelvin effect – liquefaction of hydrogen – liquefaction of helium – Kammerling – Onne's method – Helium I and II – Lambda point – production of low temperatures – adiabatic demagnetization – practical applications of low temperature – refrigerators and air-conditioning machines – super fluidity – application of super fluidity – elementary ideas and applications – Superconductivity – Type I and II superconductors – Meissner effect – applications of superconductors – superconducting magnets.

UNIT – III: THERMODYNAMICS I

Thermodynamics Potentials – Zeroth law, First and Second law of thermodynamics – Carnot's theorem – thermodynamic scale of temperature – Perfect gas scale of temperature – internal combustion engines – Otto engine and Diesel engine – working and efficiency.

UNIT - IV: THERMODYNAMICS II

First latent heat equation (Clausius-Clapeyron equation) – effect of pressure on melting point and boiling point – second latent heat equation – Third law of thermodynamics – concepts of entropy – temperature entropy diagram – entropy of perfect gas – Maxwell's thermo dynamical relations – derivation – applications – i) Clausius – Clapeyron equation, ii) Specific heat Relation.

UNIT – V: STATISTICAL PHYSICS

Phase space, Micro and Macro – canonical – Ensembles – Different types of ensembles – Definition of Probability – Relation between entropy & probability – Degrees of Freedom – Statement of theorem of equipartition of energy – Classical Statistics – Group Velocity and Phase velocity – Maxwell – Boltzmann law-distribution of velocity-Quantum statistics-Fermi-Dirac distribution law-Bose-Einstein distribution law-comparison of three statistics.

Books for study:

1. Heat and thermodynamics – Brijlal and Subramaniyam, S Chand & Co.
2. Heat and thermodynamics – J B Rajam, S Chand & Co., New Delhi.
3. Thermal Physics – R Murugeshan and Kiruthiga Sivaprasad, S Chand & Co., New Delhi.

Books for Reference:

1. Heat and thermodynamics – D S Mathur, S Chand & Co., New Delhi
2. Elements of Statistical Mechanics – Gupta and Kumar, Pragati Prakashan, Meerut.
3. Statistical Mechanics – Sathya Prakash and J P Agarwal, Kedar Nath & Ram Nath & Co., Meerut.
4. Introduction to Solid State Physics – C Kittel, Prentice Hall of India.

CORE PRACTICAL – I

(Any 16 Experiments)

1. Youngs modulus – non uniform bending – pin and microscope.
2. Youngs modulus – non uniform bending – optic lever.
3. Young's modulus cantilever – depression – dynamic method – Mirror Scale and Telescope.
4. Rigidity modulus – torsional pendulum – without masses.
5. Rigidity modulus and moment of inertia – torsional pendulum – with identical masses.
6. Surface tension and interfacial surface tension – drop weight method.
7. Coefficient of viscosity of liquid – graduated burette – Radius of capillary tube by mercy pellet method.
8. Comparison of viscosities – (η_1/η_2).
9. q, n, σ by Searle's method.
10. Rigidity modulus – Static torision – Mirror scale and telescope.
11. Compound Pendulum – Determination of 'g' and 'k'.
12. Thermal conductivity of a bad conductor – Lee's disc method.
13. Thermal conductivity of a good conductor-Forbe's method.
14. Specific heat of liquid – Newtons law of cooling.
15. Sonometer – frequency of tuning fork.
16. Sonometer – RD of a solid and liquid.
17. Focal length – R and μ of a long focus convex lens.
    i Auto collimination method
    ii Auxillary Lens Method
18. Focal length – R and μ of a concave lens.
    i Combination Method
    ii Auxillary Lens Method
19. Spectrometer – solid prism- μ of material of prism.
20. Spectrometer- Hollow prism - μ of a liquid.
21. Potentiometer – Calibration of low range voltmeter.
22. Potentiometer – Internal resistance.
23. Post office box – temperature coefficient of resistance.

ALLIED

PAPER – 2

CHEMISTRY – II

OBJECTIVE:

- Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins, Medicinal Chemistry, Corrosion and Applications wherever necessary are to be taught for II- semester.

UNIT – I

1.1 Coordination Chemistry - Nomenclature of Coordination Compounds - Ligands, Central Metal Ion and Complex Ion – Definition and Examples – Coordination Number - Werner's Theory of Coordination Compounds - Chelates - Functions and Structure of Haemoglobin and Chlorophyll.

1.2 Industrial Chemistry - Fertilisers and Manures – Biofertilisers - Organic Manures and their importance - Role of NPK in plants - Preparation and Uses of Urea, Ammonium Nitrate, Potassium Nitrite and Super Phosphate of Lime.

1.3 Contents in Match Sticks and Match Box - Industrial making of Safety Matches – Preparation and Uses of Chloroform, DDT, Gammexane and Freons.

UNIT – II

2.1 Carbohydrates - Definition and Examples - Classification – Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate.

2.2 Amino Acids – Definition and Examples - Classification of Amino Acids - Preparation - Gabriel Phthalimide Synthesis – Properties – zwitterion and Isoelectric point - Structure of Glycine.

2.3 Proteins – Definition - Classification of Proteins based on Physical properties and Biologcal functions - Primary and Secondary Structure of Proteins (Elementary Treatment only) – Composition of RNA and DNA and their Biological role - Tanning of Leather - Alum (Aluminum chloride tanning) - Vegetable tanning – Chrome Tanning.

UNIT – III

3.1 Electrochemistry - Electrolytes – Definition and Examples – Classification - Specific and Equivalent Conductance - their determination – Variation of Specific and Equivalent conductance with Dilution – Ostwald's Dilution Law and its Limitations.

3.2 Kohlrausch's Law - Determination of Dissociation Constant of weak Electrolytes using Conductance measurement - Conductometric titrations.

3.3 pH – Definition and pH determination by indicator method - Buffer solutions - Buffer action - Importance of buffers in the living systems.

UNIT – IV

4.1Paints - Components of Paint – Requisites of a Good Paint - Pigments – Classification of Pigments on the basis of Colour – Examples - Dyes – Definition – Chromophores and Auxochromes – Examples - Colour and Dyes - Classification based on Constitution and Application – Examples.

4.2 Vitamins – Definition – Classification – Water Soluble and Fat Soluble – Occurrence - Biological Activities and Deficiency Diseases caused by Vitamin A, B, C, D, E and K - Hormones – Definition and Examples – Biological Functions of Insulin and Adrenaline.

4.3 Chromatography - Principles and Applications of Column and Paper chromatography- R_f value.

UNIT – V

5.1 Drugs - Sulpha Drugs – Preparation and Uses of Sulphapyridine and Sulphadiazine - Mode of Action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicol and Streptomycin - Drug Abuse and Their Implication - Alcohol – LSD.

5.2 Anaesthetics - General and Local Anaesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS.

5.3 Electrochemical Corrosion and its Prevention – Electroplating – Applications.

ALLIED

PAPER - 2

BIOCHEMISTRY II

UNIT-I: Metabolism

Glycolysis, TCA cycle and its energetics, HMP shunt pathway. Deamination, transamination reaction, transaminase enzymes, Urea cycle.

UNIT-II: Metabolic Disorders

Diabetes mellitus, Glycogen storage diseases, Glycosuria, Ketosis, Jaundice, Phenyl ketonuria, Alkaptonuria. Dehydration: definition, causes, symptom and prevention.

UNIT-III: Enzymes

Definition, classification of enzymes with one example. Mechanism of enzyme action - Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Enzyme inhibition: competitive, uncompetitive and non competitive. Biological functions of enzymes.

UNIT-IV: Molecular Biology

Central dogma of molecular biology. DNA and RNA act as genetic material. Replication: Definition, types, mode of action of replication, mechanism of replication. General mechanism of transcription and translation. Genetic code.

UNIT-V: Vitamins

A brief outline of source, requirement, biological function and deficiency of Vitamins (fat soluble and water soluble vitamins).

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Robert K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan, MJP Publishers, Chennai-5.

SEMESTER III
PAPER – 3

ELECTRICITY AND MAGNETISM

UNIT – I : ELECTROSTATICS

Gauss' Law – Electric Field due to uniformly charged sphere – Electric Intensity - Electrostatic potential – electric potential as line integral of electric field – relation between electric potential and electric field in vector form – capacitance – capacitance of a spherical and cylindrical capacitor – energy of a charged capacitor – loss of energy due to sharing of charges - Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics - Parallel plate capacitor completely filled with dielectric.

UNIT – II : CURRENT ELECTRICITY & TRANSIENT CURRENT

Carey Foster bridge – theory – determination of temperature coefficient of resistance – calibration of ammeter and voltmeter using a potentiometer.
Growth and decay of current in a circuit containing resistance and inductance. Growth and decay of charge in circuit containing resistance and capacitor – measurement of high resistance by leakage – growth and decay of charge in a LCR circuit – condition for the discharge to be oscillatory – frequency of oscillation.

UNIT – III : THERMO ELECTRICITY

Seeback, Peltier and Thomson effects – laws of thermoelectric circuits – Peltier coefficient – Thomson coefficient – application of thermodynamics to a thermocouple and expressions for Peltier and Thomson coefficients - thermo electric power and thermo electric diagrams.

UNIT – IV : ELECTRO MAGNETIC INDUCTION

Faraday's laws of electromagnetic induction in vector form – Lenz'z law - determination of self-inductance by Anderson's bridge method and absolute mutual inductance by BG – Ruhmkorff's induction coil – induction coil and its uses – Coefficeint of coupling – Earth inductor - Eddy Currents - Energy stored in a magnetic field.

UNIT – V : MAGNETISM

Magnetostatics: Biot-Savart's law & its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law.
Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para- and ferro-magnetic materials.

Books for study:

1. R Murugeshan – Electricity and magnetism, 8th Edn, 2006, S Chand & Co., New Delhi.
2. M Narayanamurthy & N Nagarathnam, Electricity & Magnetism 4th Edn, National Publishing Co., Meerut.
3. Duggal and Chhabra, Electricity and Magnetism.
4. Brijlal, N Subramanyan and Jivan Seshan, Mechanics and Electrodynamics [2005], Eurasia Publishing House [Pvt.] Ltd., New Delhi.

Books for reference:

1. Sehgal D L, Chopra K L, Sehgal N K – Electricity and Magnetism, Sultan Chand & Sons, New Delhi. Brijlal and Subramanian, Electricity and Magnetism, 6th Edn., Ratan & Prakash, Agra.
2. David J Griffiths, Introduction to Electrodynamics, 2nd Edn. 1997, Prentice Hall of India pvt. Ltd., New Delhi.
3. Electricity & Magnetism by K K Tewari, S Chand & Co., 3rd Edition, 2001.

ALLIED

MATHEMATICS – I

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ.

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates-Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.
3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

SKILLED BASED SUBJECT

PAPER – 1

ELECTRICAL APPLIANCES

UNIT – I

Resistance and its types – capacitance and its types – Colour codes-inductance and its units – Transformers – Electrical Charge – Current – Electrical Potential

UNIT - II

Ohm's law – Galvanometer, Ammeter, Voltmeter and Multimeter Analog and Digital - Electrical Energy – Power – Watt – kWh – Consumption and electrical power.

UNIT – III

AC and DC – Single phase and three phase connections – RMS and peak values, House wiring – Star and delta connection – overloading – earthing – short circuiting – Fuses – Colour code for insulation wires

UNIT - IV

Inverter – UPS – generator and motor – types – different types of windings – circuit breaker-Electrical switches and its types.

UNIT – V

Electrical bulbs – Fluorescent lamps – Street Lighting – Flood lighting – Electrical Fans – Wet Grinder – Mixer – Water Heater – Storage and Instant types, electric iron box, microwave oven – Stabilizer, fridge.

Books for study:

1. A text book in Electrical Technology – B L Theraja – S chand & Co.
2. A text book in Electrical Technology – A K Theraja.
3. Performance and design of AC machines – M G Say ElBS Edn.

NON – MAJOR ELECTIVE

PAPER – 1

RENEWABLE ENERGY SOURCES

Unit - I: Conventional Energy Sources

The fossil fuels - commercial energy sources and their availability – various forms of energy – renewable and conventional energy system – comparison – Coal, oil and natural gas – applications– Merits and Demerits – fuel cells.

Unit - II: Solar Energy

Renewable energy sources – solar energy – nature and solar radiation – components – solar heaters – crop dryers – solar cookers – water desalination (block diagram) Photovoltaic generation – merits and demerits

Unit - III: Biomass energy fundamentals

Biomass energy – classification – photosynthesis – Biomass conversion process

Unit - IV: Biomass Utilization

Gobar gas plants – wood gasification – advantages & disadvantages of biomass as energy source

Unit - V: Other forms of energy sources

Geothermal energy – wind energy – Ocean thermal energy conversion – energy from waves and tides (basic ideas)

Books for Study:

"Renewable energy sources and emerging Technologies", by D.P. Kothari, K.C. Singal & Rakesh Ranjan, Prentice Hall of India pvt. Ltd., New Delhi (2008)

Books for Reference:

"Renewable Energy sources and their environmental impact" – S.A. Abbasi and Nasema Abbasi PHI Learning Pvt. Ltd., New Delhi (2008).

SEMESTER IV

PAPER – 4

MECHANICS

UNIT – I : DYNAMICS

Rigid body – moment of inertia – radius of gyration – moment of inertia of a solid cylinder, cylindrical shell, solid sphere, spherical shell - Compound pendulum – theory – equivalent simple pendulum – reversibility of centers of suspension and oscillation

UNIT – II : STATICS AND HYDROSTATICS

Centre of pressure – centre of pressure of a vertical rectangular lamina and vertical triangular lamina- laws of floatation- meta centre and metacentric height of a ship- production of low pressure- rotary pump- diffusion pump- pirani gauge

UNIT – III : ROCKETS AND SATELLITES

Rockets and Satellites – Basic Principles of rocket motion – Rocket Equation, thrust and acceleration – Escape velocity multistage rockets – liquid, solid and cryogenic – propellant rockets
– space shuttle - Orbital velocity – launching of a satellite, types of satellite orbits.

UNIT – IV : CLASSICAL MECHANICS I

Lagrangian formulation of classical mechanics – Mechanics for a system of particles – Generalised co-ordinates – transformation equations – configuration space – Principles of virtual work – D'Alembert's principle – Lagrange's equation – Applications of Lagrange's equation – Simple pendulum.

UNIT – V : CLASSICAL MECHANICS II

Hamiltonian formulation of classical mechanics – phase space – Hamiltonian function – Hamilton's canonical equations of motion – Applications of Hamilton's equations of motion – Simple pendulum.

Books for study:

1. Mechanics and mathematical methods by R Murugeshn, S Chand. Elements of mechanics by Gupta.
2. Dynamics by Naranamurthi, National Publishing Company, Chennai. Classical Mechanics by Gupta Kumar and Sharma.
3. Classical Mechanics by B D Gupta and Sathya Prakash, Kedar Nath Ram Nath & Co.,

Books for Reference:

1. Mechanics by D S Mathur.
2. Classical Mechanics by Goldstein, Narosa.
3. Mechanics and Properties of Matter, C.L. Arora, S. Chand & Co.

CORE PRACTICAL – II

(Any 16 Experiments)

1. Young's modulus uniform bending Pin and microscope.
2. Young's modulus uniform bending Scale and Telescope.
3. Sonometer – AC frequency – steel and brass wires.
4. Melde's String – Frequency of the vibrator – Both modes.
5. Spectometer – μ of a prism – i-d curve.
6. Spectometer – grating – N and **λ** – Normal incidence method.
7. Spectometer – grating – N and **λ** – Minimum deviation method.
8. Air wedge – thickness of a thin wire.
9. Carey Foster's bridge – Temperature coefficient of resistance.
10. Potentiometer – Calibration of high range ammeter.
11. Potentiometer – resistance and specific resistance of a wire.
12. Figure of merit of a galvanometer – Table Galvanometer.
13. BG – Figure of merit – Charge sensitiveness.
14. BG – Comparison of capacitances.
15. BG – Comparison of emf of two cells.
16. m and B_H – Tan C – deflection magnetometer and vibration magnetometer.
17. Low range power pack – using two diodes.
18. Transistor Characteristics – CE / CB modes.
19. Zener diode as a Voltage regulator.
20. IC Voltage regulator using 7805.

ALLIED

MATHEMATICS – II

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume -Fourier series for functions in (0,2□) and (-□, □).

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types , Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient ,divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Guass, Stoke's and Green's theorems(without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

SKILL BASED SUBJECT

PAPER – 2

ELECTRONIC APPLIANCES

UNIT – I

Passive devices – Resistors – types – characteristics – colour coding – capacitors – type – characteristics – colour coding star and delta connection of a resistors and capacitors.

UNIT - II

chokes – Transformers – testing of diodes, transistors and ICs – CRO – Waveforms and Lissajoue's figures – A/F and R/F oscillators – usage of bread board.

UNIT – III

Semiconductor diode – Zener diode – Transistor – Transistor configurations – diode rectifier – half wave and full wave – Bridge retifier – Diode voltage doublers and multiplier.

UNIT – IV

Regulated power supply, Zener diode voltage regulator (Series and Shunt type) IC Voltage regultors: fixed positive – fixed negative – adjustable.

UNIT – V

Basic concepts of radio transmitter and receiver – Basic concepts of TV Transmitter and receiver – TV antennas: Resonance antennas and their characteristics – Dipole Antenna – Folded dipole – Yagi antenna – Yagi antenna design – Dish Antenna – DTH system – Mobile communication system - MODEM.

Books for study:

1. Principles of Electronics by V K Metha, S Chnd & Co., 5th edition 2001.
2. Functional Electronics by Ramanan.
3. Elements of Electronics by Bagde and Singh.
4. Monochrome and Colour TV by Gulati.
5. Basic Electronics, 6th Edition by B Grob, McGraw Hill NY 1989.

NON MAJOR ELECTIVE

PAPER – 2

BASIC PHYSICS

UNIT – I: MECHANICS

Force – Weight – Work – Energy – Power – Horsepower – Centrifuge – Washing Machine.

UNIT – II: HEAT

Variation of boiling point with pressure – Pressure cooker – Refrigerator – Air Conditioner – Principle and their capacities – Bernoulli Principle – Aero plane.

UNIT – III: SOUND AND OPTICS

Sound waves – Doppler effect – Power of lens – Long sight and short sight – Microscope – Telescope – Binocular - Camera.

UNIT – IV: GEO PHYSICS AND MEDICAL PHYSICS

Earthquake – Richter scale – thunder and lightning – Lightning arrestors – Cosmic showers – X-rays– Ultrasound scan – CT scan – MRI scan.

UNIT – V: SPACE SCIENCE AND COMMUNICATION

Newton's law of gravitation – Weather forecasting and communication satellites – Indian Satellites– Electromagnetic spectrum – Radio Waves – AM and FM transmission and reception.

Books for study:

1. The Learner's Series – Everyday Science – Published by INFINITY BOOKS, New Delhi.
2. The Hindu speaks on Science, Vol I & II, Kasturi & Sons, Chennai.

Books for Reference:

1. Fundamentals of Physics by D. Hallidy, R. Rensick and J. Walker, 6^{th} Edition, Wiley, NY (2001).
2. Physics, Vols I, II, III by D. Halliday, R. Rensick and K.S. Krane, 4^{th} Edition, Wiley, New York (1994).
3. The Feymann Lectures on Physics Vols, I, II, III by R.P. Feynmann, R.B. Leighton & M. Sands, Narosa, New Delhi (1998).

SEMESTER V

PAPER – 5

OPTICS

UNIT – I : GEOMETRICAL OPTICS

Spherical aberration in lenses – Methods of minimizing sphericl aberration – Condition for minimum spherical aberration in the case of two lenses separated by a distance – Chromatic aberration in lenses – Condition for achromtism of two thin lenses (in contact and out of contact)
– coma – astigmatism – Ramsden's and Huygen's eyepieces – Constant deviation spectrometer – Calculation of characteristic wave number of spectral lines.

UNIT – II : INTERFERENCE

Theory of thin films – Air wedge – Determination of diameter of a thin wire by air wedge – Michelson's Interferometer – Theory – Applications – wave length, thickness of thin transparent material and resolution of spectral lines – Brewster's fringes – Refractive index of gases – Jamin's & Rayleigh's Interferometers.

UNIT – III : DIFFRACTION

Fresnel's diffraction – Diffraction at circular aperture, straight edge and single slit – Plane diffraction grating – theory and experiment to determine wavelength – normal incidence – oblique incidence – Fraunhofer's diffraction – Missing orders – Overlapping spectra Rayleigh's criteria – Resolving power of telescope, prism, microscope and grating.

UNIT – IV : POLARIZATION

Introduction to polarisation – Double refraction – Huygen's explanation of double refraction in uniaxial crystal – Dichroism – Polaroids and their uses Plane, elliptically and circularly polarized light – Production and detection – Optical Activity – Fresnel's explanation of optical activity – Specific Rotatory Power – Determination using Laurent's Half Shade Polarimeter – Kerr effect and Faraday effect.

UNIT – V : FIBRE OPTICS

Introduction – Structure of an optical fibre - Classification of fibres based on Refractive index and number of modes of transmission – Theory of transmission of electromagnetic wave through fibres – Acceptance angle - Numerical aperture – absorbtion and scattering losses – optical fibre communication system - Application of optical fibres as wave guide and sensors.

Books for study:

1. Optics by Subramaniam N & Brij Lal, S Chand & Co. Pvt. Ltd., New Delhi, 1990.
2. Optics by Khnna D R & Gulati H R, R Chand & Co. Pvt. Ltd., New Delhi, 1979.
3. Optics and Spectroscopy by Murugeshn, S Chand & Co. Pvt. Ltd., New Delhi.
4. Optical fiber communications –Principles and Practice by John M Senior, Second edition, Prentice Hall, Pearson New Delhi.
5. Optical fiber communications by Gerd Keiser, Second edition, McGraw Hill

Books for Reference:

1. Fundamentals of Optics by Jenkins Francis and White E Harvey, McGraw Hill Inc., New Delhi, 1976.
2. Optical Physics by Lipson. S G, Lipson H and Tannhauser D S, Cambridge University Press (1995).
3. Fundamental of Optics by Raj M G, Anmol Publications Pvt. Ltd., (1996), New Delhi.
4. Fundamentals of Physics, 6^{th} Edition, by D Halliday, R Resnick and J Walker. Wiley NY 2001.
5. Physics, 4^{th} Edition Vols I, II & II Extended by D Halliday, R Resnick and K S Krane, Wiley, Ny, 1994.
6. CRC Handbook of Physics & Chemistry, 80^{th} Ed., CRS Press, Ny, 1999.
7. The Feynman Lectures on Physics, Vols. I, II and III by R P Feynman, R B Leighton and M Sands, Narosa, New Delhi 1998.
8. Fibre Optic Communication System, Govind P. Agarwal, John –Willey & Sons.

PAPER – 6

ATOMIC PHYSICS AND SPECTORSCOPY

UNIT – I : DISCHARGE PHENOMENON THROUGH GASES

Moving of a charge in transverse electric and magnetic fields – specific charge of an electron – Dunnington's method – Magnetron method – Positive rays – Thomson prabola method – Aston and Dempster's mass spectrograph.

UNIT – II : ATOMIC STRUCTURE

Vector atom model – Pauli's exclusion principle – explanation of periodic table – various quantum numbers – angular momentum and magnetic moment – coupling schemes – LS and JJ coupling – spatial quantisation – Bohr magnetron – Stern and Gerlach experiment.

Spectral terms and notations – selection rules – intensity rule and interval rule – fine structure of sodium D lines – alkali spectra – fine structure of alkali spectra – spectrum of Helium.

UNIT – III : IONISATION POTENTIAL AND SPLITTING OF ENERGY LEVELS

Excitation and ionization potential – Davis and Goucher's method – Zeeman effect – Larmor's theorem – Debye's explanation of normal Zeeman effect – Anamalous Zeeman effect – theoretical explanation. Lande's 'g' factor and explanation of splitting of D_1 and D_2 lines of sodium – Paschen back effect-theory – Stark effect (qualitative treatment only).

UNIT-IV: INFRARED AND RAMAN SPECTROSCOPY

The energy of a Diatomic molecule - The simple harmonic oscillator - The Diatomic vibrating rotator - The vibration - rotation spectrum of carbon monoxide - Techniques and Instrumentation (outline).

Quantum theory of Raman effect - Molecular Polarizability - Pure rotational Raman spectra of linear molecules - Vibrational Raman spectra - Structured determination from Raman and Infrared spectroscopy - Techniques and Instrumentation (outline).

UNIT V: LASER PHYSICS

Lasers: Population inversion, Laser pumping, Resonators - Vibrational modes of resonators, number of modes/unit volume - Open resonators, Control resonators, Q Factor, Losses in the cavity, Threshold condition, Quantumyield. Ruby Laser – 3 level system, Pumping power, Spiking U^{3+} in CaF_2 laser, four level laser, Neodymium laser - Nd:YAG, Applications of Lasers in Industry, Medicine & Communication.

Books for study:

1. Modern physics by R Murugesan, S Chand & Co., New Delhi - 2004.
2. Atomic and Nuclear physics by N Subramanian and Brij Lal, S Chand & Co. - 2000.
3. Atomic physics by J B Rajam.
4. Spectroscopy by Gupta & Kumar
5. Spectroscopy by Banewell
6. Laser Fundamentals, by William T. Silfvast , Cambridge University Press,

Books for Reference:

1. Atomic physics by A B Gupta and Dipak Ghosh – Books and Allied Publishers.
2. Modern physics by J H Hamilton and Yang, McGraw Hill Publication 1996.
3. Concepts of Modern physics by A Beiser, Tata McGraw Hill, New Delhi 1997.
4. Fundamentals of physics, 6^{th} edition, by D Halliday, R Resnick and J Walker, Wiley NY 2001.
5. Laser and Non Linear Optics by B.B.Laud, New Age international.
6. Laser systems and applications by Niyanad Choudhary and Richa Verma, PHI,New Delhi

PAPER – 7

BASIC ELECTRONICS

UNIT – I : SEMICONDUCTOR THEORY DEVICES AND CHARACTERISTICS

Classification of solids in terms of forbidden energy gap Fermi level – Fermi-Dirac function – Carrier concentration intrinsic and extrinsic semi conductors – effect of temperature on Fermi level – PN junction diode – Zener diode – Tunnel diode – photo diode – PIN – APD – Photo transistor – JFET construction and working – types of JFET – biasing – V-I characteristics in common source mode – JFET as amplifier.

UNIT – II : RECTIFIERS AND AMPLIFIERS

Half-wave, Full-wave and bridge rectifier – Two port representation of a transistor – ***h***-parameters– AC equivalent circuit using ***h***-parameters – analysis of an amplifier using h-parameters – Expressions for current gain, voltage gain input impedance, output impedance and power gain for common emitter only. RC coupled amplifier – frequency response curve – classification of amplifiers – class A power amplifier – Push-pull, class B power amplifier – Darlington pair - Emitter follower.

UNIT – III : FEEDBACK OSCILLATORS

Voltage gain of a feedbck amplifier – Barkhausen criterion – Hartley, Colpitt's, phase shift and Weinbridge oscillators – expressions for frequency of oscillations and condition for sustained oscillations in each case – crystal oscillator – frequency stability.

UNIT – IV : WAVE SHAPING CIRCUITS AND MULTI VIBRATORS

Clipping and clamping circuits – biased clipper – integrating and differentiating circuits.

Multivibrators – Astable – Mono stable and bi-stable multivibrators-Schmitt trigger.

UNIT – V : RADIO COMMUNICATION AND TELEVISION

Principles of transmission and reception – Modulation – types of modulation – amplitude modulation – frequency modulation and phase modulation – theory and mathematical analysis for AM, FM and PM – detector – AM Detector – FM Discriminator – AM and FM transmitter and receiver – RADAR – Range equation – Applications of RADAR.

Books for study:

1. Principles of electronics by V K Mehta, S Chand & Co., 5th edition 2001. Elements of electronics by Bagde and S P Singh.
2. Functional electronics by Ramanan. Monochrome and Colour TV by Gulati.
3. Basic and applied electronics by M Arul Thalapathi, Comptek, Publishers, Chennai 2005.
4. Electronic Communication systems, by George Kennedy, Bernard Davis , S R M Prasanna, 5th edn, Tata McGraw Hill, India

Books for reference:

1. Electronic principles by Malvino.
2. Electronic devices and circuits by Allen Mottershed.
3. Monochrome and colour TV Gulati.
4. Basic Television and videosystems by B Grob.
5. Solid State Electronics by Manna, Tata McGraw Hill.
6. Basic electronics, 6th Edition by B Grob, McGraw Hill, NY 1989.
7. Introduction to Radar systems, by Merrill I Skolnik, McGraw Hill.

SKILL BASED SUBJECT

PAPER – 3

ASTRO PHYSICS

UNIT – I: ASTRONOMICAL INSTRUMENTS

Optical telescope - reflecting telescope - types of reflecting telescope - advantages of reflecting telescopes - radio telescope - astronomical spectrographs - photographic photometry - photoelectric spectrometry- detectors and image processing.

UNIT – II : SPACE

Introduction – Hubble's Law – Big bang theory – Shape of Universe – Expanding universe in space – Galaxies – Types of Galaxies – Spiral, Elliptical and Irregular Galaxies – Clusters of Galaxies – Milky Way – Quasars.

UNIT – III : STARS

Birth of Stars – Colour and Age – Life of Stars – Red giant stars – With dwarf star – Neutron Star – Black hole – Supernovae – Constellations - Zodiac.

UNIT – IV : SOLAR SYSTEM

Introduction – Sun – Structure of Sun – Nuclear reactions in sun – Sun spot and solar flares – Earth – Structure of earth – Atmosphere – Moon and its structure – Inner planets – Outer planets – Asteroids – Meteors – Meteorites - Comets.

UNIT – V : SPACE DISTANCE, UNITS AND CO-ORDINATES

Cislunar space – Translunar space – Inter planetary distance – Interesteller space – Inter galactic space – Light Year – Astronomical Unit – Astronomical Map. Astronomical Systems – Astronomical co-ordinates – Celestial Sphere – Celestial Equators – Celestial Poles - Celestic.

Books for study:

1. BaidyanathBasu / An introduction to Astrophysics / second printing, Prentice Hall of India Private limited New Delhi – 2001
2. Hewish. A / Physics of the universe / CSIR publication, New Delhi, 1992.
3. Biman Basu / Inside Stars / CSIR Publication, New Delhi, 1992.
4. Biman Basu / Cosmic Vistas / National Book Trust of India, 2002.
5. Krishnasamy K.S. / Astro Physics a modern perspective / New Age International / New Delhi.
6. Murugesan. R / Modern Physics / S. Chand & Co. / New Delhi, 2003.

Books for reference:

1. Mohan Sundara Rajan / Space today / National Book Trust of Indi, 2000.
2. William K. Hartmann / The Cosmic Voyage through time and space / Wads worth Publishing company, Californi, 1990.

SEMESTER VI

PAPER – 8
NUCLEAR AND RADIATION PHYSICS

UNIT – I : NUCLEAR STRUCTURE

Nuclear spin – determination of magnetic dipole moment, electric quadruple moment, parity of nuclei, isospin, theories of nuclear composition, proton and electron hypothesis, proton – neutron hypothesis, nuclear forces – meson theory of nuclear forces.

Liquid drop model – Bethe – Weizacker's mass formula – application to alpha decay – Bohr – Wheeler theory – Shell model – evidences – theory o energy level diagram – spin orbit interaction
– magic numbers – nuclear stability.

UNIT – II : NUCLEAR DECAY

Radioactive disintegration – law of successive disintegration – transient and secular equilibrium – radioactive series – Geiger – Nuttal law – Age of earth – alpha particle disintegration energy – alpha particle spectra – theory of alpha decay (qualitative treatment). Beta ray spectra – origin – neutrino theory of beta decay – electron capture – gamma rays – determination of wavelength by Dumond – crystal spectrometer – nuclear isomerism.

UNIT – III : PARTICLE ACCELERATORS AND DETECTORS

Cyclotron – synchrocyclotron – Betatron – electron synchrotron – proton synchrotron (Bevatron) GM counter – ionization chamber – bubble chamber – scintillation counter – photographic emulsion techniques.

UNIT – IV : RADIATION PHYSICS

Nuclear fission – Chain reaction – four-factor formula – reactor theory – critical size of a reactor – general aspect of reactor design – reactor shielding – reactor control – classification of reactors – pressurized heavy water reactor – fast breeder reactor – Radiation hazards – biological effects of radiation – radiation sickness – radiation units and operational limits – radiation survey meters – pocket dosimeter – control of radiation hazards – radiation therapy – radioisotopes used for therapy – nuclear medicine – industrial applications – food preservatives.

UNIT – V : ELEMENTARY PARTICLES

Classification – types of interaction – symmetry and conservation laws – hadrons – leptons – baryons – mesons – strangeness – hyperons – antiparticles – antimatter – basic ideas about quarks – types of quarks.

Books for study:

1. Modern physics by R Murugeshan S Chand & Co.
2. Introduction to Modern Physics by Rich Meyer, Kennard, Coop Tata McGraw Hill Publishing Co.
3. Atomic and nuclear physics by Littlefeld & Thorley.
4. Modern physics by R Murugeshan & Kiruthiga, Sivaprasath S Chand & Co. (2006).

Books for reference:

1. Nuclear Physics S N Ghoshal – S Chand & Co. Edition 2003.
2. Nuclear Physics D G Tayal – Himalayan Publishing House.
3. Elements of Nucler Physics – M L Pandya & R P S Yadav Kedar Nath Ram Nath (2000).
4. Nuclear Physics – Irving Keplan.
5. Nuclear Physics – J B Rajam, S Chand Publishing Co.

PAPER – 9

RELATIVITY, QUANTUM MECHANICS & MATHEMATICAL PHYSICS

UNIT – I : RELATIVITY

Frames of reference – Michelson – Morley experiment – Significance of negative result – postulates of special theory of relativity – Lorentz transformation equations – Length contraction – Time dilation – Relativity of simultaneity – Law of addition of velocities – variation of mass with velocity – relativistic kinetic energy equations – postulates of general theory of relativity – gravitational red shift.

UNIT – II : WAVE MECHANICS

Matter waves – de Broglie wavelength – wave velocity and group velocity – Heisenberg's Uncertainty principle – proof of Uncertainty principle for one dimensional wave packet – Postulates of wave mechanics – properties of wave functions – operator formalism – eigen functions – eigen values – expectation values.

UNIT – III : SCHRODINGER EQUATIONS AND ITS APPLICATIONS

Schrodinger equation – time dependent and time independent – application of Schrodinger equations – linear harmonic oscillator – zero point energy – particle in a one dimensional box – barrier penetration and tunnelling effect – rigid rotator – hydrogen atom.

UNIT – IV : MATHEMATICAL PHYSICS

Gauss divergence theorem – Stoke's theorem – Green's theorem – applications of vectors to hydrodynamics.

Orthogonal curvilinear coordinates – spherical polar coordinates – differential operators in terms of orthogonal curvilinear coordinates – expressions for gradient, div, curl and $\tilde{\mathbf{N}}^2$ in Cartesian, spherical and cylindrical coordinates.

UNIT – V : SPECIAL FUNCTIONS

Beta and gamma functions – problems – relation between beta and gamma functions – Bessel's differential equations – Legendre's differential equations – Hermite's differential equations – Laguerre's differential equations – series solutions – Dirac delta functions - properties.

Books for study:

1. Quantum Mechanics by V. Devanathan, Narosa, Chennai, 2005.
2. Modern Physics by R Murugeshan, Kiruthiga, Sivaprasath S Chand & Co. (2007).
3. Quantum Mechanics by V K Thangappan, Wiley Eastern.
4. A Text Book of Quantum Mechanics by P M Mathews and Venkatesan, McGraw Hill. Mathematical Physical by Sathya Prakash.
5. Mechanics and Mathematical Methods by Murugeshan, S Chand Publishing & Co.

Books for reference:

1. Mathematical Physics by B D Gupta.
2. Quantum Mechanics by Ghatak and Loganathan, McMillan.
3. Basic Quantum Mechanics by A Ghatak, McMillan India (2002).

PAPER – 10

SOLID STATE PHYSICS

Unit - I

Crystallography: Distinction between crystalline and amorphous solids – Different features of the crystal – Crystal lattice – Basis – Primitive and Unit cell – Number of lattice points per unit cell - Seven Classes of Crystals - Bravais lattices – Miller indices – Elements of Symmetry – Structure of KCl and NaCl crystal - Diamond Structure – Atomic Packing – Atomic radius –-Lattice constant and density- Crystal structure (sc; hcp; fcc;bcc.)

Unit - II

Types of Bonding in Crystals - Ionic, Valence, Metallic, vanderwaal's and Hydrogen Bonding – Optical properties of solids – Specific heat capacity of solids – Dulong and Pettit's law – Einstein's and Debye's theory – Explanation for the Occurrence of Super Conductivity - General Properties of Superconductors - Types of Superconductors – Meissner effect -Application of Superconductors.

Unit - III

Diffraction of x-Rays by Crystals - Bragg's Law In one Dimension - Experimental Method in x- Ray Diffraction - Laue Method, Rotating Crystal Method - Powder Photograph Method - von Laue's equations. Point Defects, Line Defects - Surface Defects - Volume Defects - effects of Crystal Imperfections.

Unit - IV

Different Type of Magnetic materials - Classical Theory of Diamagnetism (Langevin's Theory) - Langevin's Theory of Paramagnetism - Weiss Theory of Paramagnetism - Qualitative Explanation of Heisenberg's Internal Field and Quantum Theory of Ferromagnetism.

Unit - V

Fundamental Definitions in Dielectrics - Different types of Electric polarization - Frequency and Temperature Effects on Polarization - Dielectric Loss - Local Field on Internal Field Clausius-Mosotti Relation - Determination of Dielectric Constant Dielectric Breakdown - Properties of Different Types of Insulating Materials.

Books for Study:

1. Solid State Physics Gupta and Kumar
2. Modern Physics R Murugesan
3. Material Science by M. Arumguarn, Anuradha Publishers.
4. Material Science and Engineering by V.Raghavan, PHI
5. Introduction to Solids by Azaroff, TMH.
6. Concepts of Modern Physics by Beiser, Tata Mc.Graw Hill, 5^{th} Edition,1997.

Books for Reference:

1. Introduction to Solid State Physics by Kittel, Wiley and Sons, 7^{th} Edition.
2. Solid State Physics A J Dekker

CORE PRACTICAL – III

(Any 20 Experiments)

1. Bifilar Pendulum – Parallel Threads – Verification of Two Theorems.
2. Young's modulus – Koenig's method - non uniform bending.
3. Young's modulus – Koenig's method - uniform bending.
4. Newton's rings – R_1, R_2 and – μ of material a convex lines.
5. Spectrometer i – I' Curve.
6. Spectrometer – narrow angled prism – angle of deviation – normal incidence and normal emergence – refractive index.
7. Dispersive power of a prism.
8. Dispersive power of a grating.
9. Spectrometer – Cauchy's constants.
10. Lasers – Determination of Numerical aperture of a fiber
11. Lasers - diffraction at a straight wire – determination of thickness of the wire.
12. Field along the axis of circular coil – deflection magnetometer – M and B_H – Null Method.
13. Field along the axis of circular coil – Vibrating magnetic needle - B_H.
14. EMF of a thermocouple – Mirror galvanometer – Direct deflection method.
15. Potentiometer – emf of a thermocouple.
16. Potentiometer – calibration of high range voltmeter.
17. Potentiometer – Conversion of galvanometer into voltmeter.
18. Potentiometer – Conversion of galvanometer into ammeter.
19. BG – absolute capacitance of a capacitor.
20. BG – comparison mutual inductances.
21. BG – High resistance by leakage.
22. BG – internal resistance of a cell.
23. Hartley Oscillator.
24. Colpitt's oscillator.
25. RC Coupled single stage amplifier (without feedback).

CORE PRACTICAL – IV

ELECTRONICS

1. FET – Characteristics.
2. UJT – Characteristics.
3. UJT – Relaxation oscillators.
4. Differentiating and integrating circuits – using op-amp.
5. NAND, NOR as universal gates.
6. Verification of De Morgan's Theorems.
7. Transistor – Phase shift oscillator.
8. Transistor – Wien bridge oscillator.
9. Emitter Follower.
10. Op – Amp – Voltage follower, adder, subtractor, averager (inverting mode).
11. Op – Amp – Inverting amplifier with frequency gain response.
12. Half adder and Full adder – using NAND gate only.
13. Half subtractor and Full subtractor – using NAND gate only.
14. RS, Clocked RS, and D Flip Flops using NAND gate only.
15. Four bit ripple counter – 7473 / 7476.
16. Shift Register – Four bit left / right – 7473 / 7476.
17. Microprocessor – 8 bit addition, Subtraction – using BCD & Hexadecimal.
18. Number conversion – 8 bit – BCD to binary, Binary to BCD, Hex to ASCII using 8085.
19. Square and Square root of Hex numbers – 8 bit – using 8085.
20. Microprocessor – Sum of N elements

SKILL BASED SUBJECT

PAPER – 4

INSTRUMENTATION TECHNIQUES

UNIT – I : ELECTRICAL INSTRUMENTATION

AC bridges – Measurement of Inductance by Maxwell's Inductance Bridge – Measurement of Capacitance by De Sauty's Bridge – Measurement of Mutual Inductance by carry Foster bridge – ac differential voltmeter – dc differential voltmeter – Analog multimeter.

UNIT – II : ELECTRONIC INSTRUMENTATION

Analog to Digital converters – Dual slop ADC and Successive approximation ADC – Digital counter (four bit) – Digital voltmeter – Digital Frequency Meter – Digital Multimeter – Digital Thermometer.

UNIT – III : ANALYTICAL INSTRUMENTATION

CRO – measurement of time period and frequency – Distortion analyzer – Wave analyzer – Spectrum analyzer – IR spectrometer – UV spectrometer – Fast Fourier Transform (FFT) analyzer – Ultrasound scanner.

UNIT – IV : BIO-MEDICAL INSTRUMENTATION

Bioelectric potentials – resting and action potential – Half cell potential – surface needle and micro electrodes – principle, description, function and recording of ECG, EMG and EEG artificial pace maker – simulators – heart lung machine – kidney machine – pH meter – laser blood flow meter.

Strain gauge and measurement of strain – Measurement of pressure using electrical transducer – Measurement of seismic vibration using seismic transducer – Piezo – electric accelerometer – Measurement of temperature using semiconductor device – Radiation measurement by GM counter.

Books for study:

1. Arumugam M / Biomedical instrumention / Anuradha Publications, Kumbakonam / 2011.
2. Sawhney A K / A course in Electrical and Electronics Measuremens and Instrumentation / Dhanpat Rai & Co., Delhi / 2003.
3. Alan S Morris / Measurement & Instrumentation Principles / Elsevier / 2006.
4. Anand M.M.S. / Electronics Instruments and Instrumentation Technology / PHI, New Delhi / 2006.

ELECTIVE SUBJECTS

Students can choose any one of the groups (Elective I, II & III)

GROUP A

Elective 1: Digital Electronics
Elective 2: Applied Electronics
Elective 3: Microprocessor and its Applications – 8085

GROUP B

Elective 1: Materials Science
Elective 2: Applied Electronics
Elective 3: Laser and Fibre Optic Communication

GROUP C

Elective 1: Fundamentals of Nano Materials and its Characterization
Elective 2: Applied Electronics
Elective 3: Medical Physics

ELECTIVE

GROUP A

PAPER – 1

DIGITAL ELECTRONICS

UNIT – I : DIGITAL FUNDAMENTALS AND LOGIC GATES

Number systems – decimal, binary, octal and hexadecimal system – Conversion from one number system to another. Codes – BCD code – Excess 3 code, Gray code – ASCII code - Binary arithmetic –Binary addition – subtraction – unsigned binary numbers – sign magnitude numbers – 1's and 2's complement – Binary multiplications and division - AND, OR circuits using diodes and transistors – NOT using transistors – NAND, NOR and EXOR – functions and truth tables. NAND & NOR as universal gates.

UNIT – II : BOOLEAN ALGEBRA AND SIMPLIFICATION OF LOGIC CIRCUITS

Laws and theorems of Boolean algebra – De Morgan's theorems and their circuit implications - Simplification of Boolean equations – Karnaugh map – pairs, quads, octets – 2,3 and 4 variables - Arithmetic building blocks – Half adder – Full adder – parallel binary adder – Half subtractor – Full subtractor – The adder-subtractor – digital comparator – parity checker / generator.

UNIT – III : DATA PROCESSING CIRCUITS AND SEQUENTIAL LOGICS

Multiplexers – Demultiplexers – Decoders – 1 of 16 decoder BCD to decimal decoder – seven segment decoder – Encoders – Flip Flops – RS Flip Flop – Clocked RS Flip-flop – D flip-flop – JK flip-flop – JK master slave flip-flop – T type flip-flop.

UNIT – IV : SHIFT REGISTERS AND COUNTERS

Types of registers – serial in serial out – serial in parallel out – parallel in serial out – parallel in parallel out – ring counter – asynchronous counter – decoding gates – omitted states – modulus counters –BCD counter – up down counter – synchronous counter – combination counters – decade counter – cascaded counters.

UNIT – V : D/A AND A/D CONVERTERS

Introduction – variable resistor network – binary ladder – D/A converter – D/A accuracy and resolution – A/D converter – simultaneous conversion – A/D accuracy and resolution.

Books for study:

1. Malvino and Leech, (2000), Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi.
2. Millman and Halkias, (1972), Integrated Electronics, International Edition, McGraw Hill, New Delhi.
3. Arul Thalapapathi, Fundamentals of digital computers, Comptek publishers, Chennai, 1995.

Books for Reference:

1. Computer architecture and logic design by T C Bartee, McGraw Hill, 1991.2.
2. Solid state electronics by 1 Agarwal and Anit Agarwal.
3. Digital integrated electronics by Herbert Taub and Donald Schilling, McGraw Hill.
4. Anokh Singh and A K Chhabra, (2005), Fundamentals of Digital Electronics and Microprocessors, 2nd revised and enlarged Ed., S Chand & Co. Ltd., New Delhi.
5. Digital fundamentals – Floyd – Pearson Education 8th Edition 2004 S Chand Publications.

PAPER – 2

APPLIED ELECTRONICS

UNIT – I : SPECIAL DEVICES AND APPLICATIONS

FET – Characteristics – parameter FET as amplifier – FET as VVR – MOSFET – Depletion and enhancement – UJT characteristics – UJT as relaxation oscillator – SCR characteristics – SCR as half wave rectifier and full wave rectifier. SCR as static current switch – Firing of SCR using UJT.

UNIT – II : OPERATIONAL AMPLIFIER AND APPLICATIONS

OPAMP – Parameters – Inverting and Non-inverting amplifier – gain – Miller effect – Virtual ground – Offset voltage – offset current – PSRR – CMRR.

OPAMP – Sign and Scale changer – adder, subtractor and averager – Integrator and differentiator – DC voltage follower – ac voltage follower –

UNIT – III : OTHER APPLICATION OF OPAMP

OP AMP logarithmic amplifier – antilogarthmic amplifier – Logarithmic multiplier – Logarithmic divider. Comparator – Schmitt trigger – astable multivibrator – monostable multivibrator – Bistable multivibrator.

UNIT – IV : 555 TIMER AND PLL

555 block diagram and work monostable operation – Astable operation – Schmitt trigger. Phase – Locked Loops (PLL) : Basic principles – Phase Detector.

Comparator – Analog phase detector – Digital phase detector – voltage controlled oscillator (VCO).

UNIT – V : D/ A AND A/D CONVERTER

Weighted resistor D/A converter – 4-bit R-2R ladder DAC – Analog to Digital converter – Stair case ADC – tracking or servo ADC – Successive approximation ADC – Flash ADC Duel slope ADC.

Books for Study:

1. Basic and Applied Electronics by M. Arul Thalapathi – Comtec Publisher Chennai – 2005.
2. Digital principles and applications – Malvino Leach – 4th Edn. – Tata McGraw Hill 1992.
3. Integrated Electronics by Jacob Millman and Christos C. Halkias – McGraw Hill International 1971.
4. Linear Integrated Circuits by D. Roy Choudhury and Shail Jain – New age international (P) Ltd. OP-AMPS and linear integrated circuits – by Ramakant A. Gayakward – Printice Hall of India 1994.

Books for Reference:

1. Digital Computer electronics by Albert Paul Malvino – TMH Edition 1992.
2. Electronics – Analog and Digital – IJ Jagrath – Prentice – Hall of India – New Delhi – 1999.
3. Operational amplifier and linear integrated circuits – Prentice Hall Inc. N.J. 1977.

PAPER - 3

MICROPROCESSOR AND ITS APPLICATIONS - 8085

UNIT – I : MICROPROCESSOR ARCHITECTURE AND ITS OPERATIONS

Microprocessors – Architecture of 8085 – pin out configurations of 8085 – Bus organization and timings: buses – buffer – address bus, data bus, multiplexing address / data bus and control & status signals – ALU – registers in 8085 – flags – decoding and execution of instruction – Interrupts and its types.

UNIT – II : PROGRAMMING MODEL OF 8085

Classification of instructions and format – 8-bit data transfer, arithmetic, logical and branch instructions – Addressing modes – 16 bit data transfer and memory related instructions – stack and subroutine instructions – comparison of stack and subroutine instructions – Logical rotate and compare instructions – RIM and SIM interrupt instructions – 8-bit code conversion: Binary to BCD, BCD to binary, binary to ASCII, ASCII to binary.

UNIT – III : TIME DELAY, DESIGN OF COUNTERS AND MEMORY INTERFACE

Counters – time delay using one and pair of registers – Instruction timings of 8085 – T-states – delay routines and delay calculations.

Memory interface : 2K x 8, 4K x 6 ROM and RAM interface – timing diagram for memory read and memory write cycles – instructions cycle, machine cycle.

UNIT – IV : INTERFACING I/O DEVICES

Interfacing concepts – peripheral I/O instructions – interfacing input and output using decoders – interface of LED output display for binary data – Memory mapped I/O – LED display of binary data – comparison of peripheral I/O and memory mapped I/O.

UNIT – V : INTERFACING DATA CONVERTERS AND PERIPHERAL DEVICES

Concepts of D/A and A/D converters and circuits – illustration of interfacing 8-bit D/A - successive approximation A/D converters – interfacing of programmable peripheral device 8255 – Programming 8255A MODE zero – interfacing with ports of 8255 with LED’s to run various counters.

Books for study:

1. Microprocessor Architecture, Programming and Applications with the 8085 – R.S. Goankar, 3rd Edn. Prentice Hall.
2. Fundamental of Microprocessor – 8085 – Architecture, Programming and interfacing – V. Vijyendra, S. Viswanathan, Pvt. Ltd., 2003.

Books for reference:

1. Digital computer electronics: an introduction to microcomputers – Malvino, 2nd Edn., Tata McGraw Hill.
2. Fundamental of Microprocessor and Microcomputers – B. Ram.
3. Computer System Architecture – Moris Mano, 3rd Edn., Prentice Hall India.
4. Introduction to Microprocessors : Software, Hardware, Programming – Lance A. Leventhal, Prentice Hall India.

ELECTIVE

GROUP B

PAPER – 1

MATERIALS SCIENCE

UNIT – I : MATERIALS SCIENCE

Classification of materials – Properties of Engineering materials – Materials Structure – Types of Bonds – Bonds Formation – Ionic Bond – Covalent Bond – Metallic Bond – Comparison of Bonds – Secondary Bonds.

UNIT – II : PHASE DIAGRAM AND TRANSFORMATION

Basic terms – Solid Solution – Hume – Rothery's rule – Intermediate Phase – Phase Diagrams – Gibb's Phase Rule – Time – Temperature cooling curves – Construction of Phase Diagrams – The Lever Rule – Equilibrium Binary System – Eutectic System – Mechanism of Phase Transformation.

UNIT – III : VACUUM AND OXIDATION

History of vacuum technology – units of Vaccum – Kinetic aspects of Gases – Application of Vaccum – Gas flow in vaccum systems – production of vaccum – Measurement of vaccum – Thermal conductivity gauges – Penning Gauge – Oxidation – Oxidation Resistant Materials.

UNIT – IV : NON-DESTRUCTIVE TESTING (NDT)

NDT and its advantages – Defects in materials – Selection of the NDT Method – Visual Inspection – Basic Principle – Liquid Penetration Testing – Physical Principle – Magnetic Particle Testing (MPT) – Principle of MPT – Sensitivity – Limitation – Eddy Current Testing (ECT) – Principle – Instrument for ECT – Applications – Limitations – Radiography – Basic Principle – Application – Limitations.

UNIT – V : ELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS

Dielectrics – Polarization – Temperature and frequency effects – Electric Breakdown – Ferroelectric materials – Electrostriction – Piezoelectricity – Uses of Dielectrics – Magnetic Properties – Classification – Magnetostriction – Soft and Hard Magnetic Materials.

Books for study:

1. Materials Science by G.K.Narula, K.S. Narula, V.K. Gupta, Tata McGraw Hill Publishing, 1994.

2. Materials Science and Engineering by V. Raghavan, Prentice Hall of India, 2004.

Books for reference:

1. Practical Non-Destructive Testing by Baldevraj,T. Jayakumar, M. Thanvasimuthu, Narosa Publishing House, Chennai, 2002.

2. Testing of Metallic Materials by A.V.K. Suryanarayana, B.S. Publications, Giriraj lane, Sultan Bazar, Hyderabad – 95, 2003.

PAPER – 2

APPLIED ELECTRONICS

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1. Basic and Applied Electronics by M. Arul Thalapathi – Comtec Publisher Chennai – 2005. Digital principles and applications – Malvino Leach – 4th Edn. – Tata McGraw Hill 1992.
2. Integrated Electronics by Jacob Millman and Christos C. Halkias – McGraw Hill International 1971.
3. Linear Integrated Circuits by D. Roy Choudhury and Shail Jain – New age international (P) Ltd. OP-AMPS and linear integrated circuits – by Ramakant A. Gayakward – Printice Hall of India 1994.

Books for Reference:

1. Digital Computer electronics by Albert Paul Malvino – TMH Edition 1992.
2. Electronics – Analog and Digital – IJ Jagrath – Prentice – Hall of India – New Delhi – 1999.
3. Operational amplifier and linear integrated circuits – Prentice Hall Inc. N.J. 1977.

PAPER – 3

LASER AND FIBRE OPTIC COMMUNICATION

UNIT – I: LASER PHYSICS

Basic Principle of Laser – Einstein Coefficients – Condition for light amplification – Population Inversion – Threshold Condition – Line Shape Function – Optical Resonators – Three level and four level systems.

UNIT – II: TYPES OF LASERS AND OUTPUT MODULATION METHODS

Solid State Lasers – Ruby and Nd-YAG Laser – Gas Lasers – He-Ne and Co2 lasers – semiconductor lasers – Hetero junction Lasers – Liquid Dye Lasers – Q switching and mode locking.

UNIT – III: APPLICATIONS OF LASER

Application of laser in industry – cutting and welding – Drilling – Surface Hardening – Medical applications – Laser as diagnostic and therapeutic tool – Holography – Theory of recording and reconstruction – application of Holography.

UNIT – IV: OPTIC FIBERS

Fiber optic revolution – basic characteristics of optical fiber – acceptance angle – numerical aperture – propagation of light through optical fiber – theory of mode formation – classification of fibers – step index and graded index fibers – single mode and multi mode fibers – losses in fibers – fabrication techniques of fibers.

UNIT – V: FIBER OPTIC COMMUNICATION

Source and detectors for fiber optic communication – Laser and LED – Analog and digital modulation methods – Principle of optical detection – Pin APD photo detectors – Noise – Design consideration of a fiber optic communication system.

Books for study:

1. Laser theory and applications by K. Thyagarajan and Ajoy Ghatak, Cambridge University Press, 1999.
2. Introduction to Fiber optics by K. Thyagarajan and Ajoy Ghatak, Cambridge University Press, 1999.
3. Optical Fiber Communications by John M. Senior, Cambridge University Press, 1996.
4. Fiber-Optic Communication Systems, Govind P. Agarwal, John-Willey & Sons,

Books for Reference:

1. An Introduction to laser : Theory and Applications by M. N. Avadhanulu, S. Chand and Co., New Delhi 2001.
2. P.K. Palanisamy, Physics for Engineering, Scitech Publishing Pvt. Ltd., Chennai

ELECTIVE

GROUP C

PAPER – 1

FUNDAMENTALS OF NANO MATERIALS AND CHARACTERIZATION

UNIT – I : INTRODUCTION TO NANOTECHNOLOGY

Definition of Nanoscale system – Feymann theory of Nanotechnology – types of nanotechnology – Molecular Nanotechnology – Molecular and atomic size – Surface and dimensional space – opportunities at the Nanoscale.

Unit – 2: NANO PROPERTIES

Forces between atoms and molecules, particles and grain boundaries – Vander Waals and electrostatic forces between surface – Nano and Mesopores – size dependent variation in magnetic, electronic transport, resistivity, optical and etc – Misnomers and misconception of Nanotechnology.

Unit – 3 : QUANTUM CONFINEMENT

Quantum confinement in one dimension – Quantum walls – Quantum confinement – In two dimensions – Quantum wires – Quantum confinement in three dimensions – Quantum dots – Super lattices band – Band offsets – Quantum dot layers.

Unit – 4: SYNTHESIS OF NANOMATERIALS AND ITS CHARACTERIZATION

Basic approaches of synthesis nanomaterials – Bottom up and top down process – fundamental of sol – gel process – Sol – Gel synthesis methods for oxides – Mechanical milling – thermal evaporation – XRD with Debye Scherrer formula – SEM- TEM – FTIR – UV.

Unit – 5: APPLICATION OF NANOMATERIALS

Implications of Drug delivery – Polymeric Nanoparticles as Drug carriers and controlled release implant devices – Magnetic Data Storage – Magneto optics and magneto – optic recording – Nano Sensors – Physical sensor and chemical sensors.

Books for Study & Reference:

1. Nanotechnology : Basic Science and Emergic Technologies – Mick Wilson, Kamli Kannangara, Geoff smith , Michelle Simmons, Burkhard Raguse, overseas press (2005)

2. Nanotechnology : A Gentle introduction to the next big idea, Mark A. Rather, Daniel Rather, Mark Rather, prentice Hall PTR; 1st edition (2002)

3. Robert W. Kel Sall, Mark Geoghenan, In W. Hamley, Nano Scale Science and technology, John Wiley and sons, 2005 ISBN 0470850868.

4. Recent advances I the liquid phase synthesis of inorganic nanoparticals Brain L. Cushing, Valdimir L. Kolesnichenko, Charles J. O* Connor, Chem Rev 104 (2004)3893- 3946.

5. Nano composite science and technology, Palical M. Ajayan, Linda S. Schadles, Paul V. Braues, Wiley – VCH Verlag WEileim (2003).

6. ww.eng.vcedu/Ngbeaucag/calsses/XRD/Neutron_diffraction_atLNL.pdf

7. Nano particulates as Dring Carriers , Edited by Vladimir P. Torchilin, Imperiacal college press, North Einstein university, USA (2006), ISBN 1 – 86094 – 630 – 5.

8. Magnetic materials: Fundamental and device applications Nichola. Ann spaldin, Cambridge University press (2003) ISBN 0521016584.

PAPER – 2

APPLIED ELECTRONICS

UNIT – I : SPECIAL DEVICES AND APPLICATIONS

FET – Characteristics – parameter FET as amplifier – FET as VVR – MOSFET – Depletion and enhancement – UJT characteristics – UJT as relaxation oscillator – SCR characteristics – SCR as half wave rectifier and full wave rectifier. SCR as static current switch – Firing of SCR using UJT.

UNIT – II: OPERATIONAL AMPLIFIER AND APPLICATIONS

OPAMP – Parameters – Inverting and Non-inverting amplifier – gain – Miller effect – Virtual ground – Offset voltage – offset current – PSRR – CMRR.

OPAMP – Sign and Scale changer – adder, subtractor and averager – Integrator and differentiator – DC voltage follower – ac voltage follower –

UNIT – III: OTHER APPLICATION OF OPAMP

OP AMP logarithmic amplifier – antilogarthmic amplifier – Logarithmic multiplier – Logarithmic divider. Comparator – Schmitt trigger – astable multivibrator – monostable multivibrator – Bistable multivibrator.

UNIT – IV: 555 TIMER AND PLL

555 block diagram and work monostable operation – Astable operation – Schmitt trigger. Phase – Locked Loops (PLL) : Basic principles – Phase Detector.

Comparator – Analog phase detector – Digital phase detector – voltage controlled oscillator (VCO).

UNIT – V: D/A AND A/D CONVERTER

Weighted resistor D/A converter – 4-bit R-2R ladder DAC – Analog to Digital converter – Stair case ADC – tracking or servo ADC – Successive approximation ADC – Flash ADC Duel slope ADC.

Books for Study:

1. Basic and Applied Electronics by M. Arul Thalapathi – Comtec Publisher Chennai – 2005. Digital principles and applications – Malvino Leach – 4th Edn. – Tata McGraw Hill 1992.
2. Integrated Electronics by Jacob Millman and Christos C. Halkias – McGraw Hill International 1971.
3. Linear Integrated Circuits by D. Roy Choudhury and Shail Jain – New age international (P) Ltd.
4. OP-AMPS and linear integrated circuits – by Ramakant A. Gayakward – Printice Hall of India 1994.

Books for Reference:

1. Digital Computer electronics by Albert Paul Malvino – TMH Edition 1992.
2. Electronics – Analog and Digital – IJ Jagrath – Prentice – Hall of India – New Delhi – 1999.
3. Operational amplifier and linear integrated circuits – Prentice Hall Inc. N.J. 1977.

PAPER – 3

MEDICAL PHYSICS

UNIT – I: X – RAYS

Electromagnetic spectrum – production of x- rays – s-rys spectra – Brehmsstrahlung – Characteristic x-ray – X-ray tubes – Coolidge tube – x-ray tube design – tube cooling – stationary mode – Retting anode x-ray tubes – Tube rating – quality and intensity of x-ray. X-ray generator circuits – half wave and full wave fectification.

UNIT – II: RADIATION PHYSICS

Radiation units – exposure – absorbed dose – rad gray – kera relative biological effectivenss – effective dose – slevert - inverse square law – Interaction of radiation with matter – linear attenuation coefficient. Radiation Detectors.

UNIT – III: MEDICAL IMAGING PHYSICS

Radiological imaging – Radiography – Filters – grids – cassette – X-ray film – film processing – fluoroscopy – computed tomography scanner –principle function display – generations – mammography. Ultrasound imaging – magnetic resonance imaging – thyroid uptake system – Gamma camera [Only Principle, function and display]

UNIT – IV: RADIATION THERAPHY PHYSICS

Radio theraphy – kilo voltage machines – deep theraphy machines – tele-cobalt machines – Medical linear accelerator. Basic of Teletherapy units – deep x-ray, telecobalt units, medical linear accelerator – radiation protection – external beam characteristics – phantom –does maximm and build up – bolus – percentage depth dose – tissue – air ration – back scatter factor.

UNIT – V: RADIATION PROTECTION

Principles of radiation protection – protective materials – radiation effects – somatic, genetic stochastic and deterministic effect, Personal monitoring devices – TLD film badge – pocket dosimeter.

Book for Study:

1. Basic Radiological Physics Dr. K. Thayalan – Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi (2003)

2. Christensen's Physics of Diagnostic Radiology : Curry, Dowdey and Murrey – Lippincot Williams and Wilkins (1990)

3. Physics of Radiation Theraphy : FM Khan – Williamd and Wilkins, Third edition (2003)

4. The essential physics of Medical imaging : Bushberg, Seibert, leidholdt and Boone Lippincot Williams and Wilkins, Second Edition (2002)

5. HE Johns and Cunningham – The Physics of Radiology.

Books for Refernece :

1. Nuclear medicine Physics : Chandra – Lippincot Willams and Wilkins (1998)

2. The Physics of radiology : John R. Gunni ingham and Johns – Charles C Thomas USA (19190)

3. Medical Imaging Physics : William R Hendee – Mosby , 3rd edition (1992)

4. Advanced Medical Radiation Dosimetry : Govindarajan KN Prentice – Hall of India Pvt. Ltd. New Delhi (1992)

5. Erric Hall Radio Biology for the Radiologist – Lippincott Williams & Wilkins.

6. The modern Technology of Radiation oncology – Jake VanDyk – Medical Physics Publishing.

ALLIED

PHYSICS - I

UNIT – I: PROPERTIES OF MATTER

Elasticity : Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula .

Surface Tension: Surface Tension – Surface Tension and interfacial surface tension by the method of drops.

UNIT – II: HEAT

Heat: Specific heat – Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power.
Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Super conductors. Type I and II – Meisner Effect – Helium I and II.

UNIT – III: ELECTRICITY AND MAGNETISM

Electricity: Potentiometer – Principle – Calibration of low range voltmeter – Measurement of internal resistance of cell – measurement of an unknown resistance.

Magnetism – Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer in Tan C position and the vibration magnetometer.

UNIT – IV: SOUND AND ACOUSTICS OF BUILDING

Sound: Transverse vibration of strings – Velocity and frequency of vibrations of a stretched string – laws – sonometer – A.C. Frequency – Steel Wire – Brass wire.

Ultrasonics – Production by Piezo – electric method – properties and uses.
Acoustics of buildings: Reverberation – Reverberation time – Sabine's formula (definition only) – Sound absorption co-efficient of surface – conditions for the perfect acoustics.

UNIT – V: OPTICS

Interference: Air Wedge – Description – Test for optical flatness of glass plate – Determination of diameter of a thin wire by air wedge.

Diffraction: Theory of transmission grating – Normal Incidence – Determination of Wavelength of monochromatic source and Wavelength of mercury line using a grating by normal Incidence.

Fibre optics: principle-classification of optical fibres-fibre optic communication system block diagram.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Introduction to Fibre optics- K.Thyagarajan and Ajay Ghatak,Cambridge,University Press(1999).

ALLIED

PHYSICS II

UNIT – I: WAVE MECHANICS

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

UNIT – II : NUCLEAR PHYSICS

Particle accelerators – cyclotron, particle detectors – GM Counter Artificial Transmutation – Rutherford's Experiment – The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions.

Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy – Conservation of Parity – Quantities conserved and quantities not conserved in a nuclear reaction.

UNIT – III : ENERGY PHYSICS

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

UNIT – IV: CRYSTALLOGRAPHY

Crystallography : The crystal structure – Unit Cell –Bravais lattice- structures of simple cubic-BCC and FCC- co ordination number, packing factor calculation for the above structures –Hexogonal closed packed(HCP) structure -Miller indices – concept of Reciprocal Vectors.

UNIT – V: ELECTRONICS

Electronics: Transistor characteristics in common base and common emitter mode- Transistor single stage amplifier- Expression for input impedence, output impedence and current gain.
Digital Electronics : NAND and NOR as universal building blocks- De Morgan's theorem –statement and proof- Fabrication of diodes and transistors using Monolithic technology– limitations.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
9. Introduction to Solid State Physics – C. Kittel, 5^{th} Edition Wiley Eastern Ltd.
10. Renewable & Sustainable energy sources – Agarwal.

ALLIED PRACTICAL

PHYSICS
(Any 15 Experiments)

1. Young's modulus – non uniform bending – pin and microscope.
2. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
3. Ridigity modulus – Torsional oscillation method (without symmetric masses).
4. Determination of Co-efficient of Viscosity – Graduated Burette.
5. Surface Tension and Interfacial Tension – By drop weight method.
6. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
7. Sonometer – Determining A.C. Frequency. (Screw Gauge is given).
8. Sonometer – frequency of tuning fork.
9. Newton's Rings – Radius of Curvature.
10. Air Wedge – Determination of thickness of thin wire.
11. Spectrometer Grating – Minimum Deviation – Mercury Lines.
12. Spectrometer – Refractive Index of a liquid – Hollow Prism.
13. Potentiometer – Calibration of High Range Ammeter.
14. Potentiometer – Calibration of Low Range Voltmeter.
15. Determination of M and B_H using Deflection Magnetometer in Tan C position and vibration magnetometer.
16. Figure of merit and voltage sensitiveness of table galvanometer.
17. Construction of AND, OR gates using diodes and NOT by transistors.
18. Zener diode – Voltage Regulation.
19. NAND / NOR as universal gate.
20. Demorgan's theorem verification.

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THIRUVALLUVAR UNIVERSITY

PART-IV

ENVIRONMENTAL STUDIES

SYLLABUS

(For all UG Degree Courses)

(with effect from 2017-2018)

SEMESTER I

UNIT-I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES :

Environmental Sciences - Relevance - Significance - Public awareness - Forest resources - Water resources - Mineral resources - Food resources - conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies.

UNIT-II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION:

Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem.

Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) and local levels - Hotspots, threats to biodiversity - conservation of biodiversity - Insitu & Exsitu.

UNIT-III: ENVIRONMENTAL POLLUTION AND MANAGEMENT

Environmental Pollution - Causes - Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management - Floods, Earth quake, Cyclone and Land slides. Role of individuals in prevention of pollution - pollution case studies.

UNIT-IV: SOCIAL ISSUES - HUMAN POPULATION

Urban issues - Energy - water conservation - Environmental Ethics - Global warming - Resettlement and Rehabilitation issues - Environmental legislations - Environmental production Act. 1986 - Air, Water, Wildlife and forest conservation Act - Population growth and Explosion - Human rights and Value Education - Environmental Health - HIV/AIDS - Role of IT in Environment and Human Health - Women and child welfare - Public awareness - Case studies.

UNIT-V: FIELD WORK

Visit to a local area / local polluted site / local simple ecosystem - Report submission

REFERENCES

1. KUMARASAMY, K., A.ALAGAPPA MOSES AND M.VASANTHY, 2004. ENVIRONMENTAL STUDIES, BHARATHIDSAN UNIVERSITY PUB, 1, TRICHY

2. RAJAMANNAR, 2004, ENVIRONEMNTAL STUDIES, EVR COLLEGE PUB, TRICHY

3. KALAVATHY,S. (ED.) 2004, ENVIRONMENTAL STUDIES, BISHOP HEBER COLLEGE PUB., TRICHY

THIRUVALLUVAR UNIVERSITY, SERKADU

FOUNDATION ENGLIAH PART II

REVISED SYALLABUS
(w.e.f 2017-2018)

SEMESTER I

UNIT 1-PROSE

1. My greatest Olympic Priize -Jesse Owens
2. The Tree Speaks – Rajagopalachari.C
3. Snake in the Garden – R.K.Narayan
4. Futurology - Aldous Huxley

UNIT 2 -POETRY

1. The River - Parthasarathy
2. Ode to Nightingale – John Keats
3. "O Captain, My Captain - Walt Whitman
4. Paper Boat – Rabindranath Tagore

UNIT 3 -SHORT STORY AND ONE ACT PLAY

1. A Day's Wait – Ernest Miller Hemingway
2. Little Girls Wiser Than Men - Tolstoy

One act play

3. The Bishop's Candlestick – Morman Mckinnel

UNIT- 4 GRAMMAR AND COMPOSITION

1. Correct usage of Words
2. Vocabulary – Synonyms & Antonyms
3. Abbreviations
4. English for Excellence – Parts of Speech -Modern Avenue
5. Functional English: Creative Writing
   College Grammar
   Letter of Application
   Writing a Resume

UNIT-5 COMMUNICATION SKILLS

1. Listening Conversation –(i) Agreeing and Disagreeing..
   (ii) Seeking and giving permission
   (iii) Greetings
   (iv) Introducing Oneself to others

SEMESTER II

UNIT – 1 **PROSE**

1. Ant and Grasshopper - Somerset Maugham
2. Early Influences - A.P.J. Abdul Kalam
3. Forgetting – Robert Lynd
4. The Unity of Indian Culture – Humayan Kabir

UNIT -2 POETRY

1. The Soul's Prayer.- Sarojini Naidu
2. The Lotus - Toru Dutt
3. Nutting – William Wordsworth
4. Ozymandias- P.B.Shelley

UNIT-3 SHORT STORY AND ONE ACT PLAY

4. The Doll's House - Katherine Mansfield
5. Karma - Kushwant Singh

One Act Play

6. Hijack -Charles Wills

UNIT -4 Vocabulary

6. Functional Grammar
7. Functional English

UNIT-5 COMMUNICATION SKILLS

8. Making Request
9. Offering Help
10. Inviting Someone
11. Asking Permission

SEMESTER III

UNIT -1 PROSE

1. The Right to Public Amnesia – Santhosh Desai
2. On saying "Please" – .A.G. Gradiner.
3. With the Photographer – Stephen Leacock
4. Indian Women -Dr.S.Radhakrishnan

UNIT -2 POETRY

1. Time and Love -William Shakespeare
2. Satan's Speech – John Milton
3. Obituary -A.K.Ramunujam
4. The Professor – Nissim Ezekiel

UNIT -3 DRAMA

1. Lady Macbeth soliloquy- Act I scene V
2. Women's Monologue- Antony & Cleopatra Act IV scene ii and Act V scene xiii

BIOGRAPHY

1. Mother Teresa -F.G.Herod

UNIT -4 VOCABULARY

1. Lexical Skills
2. Functional Grammar
3. Functional English

UNIT -5 COMMUNICATION SKILLS

1. Asking for Advice
2. Expressing Gratitude
3. Complementing and Congratulating
4. Complaining

SEMESTER IV

UNIT -1 PROSE

1. What is Courage - J.B.Priestly
2. Travel By Train - J.B.Priestly
3. Nobel Lecture - C.Malala Yousafjai
4. I won"t Let him Go -Mathavan Kutty

UNIT -2 POETRY

1. Stooping by Woods on Snowy Evening – Robert Frost
2. Refugee Mother and Child -Chinua Achebe
3. An Octobere Morning - Jayanta Mahapatra
4. Lyric No.1-XX11 (From Gitanjali) – Rabindranath Tagore

UNIT -3 DRAMA

Selected Scenes from Shakespeare

1. Hamlet (Soliloquy) Act III Scene I
2. Funeral Oration – Julius Caesar Act III Scene II

BIOGRAPHY

1. Rabindranath Tagore – E.M. Carter

UNIT -4 VOCABULARY

1. Lexical Skills
2. Functional Grammar and English Grammar

UNIT -5

1. E-mail
2. Presentation Skills
3. Curriculum Vitae and Covering Letter
4. Facing an Interview

இளநிலைப் பட்டப்படிப்பு

அடித்தளப் படிப்பு : பகுதி - 1 தமிழ்
முதலாமாண்டு - முதற்பருவம்

அலகு - 1 கவிதை

1. பாரதியார் - 1. உறுதிவேண்டும், 2. புதுமைப்பெண்
2. பாரதிதாசன் - புரட்சிக்கவி "பேரன்பு கொண்டவரே" என்ற பாடல் முதல் "கவிஞனுக்கும் காதலிக்கும்" என்ற பாடல் வரை.
3. கவிமணி - ஆசியஜோதி - புத்தரும் ஏழைச் சிறுவனும்
4. கண்ணதாசன் - நீ மணி, நான் ஒலி!
5. கவிஞர் அறிவுமதி - நட்புக் காலம்
6. வைரமுத்து - தமிழுக்கு நிறமுண்டு - கூடு
7. மு. மேத்தா - வாழை மரத்தின் சபதம்
8. செ. அன்னகாமு - நாட்டுப்புறப் பாடல்கள் - தாலாட்டு, ஒப்பாரி
9. அப்துல் ரகுமான் - கனவு நாயகன் - அப்துல் கலாம்

அலகு - 2 உரைநடை

1. உள்ளுணர்வு கனவாக வெளிப்படுகிறது - எம்.எஸ். உதயமூர்த்தி
2. வீழ்ந்த ஆலமரம் - கல்கி
3. ஏழாவது அறிவு (போரின்றி வெற்றி மட்டும்) - வெ. இறையன்பு

அலகு - 3 நாடகம்

1. மாங்கல்யப் பிச்சை - டி.என். சுகி. சுப்பிரமணியம்
2. சாபம் விமோசனம் - மு. இராமசாமி

அலகு - 4 சிறுகதை

1. வளையாத பனைகள் - இரா. நந்தகோபால்
2. ஒரு சிறு இசை - வண்ணதாசன்

அலகு - 5 மொழித்திறன்

1. அகர வரிசைப்படுத்தல்
2. ண-ன-ந, ல-ள-ழ, ர-ற வேறுபாடு அறிதல்
3. தன் விவரக் குறிப்பு தயாரித்தல்
4. கலைச் சொல்லாக்கம்
5. ஒற்றுப்பிழை, தொடர்ப்பிழை நீக்கி எழுதுதல்

இலக்கிய வரலாறு

பாடப்பகுதியை ஒட்டிய இலக்கிய வரலாறு : 20-ஆம் நூற்றாண்டுக் கவிஞர்களும் கவிதைகளும், உரைநடை, நாடகம், சிறுகதை.

இளநிலைப் பட்டப்படிப்பு

அடித்தளப் படிப்பு : பகுதி - 1 தமிழ்
முதலாமாண்டு - இரண்டாம் பருவம்

அலகு - 1

அ. திருஞானசம்பந்தர் - தேவாரம் - திருவீழிமிழலை - வாசிதீரவே (முழுவதும்)

ஆ. மாணிக்கவாசகர் - திருவாசகம் - பிடித்த பத்து (அம்மையே, அருளுடை, ஒப்புனக்கு, பாசவேர், பால்நினைந்து)

இ. திருமூலர் - திருமந்திரம் - (உடம்பினை முன்னம், யாவர்க்குமாம், ஒன்றே குலமும், உள்ளம் பெருங்கோயில், ஆர்க்கும்)

அலகு - 2

அ. ஆண்டாள் - திருப்பாவை (முதல் 5 பாடல்கள்)

ஆ. தொண்டரடிப் பொடியாழ்வார் - திருப்பள்ளியெழுச்சி (முதல் 5 பாடல்கள்)

இ. குலசேகராழ்வார் - பெருமாள் திருமொழி, 4-ஆம் திருமொழி, ஊனேறு செல்வம் ... (முதல் 5 பாடல்கள்)

அலகு - 3

அ. தமிழ்விடுதூது - கண்ணி 69 முதல் 90 வரை

ஆ. திருக்கயிலாய ஞான உலா - 1 முதல் 10 கண்ணிகள் வரை

இ. தஞ்சைவாணன் கோவை - 1 முதல் 5 பாடல்கள்

அலகு - 4

அ. இராமலிங்க அடிகள் - திருவருட்பா - பிள்ளைச் சிறுவிண்ணப்பம்

ஆ. எச்.ஏ. கிருஷ்ணப்பிள்ளை - இரட்சண்ய யாத்திரிகம் - குமாரப்பருவம் - இரட்சணிய சரிதப் படலம்

இ. குணங்குடி மஸ்தான்சாகிபு - மஸ்தான் சாகிபு பாடல்கள் - பராபரக் கண்ணி (1-40 கண்ணிகள்)

ஈ. முத்தொள்ளாயிரம் - 9 பாடல்கள்

அலகு - 5

அ. நேர்காணல்

ஆ. பொதுக்கட்டுரைகள்

இளநிலைப் பட்டப்படிப்பு

அடித்தளப் படிப்பு : பகுதி - 1 தமிழ்

இரண்டாமாண்டு - மூன்றாம் பருவம்

அலகு I **திருக்குறள்**

1. மக்கட்பேறு
2. விருந்தோம்பல்
3. இறைமாட்சி
4. காலமறிதல்
5. நெஞ்சோடு புலத்தல்

அலகு II **சிலப்பதிகாரம்**

மதுரைக்காண்டம் - ஏழாவது காதை
ஆய்ச்சியர் குரவை

மணிமேகலை - பத்தொன்பதாவது காதை
சிறைக்கோட்டம் அறக்கோட்டம் ஆக்கிய காதை.

அலகு III **சீவகசிந்தாமணி**

காந்தருவதத்தையார் இலம்பகம்

கம்பராமாயணம்

கிட்கிந்தா காண்டம் - வாலிவதைப் படலம்

அலகு IV **பெரியபுராணம்** - முதற்காண்டம்
தடுத்தாட்கொண்ட புராணம்

சீறாப்புராணம் - இரண்டாம் காண்டம் -
நுபுவ்வத்துக் காண்டம் - சதைக்கட்டியைப்
பெண்ணுருவமைத்த படலம்

தேம்பாவணி - முதற்காண்டம் - வளன் சனித்த படலம்

அலகு V **மொழித்திறன்**

1. கடிதம் வரைதல்
2. விண்ணப்பம் எழுதுதல்
3. தன் விவரம் எழுதுதல்
4. நிகழ்ச்சி நிரல் (அறிக்கை தயாரித்தல்)

இலக்கிய வரலாறு

பதினெண்கீழ்க்கணக்கு நூல்கள், அற இலக்கியங்கள்,
காப்பிய இலக்கியங்கள்.

இளநிலைப் பட்டப்படிப்பு

அடித்தளப் படிப்பு : பகுதி - 1 தமிழ்

இரண்டாமாண்டு - நான்காம் பருவம்

அலகு I

1. குறுந்தொகை (பாடல்கள் - 7, 8, 58, 94, 103)
2. நற்றிணை (பாடல்கள் - 1, 226, 238, 249, 380)
3. ஐங்குறுநூறு (குரக்குப்பத்து 1-5, சிறுவெண்காக்கைப்பத்து 1-5)

அலகு II

4. புறநானூறு (பாடல்கள் - 10, 18, 206, 212, 278)
5. பதிற்றுப்பத்து (பாடல்கள் - 20, 59)

அலகு III

6. கலித்தொகை (பாடல்கள் - 8, 59, 84, 108, 120)
7. பரிபாடல் திருமால் - 1:36-73
   செவ்வேள் - 5:55-81
   வையை - 6:1-24

அலகு IV

8. பத்துப்பாட்டு - முல்லைப்பாட்டு (முழுவதும்)

அலகு V

9. சங்க இலக்கிய வரலாறு
   (1) எட்டுத்தொகை நூல்கள்
   (2) பத்துப்பாட்டு நூல்கள்

10. மொழிபெயர்ப்பு
    (1) கொடுக்கப்பட்டுள்ள ஆங்கிலப் பகுதியைத் தமிழில் மொழிபெயர்த்தல்.
    (2) அலுவலகக் கடிதம் - தமிழில் மொழி பெயர்த்தல்

THIRUVALLUVAR UNIVERSITY

HUMAN RIGHTS

COMPULSORY PAPER

(For all PG Degree Courses)

(with effect from 2017-2018)

UNIT-I

Definition of Human Rights - Nature, Content, Legitimacy and Priority - Theories on Human Rights - Historical Development of Human Rights.

UNIT-II

International Human Rights - Prescription and Enforcement upto World War II - Human Rights and the U .N .O. - Universal Declaration of Human Rights - International Covenant on Civil and Political Rights - International Convenant on Economic, Social and Cultural Rights and Optional Protocol.

UNIT-III

Human Rights Declarations - U.N. Human Rights Declarations - U.N. Human Commissioner.

UNIT-IV

Amnesty International - Human Rights and Helsinki Process - Regional Developments - European Human Rights System - African Human Rights System - International Human Rights in Domestic courts.

UNIT-V

Contemporary Issues on Human Rights: Children's Rights - Women's Rights -Dalit's Rights - Bonded Labour and Wages - Refugees - Capital Punishment.

Fundamental Rights in the Indian Constitution - Directive Principles of State Policy - Fundamental Duties - National Human Rights Commission.

Books for Reference:

International Bill of Human Rights, Amnesty International Publication, 1988.

Human Rights, Questions and Answers, UNESCO, 1982

Mausice Cranston- What is Human Rights

Desai, A.R. - Violation of Democratic Rights in India

Pandey - Constitutional Law.

Timm. R.W. - Working for Justice and Human Rights.

Human Rights, A Selected Bibliography, USIS.

J.C.Johari - Human Rights and New World Order.

G.S. Bajwa - Human Rights in India.

Amnesty International, Human Rights in India.

P.C.Sinha & - International Encyclopedia of Peace, Security

K. Cheous (Ed) - Social Justice and Human Rights (Vols 1-7).

Devasia, V.V. - Human Rights and Victimology.

Magazines:

The Lawyer, Bombay

Human Rights Today, Columbia University

International Instruments of Human Rights, UN Publication

Human Rights Quarterly, John Hopkins University, U.S.A.

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THIRUVALLUVAR UNIVERSITY

M.A. ENGLISH

SYLLABUS

UNDER CBCS
(with effect from 2017-2018)

Year/ Semester	Subject	Paper	Title of the Paper	Ins. Hrs/ week	Credits	Max. Marks		
						CIA	Uni. Exam	Total
I Year/ I SEMESTER	CORE	1	Chaucer and Elizabethan Literature	6	4	25	75	100
	CORE	2	American Literature	6	4	25	75	100
	CORE	3	Indian Literature in English	6	4	25	75	100
	CORE	4	Modern English Grammar	6	4	25	75	100
	Elective I A		Indian Writing in Translation	6	4	25	75	100
	Elective I B		Classics in World Literature					
	Elective I C		Women's Writing					
				30	20	125	375	500
II SEM	CORE	5	Restoration and Eighteenth Century Literature	5	5	25	75	100
	CORE	6	The Romantic Revival Literature	6	5	25	75	100
	CORE	7	Language and Linguistics	6	5	25	75	100

E S T E R	**CORE**	**8**	**Literary Criticism**	**6**	**5**	**25**	**75**	**100**
	Compulsory Paper		**Human Rights**	**2**	**2**	**25**	**75**	**100**
	Elective II A		**Indian Diaspora Literature**	**5**	**3**	**25**	**75**	**100**
	Elective II B		**Post colonial Studies**					
	Elective II C		**New Literatures in English**					
				30	**25**	**150**	**450**	**600**
III S E M E S T E R	**CORE**	**9**	**Shakespeare Studies**	**6**	**5**	**25**	**75**	**100**
	CORE	**10**	**Victorian Literature**	**6**	**5**	**25**	**75**	**100**
	CORE	**11**	**Contemporary Literary Theory– I**	**6**	**5**	**25**	**75**	**100**
	CORE	**12**	**Research Methodology**	**6**	**4**	**25**	**75**	**100**
	Elective III A		**History of Ideas**	**6**	**3**	**25**	**75**	**100**
	Elective III B		**Literature : Analysis, Approaches and Applications**					
	Elective III C		**Translation Studies**					
				30	**22**	**125**	**375**	**500**
IV S E M E S T E	**CORE**	**13**	**Twentieth Century Literature**	**6**	**5**	**25**	**75**	**100**
	CORE	**14**	**English Language Teaching**	**6**	**5**	**25**	**75**	**100**
	CORE	**15**	**Contemporary Literary Theory–II**	**6**	**5**	**25**	**75**	**100**
	CORE	**16**	**Research Project**	**6**	**5**	**25**	**75**	**100**
	Elective IV A		**Children's Literature**	**6**	**3**	**25**	**75**	**100**

R	**Elective IV B**		**Academic Writing**					
	Elective IV C		**Comprehensive Study of Literature**					
				30	**23**	**125**	**375**	**500**

Subject	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total Marks**
Main	16	4-5	76	100	1600
Elective	4	3	12	100	400
Compulsory Paper	1	2	2	100	100
Total	**21**	**-**	**90**	**-**	**2100**

SEMESTER I

PAPER - 1
CHAUCER AND THE ELIZABETHAN LITERATURE

OBJECTIVES:

- To explore the literary traditions of the Elizabethan period that promoted the indigenization of the European forms such as the sonnet, allegory and the romance poem etc.
- To examine the cultural practices of the age which reflects in the writings and the transition from 11th to the 17th century

UNIT I: POETRY (Detailed)

1. Chaucer : Prologue to the Canterbury Tales: The Knight, The Prioress, The Wife of Bath, The Pardoner, The Monk
2. John Donne : 1.Batter My Heart
   2. Valediction Forbidding Mourning

UNIT II: POETRY (Non-Detailed)

3. Edmund Spenser : Epithalamion
4. Thomas Wyatt : Whoso List to Hunt
5. Earl of Surrey : The Soote Season

UNIT III: PROSE (Detailed)

1. Bacon : Of Truth, of Revenge , Of Friendship, Of Love
2. The Gospel according to St. Mark (MacMillan Annotated Classics)
3. Thomas More : The Utopia – Book I (Non-Detailed)

UNIT IV: DRAMA

1. Thomas Kyd (Detailed) : The Spanish Tragedy

UNIT V: DRAMA (Non-Detailed)

1. Thomas Dekker : The Shoemaker's Holiday
2. Webster : The Duchess of Malfi

BOOKS FOR STUDY AND REFERENCE

1. Fermor, Una Ellis - The Jacobian Drama - London: University Paperback, 1965.
2. Ford, Boris - A guide to English Literature. Vol 1. The Age of Chaucer - London: Penguin, 1961.
3. Grierson H.J.C. - Metaphysical Lyrics and Poems of the Seventeenth Century - Oxford University Press, 1972.
4. Rickert, Edith - Chaucer's World - London: Columbia University Press, 1964.

PAPER - 2

AMERICAN LITERATURE

OBJECTIVES:

- To enable the students to have an overview of major authors who have given significant contributions to the development of American literature.
- The social and political events that have influenced the literary movements can be understood by the study of representative authors

UNIT I: POETRY

(Detailed)

1. Walt Whitman : When the Lilacs last bloom'd
2. Emily Dickinson : I Felt a Funeral in My Brain
3. Robert Frost : Home Burial
4. Adrienne Rich : Diving into the Wreck
5. Elizabeth Bishop : The Fish

(Non-detailed)

1. e.e. Cummings : in Just-
2. Carl Sandburg : Chicago
3. Gwendolyn Brooks : The Mother

UNIT II: PROSE

(Detailed)

1. R.W. Emerson : Self-Reliance
   (Non-detailed)
2. H.D. Thoreau : Walden Where I Lived and What I Lived For

UNIT III: DRAMA

1. Arthur Miller : The Death of a Salesman (Detailed)
2. Edward Albee : The American Dream (Non-detailed)

UNIT IV: SHORT STORIES (Non-detailed)

1. Nathaniel Hawthorne : The Purloined Letter
2. John Updike : The Witness
3. Pearl S. Buck : The Quarrel
4. John Steinbeck : Flight
5. Eudore Welty : Worn Path

UNIT V FICTION (Non-detailed)

1. Ernest Hemingway : The Sun Also Rises
2. Harper Lee : To Kill a Mocking Bird
3. Toni Morrison : The Bluest Eye

BOOKS FOR STUDY AND REFERENCE

1. Donald, Heiney and Lenteil H. Essentials of Contemporary Literature of the Western World, (Vol. 3 & 4). USA: Barron's Educational Series.
2. Gray, Richard. A Brief History of American Literature. UK: Wiley – Blackwell, 2011.
3. Hoffmann, Daniel. ed. Harvard Guide to Contemporary American Writing. London: Oxford University Press, 2004.
4. Massa, Ann. American Literature in Context. London and New York: Methuen & Co. Ltd., 1982.

Web resources

E.E. Cummings -in Just:

1. http://www.english.illinois.edu/maps/poets/a_f/cummings/landles10.html

PAPER - 3

INDIAN LITERATURE IN ENGLISH

OBJECTIVES:

- To help the students appreciate the richness in Indian writing in English.
- To acquaint the students to the eminent Indian writers in English

UNIT I: POETRY

(Detailed)

1. Aurobindo : The Tiger and the Deer
2. Arun Kolatkar : From Jejury: 1.An Old Woman
   2. The Butterfly
3. Rabindranath Tagore : Gitanjali (1-10)
4. Kamala Das : The Old Playhouse

(Non-Detailed)

1. Keki N. Daruvalla : The People
2. Gieve Patel : Servants
3. Adil Jusswala : The Waiters
4. Mamta Kalia : Tribute to Papa

UNIT II: PROSE

(Detailed)

1. Nirad C.Chaudhuri :Autobiography of an Unknown Indian (Book III Education)
2. Ananda Coomarasamy :Dance of Shiva

UNIT III: DRAMA

1. Girish Karnad : Hayavadana (detailed)
2. Mahesh Dattani : Dance Like a Man(Non-detailed)

UNIT IV: SHORT STORIES (Non-Detailed)

1. R.K. Narayan : A Horse and Two Goats
2. Mulk Raj Anand :The Gold Watch
3. V.S. Naipaul : Love, Love, Love Alone
4. Shashi Deshpande : A Wall is Safer
5. Anita Desai : Circus Cat, Alley Cat

UNIT V: FICTION (Non-Detailed)

1. Amitav Ghosh : The Hungry Tide
2. Shashi Tharoor : The Great Indian Novel

BOOKS FOR STUDY AND REFERENCE

1. Karnad, Girish - Collected Plays – Vol. I. New Delhi: Oxford University Press, 2005.
2. Arvind Krishna Mehrotra, ed. - An Illustrated History of Indian Literature in English - New Delhi: Permanent Black, 2003
3. Chakraborty, Kaustav. Indian Drama in English. New Delhi: PHI Learning, 2011.
4. Prasad, Amar Nath and John Peter Joseph. Indian Writing in English. New Delhi: Sarup& Sons, 2006.

PAPER - 4

MODERN ENGLISH GRAMMAR

OBJECTIVES:

- To enable the students to acquire a high proficiency in the use of English
- To enable the students to know the dynamic and analytical aspects of the use of language.

UNIT I: WORDS AND PHRASES

WORDS

Nouns-Pronouns-Adjectives-Determiners-Verbs-Adverbs-Preposition-Conjunctions-Interjections

PHRASES

Noun Phrases-Verb Phrases-Adjective Phrases-Adverb Phrases-Preposition Phrases

WORD FORMATION

Acronyms- Analogy- Back formation- Blending- Borrowing- Clipping- Coining- Compounding- Reduplication- Prefixes and suffixes

UNIT II: SENTENCES AND CLAUSES

THE SENTENCE

Major and minor sentences- Simple and multiple sentences and clauses- Sentence types- Positive and negative sentences- Active and passive sentences

SENTENCE AND CLAUSES

Clause elements -Subject- Predicate -Verb- Object- Complement- Adverbial- Compound and complex sentences- Independent and dependent clauses- Coordination- Subordination- Subordinate clauses- Nominal or noun clause- Adverbial clauses- Relative clauses- Comparative clauses- Finite and non finite clauses- Restrictive and non restrictive clauses- Dangling modifiers- Readability

UNIT III: PUNCTUATION

Apostrophe- Brackets- Capital Letters- Colon- Comma- Dash- Ellipsis- Exclamation mark- Full stop- Hyphen -Paragraph- Question mark- Quotation marks- Semicolon- Slash

UNIT IV: FIGURES OF SPEECH AND LITERARY DEVICES

Allegory -Alliteration- Anacoluthon- Analogy- Anticlimax- Antithesis- Apostrophe- Assonance- Bathos- Catch phrases- Clerihew- Cliché- Colloquialism- Dead Metaphor- Doubles- Epigram- Euphemism- Haiku- Hyperbole- Idiom- Innuendo- Irony- Limerick- Litotes- Malapropism- Meiosis- Metaphor- Metonymy- Metre- Onomatopoeia- Oxymoron- Palindrome- Paradox- Personification- Proverb- Pun- Rhetorical question- Simile- Spoonerism- Syllepsis- Synecdoche- Zeugma.

UNIT V: COMMON ERRORS AND CONFUSIBLES

Exercises for Practice

Prescribed Text:

1. Jarvie, Gordon. Bloomsbury Grammar Guide second Edition, New Delhi.Bloomsbury.2007

Books for Reference:

Eastwood, John. Oxford Guide to English Grammar. India: OPU, 2003.
T.J. Fitikides- Common Mistakes in English - Mumbai, orient Longman,1997
Leech, Geoffrey, Deucher Margeret, Robert Hoogenrad. English Grammar for Today. New York: Palgrave Macmillan, 2011
Palmer, Frank – Grammar - Great Britain: Viney Ltd, 1978

Palmer, Richard. The Good Grammar Guide. London: Routledge, 2005.

ELECTIVE PAPER 1 A

INDIAN WRITING IN TRANSLATION

OBJECTIVES:

- To acquaint the students to the recent translated works from Indian languages to English.
- To appreciate the native literary richness and also to connect and critically respond to the Socio- Cultural reality of India.

UNIT I: POETRY

Kalidasa	: Meghadutam
Mirabai	:I sing for him Joyfully
Amir Khusrau	:Colour me in Colours of Love
Akka Mahadevi	:1. Sunlight Made Visible 2.Show Me Your Way Out 3.O Lord, White As Jasmine 4.How Can You Be Modest 5.Don't Despise Me

UNIT II: PROSE

Meenakshi Mukherjee	: The Anxiety of Indianness Divided by a Common Language

UNIT III: DRAMA

Bhasa	: Urubhangam (The Shattered Thigh)
Indira Parthasarathy	: Nandhan Kathai (Tr. C.T.Indira)

UNIT IV: SHORT STORY

Khushwant Singh	: A Punjab Pastorale
Pudumai Pithan	: The Human Machine
Mahaswetha Devi	: Draupadi
Mahim Bora	: Kathanibarighat

UNIT V: FICTION

U.R. Anandamurthy	:Samskara
Prem Chand	: Godaan
Thakazhi Sivasankara Pillai	: Chemmeen

BOOKS FOR STUDY AND REFERENCE

Mukherjee, Meenakshi - The Perishable Empire - UK: Oxford University Press, 2004.

Sivasankari - Knit India Through Literature – Vol. II & III. Chennai: East West Books Pvt. Ltd, 2004.

Arvind Krishna Mehrotra, ed. - An Illustrated History of Indian Literature in English - New Delhi: Permanent Black, 2003

Kumar, Dilip. D. - Contemporary Tamil Short Fiction - Madras: Manas East West Books, 2005.

Web sources

1.Songs of Kabir Tr by Rabindranath Tagore:
<http://www.sacred-texts.com/hin/sok/index.htm>
Mahim Bora*Kathanibarighat:*
https://indianreview.in/fiction/kathanibarighat-mahim-bora-assamese-short-stories-translated-lalit-saikia/

ELECTIVE PAPER 1 B
CLASSICS IN WORLD LITERATURE

OBJECTIVES:

- To help the students imbibe classical education through translation from the rich source of cultural heritage
- To acquire the knowledge of great literary traditions due to their strong influence on British and American literature

UNIT I: POETRY

Homer : Odyssey Book XI - XII

Thiruvalluvar : Thirukkural Book – Selections

PART I VIRTUE

1.1.4. Assertion of the Strength of Virtue 31- 40

PART II WEALTH:

2.1.5 The Possession of Knowledge 421- 430

PART III. LOVE: 3.2.10. Soliloquy 1241 -50

UNIT II: POETRY

Dante : The Inferno (Canto III)
Omar Khayyam : Rubaiyat I - XXV (Tr. Edward Fitzgerald)
Kahlil Gibran : The Prophet

UNIT III: PROSE

Vyasa : Mahabharatha (retold by C.Rajagopalachari)
Valmiki : Ramayana (retold by R.K.Narayan)

UNIT IV: DRAMA

Sophocles : Oedipus Rex
Anton Chekov : The Cherry Orchard

UNIT V: FICTION

Albert Camus : The Outsider
Herman Hesse : Siddhartha

BOOKS FOR STUDY AND REFERENCE

Homer. The Odyssey, Trans. George Chapman. London: Wordsworth Classics. 2002.

Bloom, Harold. The Rubaiyat of Omar Khayyam. India: Viva Books, 2007.

Croally, Neil and Roy Hyde. Classical Literature. London: Routledge Publications, 2011.

Fischer, Carl - The Myth and Legend of Greece – Geo A, Pflaum, Publisher, Inc, 1968.

Kirk, G.S. The Nature of the Greek Myths. Great Britain: Penguin Books, 1982.

Web sources

Tirukural -<www.**projectmadurai**.**org**/pm_etexts/pdf/pm0153.pdf>

Mahabharatha (retold by C.Rajagopalachari):
<http://www.gita-society.com/section3/mahabharata.pdf>

ELECTIVE PAPER 1 C
WOMEN'S WRITING

UNIT I: POETRY

Sylvia Plath	: Lady Lazarus
E.B. Browning	: A Man's Requirements
Maya Angelou	: Phenomenal Woman
Imtiaz Dharker	: Another Woman

UNIT II: PROSE

Padmini Sen Gupta	: The Position of Women in Ancient India
Vandana Shiva	: Ecofeminism: Masculinization of the Motherland

UNIT III: DRAMA

Caryl Churchill	: Top Girls
Morsha Norman	: night' Mother

UNIT IV: SHORT STORY

Joyce Carol Oates	: The White Cat
Flannery O'Connor	: A Good Man is Hard to Find
Katherine Mansfield	: The Doll House
C. S. Lakshmi	: A Deer in the forest

UNIT V: FICTION

Arundhati Roy	: The God of Small things
Margaret Atwood	: Surfacing
Manju Kapur	: Difficult Daughters

BOOKS FOR STUDY AND REFERENCE

Gilbert, Sandra and Susan Gubar. *The Mad Woman in the Attic: The Woman Writer and the Nineteenth Century Literary Imagination.* Yale : Yale Nota Bene, 2000.

Eagleton, Mary Ed. *Feminist Literary Theory: A Reader.* 2nd edition. Blackwell Publishers: UK, 1994.

Jaidka, Manju. *From Slant to Straight: Recent Trends in Women's Poetry.* New Delhi: Prestige Books, 2000.

Web sources

Encycolpedia of Feminist Literary Theory:

http://www.tandfebooks.com.iproxy.inflibnet.ac.in:2048/action/showBook?doi=10.4324/97802038744

SEMESTER II

PAPER – 5

RESTORATION AND EIGHTEENTH CENTURY LITERATURE

OBJECTIVE:

- To survey the emergence of new models of poetry and drama in this period of high ideals combined with wit and language
- To study the broadening of the literary civilization that included more of the middle class.

UNIT – I: POETRY (Detailed)

John Milton : Paradise Lost Book IX (Lines 48 – 191)
The Sun was sunk, and after him the Starr …
Disturbd not, waiting close th' approach of Morn.

Andrew Marvell : To His Coy Mistress

POETRY (Non-detailed)

Alexander Pope : The Essay On Man: Epistle II (II. 1 - 92)
("Know then thyself….Our greatest evil or great good")

William Cowper : The Castaway

UNIT II – PROSE (Detailed)

Jonathan Swift : The Battle of the Books (Para 10 – 14)
(Things were at this crisis, when a material accident fell out... thus furnishing man-kind with the two noblest of things, which are sweetness and light.)

PROSE (Non-detailed)

Addison and Steele : The Coverley Papers:
1. Sir Roger at the Theatre
2. Sir Roger at Home

UNIT – III: DRAMA (Detailed)

John Dryden : All for Love

UNIT – IV: DRAMA (Non-detailed)

Richard Sheridan : The School for Scandal
Congreve : The Way of the World

UNIT – V: FICTION(Non-detailed)

Daniel Defoe : Robinson Crusoe
Henry Fielding : Tom Jones

BOOKS FOR STUDY AND REFERENCE

Sanders, Andrews. English Literature. India: OUP, 2011.
Tillyard, E.M. Milton. London: Chatto&Windus Ltd, 1966.
Clifford L., James. Ed. Eighteenth Century English Literature. London: OUP, 1977.
Dobree, Bonamy and Wilson F. P. ed. English Literature. London: OUP, 1963.

PAPER – 6

THE ROMANTIC REVIVAL LITERATURE

OBJECTIVES:

- To provide an overview of the transformation of the literary climate where the romantic sensibility finds an authentic voice, touch and intensity.

- To enable the students to appreciate the reformed literary style of the representative writers of the period.

UNIT – I: POETRY (Detailed)

William Wordsworth	: Immortality ode
S.T. Coleridge	: Kubla Khan
P.B. Shelley	: Ode to the West Wind
John Keats	: Ode to a Nightingale

UNIT – II: POETRY (Non-detailed)

William Morris	: Haystack in the Floods
Lord Bryon	: Don Juan - Canto X

UNIT – III: PROSE (Detailed)

Charles Lamb	: From Essays of Elia: 1.Dream Children: A Reverie 2.Old China
Hazlitt	: My First Acquaintance with Poets

UNIT – IV: DRAMA (Non-detailed)

Shelley	: Prometheus Unbound

UNIT – V: FICTION (Non-detailed)

Walter Scott	: Kenilworth
Charlotte Bronte	: Jane Eyre
Jane Austen	: Northanger Abbey

BOOKS FOR STUDY AND REFERENCE

Raymond Wilson Ed., *A Coleridge Selection*. London: Macmillan Ltd., 1988.
Edmund Blunden Ed., *The Poems of John Keats.* New Delhi: Rupa Publication, 2000.
Geoffrey Durant *William Wordsworth* — Cambridge: Cambridge University Press, 1969.
Kelvin Everest, *John Keats* — New Delhi: Atlantic Publication, 2002.

PAPER – 7

LANGUAGE AND LINGUISTICS

OBJECTIVES:

- To enhance the basic knowledge of the structure of English and the theoretical background to phonetics and English Phonology.
- To introduce the students to basic concepts in morphology, syntax, semantics and pragmatics.
- To equip the students with the knowledge of applications of linguistics.

UNIT – I: THE HISTORY OF ENGLISH LANGUAGE

The descent of English language; Old English Period; Middle English; Renaissance & After; Growth of Vocabulary; Change of Meaning; Evolution of Standard English.

From Wood F.T. *An Outline History of the English Language.* Madras.Macmillan, 2001

UNIT – II: PHONOLOGY

Air stream mechanisms - The organs of speech – Classification and description of sounds, Cardinal Vowels, English Vowels, Diphthongs and Consonants, Transcription, Syllable

UNIT – III: PHONOLOGY

Accent, Rhythm and Intonation, Assimilation, Elision, Liaison and Juncture,
Phonetic transcription of dialogues

Connor, J.D.O.', *Better English Pronunciation*. Cambridge : Cambridge University Press, 1980.

Balasubramanian – A Textbook of English Phonetics for Indian Students. Madras Macmillan, 1993.

UNIT – IV: LEVELS OF LINGUISTIC ANALYSIS

Morphology, Phrases Sentence, Grammar, phrases, semantics, Pragmatics, Discourse Analysis

From Geroge Yule.*The Study of Language* Second Edition Cambridge University Press, 1996

UNIT – V

(A) Sociolinguistics

Language varieties, language, society and culture
From George Yule.*The Study of Language* Second Ed. CUP, 1996)

(B) TG Grammar - IC Analysis
From Grammar 3rd edition by Frank Palmer. Penguin

(C) Applications of Linguistics

Verma and Krishnaswamy :Modern Linguistics (Units 42 – 45).

BOOKS FOR STUDY AND REFERENCE

Connor, J.D.O.', *Better English Pronunciation*. Cambridge : Cambridge University Press, 1980.

Wood F.T., *An Outline History of the English Language.* Madras : Macmillan, 2001

Balasubramanian – A textbook of English Phonetics for Indian Students – Madras Macmillan, 1993.

Finch, Geoffrey – Language and Linguistics: An Introduction – Macmillan, 2000

Jones, Daniel – The Pronunciation of English – New Delhi: Universal Book Stall & Cambridge University Press, 1992.

Krishnaswamy N,. S.K. Verma – Modern Linguistics – New Delhi: Oxford University Press, 1989.

Yule, George.*The Study of Language*. Cambridge University Press, 1985.

Web sources

The History of Teaching English as a Foreign Language, from a British and European Perspective A. P. R. Howatt & Richard Smith
http://www.tandfonline.com/doi/pdf/10.1179/1759753614Z.00000000028?needAccess=true

PAPER – 8
LITERARY CRITICISM

OBJECTIVES:

- To examine the representative texts of the seminal literary critics to understand intrinsic and extrinsic criticism.
- To expose the students to the concepts of the historical perceptions over the centuries.

UNIT – I

Introduction to Classical Literary Criticism- Plato, Aristotle, Horace and Longinus
From Nagarajan M.S. – English Literary Criticism and Theory – Hyderabad: Orient Longman, 2006

UNIT – II

Bharatamuni : From Natya and Rasa – Aesthetics of Dramatic Experience
Anandavardhana : Dhvani: Structure of Poetic Meaning from the Dhvanyloka

From Indian Literary Criticism: Theory and Interpretation ed. G.N. Devy, Orient Longman, Hyderabad.

UNIT – III

Wordsworth : Preface to the Lyrical Ballads (Selection)
Alexander Pope : An Essay on Criticism – lines 233 -415
(A perfect Judge will read each work…That in proud dullness joins with Quality)

UNIT – IV

Mathew Arnold : The Study of Poetry
D.H. Lawrence : Why the Novel Matters
William Empson : Seventh Type of Ambiguity

UNIT-V

Northrop Frye : Archetypes of Literature
Roland Barthes : The Death of the Author

BOOKS FOR STUDY AND REFERENCE

Nagarajan M.S. – English Literary Criticism and Theory – Hyderabad: Orient Longman, 2006

Das and Kumar, Bijay - Twentieth Century Literary Criticism -Atlantic Publishers,

Habib, M. A. R. *A History of Literary Criticism*. Black Publishing, USA. 2006

... *Modern Literary Criticism and Theory*. Blackwell Publishing, New Delhi. 2008.

Lodge, David, ed. Modern Criticism and Theory - II edition, New Delhi: Pearson Education, 1998.

Ramaswami and Seturaman V.S. ed. - The English Critical Tradition**:** An Anthologyof English Literary Criticism**:** Vol. 1. - Macmillian, 1986.

Seturaman, ed. – Indian Aesthetics:An Introduction-New Delhi: Macmillan, 2005

ELECTIVE PAPER 2 A

INDIAN DIASPORA LITERATURE

OBJECTIVES:

- To acquaint students with a knowledge of Indian Diaspora writers and their works.
- To help the students have a broad outlook on diaspora literature and to make them understand and estimate the diverse paths, the Indian culture has taken in the era of multiculturalism.

UNIT I: POETRY

Sujata Bhatt	: A Different History
R. Parthasarathy	: Exile, Trial, Homecoming
A. K. Ramanujan	: Relations: Of Mothers, Love Poem for a Wife, Farewells
Meena Alexander	: I Root My Name

UNIT II: DRAMA

Manjula Padmanabhan	: Harvest

UNIT III: ESSAY

Amitav Ghosh	: The Diaspora in Indian Culture
Salman Rushdie	: Imaginary Homelands

UNIT IV: SHORT STORY

V.S.Naipaul	: The Enemy
JhumpaLahiri	: Interpreter of Maladies
Amit Chaudhuri	: Portrait of an Artist
Shauna Singh Baldwin	: English Lessons

UNIT V: FICTION

Kiran Desai	: The Inheritance of Loss
Gita Hariharan	: The Ghosts of Vasumaster
Bharathi Mukherjee	: Jasmine

BOOKS FOR STUDY AND REFERENCE

Bandyopadhyay, Pranab, ed. - Women Poets of India: An Anthology of Indian Poetry - Calcutta: United Writers, 1977.

Batra, Shakti - Modern Indian Literature: Poems and Short Stories: A Critical Study - Delhi: Surjeet Publications, 2006.

De Souza, Eunice, ed. - Nine Indian Women Poets: An Anthology – New Delhi: Oxford University Press, 1997.

King, Bruce - Modern Indian Poetry in English – New Delhi: Oxford University Press, 1987.

Kurup P.K.J. - Contemporary Indian Poetry in English - New Delhi: Atlantic Publishers, 1991.

Arvind Krishna Mehrotra, ed. - An Illustrated History of Indian Literature in English - New Delhi: Permanent Black, 2003..

M.C. Leod A.L.- Commonwealth and American Women's Discourse: Essays in Criticism - New Delhi: Sterling Publishers, 1996.

Mukherjee, Bharati - Indian English Novelists: An Anthology of Critical Essays.

Peeradina, Saleem - Contemporary Indian Poetry in English

Rao Ramakrishna, Adapa and Sivaram Krishna M. - When East meets West: Indian Thought in Anglo Indian and Indo English Fiction

Balachandran,Dr.K-critical Essays on Diasporic Writings-Arise Publishers& Distributers,2008.

ELECTIVE PAPER 2 B

ELECTIVE IIB: POSTCOLONIAL STUDIES

OBJECTIVES:

- To introduce the political and socio-cultural discourse of the developing countries through the study of key authors and poets who cherished the native culture.
- To trace the historical contents laying emphasis on the development of post-colonial literatures and theory.

UNIT I: POETRY

1. P.K. Page : Autumn
2. David Rubadri : An African Thunderstorm
3. Derek Walcott : The Fortunate Traveller
4. Gabriel Okara : The Mystic Drum
5. J.P. Clark : The Casualties

UNIT II: DRAMA

1. Athol Fugard : Sizwe Bansi is Dead
2. Gurucharan Das : Larins Sahib

UNIT III:PROSE I

1. Meenaksi Mukherjee : Interrogating Post Colonialism
2. Bill Ashcroft, Gareth Griffiths and Helen Tiffin : The Empire Writes Back (Introduction)

UNIT IV:PROSE II

1. Homi K. Bhabha : The Location of Culture
2. Ngugi wa Thiong'O : From Decolonising the mind
   I was born …in the lives of Kenyan children

UNIT V: FICTION

1. Salman Rushdie : Midnight's Children
2. Monica Ali : Brick Lane
3. Michael Ondatjje : The English Patient
4. Caryl Phillips : Crossing the River

BOOKS FOR STUDY AND REFERENCE

Das, Gurucharan. Three Enlish Plays. New Delhi: Oxford University Press, 2001.

Ashcroft, Bill. Gareth Griffiths and Helen Tiffin. The EmpireWrites Back. London: Metheun, 1987.

Bhabha, Homi K. The Location of Culture: New York: Routledge 2012.

Contemporary Indian Poetry in English: Ed. By Saleem Peeradina

Ashcroft, Bill, Garreth Griffiths and Helen Tiffin - The Empire Writes Back - London and New York: Roultedge, 1989.

Narasimiah C.D. Anthology of Commonwealth Poetry. Macmillan

Abraham, Taisha. Introducing Postcolonial Theories. New Delhi: Macmillan Publishers India, 2007.

King, Bruce - New National and Postcolonial Literatures - Clarendon Paperbacks.

Nasta, Susheila. Writing Across Worlds. London: Routledge Taylor & Francis Group, 2004.

Patke, Rajeev S. Postcolonial Poetry in English. New Delhi: OUP,2006.

Sarangi, Jaydeep and Binod Mishra. Explorations in Australian Literature. India: Sarup & Sons, 2006

ELECTIVE PAPER 2 C

ELECTIVE IIC: NEW LITERATURES IN ENGLISH

OBJECTIVES:

To introduce to the students the New Literatures apart from the 'traditional' English literature and instill a critical reflection of the colonial experience.

To acquaint students to the literatures introduced in the second half of the twentieth - century and to analyse the characteristics of self-constituted identity and independence in the aftermath of colonialism.

UNIT-I: POETRY

1. Pablo Neruda : Fully Empowered
2. A.D.Hope : Lamp
3. F.R.Scott : The Canadian Authors' Meet
4. Judith Wright : Woman to Man

UNIT–II: PROSE

1. Frantz Fanon : The wretched of the earth:

   Reciprocal Bases of National Culture and the Fight for Freedom
2. Milan Kundra :The Art of the Novel- The Depricated Legacy of the Cervantes (Yet I think…..one is outraged.)

UNIT-III: DRAMA

Lorraine Hansberry : A Raisin in the Sun

UNIT-IV: SHORT STORIES

1. Jorge Luis Borges : Death and the Compass
2. Carlos Fuentes : The Doll Queen
3. Octavio Paz : The Blue Bouquet
4. Gabriel Garca Marquez : Balthazar’s Marvellous Afternoon

UNIT - V: FICTION

1. Amy Tan	: The Joy Luck Club
2. Nayomi Munaweera	: Island of a Thousand Mirrors
3. Chimamanda Ngozi Adichie	: Half of a Yellow Sun
4. Yann Martel	: Life of Pi
5. Orhan Pamuk	: My Name is Red

BOOKS FOR STUDY AND REFERENCE

Kundra, Milan. *The Art of the Novel.* New York: Penguin Books & Faber & Faber, 1986.

Habib M.A.R. Literary criticism from Plato to the Present. An Introduction". U.K. Wiley – Blackwell Publication, 2011.

Ryan, Michael.Literary Theory: A Practical Introduction. Australia: Blackwell Publishing, 2007.

Wyrick, Deborah. Fanon for Beginners. India: Orient. Black Swan, 2008.

Tandon, Neeru; Edt. Feminine psyche: A Post – Modern Critique. New Delhi: Atlantic Publishers, 2008.

Lennard, John. The Poetry Handbook. New York: Oxford, 2005.

Web sources

Frantz Fanon https://www.marxists.org/subject/africa/fanon/national-culture.htm

SEMESTER III

PAPER - 9
SHAKESPEARE STUDIES

OBJECTIVES:

- To enable the students to read the plays in the light of the critical approaches that has emerged prominent.
- To study the plays of Shakespeare in the critical, textual, and theatrical contexts.

UNIT – I: A Midsummer Night's Dream (Detailed)

UNIT – II: Hamlet (Detailed)

UNIT – III: Henry IV Part I (Non-Detailed)

UNIT – IV: Antony and Cleopatra (Non-Detailed)

UNIT – V: Critical Interpretations of Shakespeare's Plays (Non-Detailed)

Structuralism : Roland Barthes – Mythic Signs in Mankiewicz's *Julius Caesar*

Pscholoanalysis : Ernest Jones – Reading the Oedipus Complex in *Hamlet*

Marxism : Karl Marx – *Timon of Athens* and the Power of Money

Feminism : Virginia Woolf - Shakespeare and the Question of Female Authorship

Postcolonial Theory : Wole Soyinka – Antony and Cleopatra by Shakespeare

From Jonathan Gil Harris, *Shakespeare and Theory.* New York: Oxford University Press, 2012.

BOOKS FOR STUDY AND REFERENCE

Dover Wilson, *What Happens in Hamlet.* London: Cambridge University, 1974.
Jonathan Gil Harris, *Shakespeare and Theory.* New York: Oxford University Press, 2012.
Ania Loomba, *Shakespeare, Race and Colonization.* New York: Oxford University Press 2012.
John Russell Prown, *Shakespeare's Antony and Cleopatra.* London: Macmillan Press Ltd., 1977.
Diana Henderson Ed. *Alternative Shakespeare 3.* Oxford: Routledge Abington, 2008.
A.C. Bradley, *Shakespeare Tragedy.* New Delhi: Atlantic Publishers and Distributers Pvt. Ltd., 2010.
Robin Lee, *Shakespeare'sAntony and Cleopatra – Studies in English Literature.* London: Edward Arnold, 1984.

PAPER -10

THE VICTORIAN LITERATURE

OBJECTIVES:

- To study Victorian Literature in the background of the changing views, improvements in technology and the poor conditions of the working class people.

- To analyse Victorian literature as an art that encouraged higher good as righteous and instilled social consciousness.

UNIT – I: POETRY
(Detailed)

1. Mathew Arnold : Dover Beach
2. Alfred Tennyson : Tithonus
3. Robert Browning : My Last Duchess
4. G.M.Hopkins : The Wind Hover

(Non-Detailed)

1. Christina Rossetti : Goblin Market
2. E. B. Browning : Sonnet from the Portuguese: No 14: If thou must love me

UNIT – II: PROSE (Detailed)

Thomas Carlyle : Hero and Hero Worship: Hero as a Poet

UNIT – III: DRAMA (Detailed)

Oscar Wilde : The Importance of Being Earnest

UNIT – IV: FICTION (Non-Detailed)

1. George Eliot : The Mill on the Floss
2. Thomas Hardy : Tess of the D'ubervilles

UNIT – V: FICTION (Non-Detailed)

1. Charles Dickens : David Copperfield
2. Horace Walpole : The Castle of Otronto

BOOKS FOR STUDY AND REFERENCE

1. Charles Lamb, *Essays of Elia*. Bombay: Macmillan, 1895.
2. Charles Dickens, *Oliver Twist*. London: Thomas Nelson & Soni Ltd, 1958.
1. *Critical Essays on the poetry of Tennyson*, Ed by John Killbam, Roritledge & Kegan Paul. London: 1960.
2. Geoffrey H. Hastman, *Hopkins: A Collection of Critical Essays*, Ed by. New Delhi: Prentice-Hall of India Pvt Ltd., 1980.
3. Andrew H. Wright, *Jane Austen's Novels*. A Peregrine Book, Middlesex: Penguin Books Ltd., 1953.
4. Rod Mengham, *Charles Dickens.* New Delhi: Atlantic Publishers, 2001.
5. R.T. Jones, *British Authors, Introductory Critical Studies, George Eliot.* London: Cambridge University Press, 1970.
6. Lance St. John Butler, *Studying Thomas Hardy*. Essex: Longman York Press – 1986.

PAPER – 11

CONTEMPORARY LITERARY THEORY - I

OBJECTIVES:

- To help the students understand literary theory as a system to critically interpret literary texts.
- To enable the students to understand the broad spectrum of thought that is covered by literary theory and also to enhance their literary research.

UNIT I: Introduction

Literary theorising from Aristotle to Leavis - The transition to 'theory'- recurrent ideas in critical theory

Structuralism Structuralism Critical Terms: Signifier, Signified, Langue, Parole, Semiotics.

The scope of structuralism - Structuralist criticism: examples

Unit II: **Stylistics**
Rhetoric to philology - The ambitions of Stylistics - Stylistics: examples

Narratology
Telling stories – Aristotle – Vladimir Propp – Gerard Genette - – Narratology: an example

UNIT III: Post structuralism and deconstruction

Post structuralism and deconstruction: Decentring, Aporia, Difference, Impasse, Binary Opposition.

Theoretical differences between Structuralism and Post-structuralism
Post-structuralism - life on a decentred planet - Structuralism and post-structuralism-practical differences - Deconstruction: an example

UNIT IV: Psychoanalytic criticism

Psychoanalysis Critical Terms: Unconscious, Repression, Sublimation, Ego, Super-ego, Id, Oedipus Complex, Libido, Phallic, Eros, Thanato, Transference, Projection, Defence Mechanism, Screen Memory, Paraprascis, Displacement, Condensation.

Introduction - How Freudian interpretation works - Freud and evidence
Freudian psychoanalytic criticism: examples
Lacan - Lacanian criticism: an example

UNIT V: Feminist Criticism

Feminism Critical Terms: Feminist, Female, Feminine, Gynocriticism, Chora.

Feminism and feminist criticism - Feminist criticism and the role of theory
Feminist criticism: an example

Prescribed Text

Barry, Peter. *Beginning Theory.* Manchester and New York: Manchester University Press, 2002.

BOOKS FOR STUDY AND REFERENCE

Hawkes, Terence. *Srtucturalism and Semiotics.* London and New York: Roultedge, 1977.

Holquist, Michael. *Dialogism.* London and New York: Roultedge, 1990.

Allen, Graham. *Roland Barthes.* London and New York: Roultedge, 2003.

Belsey, Catherine. *Critical Practice.* London and New York: Roultedge, 1980.

Bennett, Tony. *Formalism and Marxism.* London and New York: Roultedge, 1979.

Bertens, Hans. *Literary Theory: the Basics.* London: Routledge, 2001.

Culler, Jonathan Barthes. *A Very Short Introduction.* New York: OUP, 2002.

Fillingham, Lydia Alix and Moushe Susser. *Foucault for Beginners.* India: Orient Longman, 2000.

Iyengar, Srinivasa K.R. *The Adventure of Criticism*. New Delhi: Sterling Publishers, 1985.

Krishnaswamy N. John Varghese and Sunita Mishra. *Contemporary literary Theory: A Student's Companion.* New Delhi: Macmillan, 2001

Hawthorn, Jeremy. A Glossary of Contemporary Literary Theory. Fourth Edition. UK. Hodder Education,2000.

PAPER – 12

RESEARCH METHODOLOGY

OBJECTIVES:

- To facilitate students to gain knowledge to pursue research.
- To enable students to present the research findings through the application of systematic and scientific methods.

Unit I
Selecting a Topic - Compiling a Working Bibliography –Evaluating Sources

Unit II
Taking Notes – Outlining – Writing Drafts – Language and Style -Plagiarism

Unit III
The Mechanics of Writing -The Format of Research Paper –Documentation

Unit IV
Documentation: Citing sources in the text: Parenthetical Documentation and the List of Works Cited

Unit V
Abbreviations: Common Scholarly Abbreviations and Reference words – Symbols and Abbreviations Used in Proofreading and correction –Common Correction Symbols and Abbreviations – Titles of works

Prescribed Text

Gibaldi, Joseph - *M.L.A: Handbook for Writers of Research Papers, 7th Edition* . New Delhi: Affiliated East-West Press Pvt. Ltd., 2003.

Essential reading:

W.R.Owens - Planning , Writing and Presenting a dissertation or Thesis
From DaSousa, Delia Correa and W.R.Owens. *The Handbook to Literary Research*, second Edition. Routledge: Taylor and Francis Group, The Open University Abingdon-Oxon. 2010.

Gabriele Griffin – Research Skills, Methods, and Methodologies (Pg 5 - 7)
From Gabriele Griffin. *Research Methods for English Studies: An Introduction*. UK: Edinburgh University Press, 2005.

BOOKS FOR STUDY AND REFERENCE

George. Watson. *Writing a Thesis: A Guide to Long Essays and Dissertations*. London and New York: Longman, 1987.

Gabriele Griffin. *Research Methods for English Studies: An Introduction*. UK: Edinburgh University Press, 2005.

DaSousa, Delia Correa and W.R.Owens. *The Handbook to Literary Research*, second Edition. Routledge: Taylor and Francis Group, The Open University Abingdon-Oxon. 2010.

Anderson, Janathan, Berry H. Durston and Millicent Poole. *Thesis and Assignment Writing.* New York: Wiley Eastern Limited, 1988.

Kumar, Anand Raju.*American British and Commonwealth*. Chennai: Affiliated East-West Press Ltd, 1990.

Eliot Simon ed. *A Hand Book to Literary Research.* London: Routledge, 1998.

Fabb Nigel and Durant Allan. *How to Write Essays Theses Dissertations in Literary Studies*. London: Longman Publishing, 1993.

Goring Paul. *Studying Literature: The Essential Companion. UK:* Hodder education, 2001.

ELECTIVE PAPER 3 A

HISTORY OF IDEAS

OBJECTIVES:

- To encourages scholarship at the intersection of cultural and intellectual histories of philosophy, of literature and the arts, of the natural and social sciences, of religion, and of political thought.
- To encourage diverse methodological approaches in critical interpretation

UNIT I: ANCIENT

Plato : Republic – 2

Aristotle : On Poetics – Description of Tragedy

UNIT II:

MEDIEVAL

St. Augustine : Confessions –Ch X

SEVENTEENTH CENTURY

John Locke : An Essay Concerning Human Understanding- Introduction

UNIT III: EIGHTEENTH CENTURY

Rousseau : The Social Contract or Principles of Political Right – Book I

Mary Wollstonecraft : A Vindication of the Rights of Woman with Strictures on Political and Moral Subjects

UNIT IV: NINETEENTH CENTURY

Darwin : Survival of the Fittest (Chapter IV)

Marx : The Communist Manifesto – Chapter II

UNIT V: TWENTIETH CENTURY

Sigmund Freud : The Structure of the Unconscious

Simone de Beauvoir : The Second Sex-Introduction

S. Radhakrishnan : Introduction to the Principal *Upanishad*s

BOOKS FOR STUDY AND REFERENCE

Annas, Julia. *Plato, A Very Short Introduction*. New Delhi: Oxford University Press, 2006.

Shields, Christopher. *Aristotle*. Oxon: Routledge, 2007.

Lewens, Tim. *Darwin.* Oxon: Routledge, 2007.

Darwin, Charles. *The Origin of Species.* New Delhi: Peacock Books, 2012.

Dent, Nicholas. *Rousseau*. Oxon: Routledge, 2005.

Stevensen, Leslie & David L. Haberman. *Ten Theories of Human Nature.* Fourth Edition. New Delhi: Oxford University Press, 2006.

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ELECTIVE PAPER 3 B

LITERATURE: ANALYSIS, APPROACHES AND APPLICATIONS

OBJECTIVES:

- To develop the reading and writing skills of the students for professional and academic purposes.
- To enhance the interpretation skills of the students to critically analyse and appreciate literary texts.

UNIT I **Practical Criticism**

Literary Analysis: Interpretation of passages of prose and poetry. Such questions may involve recognition of conventions and genres, allusions and references, meaning and tone, grammatical structures and rhetorical strategies, and literary techniques.

Reference: Stephen, Martin. *English literature*. New York: Longman, 1986.

V.S.Seturaman,C.T.Indira, T.Sriraman. Practical criticism. India, Macmillan.1999.

UNIT II **(a) Book Publication**

ISBN – The International Standard Book Number
ISSN – The International Standard Serial Number
Foreword – Preface

(b) Copy editing

Introduction to copy- editing- making the typescript - Copyright Permission and acknowledgement- making corrections- House Style- Abbreviation - Bias and Parochialism – Capitalization - Cross- References - Dates and Time- Italic - Proper Names – Punctuation – Spelling - Miscellaneous Points - Preliminary Pages

From Butcher,Judith, Drake Caroline, and Leach ,Maurice. *Butcher's Copy-editing: The Cambridge Handbook for Editors,Copy-editorsand Proof readers.*

UNIT III **Journalism and Mass Communication**

Report Writing, Book Review, Film Review and Proofreading

Reference: Mukhopadhyay, Lina *et al. Polyskills: A Course in Communication Skills and Life Skills*. Chennai and New Delhi: Foundation Books CUP, 2012.

UNIT IV Technical Writing

User's Manual, Technical Letters, Flow Charts, Tablets, Writing Instruction

Reference: Pauley, Steven E. and Daniel, G.Riordan. *Technical Report Writing.* New Delhi: A.I.T.B.S. Publishers and Distributors, 2006.

UNIT V Theoretical Approaches to Literature

1. Text-Oriented Approaches
   Philology- Rhetoric and Stylistics - Formalism and Structuralism
   New Criticism- Semiotics and Deconstruction
2. Author-Oriented Approaches
3. Reader-Oriented Approaches
4. Context-Oriented Approaches - New historicism - Feminist literary theory and gender theory
5. Literary Critique or Evaluation

From Theoretical Approaches - Klarer, Mario. An Introduction to Literary Studies. Theoritical Approaches to Literature (pg71-96)

BOOKS FOR STUDY AND REFERENCE

Butcher,Judith,Drake Caroline, And Leach ,Maurice. *Butcher's Copy-editing: The Cambridge Handbook for Editors,Copy-editorsand Proof readers*. Fourth Edition Cambridge University Press, 2007

Stephen, Martin. *English literature*. New York: Longman, 1986.

Klarer, Mario. *An Introduction to Literary Studies*. London: Routledge, 2004.

Leech, Geoffrey, Margaret Deuchar and Robert Hoogenraad. *English Grammar for Today*. New York: Palgrave Macmillan, 2011.

Gerson, Sharon. J. and Steven M. Gerson. *Technical Writing: Process and Product* - III edition. New Delhi: Pearson Education Inc., 2005.

Pauley, Steven E. and Daniel, G.Riordan. *Technical Report Writing.* New Delhi: A.I.T.B.S. Publishers and Distributors, 2006.

ELECTIVE PAPER 3 C
TRANSLATION STUDIES

OBJECTIVES:

- To help the students understand how translation shapes the knowledge of the world in the past and better equips to shape the future
- To understand better the emphasis in cultural aspects and the context within which translation occurs

UNIT I: CENTRAL ISSUES

Language and Culture – Types of Translation – Decoding and Recoding – Problems of Equivalence – Loss and Gain – Untranslatability

From Bassnett, Susan - *Translation Studies,* 3rd Edition – Routledge, New Delhi, 2005.

UNIT II: HISTORY OF TRANSLATION – THEORY I

Problems of "Period Study" – Bible Translation – Education and the Vernacular – Early Theorists – Archaizing

From Bassnett, Susan - *Translation Studies,* 3rd Edition – Routledge, New Delhi, 2005.

UNIT III: HISTORY OF TRANSLATION – THEORY II

The Renaissance – The Seventeenth and the Eighteenth Century – Romanticism and Post Romanticism – The Victorian – The Twentieth Century

From Bassnett, Susan - *Translation Studies,* 3rd Edition – Routledge, New Delhi, 2005.

UNIT IV: COMPARATIVE STUDY OF TRANSLATION

A.K. Ramanujan : On Translating a Tamil Poem

A.K. Ramanujan : Three Hundred Ramayanas: Five Examples and Three Thoughts on Translation

From Dharwadker, Vinay (Ed). *The Collected Essays of A.K. Ramanujan.* New Delhi: Oxford University Press, 2004.

UNIT V: TRANSLATION IN PRACTICE

A field work on any one of the topics given below has to be undertaken by the students to attempt a translation of the same for **internal assessment.**

- Oral stories, songs and traditions of the village
- History of the local or town temple or masque or churches- worship places.
- History of the monuments in the village or town
- Family History
- Life of the ancestors in the village or town
- The origin of the name of the village /town
- Great personalities of the past and present who lived in the village/town
- Extraordinary Historical event.
- The development of the village or town
- The description of special occupation of the village or town
- Typical village festival, its origin and the celebrations.
- The natural treatment and cure of the diseases.
- The Landscape, details of the source of water.
- Food habits of the village or town.
- Inscriptions

BOOKS FOR STUDY AND REFERENCE

Bassnett, Susan and Harish, Trivedi. *Post-Colonial Translation: Theory Practice.* London and New York: Routledge, 1999.

Kumar, Bijay Das. *A Handbook of Translation Studies.* New Delhi: Atlantic Publishers and Distributors, 2005.

Seturaman, ed. *Indian Aesthetics: An Introduction*. New Delhi: Macmillan, 2005.

Mukherjee Sujit. *Translation as Recovery*. Delhi: Pencraft International.

SEMESTER IV

PAPER –13
TWENTIETH CENTURY LITERATURE

OBJECTIVES:

- To help the students to retrace the diversity of the literary schools of this period which were more liberal in outlook and scientific in technique
- To introduce students to the thoroughly competent and literate authors in the traditional mode, who were creatively original

UNIT – I: POETRY (Detailed)

1. W. B .Yeats : Easter 1916
2. T. S Eliot : The Wasteland
3. Wilfred Owen : Anthem of Doomed Youth

POETRY (Non - Detailed)

1. Seamus Heaney : Digging
2. Thom Gunn : On the Move
3. Stephen Spender : The Labourer in the Vineyard
4. Ted Hughes : Crow Alights

UNIT – II: PROSE (Detailed)

1. E.M. Forster : What I Believe
2. C. P. Snow : Two Cultures

UNIT – III: DRAMA
(Detailed)
Beckett : Waiting For Godot
(**Non-Detailed)**
Harold Pinter : The Birthday Party

UNIT – IV: SHORT STORY
1. James Joyce : After the Race
2. Joseph Conrad : The Secret Sharer
3. Sir Arthur Conan Doyle : A Scandal in Bohemia
4. Margaret Drabble : A Day in the Life of the Smiling Woman

UNIT – V: FICTION
1. Graham Greene : The Power and the Glory
2. D. H. Lawrence : Sons and Lovers

BOOKS FOR STUDY AND REFERENCE

A.J. Wilks, *T.S. Eliot : The Waste Land Macmillan Critical Commentaries*. London: Macmillan Education Ltd, 1971.

Harold Bloom Ed, *Samuel Beckett's Waiting for Godot: Viva Modern Critical Interpretations.* New Delhi: First Indian Edition, 2007.

Morries Beja, A. E. Dyson Ed. *James Joyce : Dubliners and A portrait of the Artist as a Young man: A selection of critical essay*s, 1st ed. London: The Macmillan Press Ltd, 1973.

Gamini Salgado, A. E. Dyson Ed., *D.H. Lawrence Sons and Lovers: A selection of Critical Essays.* London: The Macmillan Press Ltd, 1973.

R.D. Draper, *Sons and Lovers by D.H. Lawrence Macmillan Master Guides.* New York: Palgrave Macmillan, 1986.

PAPER – 14
ENGLISH LANGUAGE TEACHING

- To equip students to teach efficiently well at the secondary and tertiary level.
- To train them in the use of new methodologies in teaching English.

UNIT I: History of ELT

The brief history of Language Teaching

English in India – Past, Present and Future

UNIT II: Approaches and Methods

Communicative Language Teaching Method - Total Physical Response -The Silent Way

The nature of Human language – Linguistics, Psychology and English Teaching– Methods – Approach, Method and Technique

UNIT III: Grammar and LSRW Skills

Essential Word – Grammar for teachers – Teaching of vocabulary – Essentials of English Grammar -The Teaching of Grammar – Essentials of English speech – Teaching spoken English: Some Techniques– Reading and Teaching of Reading -Writing and teaching of writing and composition

UNIT IV: Teaching Literature

Teaching Prose – Teaching Poetry – Teaching Drama – Teaching Fiction

UNIT V: Teaching Tools and Assessment

Use of Blackboard and Other Instructional Aids– Study skills and reference skills - Test and Testing– Common Errors and remedial English – Planning and lesson planning

BOOKS FOR STUDY AND REFERENCE

Jack.C.Richards, Theodore.S.Rodgers, *Approaches and Methods in Language Teaching.* UK: Cambridge University Press, 2001.

Martin Parrot, *Tasks for Language Teaching.* New Delhi:CUP, 1993.

Penny Ur, *A Course in Language Teaching: Trainee Book.* UK: First Asian Edition, 1999.

Jerry S. Gabbard and Robert Oporandy, *Language Teaching Awareness.* Chennai: OBS, 2009.

Michael.J.Wallace, *Training Foreign Language Teachers.* New Delhi: CUP, 1991.

Jack C. Richards and Willy A. Renandya ed., *Methodology in Language Teaching: An Anthology of Current Practice.* New Delhi: CUP, 2000.

N. Krishnaswamy and Lalitha Krishnaswamy, *Methods of Teaching English.* Chennai: Macmillan, 2011.

Mario Rinvolucri, *Grammar Games: Cognitive, Affective and Drama Activities for EFL Students.* UK: CUP, 1984.

David Nunan, *Research Methods in Language Learning.* New Delhi: CUP, 1992.

Penny Ur, *A Course in Language Teaching: Practice and Theory.* UK: CUP, 1991.

E. Suresh Kumar and P. Sreehari, *A Handbook for English Language Laboratories.* New Delhi: CUP India Pvt Ltd, 2007.

A. P.R. Howatt and H. G. Widdowson, *A History of English Language Teaching.* New York: OUP, 2004.

S. Kudchekar Ed, *Readings in English Language Teaching in India.* Chennai: Orient Black Swan, 2005.

Penny Ur and Andrew Wright, *Five-Minute Activities: A Resource Book for Language Teachers.* New York: CUP, 1992.

PAPER – 15
CONTEMPORARY LITERARY THEORY – II

Unit I: Marxist Criticism
Marxist Critical terms: Communism, Materialist, Alienation, Reification, Over determinism, Relative Autonomy, Engelsian, Interpellation.

Beginnings and basics of Marxism - Marxist literary criticism
The Present : the influences of Althusser - Marxist criticism: an example

Unit II: New Historicism and Cultural Materialism
New Historicism Critical Terms: Parallel, Thrice-processed**,** Discursive**.**

New historicism - New and old historicisms- differences - New historicism and Foucault - New historicism: an example
Cultural materialism - Cultural materialism: an example

Unit III: Postcolonial Criticism
Postcolonial Criticism Critical Terms: Orientalism, Adept, Adapt.

Background - Postcolonial reading - Postcolonial criticism: an Example

Ecocriticism Critical Terms: Entropy, Symbiosis.
Culture and nature - Ecocriticism: an example.

UNIT IV:Postmodernism
Postmodernism Critical Terms: Narcisssism, Meta narrative, Eclectic, Aleatory, Avant-garde, Simulacrum, Simultion.

Postmodernism (pg 78 -90).

Unit V: Theory after 'Theory'
Theory after 'Theory' Critical Terms: Routinise, Crisis Critique, Presentism, Aestheticism, Affective Fallacy, Congnoscere, Deviance.

Theory after 'Theory' (Pg 287-316)

BOOKS FOR STUDY AND REFERENCE

Bennett, Tony. *Formalism and Marxism.* London and New York: Roultedge, 1979.
Belsey, Catherine. *Critical Practice.* London and New York: Roultedge, 1980.
Bennett, Tony. *Formalism and Marxism.* London and New York: Roultedge, 1979.
Bertens, Hans. *Literary Theory: the Basics.* London: Routledge, 2001.
Culler, Jonathan Barthes. *A Very Short Introduction.* New York: OUP, 2002.
Powell, Jim. *Postmodernism*. Chennai: Orient Longman, 1998
Dobie, Ann B. *Theory into Practise: An Introduction to Literary Criticism*. New Delhi: Cengage Learning, 2012.
Guerin Wilfred L., Earle Labour et al. *A Handbook of Critical Approaches to Literature*. New York: OUP, 1999.

PAPER – 24
RESEARCH PROJECT

Objectives:

- To provide an opportunity for the students to pursue a topic of individual interest to usher into research
- To develop in the students the ability to carry out research projects within a methodological framework through extensive personal study and individual guidance.

Preliminary Requirements:

- Knowledge of the types of Research, Deductive and Inductive Arguments, Critical Approach, Research ethics, Bibliography.
- The research work must be strictly an individual sincere work, the result of ardent study and pursuit of excellence. The work should not exceed 10,000 words and there will be viva- voce by an examiner.
- This module gives the opportunity to undertake supervised work on a dissertation in Literature or English Language Teaching up to 10,000 words, on a topic of one's choice agreed with the Guide/supervisor.
- **It is strongly recommended that the student must be motivated to begin the Preliminary reading and survey of related secondary sources for the dissertation in the first summer term and vacation holidays.**
- The students can be encouraged to present papers in the conferences and to publish in the proposed topic.

Essential Reading

a) Where And How To Find Secondary Literature

b) How to Write a Scholarly Paper

From *An Introduction to Literary Studies*- Mario Klarer Pub. London, Routledge. 2004

c)The Undergraduate Dissertation

From *In Pursuit of English Studies*.Barry,Peter.New Delhi, Bloomsbury.2014

d) Gupta, Suman.The place of theory in literary disciplines

From DaSousa, Delia Correa and W.R.Owens. *The Handbook to Literary Research*, second Edition. Routledge: Taylor and Francis Group, The Open University Abingdon-Oxon. 2010.

Web sources

MLA 7th Edition Quick reference

sites.psu.edu/bee11/wp-content/uploads/sites/16010/.../**MLA**-April-2010-rev1.pdf

ELECTIVE PAPER 4 A
CHILDREN'S LITERATURE

OBJECTIVES:

- To enable the students to evaluate the literary qualities and the popular appeal of Children's Literature
- To help the students to explore the category of Children's Literature and its impact on children

UNIT I: POETRY

William Wordsworth	: To the Cuckoo
Edward Lear	: The Owl and the Pussy Cat
Theodore Roethke	: My Papa's Waltz
Coventry Patmore	: Toys

UNIT II: PROSE

Jawaharlal Nehru	: Letters from a Father to his Daughter: The Book of Nature
Shoba De	: Speed Post:1. Circle of Love 2. Growing up is hard to do

UNIT III: DRAMA

Rabindranth Tagore	: The Post Office

UNIT IV: SHORT STORY

Panchatantra Stories	**:** 1.The Greedy Cobra and the King of Frogs 2. The Story of the Potter 3. The Carpenter's Wife
Hans Anderson	: The Little Mermaid
Richard Burton	: Alibaba and the Forty Thieves
Ruskin Bond	: The Tiger in the Tunnel

UNIT V: FICTION

C.S. Lewis	: The Tale of Narnia : The Lion, The Witch and The Wardrobe
Rudyard Kipling	: The Jungle Book
Roald Dahl	: Matilda

BOOKS FOR STUDY AND REFERENCE

Tiwari, Shubha – Children and Literature – New Delhi: Atlantic Publishers and Distributors, 2006

Winbott S.E. – English Poetry for the Young – Blackie and Sons.

Hans Anderson – Hans Anderson Fairy Tales: India: Wilco Publishing House, 2005.

Nehru, Jawaharlal. Letter from a Father to His Daughter. India: Puffin Books, 2004.

ELECTIVE PAPER 4 B
ACADEMIC WRITING

OBJECTIVES:

- To develop the reading and writing skills for personal and academic purpose.
- To enhance the interpretative ability to critically analyse and appreciate literary texts

UNIT I
Writing a Summary and Response
Writing Practice: Identifying arguments – Summarizing - Forming and expressing a point of view
Editing focus: Paraphrasing - Subject-verb agreement

UNIT II
A) **Writing a Descriptive Essay**
Reading: *Cherries for My Grandma* by Geoffery Canada
Writing practice: Analyzing essay organization - Writing detailed examples as support - Using a summary as an introduction
Editing focus: Adjective clauses - Habitual past: *would* vs. *used to*

B) **Writing a Classification Essay**
Reading: *Some Reflections on the Technology of Eating* (from *The New York Time*)
Writing practice: Determining an organizing principle for categorization - Categorizing and avoiding overlapping - Developing conclusions for classification essays
Editing focus: Pronoun referents

UNIT III
Writing an Advantages–and–Disadvantages Essay
Reading: *You've Got Inappropriate Mail* (from *The New York Time*)
Writing practice: Summarizing and incorporating academic research as support Responding to a quote- More on using a summary as an introduction Using the conclusion to unit an essay
Editing focus: Bibliographies or "Works Cited" lists - Citations for online references - Citations within a text

UNIT IV
A) **Writing a Cause –and-Effect Essay**

Reading: Excerpt from *The Face of Beauty* by Diane Ackerman
Writing practice: Developing different types of support - Writing up research studies Showing cause and effect - Outlining an essay

Editing focus: Adverbial clauses - Causal connectors - Reported speech

B) **Writing a Comparison–and-Contrast Essay**

Reading: "A Holistic Approach to Personality Analysis. The Myers-Briggs Type Indicator"
Writing practice: Developing introductions - Assessing the value of a theory
Editing focus: Clauses for comparison, contrast and concession - Transitional expressions between sentences

UNIT V

A) **Writing a Literary Analysis Essay**
Reading: Excerpt from *The Kite Runner*, by Khaled Hosseini
Writing practice: Analyzing mood - Summarizing a story - Understanding plot devices - Writing about symbols - Organizing an introduction for a literary analysis essay Integrating quotes with text - Integrating simile, metaphor, and personification
Editing focus: Present and past unreal conditions

B) **Writing an Argumentative Essay**
Reading: *Students Shall Not Download. Yeah, Sure.* (from *The New York Time*)
Writing practice: Identifying arguments and counterarguments -Refuting an argument - Organizing an argumentative essay - Synthesizing information to form arguments
Editing focus: Unstated conditionals - Noun clauses

Prescribed Text

Colonna, Mary and Gilbert, Judith. Reason to Write**.** Oxford: Oxford University Press, 2006.• Print.

BOOKS FOR STUDY AND REFERENCE

Bailey, Stephen. Academic Writing:A Handbook for International Students. USA and Canada: Routledge Third edition.2011

Savage, Alice., Effective Academic Writing: Developing Ideas Oxford: Oxford University Press, 2012. Print.

Savage, Alice and Shafiei, Masoud. Effective Academic Writing: The Paragraph. Oxford: Oxford University Press, 2012. Print.

ELECTIVE PAPER 4 C

COMPREHENSIVE STUDY OF LITERATURE

OBJECTIVES:

- To test the student's level of knowledge in the chosen field of study as a whole and to evaluate their mastery.
- To ensure acquisition of a complete knowledge of the coursework and to enable the students to qualify eligibility and competitive examinations

Note for Instructors: This paper covers the entire course undergone by the student through the four semesters. There need not be a formal instruction. The faculty members of the department can offer special lectures and guidance for the preparation on the topics given. The students can be assisted with practice sessions consisting of seminars, assignments and tests.
The final examination objective type questions will cover the whole syllabus of the four semesters. The students can be internally assessed through model tests from the UGC – NET, SET and TRB. Refer to GRE tests.

Methods for study:

- Review names of important writers and their works from each literary period
- Review main characters
- Summarize plots
- Analyze significant themes and conflicts
- Review introductions to each of the following period, genres, movements and categories:

  - British Drama from *Everyman* to the Present Day
  - Twentieth-Century American Drama
  - Indian and Commonwealth Drama
  - Elizabethan and Nineteenth-Century British Fiction
  - The Twentieth-Century American Novel
  - The Indian and Commonwealth Novel
  - British poetry from Chaucer to the Romantics
  - Victorian Poetry
  - Twentieth-Century Poetry
  - Nineteenth and Twentieth-Century American Poetry
  - Commonwealth and Indian Poetry
  - Elizabethan and Nineteenth-Century British Fiction

- The Reflective Essay from Bacon to the Twentieth century
- The British Periodical Essay
- The Satirical Essay
- Literary Theory and Criticism
- Rhetoric and Prosody
- Indian Literature in Translation
- Indian Writing in English
- American and other Non-British Literatures
- European Literature From Classical Age To The 20th Century
- English as a World Language
- Characteristics of Indian English
- Teaching of Indian English at the Tertiary level

Unit I: Ideas, Periods and Movements

Identify the following genres or literary movements, with examples of important works and authors, the eras in which they flourished, the characteristic features and social or intellectual developments that may have shaped the genre or movement:

Aesthetic Movement – Augustan – Elizabethan – Enlightenment -Expressionism Fin de Sicele - Harlem Renaissance – Humanism – Imagism – Impressionism – Jacobean - Magical Realism Modernism – Naturalism – Neoclassicism – Neoplatonism – Platonism – Postmodernism - Pre-Raphaelitism Realism – Reformation – Renaissance – Restoration – Romanticism – Sentimentalism - Surrealism
Symbolist movement – Transcendentalism - Victorian

Note: Unit II, III, IV- Refer to the following terms and how each operates to create meaning in literary works from specific examples of texts and authors. In general, explore a range of functions or issues.

Unit II: Poetry

Accent or beat - Accentual-Syllabic Verse - Accentual Verse – Alexandrine – Anapestic – Alliteration – Ballad - Stanza - Blank Verse – Caesura - Carpe Diem - Confessional Poetry – Dactylic - Dramatic Monologue– Eclogue – Elegy – Enjambment – Epic - Feminine or Double Rhyme – Foot - Free Verse - Heroic Couplet – Hexameter – Iambic - Internal Rhyme - Incremental Repetition – Lyric - Metaphysical Poetry– Ode (nondramatic) – Pastoral – Pentameter – Quatrain – Refrain – Rhyme - Rhyme Scheme – Rhythm - Slant Rhyme - Sonnet (English v.

Italian Forms) - Spenserian Stanza – Spondaic – Stanza - Syllabic Verse – Tercet - Terza Rima – Tetrameter – Trochaic - Verse

Unit III: Drama

Aside – Catharsis – Chorus - Closet Drama – Comedy - Comedy of Humors - Comedy of Manners -Deus ex machina - Dramatic Irony – Epilogue – Farce – Hamartia – Masque – Melodrama – Mime - Morality Play - Mystery Cycle - New Comedy (Greek) - Ode (Greek drama) - Old Comedy (Greek) – Prologue – Protagonist Sentimental Comedy – Soliloquy - Stock Character - Strophe/Antistrophe – Tragedy - Tragicomedy– Unities

Unit IV: Fiction

Bildungsroman - Episodic plot - Epistolary Novel - First Person - Flat Character - Focalizing -Frame Tale - Free Indirect Style or Discourse - Gothic Novel - Interior Monologue – Metafiction – Narrator - Novel of Manners – Omniscient - Picaresque Novel – Plot - Point of View – Polyglossia - Romance (narrative) - Round Character - Stream of Consciousness - Third Person - Unreliable Narrator

(A) Rhetoric & Style

Allusions – Anticlimax – Antithesis – Aphorism – Apostrophe – Bathos – Epic – Epigram – Ethos – Hyperbole - Logos – Metaphor – Metonymy - Mock Heroic – Onomatopoeia – Oxymoron – Paradox – Pathos – Persona – Personification – Rhetoric - Rhetorical Appeal – Satire - Simile and Epic Simile - Symbol

(B)Literary Theory and critical Terms

Archetype - Author Function – Canon – Conventions – Deconstruction – Dialogic – Discourse - Feminist Criticism - Genre – Grotesque – Hermeneutics - Hybridity (postcolonial) - Intentional Fallacy – Intertextuality – Irony - Marxist Criticism – Metanarrative – Mimesis – Myth – Narratology - New Criticism - New Historicism– Orientalism - Pathetic Fallacy – Parody – Pastiche – Postcolonial – Poststructuralism – Psychoalytical Criticism - Queer Theory - Reader-Response Criticism – Semiotics - Signifier/Signified – Simulacra - Speech Act Theory - Structuralism – Subaltern - Verisimilitude

Unit V: History of English Language - English Language Teaching

HISTORY OF THE ENGLISH LANGUAGE

Origin of Language - Place of English in the Indo-European family - General Characteristics of Old and Middle English - The rise and growth of Modern English - Growth of vocabulary– Greek, Latin, French, Italian, Scandinavian and other

foreign influences – Word Formation - Change of Meaning - The Makers of English - The Bible, Spenser, Shakespeare, Milton and Dr.Johnson - American English - Indian English - Characteristics of Modern English - Spelling Reform - The English Lexicon.

LINGUISTICS

Definitions – The Nature and Scope of linguistics, Speech and Writing - Form and Meaning - Words, Clause and Phrase – Concord Government– Sentence Pattern – Phonology – Morphology - Idiolect - Dialect - Transformational Generative Grammar.

ENGLISH LANGUAGE TEACHING

The brief history of Language Teaching - English in India – Past, Present and Future

Approaches and Methods of English Language Teaching

Communicative Language Teaching Method - Total Physical Response – The Silent Way

The nature of Human language – Linguistics, Psychology and English Teaching

Outline of Examination:

- The test consists of approximately 75 objective questions on poetry, drama, biography, the essay, the short story, the novel, criticism, literary theory and the history of the language. The questions may be classified into two groups: factual and analytical.
- The analytical questions test the ability to read a literary text perceptively to answer questions about meaning, form and structure, literary techniques, and various aspects of language.
- The Examination is based on literature in English from the British Isles, the United States and other parts of the world. It also contains a few questions on works, translated from other languages.
- The Examination calls attention to authors, works, genres and movements. The factual questions may require a student to identify characteristics of literary or critical movements, to assign a literary work to the period in which it was written, to identify a writer or work described in a brief critical comment, or to determine the period or author of a work on the basis of the style and content of a short excerpt.

BOOKS FOR STUDY AND REFERENCE

Albert, Edward. A History of English Literature. Oxford: Oxford University Press, 1979.Print.

Chowdhury, Aditi and Rita Goswami. A History of English Literature: Traversing the Centuries. Hyderabad: Orient Blackswan, 2014. Print.

Daiches, David. A Critical History of English Literature. London: Secker & Warburg, 1960. Print.

Sanders, Andrew. The Short Oxford History of English Literature. Oxford, UK: Oxford University Press, 1994. Print

A. P.R. Howatt and H. G. Widdowson, *A History of English Language Teaching.* New York: OUP, 2004.

Jack.C.Richards, Theodore.S.Rodgers, *Approaches and Methods in Language Teaching.* UK: Cambridge University Press, 2001.

Bertens, Hans. *Literary Theory: the Basics.* London: Routledge, 2001.

Barry, Peter. *Beginning Theory.* Manchester and New York: Manchester University Press, 2002.

Wood F.T., *An Outline History of the English Language.* Madras : Macmillan, 2001

Yule, George.*The Study of Language*. Cambridge University Press, 1985.

Web sources

http://english.columbia.edu/graduate/orals-reading-list#Medieval

THIRUVALLUVAR UNIVERSITY

MASTER OF COMMERCE

UNDER CBCS

(with effect from 2017-2018)

The Course of Study and the Scheme of Examination

S.NO.	Study Components / Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I						**CIA**	**Uni. Exam**	**Total**
1	MAIN	Paper-1	6	5	Advanced Financial Management	25	75	100
2	MAIN	Paper-2	6	5	Accounting for Managerial Decisions	25	75	100
3	MAIN	Paper-3	6	4	Global Marketing	25	75	100
4	MAIN	Paper-4	6	4	Advanced Business Statistics	25	75	100
5	ELECTIVE	Paper-1	6	3	(to choose 1 out of 3) A. Managerial Economics B. Computer Applications in Business C. Insurance and Risk Management	25	75	100
			30	**21**		**125**	**375**	**500**
SEMESTER II						**CIA**	**Uni. Exam**	**Total**
6	MAIN	Paper-5	6	5	Corporate Laws	25	75	100
7	MAIN	Paper-6	6	5	Human Resource Management	25	75	100
8	MAIN	Paper-7	5	4	Advanced Accounts	25	75	100
9	MAIN	Paper-8	5	4	Quantitative Techniques for Business Decisions	25	75	100
10	**Compulsory Paper**		2	2	**Human Rights**	25	75	100
11	ELECTIVE	Paper-2	6	3	(to choose 1 out of 3) A. Retail Management B. E -Commerce C. Bank Management	25	75	100
			30	**23**		**150**	**450**	**600**
SEMESTER III						**CIA**	**Uni. Exam**	**Total**
12	MAIN	Paper-9	6	5	General Service Tax (GST)	25	75	100
13	MAIN	Paper-10	6	5	Organizational Behavior	25	75	100
14	MAIN	Paper-11	6	5	Advanced Cost Accounting	25	75	100
15	MAIN	Paper-12	6	5	Research Methodology	25	75	100

16	ELECTIVE	Paper-3	6	3	(to choose 1 out of 3) A. Financial Service B. Computer and office management C. Services Marketing	25	75	100
			30	**23**		**125**	**375**	**500**
SEMESTER IV						**CIA**	**Uni. Exam**	**Total**
17	MAIN	Paper-13	6	5	Direct Taxes	25	75	100
18	MAIN	Paper-14	6	5	Investment Management	25	75	100
		Project/Dissertation * with *viva voce* (or)	12	10		50	150	200
19	MAIN	Paper-15	6	5	Project Development	25	75	100
20	MAIN	Paper-16	6	5	Marketing Research	25	75	100
21	ELECTIVE	Paper-4	6	3	(to choose 1 out of 3) A. Business Environment and Policy B. Introduction to Information Technology C. Sales and Advertising Management	25	75	100
			30	**23**		**125**	**375**	**500**

Subject	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total marks**
MAIN	16	4-5	76	100	1600
ELECTIVE	4	3	12	100	400
COMPULSORY PAPER	1	2	2	100	100
Total	**21**	**-**	**90**	**-**	**2100**

* Students have to choose either Project / Dissertation with *viva voce* or Paper-15 and Paper-16 instead of Project / Dissertation.

Project/Dissertation with viva voce:

Maximum Marks 200 Passing Minimum 100 marks

DISSERTATION : 150 Marks

Viva voce : 50 Marks

There will be a Project / Dissertation during the fourth Semester in lien of theory papers. Teachers may be assigned students based on the total strength of staff and students of the Department. Care should be taken to see that equal no of students are allotted for work assignment among the teachers concerned.

Duration of the Project / Dissertation - IV Semester - December to April

The general regulations will apply for project / dissertation exam / valuation.

There will not be Practicals for the Computer related papers offered as Electives under various groups in the respective Semesters. These Subjects may be handled by the teachers working in the Commerce Department of the affiliated Colleges.

THIRUVALLUVAR UNIVERSITY

MASTER OF COMMERCE

SYLLABUS

UNDER CBCS

(with effect from 2017-2018)

SEMESTER I

PAPER - 1

ADVANCED FINANCIAL MANAGEMENT

UNIT-I

Financial Management - Functions - Goals of Financial Management - Maximization Vs. optimizations - Risk-return trade off.

UNIT-II

Management of funds - Long term sources - shares and Debentures - Convertible securities and Term Loans - Working Capital financing - Sources and approaches- Bank credit-Basic principles and methods of assessment- Other sources of short term finance-Operating environment of working capital

UNIT-III

Capital structure planning: Concepts of cost of capital - cost of equity, debt, retained earning - Weighted average cost of capital - Capital structure theories - Net income, Net operating income, MM and Traditional Theories - Leverage - Types and significance. Dividend policy and practices - Dividend policies - Factors affecting dividend decision - Dividend theories - Graham, Gordon, Walter and MM Theories.

UNIT-IV

Management of fixed assets - Evaluation of capital investment decision: Payback period - ARR - IRR - NPV - CAPM.

UNIT-V

Working capital management-working capital cycle-forecasting of working capital requirements - Factors influencing working capital-Management of inventory, cash and accounts receivables-payables management-credit and collection policies.

Note: The proportion between Theory and Problems shall be 40:60

Reference Books

1. I M Pandey, Financial Management, Vikas Publishing House Pvt Ltd.
2. John H Hampton, Financial Decision Making, Prentice Hall of India Ltd.
3. Prasanna Chandra, Financial Management, Tata McGraw Hill Publishing Company Limited.
4. M.Y.Khan and P.K.Jain, Financial Management, Tata McGraw Hill Publishing Company Limited.
5. P.V.Ratnam, Financial Management Theory, Problems and Solutions, Kitab Mahal.

PAPER - 2

ACCOUNTING FOR MANAGERIAL DECISIONS

UNIT-I

Accounting for Decision making - Scope and Importance - Decision Accounting vs. Financial Accounting and Cost Accounting.

UNIT-II

Financial and Investment analysis - Analysis and Interpretation - Ratio Analysis-Leverage analysis-Budgeting and budgetary control - Functional Budgets- Master Budget - Flexible budgeting - Zero Base Budgeting-

UNIT-III

Understanding Financial statements-Construction and analysis of profit and loss account and balance sheet-Construction and analysis of Fund flow and cash flow statements.

UNIT-IV

Cost Management- Absorption and Marginal Costing - Cost - volume-profit analysis-Applications and techniques.

UNIT-V

Financial decisions-capital structure-dividend decisions (only simple problems).

Note: 80% of the total marks be allotted for problems and 20% for theory

Prescribed Text Book

Management Accounting and Financial Control - S.N.Maheswari, Sultan Chand & sons, New Delhi

Reference books

1. Management Accounting - Man Mohan and Goyal.
2. Management Accounting - Hingorani and Ramanathan.
3. Management Accounting - Charles Horngren.
4. Management Accounting - J.Batty.

PAPER - 3

GLOBAL MARKETING

UNIT-I

Global Marketing - Scope - Importance - Global vs. National Marketing - Global Marketing Environment - Social - Cultural - Political - Legal and Regulatory Environments.

UNIT-II

International infrastructure for global trade promotion - GATT/ WTO - Export Promotion Councils - Services Institutions - IIFT - NCTI - ECGC - EXIM Bank - Export Promotion Council - Directorate General of Shipping - Global pricing - Objectives and Strategies.

UNIT-III

Global Customers - Segmentation, Targeting and Positioning - Global Product Positioning - Product life Cycle in Global Marketing - Global pricing - Objectives and Strategies.

UNIT-IV

Global Marketing Channels and Physical Distribution - Channel Objectives and Constraints - Channel Strategy - Physical Distribution and Logistics - Global Advertising and Branding - Global Promotion.

UNIT-V

Global Trade Procedure - Export Documentation - Processing of Export Procedure - Payment terms and conditions - Letter of Credit - Pre-shipment and Post Shipment finance - Forfeiting - Buyers Credit - Global Trade Assistance.

Reference books

1. Varshney, R.L. and Bhattacharya B: International Marketing Management, Sultan Chand and Sons, New Delhi.
2. Warnen J.Keegan: Global Marketing Management, Prentice Hall of India, New Delhi.
3. Cherian and Jacob: Export Marketing, Himalaya Publishing House, Mumbai.
4. Duby V.K.: Export Marketing, Common Wealth Publishers, New Delhi

PAPER - 4

ADVANCED BUSINESS STATISTICS

Objective

To apply statistical techniques for interpreting and drawing conclusion for business problems.

UNIT-I

Partial correlation-Partial correlation coefficient-Partial correlation in case of four variables- Multiple correlation-Multiple regression.

UNIT-II

Theory of probability-probability rules-Bayes theorem-Probability distribution-Characteristics and application of Binomial, poission and normal distribution

UNIT-III

Sampling- sampling methods- sampling error and standard error- relationship between sample size and standard error. Testing hypothesis- testing of means and proportions-large and small samples- Z test and t test.

UNIT-IV

Chi square distribution- Characteristics and application- test of goodness of fit and test of independence- Test of Homogeneity

UNIT-V

F distribution- testing equality of population variances- Analysis of variance-one way and two way classification.

Note: The proportion between theory and problems shall be 20:80

Reference Books

1. S P Gupta, Statistical methods, Sultan chand & Sons, 2000, New Delhi
2. D C Sancheti and V K Kapoor, Business statistics, Sultan Chand and sons, New Delhi
3. J.K.Sharma, Business Statistics-Pearson Education
4. Richard I Levin and David S. Rubit, Statistics for management, 7th Edition,Pearson education, New Delhi, 2002
5. Business statistics and operations research, Dr D Joseph Anbarasu,Lintech press Trichy

ELECTIVE

PAPER - 1

A. MANAGERIAL ECONOMICS

Objectives

Aims to provide a broader understanding of Managerial Economics and its managerial applications.

UNIT-I

Definition and scope of the subject-fundamental concepts and Methods-firm's objectives and the role of managerial economist.

UNIT-II

Demand analysis and Forecasting for consumer goods and capital goods-use of business indicators- type of elasticity.

UNIT-III

Concept and resources allocation- Cost Analysis- Short run and long run Cost functions-production functions- cost price- Output relations.

UNIT-IV

Economics of size and capacity Utilization - Input-Output analysis- Market Structure-Pricing and output general equilibrium.

UNIT-V

Pricing Objectives- pricing methods and approaches-price discrimination, Product line pricing-profit planning and Cost control- Business cycle and Policies.

Reference Books

1. Peterson, managerial economics, 4th edition - Pearson education - New Delhi.
2. Sampat Mokherjie, Business and Managerial Economics, New Central Book Agency, Calcutta.
3. Spencer M.H.Managerial Economics Text, Problems and short cases, Richard D.Inwin INC.
4. Sankaran.S, Managerial Economics Margham Publications, Chennai.
5. Dwivedi D.N , Managerial Economics, Vikas-New Delhi
6. Mankar & Denkar, Business Economics, Himalaya publishing House, Bombay
7. Joel Dean, Managerial Economics, Prentice Hall of India - New Delhi.
8. R.L. Varshney & K.L. Maheshwari, Managerial Economics-Sultan Chand & Sons, New Delhi.

B. COMPUTER APPLICATIONS IN BUSINESS

UNIT-I : COMPUTER HARDWARE

CPU, Input devices, Output Devices, Communication devices, storage devices Types of Computer system.

UNIT-II : INFORMATION TECHNOLOGY

Basic idea of LAN (Local Area Network), and WAN (Wide Area Net work) E-mail: Internet Technologies, Access Devices, Concept of World Wide Web and Internet browsing.

UNIT-III : WORD PROCESSING

Introducing and working with MS Word in MS-Office - Word Basic Commands, Formatting - Text and documents, Sorting and Tables, Working with graphics, introduction to Mail merge.

UNIT-IV : SPREAD SHEET

Working with EXCEL - Formatting functions, chart features, working with graphics in EXCEL using worksheets as database in accounting, Marketing, finance and personnel areas.

UNIT-V : PRESENTATION WITH POWER POINT

Power Point, basics creating Presentation of easy way: working with graphics in Power Point show time, sound effect and animation effects.

Reference Books

1. Date, C.J: An Introduction to Data base systems, Addison Wesley, Massachusetts.
2. Dienes, Sheih.S: Micro soft Office, Professional for Windows 95: Instant Reference: BPB Publication, New Delhi.
3. Mansfield, Ron: The Compact Guide to Micros soft Office BPB Publicaton, New Delhi.
4. O.Brian...A: Management information System, Tala Mc Graw Hill, Delhi.
5. Ullman, J.O: Principles of Data base System, Galgoia publication, New Delhi.

C. INSURANCE AND RISK MANAGEMENT

UNIT-I

Risk and Risk management process - risk identification - evaluation-risk management techniques-Insurance and risk management techniques-selecting and implementing risk management techniques.

UNIT-II

Commercial risk management applications - property - liability-commercial property insurance - different policies and contracts-business liability and risk management insurance-workers compensation and risk financing.

UNIT-III

Personal risk management - applications-property and liability- risk management for auto owners- Lorry owners- risk management for homeowners.

UNIT-IV

Risk management applications-loss of health - medi-claim-retirement planning and annuities-employee benefits- financial and estate planning.

UNIT-V

Risk management environment - Insurance industry - functions and organization of insurers-Government regulation of insurance sector - IRDA-privatization of insurance business in India-changes in insurance act-Insurance intermediaries-insurance products-pricing-claim valuation-Foreign insurers in India

Reference Books

1. Anand Gangly, Insurance Management, New age International, 2002
2. Arthur C Williams, Risk Management and Insurance, 8th Ed, McGraw Hill Co.
3. Insurance Act - Latest edition.

SEMESTER II

PAPER - 5

CORPORATE LAWS

UNIT-I

Corporate Laws: Importance - objectives. Doctrine of indoor Management. Liability of Misstatement - Mergers and Acquisitions.

UNIT-II

Information Technology Act: Intellectual Property Rights - Patents Act - Foreign Exchange Management Act - 2000 (FEMA) - Competition Act - 2002.

UNIT-III

SEBI ACTSEBI Regulations - Corporate Governance - Transparency and Disclosures - Latest trends. Audit Committee. Nolin Committee

UNIT-IV

ENVIRONMENT PROTECTION ACT - 1986. Power of Government - Air (Prevention and Control of Pollution) Act, 1981. Water (Prevention and Control of Pollution) Act, 1974.

UNIT-V

CONSUMER PROTECTION ACT, 1986-Competition Act 2002-Definitions-Competitive agreements-Abuse of dominant position-combination-regulation of combinations-competition commission of India, duties,Powers and functions of Commission-Competition Appellate Tribunal.

Reference Books

1. N.D. Kapoor, Elements of Company Law, Sultan Chand & sons, New Delhi.
2. Company Acts, 1956 (Acts and Rules).
3. N.D. Kapoor, Elements of Mercantile Law, Sultan Chand & sons, New Delhi.
4. Gulshan, S.S. A Hand book of Corporate Laws, S. Chand & Co, New Delhi.
5. Kuchhal, M.C. Mercantile Law, Vikas Publishing House, New Delhi.
6. Shukla, M.C. a Manual of Mercantile Law, S. Chand & Co.,New Delhi.

PAPER - 6

HUMAN RESOURCE MANAGEMENT

UNIT-I

Humans and other physical resources - development of the human potential - Implications of Behavioral Science theories to HRM - Link between organization planning and HR planning.

UNIT-II

Acquisitions and maintenance of personnel - recruitment and selection - purposes and methods of recruitment and selection - Maintenance of personnel - motivation for increased productivity - Q W L.

UNIT-III

Rewards and incentives - financial and non-financial incentives - Grievance procedure - conflict - process - stress vs. challenge - sources - resolution.

UNIT-IV

Performance appraisal - Ranking, rating scales, critical incident method - MBO as a method of appraisal - Removing subjectivity from evaluation - Criteria for promotions and job enrichment.

UNIT-V

Human development - training - need and importance - methods of training - designing training program - Evaluation of training program - Executive development. - Organization change - change agents - resistance to change - managing the resistance.

Reference Books

1. Dressler- Human Resource management, 8th Ed. Pearson Education, 2002
2. De Cenzo and Robbins, Personnel/Human Resource Management, Prentice Hallof India, 1998.
3. S.K.Chakrabothy, Values and Ethics for Organization, Oxford University Press 1999.
4. Aswathappa, Human Resource and Personnel Management, TataMcGraw Hill, NewDelhi, 2002.
5. A.M. Sheikh, Human Resource Development and Management, S. Chand & Co, New Delhi.

PAPER - 7

ADVANCED ACCOUNTS

Objectives

The primary objective of this subject is to enlighten the students the theoretical aspects of different topics and special attention to chapters like Inflation accounting, Holding Companies, Bank and Insurance Company accounts.

UNIT-I

Accounts of Banking Companies - Legal Provisions - Capital Adequacy Norms - Rebate on Bills Discounted - Asset Classification and Provisioning - Preparation of Final accounts.

UNIT-II

Insurance Company Accounts - Nature of Insurance Business - Distinction between Life and Non Life Insurance - Accounts of Life Insurance Business - Accounts of General Insurance Business - IRDA Regulations Regarding Preparation of Financial Statements.

UNIT-III

Holding Company Accounts - Consolidated Financial Statements - Consolidation of balance Sheets and Profit and Loss Accounts.

UNIT-IV

Inflation accounting - Need - Objections - Adjustments for General Price Changes - Current Purchasing Power Accounting (CPP) - CPP method of preparing financial statements.

UNIT-V

Human Resource Accounting - Need and Development - Importance of Human Resource Accounting - Objections against Human Resource Accounting - Human Resource Accounting in India. Corporate Social Reporting - Concept and objectives of social responsibility.

Reference Books

1. M C Shukla and T S Grewal, Advance accounts, S.Chand & Co New Delhi
2. Anjan Bhattacharya & Subrata Mukerjee, Advanced Practical Accounts, S. Chand & Co., New Delhi.

PAPER - 8

QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS

UNIT-I

Linear programming and net work analysis- PERT and CPM- Simplex method-Application of simplex technique.

UNIT-II

Inventory models- General concepts and definitions-Various cost concepts-The technique of inventory control-EOQ models.

UNIT-III

Transportation model-Definitions-Formulation and solution of Transportation models-North west corner - MMM-VAM.

UNIT-IV

Assignment model - Definitions- Formulation and solution of Assignment models-simplex and Hungarian method.

UNIT-V

Queuing theory-meaning-objectives - Limitations-Elements of queuing system-Queuing models.

Note: The proportion between theory and practice shall be 20:80

Reference Books

1. C.R.Kothari, Quantitative Techniques, Vikas publishing house.
2. P.R.Gupta and man Mohan, Operation Research, Sultan Chand and sons,New Delhi.
3. J.K. Sharma, Mathematical Models in operation research, TMH publishers.
4. Business statistics and operations research, Dr D Joseph anbarasu Lintec Press Trichy.

ELECTIVE

PAPER - 2

RETAIL MANAGEMENT

COURSE OBJECTIVE:

The objective of the course is providing insights on retail operations. This will enable the students to become good retail planners and decision makers and help focus on change and adaption to change

Unit-I

Introduction to retail: retail in India; retail models and theories of retail development; understanding the retail consumers; ethical issues in retailing

Unit-II

Retail marketing strategy; retail franchising; retail store location and site selection; retail store design and visual merchandising; customer relationship management in retailing.

Unit-III

Basics of retail merchandising; the process of retail merchandising; the method of merchandise

Procurement; retail pricing and evaluating merchandise performance; retail communication mix

Unit-IV

Retail store operations; servicing the retail customers; retail human resource management; financial aspects of retail management; retail information system; supply chain management in retailing

Suggested Reading:

1. Pradhan, Swapna; Retaling Management; Tata McGraw Hill; New Delhi
2. Bajaj, Chetan, Tuli, Rajnish and Srivastava, Nidhi; Retail Management; OUP; New Delhi
3. Berman, Barry & Evans, Joel R.; Retail Management – A strategic approach; Pearson

1. Education/Prentice Hall of India; New Delhi

4. Levy, Michael & Weitz, Barton A.; Retailing Management; Tata McGraw Hill; New Delhi
5. Newman, Andrew J. & Cullen, Peter; Retailing – Environment and Operations; Thomson Asia Pvt. Ltd.; New Delhi
6. Dunne, Patrick M., Lusch, Robert F & Griffith, David A.; Retailing; Thomson Asia Pvt. Ltd; ND
7. Lamba, A.J.; The Art of Retailing; Tata McGraw Hill; New Delhi

A. E-COMMERCE

UNIT-I : ELECTRONIC COMMERCE

Meaning - Traditional Commerce - E. Commerce and its application in business. Basic Blocks of E. Commerce. E. Commerce consumer - Anatomy of E. Commerce.

UNIT-II : NETWORK INFRASTRUCTURE

Global Information Distribution Networks - Components of the I - way - Policy issues- Internet terminology - Internet Governance - An overview of Internet Applications.

UNIT-III : NETWORK LAYERS

Internet Protocol (IP) - Transmission Control Protocol (TCP) - Multimedia Concepts - Advantages of Internet. Electronic Data Interchange (EDI) - EDI and E. Commerce - EDI application in Business.

UNIT-IV : NETWORK SECURITY

Client Server Network security - Firewalls and Network Security - data and message Security - encrypted documents and Electronic Mail. Video conferencing.

UNIT-V : DIGITAL DOCUMENTS

Document Library - Types of Digital Documents - Corporate data warehouse - Electronic Payment Scheme - Intra-organizational Electronic Commerce.

References Books

1. David Kosiur, understanding Electronic Commerce, Addison Wesley, 1996.
2. Soka, From EDI to Electronic Commerce, Tata McGraw – Hill, 1995.
3. Saily Chan, Electronic Commerce Management, John Wiley, 1998.
4. Neil Randall, The Internet in a Wee, 2nd Edn. Prentice Hall of India, New Delhi.
5. Kamalesh, K. Balaji and Debjani Nag, "E-Commerce", the cutting edge of business, Tata McGraw – Hill, 2000.
6. Marilyn Greenstein and Todd M. Fein Mann, Electronic Commerce, Security, Risk Management, Irwin McGraw Hill, 2000.

B. BANK MANAGEMENT

UNIT-I

Banking structure in India - banking functions and services - Foreign commercial banks - Private commercial banks - capital adequacy.

UNIT-II

Principles of lending - financial adequacy assessing the borrower - project appraisal - structural and Infrastructural analysis - legal formalities - follow up loans, asset management companies.

UNIT-III

Non Performing Assets (NPAs) - Early Warning Signals - Management of NPAs- Remedies Available - Recent Measures - loan recovery tribunals - Provisions of Revenue Recovery Act

UNIT-IV

Investment management - priorities in allocation of bank funds - investment in governments securities - maturity and yield - quality and diversification, profitability management - profit planning

UNIT-V

Traditional Banking vs. E-Banking - facets of E-Banking - Internet Procurement - E-Banking Transaction - Electronic Delivery Channels - Truncated Cheque - Complete Centralized Solution - Features of CCS - Advances of E-Banking - Constraints in E-Banking - Security Measures.

Reference Books

1. Varshney, PN. Banking Law & Practice, Sultan Chand, New Delhi.
2. S.N.Maheswari, Banking Law & Practice, Ludiana, Kalyani Publications.
3. Vasant Desai, Principles of Bank Management, Mumbai, Himalaya Publications.
4. K.Subramanian, Banking Reforms in India, TMH, New Delhi.
5. Joseph Sinkey, Commercial Bank Financial Bank Financial Management, Pearson Education (Prentice Hall)
6. E.Gordon and Dr. K. Natarajan, Banking Theory Law and Practice – Himalaya Publishing House.

SEMESTER III

PAPER - 9

Basics of GST

Unit I

GST - The Road Begins -Draft Model GST Law - Positives –Negatives- LEVY - Territorial jurisdiction of GST - Taxable Event - Consideration - Levy and collection of GST - Composition levy - PLACE AND TIME OF SUPPLY - Definitions of Goods & Services - Time of supply.

Unit II

VALUATION - Value of taxable goods and services- Valuation Rules -SPECIAL TRANSACTIONS - Job work - Electronic Commerce -INPUT TAX CREDIT - Input tax credit - Input Service Distributor -REFUNDS - Refund -Interest on refund.

Unit III

COMPLIANCES - Registration - Invoices, credit and debit notes - Payment of tax - Tax deducted at source - Returns - Accounts and Records - ASSESSMENT, AUDIT AND INSPECTION - Assessment - Audit - Inspection - INTEREST, PENALTY AND PROSECUTION - Interest - Offences and Penalties – Prosecution.

Unit IV

DEMAND AND APPEALS - Demand - Appeals - CGST - SGST -IGST-ALTERNATE DISPUTE RESOLUTION MECHANISM - Authority of Advance Ruling - Settlement of cases.

Unit V

RECOVERY AND LIABILITY TO PAY TAX - Recovery of tax - Liability to pay tax in specified cases - TRANSITIONAL PROVISIONS -Transitional Provisions.

Author : Nitya Tax Associates ,Taxmann Publications.

PAPER - 10

ORGANISATIONAL BEHAVIOUR

UNIT-I

Organizational Behavior - Fundamental concepts - nature and scope - OB in the new millennium - Foundations of Individual behavior - Personality, Perception, Learning, Values and Attitudes.

UNIT-II

Motivation - Early theories - Contemporary theories - Motivation at work - Designing and Motivating for jobs.

UNIT-III

Group Dynamics - Group Behaviour, - Inter-group relations - Communication and Group - Decision making.

UNIT-IV

Leadership - Trait, behaviour and contingency theories- Power and Politics - Conflict - causes, conflict management, Transactional Analysis (TA) - Work Stress.

UNIT-V

Organizational Structure And Design**:** Organizational changes and development - Organizational culture and climate -Organizational effectiveness.

Reference Books

1. Stephen Robbins, Organisational Behaviour, 0^{th} Ed. Pearson Education, 2001
2. Fred Luthans, Organizational Behavior, McGraw Hill, 1998
3. Wagner, Organizational Behavour, Thomson Learning, 2002.
4. S.S. Khanka, Organisational Behaviour, S.Chand & Co.,,New Delhi Edn,2007
5. Dr. S. Shajahan & Linu shajahan, Organisational Behaviour, New age International Publishers, New Delhi.

PAPER - 11

ADVANCED COST ACCOUNTING

Objectives

The aim of the cost accounting is to acquaint the students with various concepts, methods of costing and decision making

UNIT-I

Nature and significance of cost accounts-Definition of Costing, Scope, Objectives, Functions and limitations of cost accounting-Installation of costing system-Elements of Cost- Cost centre and profit centre-Preparation of Cost sheet, tender of quotations.

UNIT-II

Methods of Costing-Process costing, Treatment of equivalent production- Inter process profit-Joint and by product Costing-Preparation of contract account, Cost plus contract and escalation clause.

UNIT-III

Standard Costing and Variance analysis-Material, Labor and Overheads -reporting of variances

UNIT-IV

Cost controland Cost Reduction-Control over wastages, Scrap, Spoilage and defectives– Methods of cost reduction.

UNIT-V

Activity based costing–Meaning and concept-Characteristics of ABC-Benefits from adoption of ABC-Just in Time Costing (JIT)

Note: The proportion between theory oriented and problem oriented questions in the university examination shall be 20:80

Reference Books

1. S.P. Jain and K.L. Narang-Cost accounting-Kalyani Publishers-New Delhi.
2. B.K. Bhar- Cost Accounting-Academic publishers, Calcutta
3. T.S.Reddy and Y.H. Reddy- Cost and Management Accounting-MargamPublications, Chennai
4. C.T.Horangren-Cost Accounting - A Managerial Emphasis- Pearson education-New Delhi
5. Jawaharlal - Cost Accounting-Tata Mc. Graw Hill
6. Ravi M Kishore Advanced Management Accounting - Taxman's-New Delhi.
7. Robert S. Kaplan-Anthony A. Atkinson- Advanced Management Accounting - Prentice Hall of India-New Delhi
8. Weldon's Cost Accounting and Cost Methods - Mc. Donald and Evens Limited.

PAPER - 12

RESEARCH METHODOLOGY

UNIT-I : INTRODUCTION

Research - definition, characteristics, nature and scope. Various types of research - Formulation of research problem - Major steps in Research – Hypothesis - Research Design - Uses of social research.

UNIT-II : SAMPLING AND DATA COLLECTION

Sampling: Meaning, definition, need and types. Sampling errors - Merits and demerits of Sampling. Data collection: Sources of data; Primary and Secondary data. Procedure for data collection, Tool of data collection - Questionnaire – Interview-Schedule.

UNIT-III : DATA PROCESSING AND ANALYSIS

Processing of data: editing, coding and Tabulation - Problems - use of computer in social research. Analysis of data: Statistical analysis; diagrammatic and graphic representation. Interpretation of results.

UNIT-IV : STATISTICAL APPLICATIONS

Factor Analysis - bivariate and Multivariate Analysis. (Practical problems.)

UNIT-V : RESEARCH REPORTS

Structure and components - Types of Research Report, Good Research Report. Pictures and Graphs. Introduction to SPSS Package.

References Books

1. Wilkinson. T.S. & Bhandarkar. P.L. Methodology and Techniques of Social Research, Himalaya Publishing House, 2000, Mumbai.
2. Panneerselvam. R. Research Methodology, Prentice Hall of India, New Delhi, 2004.
3. Green, P.E., et al., Research for Marketing Decisions, 5th ed., Prentice-Hall of India, New Delhi, 1994.
4. Young, P.V., Scientific Social Survey and Research, Prentice Hall, 1949. New York.
5. Kothari.C.R. Research Methodology - Methods & Technology, New Age International Publisher, New Delhi
6. Gupta, S.P. Statistical Methods, Sultan Chand and sons, 1999, New Delhi
7. Gupta, C.B., An introduction to Statistics Methods, Vikas Publishing House, 1998, New Delhi.

ELECTIVE
PAPER - 3
FINANCIAL SERVICES

UNIT – I : Indian Financial System

Introduction – Structure of the Indian Financial System – Recent Development – Financial Services – Concept – Objectives – Importance – Characteristics – Types of Financial Services – Regulatory Framework – Problems in Financial Services Sector.

UNIT – II : Mutual Funds concept of Regulations

Introduction – Types – Advantages and Disadvantages – Mechanics of Mutual Fund Operations – Asset Management Company (AMC) – Net Asset Value – SEBI's New Regulations to Mutual Funds (1990).

UNIT – III : Capital and Money Markets and Stock Exchanges

Capital Market: Meaning – Functions – Importance – Players in Capital Market – Primary and Secondary Capital Market. Money Market: Definition – Features – Money Market Instruments – Capital Market Versus Money Market etc., NSE – OTCEI.

UNIT – IV : Factoring Services and Consumer Finance

Factoring Services: Introduction – Mechanics of Factoring – Types – Advantages and disadvantages – Players in factoring services – Factoring Vs Bills Discounting – RBI Guidelines for factoring – Constrains of Factoring Services in India – Forfeiting. Consumer Finance: Definition – Types – Credit Cards – Debit Cards – Mechanics of consumer Financing – Sources – Modes.

UNIT – V : Venture Capital and Credit Rating

Venture Capital: Concept – Features – Forms of Venture Capital – Phases – Functions – Advantages – Venture Capital Institutions. Credit Rating: Introduction – Rating Process – Credit Rating Agencies – CRISIL, ICRA, CARE, Credit Rating symbols.

Text Books:

1. Bhatia, B.S and G.S Batra, Management of Financial Service, Deep & Deep Publications, New Delhi, 1996.
2. Cornett, Sauders, Financial Markets and Institutions, 3rd Edition, Tata McGraw Hill, New Delhi, 2007.
3. Sasidharan, Mathews, Financial Services and System, 1st Edition, Tata McGraw Hill, New Delhi, 2008.

Reference Books:

1. Bhalla, V.K. : Management Financial Services, Anmol, New Delhi 2001.
2. Gordan, E and K Natrajan: Emerging Scenario of Financial Services, Himalaya Publishing House, 1997.
3. Saha, T.R and Mondal A: Indian Financial System & Financial Market Operation, New Central Book Agency (P)Ltd., 2004
4. Avadhani V.A Marketing of Financial Services of Markets, 3rd Edition, Himalaya Publishing House, Mumbai, 2007.
5. M.Y. Khan – Financial Services, 4th edition, Tata McGraw Hill, New Delhi, 2007.

A. Computer and Office management

Objectives:

To familiarize the students with the fundamental of computer and to implement the Principles of Computers in the business operations

UNIT-I

History of computers- Types-Generation- Features- Hardware-Software-CPU-Floppy drives- Hard disk-CD Rom- Keyboard- Printer- Magnetic tapes.

UNIT-II

External storage units-Net work attached storage device (NAS)-CD Media-Pen Drive-External Hard Disks-Classification -Applications-Use of computers in various fields

UNIT-III

Flow charting- data communication- LAN-WAN-INTERNET-INTRANET- E mail-Security of data- Anti virus programmes.

UNIT-IV

Word basics-Formatting- Working with Headers-Footers and footnotes-Tab and tables-working with graphics-Macros Mail merge.

UNIT-V

Excel basics-Formatting tips- Function- Chart features-Working with graphics-Excels command Macros using worksheet as data base- Power point Presentation.

Reference Books:

Sanchs H Donald, Computer concepts and applications, Sultan Chand & Sons, New Delhi.

Subash Mehta: Easy Computers, Wheeler Publishing company, New Delhi.

SERVICES MARKETING

UNIT-I

Growth of the Service Sector - Nature and Concept of Service - classification of services - Characteristics of Services and their marketing implications - Essential Elements of marketing mix in Service marketing.

UNIT-II

Marketing strategies for service firms with special reference to information, communication, consultancy, advertising, professional services, after sales service, recruitment training and tourism.

UNIT-III

Product support services - pricing of services - problems of Service quality management - Customer Expectations - innovation in services.

UNIT-IV

Marketing of financial services - nature - types - marketing of insurance - mutual fund - marketing for non - profit firms - Growth of financial services in India.

UNIT-V

CRM - identifying and Satisfying Customer needs - Relationship marketing - Customer Satisfaction - Managing Service Brands.

Reference Books

1. Christopher lovelock, Services Marketing, Pearson Education.
2. E.G. - Bateson, Managing Service marketing - Text and Readings, Dryden press, Hidsdale
3. Philip Kotler and Paul N.Bloom, Marketing professional Services, Prentice hall, New Jersey.
4. Payne, the essence of Service Marketing, New Delhi, prentice Hall.
5. Helen Wood Ruffe, Services Marketing, Macmillan India, New Delhi.
6. Mary Ann pezzallo, Marketing Financial Services, Macmillan.
7. Dr.S.Gurusamy, Financial and Markets Vijay Nicole imprints private limited, Chennai.
8. Dr.B.Balaji, Services, Services Marketing and Management, S.Chand & Company Ltd., New Delhi.

SEMESTER IV

PAPER - 13

DIRECT TAXES

UNIT-I

Basic concepts - Definitions - Assesses - Assessment year - Previous Year - Income - Residential Status - Scope of Total Income - Exempted income - Agricultural income - Capital income and expenditure - Revenue Income and expenditure.

UNIT-II

Heads of Income - Income from Salaries - Income from House property - Income from Business or Profession - Depreciation.

UNIT-III

Income under the head capital gains - Income from other sources - Deductions from Gross Total Income.

UNIT-IV

Computation of Total Income - Individual - Firm - Companies - MAT - Tax Deducted at Source - Advance Tax - Interest payable - Set off and Carry forward of losses - PAN - Rates of Tax.

UNIT-V

Assessment Procedure - Income tax Authorities - Penalties - Assessment of Fringe Benefit Tax - An outline of Wealth Tax - Computation of Net wealth.

Note: The ratio between theory and problems shall be 40:60.

Reference Books

1. Jayakumar A. & C.Dhanapal - Income Tax Theory, Law and Practice – Learnetech Press, Trichy,
2. Gaur V.P & Narang K.L, Income Tax Law and Practice, Kalyani Publishers, New Delhi.
3. Dr. Vinod Sighania, Direct Taxes, Tax Man Publications, New Delhi.
4. Dinkar Pagare, Income Tax Law and Practice, Sultan Chand & Sons, New Delhi.

PAPER - 14

INVESTMENT MANAGEMENT

UNIT-I

Properties of financial assets - Financial Markets - Investments - Types - Characteristics - Objectives - Types of investors - Investment vs. Gambling, Speculation, Speculation Vs. Gambling.

UNIT-II

Nature and Scope of Security Analysis - Concept of Risk and Return - Measurement of Risk

UNIT-III

Fundamental analysis-Economic analysis, Industry Analysis and company Analysis-Technical analysis- Trend indications- Indices and moving average applied in technical analysis.

UNIT-IV

Valuation of Securities - Equity shares - Preference shares - Debentures - Bonds

UNIT-V

Efficient market Hypothesis - Random Walk Theory - Markowitz Theory - Sharpe's optimization solution - Dow Theory - CAPM model - SML, CML.

Note: Only theory questions.

Reference Books

1. Dr.Raganatham m & Madhumathi R. Investment analysis 7 Portfolio management. Person Education, New Delhi.
2. Dr.Bhalla V.K.Investment Management, S.Chand and Company, New Delhi.
3. Fisher & Jordan, Security analysis and portfolio management, Prentice Hall of India, New Delhi.
4. Sharpe, William and Gordon, Investments – Prentice hall of India, New Delhi.
5. Rustagi R.P, Investments Analysis and Portfolio management, Sultan Chand & Sons, New Delhi

PAPER - 15

PROJECT DEVELOPMENT

UNIT-I: PROJECT

Meaning and overview - Project Development Cycle - Capital Expenditure Decisions - Importance and Difficulties.

UNIT-II : PROJECT APPRAISAL

Aspects of Appraisal - Market Appraisal - Technical Appraisal - Financial Appraisal - Economic Appraisal. Project formulation. Feasibility Report.

UNIT-III : PROJECT COST AND MEANS OF FINANCE

Project cost - Social Cost and Social Benefit. Term Loans - Loans from Development banks - Assistance from Indian finance Corporations and international finance Corporations. External commercial borrowing.

UNIT-IV : PROJECT SELECTION

Selection of a suitable project - Programming - scheduling and Controlling Mechanism.

UNIT-V : PROJECT CONTROL

Time and cost control - Budgetary control - corrective and preventive actions. Risk Management functions.

References Books

1. Prasanna Chandra, Projects - Preparation, Appraisal, Budgeting and Implementation, 3rd ed. Tata McGraw- Hill Publishing Company Limited, New Delhi.
2. Dr. Gupta, C.B. & Dr. Srinivasan, N.P. Entrepreneurial Development, Sultan Chand & sons, New Delhi.
3. Bryce, M.D. Industrial Development: A Guide for Accelerating Economic Growth, McGraw- Hill, 1960 New York.
4. Varma, M.L. Foreign Trade Management in India, Vikas Publishing House, 1993, New Delhi.
5. Jeevanandam, C. Foreign Exchange, Sultan Chand & sons, 1994, New Delhi.

PAPER - 16

MARKETING RESEARCH

Objectives

The aim of the subject is to impart knowledge to the students on Market Research and the method of conducting such research.

UNIT-I

Marketing research-Nature, Scope and importance-Research proposal- Steps in marketing research.

UNIT-II

Research design- Exploratory research-Descriptive research-survey research.

UNIT-III

Data collection-Secondary data- primary data-types, merits and Limitations-Methods of collection- Processing of collected data-Management Information System.

UNIT-IV

Ethics in marketing research-Treatment of respondents, buyer and Researchers-International code of marketing research practice.

UNIT-V

Application of marketing research-product research-motivation Research-presentation of research project - Future of Marketing Research in India.

Reference Books

1. Philip Kotler-Marketing Management and Control-Asian perspectives-Prentice Hall of India1999 (The Millennium Edition).
2. Boyd Harper W. and Ralph Westfall-marketing research-text and cases-Richard D. Irwin Inc. Indian Edition.
3. Schreir Fredric T. Modern Marketing research, World wide publishing company.Inc.
4. Dr.D.D Sharma - Marketing research-Sulthan Chand &Sons, New Delhi.
5. Donald Tull and Deli Hawkins, Marketing research, Macmillan.

ELECTIVE

PAPER - 4

A. BUSINESS ENVIRONMENT AND POLICY

UNIT-I

Business Environment**:** Cultural, social, political, technological, economic and legal environment - scanning - techniques of environmental forecasting - SWOT - Internal environment - their impact on policy formulation.

UNIT-II

Economic reforms in India - Liberalization - privatization and globalization - Competitive Strength of Indian industry - Impact of liberalization policy on different sectors - Foreign Investments policy in India.

UNIT-III

Multi-national corporations - Their participation in India - Their strategies, competitive strengths policies and performance.

UNIT-IV

Business policy and corporate strategy: Policies; Strategies and Tactics; Policies and procedures - Corporate strategy: alternatives - variations - Strategic choice, implementation.

UNIT-V

Business ethics and social responsibilities - relationship between business and society - Corporate power social accountability - Ethical issues and values in business - Corporate Social policies - issues and challenges - Ecological and environmental issues.

Reference Books

1. Wheelen, Concepts of Strategic Management and Business policy, 8th Ed. Pearson Education, New Delhi, 2002.
2. William Gluck & L R Jauch, Business Policy & Strategic Management,McGraw-Hill 2001.
3. Kazhmi Azhar , Business Policy, TMH,2002.
4. Gupta, Liberalisation - its impact on Indian Economy, Macmillan, 2002.

B. INTRODUCTION TO INFORMATION TECHNOLOGY

UNIT-I : INFORMATION TECHNOLOGY

Meaning - Definition - Types of Information System - Computer net works: Goals and uses of networks. Network Hardware and Software - Types of Networks - Protocols - Knowledge Management.

UNIT-II : ELECTRONIC BUSINESS

Computers - Internet business - Definition - Online Business - E.Business Categories - preparing to online business - Ethics of information technology. E. Business Applications - Business to Business (B2B) - Business to Customers (B2C) - Electronic Shopping.

UNIT-III : PAYMENT SYSTEM

Paying in the net: The Payment Business - Post-paid System - Instant-paid payment System - Pre-paid Payments System. The Open source Projects - Introduction to open hardware.

UNIT-IV : STORAGE AND DATA BASE

Foundation for interactivity - Multimedia and Knowledge storage Capacity - Compression and Decompression. Secondary Storage Devices Diskettes - Hard disks - Optical Disks - Magnetic tape.

UNIT-V : DATA BASE MANAGEMENT SYSTEM (DBMS)

Introduction to data base approach - objectives of data base and data base languages - Ethics of using Databases - Concerns about accuracy and privacy.

Reference Books

1. Saily Chan, Electronic Commerce Management, John Wiley, 1998.
2. Neil Randall, The Internet in a Wee, 2nd Edn. Prentice Hall of India, New Delhi.
3. Marilyn Greenstein and Todd M. Fein Mann, Electronic Commerce, Security, Risk Management, Irwin McGraw Hill, 2000.
4. David Kosiur, understanding Electronic Commerce, Addison Wesley, 1996.

C. SALES AND ADVERTISING MANAGEMENT

UNIT-I

Sales management-Meaning and Scope-Functions Sales and Planning-Sales policy-Sales organization-Sales Territories-Sales Quota-Selling process-Responsibilities of Sales manager

UNIT-II

Need for sales force- Recruitment and Selection of sales force-Training of salesmen-Qualities of a Good salesman

UNIT-III

Advertising-Scope and Function- Need for Advertising classification-Advertisement Planning and Organization-Ethical Issues in Advertising

UNIT-IV

Advertising Media- Role of Media-Types of Media-Merits and Demerits- Media Research- Evaluation and Effectiveness of Advertising.

UNIT-V

The Advertising budget-Advertising Agencies- Types of Legal framework of advertising-Self regulation of Advertising.

Reference Books

1. Ramasamy : V S Marketing Management, Macmillan
2. Davar: Salesmanship and Advertising
3. Pillai and Bagavathi: Salesmanship.
4. Richard R Still and Edward W Gundiff- Sales management- Prentice Hall

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THIRUVALLUVAR UNIVERSITY

MASTER OF SCIENCE

DEGREE COURSE

M.Sc. APPLIED MICROBIOLOGY

UNDER CBCS

(with effect from 2017-2018)

The Course of Study and the Scheme of Examinations

S.NO.	Study Components / Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
	SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	MAIN	Paper-1	5	5	General Microbiology and Microbial Physiology	25	75	100
2	MAIN	Paper-2	5	5	Food, Agriculture and Environmental Microbiology	25	75	100
3	MAIN	Paper-3	5	5	Immunotechnology	25	75	100
4	MAIN	Paper-4	4	4	Human anatomy and physiology	25	75	100
5	MAIN PRACTICAL	Paper-1	4	0	(Subjects covering Paper 1, 2 and 3)	-	-	-
6	MAIN PRACTICAL	Paper-2	4	0	(Subjects covering Paper 4, 5 and 6)	-	-	-
7	ELECTIVE	Paper-1	3	3	(to choose 1 out of 3) A. Biofertilizer Technology B. Fundamentals in Biology C. Microbial Biotechnology	25	75	100
			30	**18**		**125**	**375**	**500**
	SEMESTER II					**CIA**	**Uni. Exam**	**Total**
8	MAIN	Paper-5	5	5	Medical Microbiology	25	75	100
9	MAIN	Paper-6	5	4	Microbial Pharmacology	25	75	100
10	MAIN	Paper-7	5	4	Bioinformatics and Biostatistics	25	75	100
11	MAIN PRACTICAL	Paper-1	5	5	(Subjects covering Paper 1, 2 and 3)	25	75	100
12	MAIN PRACTICAL	Paper-2	5	5	(Subjects covering Paper 4, 5 and 6)	25	75	100

13	**Compulsory Paper**		2	2	**Human Rights**	25	75	100
14	ELECTIVE	Paper-2	3	3	(to choose 1 out of 3) A. Food analysis and quality control B. Genetic Engineering C. Microbial Bio nanotechnology	25	75	100
			30	**28**		**175**	**525**	**700**
SEMESTER III						**CIA**	**Uni. Exam**	**Total**
15	MAIN	Paper-8	6	5	Microbial Genetics and Molecular Biology	25	75	100
16	MAIN	Paper-9	6	5	Recombinant DNA Technology	25	75	100
17	MAIN	Paper-10	5	5	Industrial Biotechnology	25	75	100
18	MAIN PRACTICAL	Paper-3	5	-	(subjects covering Paper 7, 8 and 9)	-	-	-
19	MAIN PRACTICAL	Paper-4	5	-	(subjects covering Paper 10)	-	-	-
20	ELECTIVE	Paper-3	3	3	(to choose 1 out of 3) A. Biological Techniques B. Herbal Technology C. Vaccine Biotechnology	25	75	100
			30	**18**		**100**	**300**	**400**
SEMESTER IV						**CIA**	**Uni. Exam**	**Total**
21	MAIN	Paper-11	6	4	Research Methodology	25	75	100
22	MAIN	Paper-12	5	5	Project / Dissertation with *viva voce*	50	150	200
23	MAIN PRACTICAL	Paper-3	5	5	(subjects covering Paper 7, 8 and 9)	25	75	100
24	MAIN PRACTICAL	Paper-4	5	5	(subjects covering Paper 10)	25	75	100
25	ELECTIVE	Paper-4	3	3	(to choose 1 out of 3) **A.** Bioremediation **B.** Marine Microbiology **C.** Clinic Microbiology	25	75	100
			30	**26**		**150**	**450**	**600**

Subject	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total marks**
MAIN	12	4-5	56	100	1300
MAIN PRACTICAL	4	5	20	400	400
ELECTIVE	4	3	12	100	400
COMPULSORY PAPER	1	2	2	100	100
Total	**21**	**-**	**90**	**-**	**2200**

THIRUVALLUVAR UNIVERSITY
M.Sc. APPLIED MICROBIOLOGY
SYLLABUS
UNDER CBCS
(with effect from 2017-2018)
SEMESTER I

PAPER – 1
GENERAL MICROBIOLOGY AND MICROBIAL PHYSIOLOGY

OBJECTIVES

To enable the students to understand the basic knowledge in Microbiology and Microbial diversity.

UNIT-I

Discovery of Microbial world. Controversy over spontaneous generation. Evolutions of Microbiology with its recent developments in Medicine. Modern trends in microbial taxonomy.

UNIT-II

Microscopy - Its principles and applications. Simple - Compound, Dark field, phase contrast, Fluorescent and Electron Microscopes - SEM, TEM. Principles, Operation and maintenance of autoclaves, Ovens, Centrifuges - refrigerated & ultra speed, calorimeters, spectrophotometers, lyophilizers, deep freezer. Staining methods - Gram, Acid Fast, metachromatic, granules, nuclear staining, capsule, silver impregnation, flagella and other special staining methods. Sterilization and disinfection methods and their quality control.

UNIT-III

Bacterial morphology, structure and characterization - cellular components of bacteria - sporulation and its mechanics - growth and nutrition - Nutritional requirements - Autotrophs, heterotrophs - enrichment culture - growth curve - Kinetics of Growth - Mathematical expression of exponential growth phase; Measurement of growth and growth yields - Batch Culture - Synchronous growth - Techniques of pure culture.

UNIT-IV

Classification of bacteria and salient features according to Bergey's manual of determinative Bacteriology. Microbial diversity in different ecosystems. Structure and function of viruses - classification of viruses - replication of viruses - bacteriophages, plant viruses- TMV, CMV, Alfalfa mosaic virus and animal viruses. Specialized somatic Structure and Classification of fungi. Reproduction in fungi - Life cycles of fungi. Structure and Classification of Algae - ultrastructure and life histories of microalgae belonging to various algal classes. Cyanobacteria.

UNIT-V

Basic concepts of metabolism. Carbohydrate metabolism - Glycolysis - HMD, TCA & ED and other pathways. Aerobic and anaerobic respirations - Generation of energy - substrate level and oxidation phosphorylation - Electron transport chain - Lipid metabolism - Beta oxidation - proteins - primary, secondary, tertiary and quaternary structures - Enzymes nomenclatures, classification and general properties - factors affecting enzyme synthesis and activities - Allosteric enzymes - photosynthesis - cyclic and non -cyclic photophosphorylation - Bioluminescence.

TEXT BOOKS:

1. Rajan. S and Selvi Christy (2015). Essentials of Microbiology, Anjanaa Book House Publishers, Chennai.

2. Ananthanarayan and Panikers (2013) Textbook Microbiology 9th edition, Universities Press (India) Private Ltd.

3. Chandar Sbekar, C.N. (2006). Manipal Manual of Physiology, CBS Publishers and distributors Pvt. Ltd., Chennai.

4. Rafi, M.D. (2014). Textbook of Biochemistry. 2nd edition, Universities Press (India) Private Ltd.

5. Channarayappa (2015). Molecular Biology, Universities Press (India) Private Ltd.

6. Dubey RC and Maheswari DK (2005). A text book of Microbiology, Revised Multicolour edition, S.Chand Publishers, New Delhi.

7. Purohit SS (2005). Microbiology - Fundamentals and Applications. Student Edition Publishers, Jodhpur.

8. Pelczar & Kreig (2006). Microbiology5th edition. Tata McGraw Hill, New Delhi

9. Powar & daginawala (2005). General Microbiology Vol.I & II 8th Edition, Himalaya Publishing House, Mumbai.

10. Salle, AJ (2001). Fundamentals & Principles of Bacteriology. 7th edition. Tata McGraw-Hill, Davis,

11. Chandar Sbekar, C.N. (2006). Manipal Manual of Physiology, CBS Publishers and distributors Pvt. Ltd., Chennai.

12. Pal, G.K and Pravathi Pal. (2016) A text book of Practical Physiology, 4th Edition Universities Press (India) Pvt Ltd,

REFERENCE BOOKS:

1. Delbecco, Eisen & Ginsburg (1990) Microbiology 5th Edition Harper & raw, New York

2. Gerhardt, Murray, Wood and Kreig 1994. Methods for General and Molecular Bacteriology, ASM Press, Washington.

3. Alexopoulus CJ and C W. Mims.(1993).Introductory Mycology (3rd edition) Wiley Eastern Ltd, New Delhi.

4. Elizabeth Moore-Landecker. (1996). Fundamentals of the fungi. (4th edition). Prentice Hall International, Inc, London.

5. Conrat HF, Kimball PC and Levy JA. (1988). Virology. II edition. Prentice Hall, Englewood Cliff, New Jersey.

6. Roger Hull (2002). Mathews' Plant Virology. (4thEdition).Academic press-A Harcourt Science and technology company, New York.

7. Nelson D.L. and Cox, M.M. (2001). Lehninger Principles of Biochemistry, 3rd edition, Mac Millan Eworth Publishers.

8. Raaman, N. 2006. Phytochemical Techniques. New India Publishing Agency, New Delhi

Stryer L (1995). Biochemistry. W.H. Freeman and Company.

9. Voet D. and Voet J (1995) Biochemistry, 2nd edition, John Wiley and Sons Inc.

PAPER-2

FOOD, AGRICULTURE AND ENVIRONMENTAL MICROBIOLOGY

OBJECTIVES

To enable students to understand the various microbes involved in food, agriculture and environment.

UNIT-I

Importance of studying food and dairy microbiology. Primary sources of microorganisms in foods. Factors influencing microbial growth in foods - extrinsic and intrinsic. Principles of food preservation - preservation methods - irradations - drying, heat processing, chilling and freezing, high pressure, modification of atmosphere and chemical preservatives. Nutritional value of fermented foods. SCP and their uses - contamination, preservation and spoilage of fruits vegetables, meat and poultry products.

UNIT-II

Microbiology of fermented milk - fermented milk products - Food sanitation in food manufacture and in the retail trade - Food control agencies and its regulations, HACCP Methods. Bacterial pathogens such as Brucella, Clostridium, Bacillus, E. coli, Listeria, Salmonella, Staphylococcus, Vibrio and Yersinia.

UNIT-III

Distribution of soil microorganisms in soil. Factors influencing the soil microflora - Role of microorganisms in soil fertility. Interactions among microorganisms, mutualisms, comensalism, competition, amensalism, parasitism, predation - Interactions between microbes and plants - rhizosphere, phyllosphere, mycorrhizae. Microbial interactions in animals-Rument microbiology - Microbial contribution to food digestion.

UNIT-IV

Biogeochemical - carbon cycle - role of microbes in carbon cycle - trophic relationships - mobilization and immobiilisation of carbon with rhizosphere. Nitrogen cycle - mechanism of biological nitrogen fixation - ammonification - nitrification - denitrificatioin and microorganisms involved in such processes. Phosphorous cycle - Sulphur cycle. Biofertilizer for sustainable agriculture *Rhizobium Azospirillium, Azotobacter,Azolla,* BGA -mass production methods - applications methods of biofertilizers - significance of biofertilizers.

UNIT-V

Air pollution - sources, major pollutants, adverse effect on living organisms -acid rain and its impact on ecosystem-gaseous emission - Green house effect -Global warming - Ozone layer depletion and its effect - Droplet neuclei -Aerosol - Assessment of air quality - Airbone disesases, their symptoms and preventive measures. Types of wastes, characterization of solid and liquid waste. Solid waste treatment - saccharification - pyrolysis - composting. Water pollution - sources and nature of pollutants in water - Sewage - industrial effluent - agrochemicals - Eutrophication - waterborne diseases. Potable water. Assessment of microbiological quality of water. Brief account on bioterrorism.

TEXT BOOKS:

1. Adams MR and Moss MO. (1995). Food Microbiology, The Royal Society of Chemistry, Cambridge.

2. Alexander M. (1977) Introduction to soil microbiology. John Wiley & Sons, Inc., New York.

3. Rajan. S and Selvi Christy (2015). Essentials of Microbiology, Anjanaa Book House Publishers, Chennai.

4. Andrews AT, Varley J. (1994) Biochemistry of milk products. Royal Society of Chemistry.

5. Banwart GJ. (1989), Basic food microbiology, Chapman & Hall, New York.

6. Ec Eldowney S, Hardman DJ, Waite DJ, Waite S. (1993). Pollution: Ecology and Biotreatment – Longman Scientific Technical.

7. Frazier WC and Westhoff DC. (1988) Food microbiology, TATA McGraw Hill Publishing Company Ltd. New Delhi.

8. Grant WD, Long PL. (1981) Environmental Microbiology. Blackie Glasgow and London.

9. Hobbs BC and Roberts D. (1993) Food poisoning and food hygiene, Edward Arnold (A division of Hodder and Stoughton), London.

10. Jay JM. (1987) Modern food microbiology, CBS Publishers and distributors, New Delhi.

11. Robinson RK. (1990) The microbiology of milk. Elsevier Applied Science, London.

12. Robinson RK. (1990) Dairy Microbiology, Elsevier Applied Science, London.

13. Rogers JE and Writman WB (1991) Microbial production and consumption and green house gases: Methane: Nitrogen oxides and Halomethanes. American Society for Microbiology, Washington DC.

14. Dirk J, Elas V, Trevors JT, Wellington, EMH (1997) Modern Soil Microbiology, Marcel Dekker INC, New York.

15. Ramanathan, and Muthukaruppan SM (2005) Environmental Microbiology. Om Sakthi Pathipagam, Annamalai Nagar.

PAPER-3
IMMUNOTECHNOLOGY

OBJECTIVES

To enable the students to understand the immunity and immune system.

UNIT-I

Introduction: Infection, immunity, types of immunity - innate and adaptive, phagocytosis and extracellular killing, immunity to specific infection, milestones in immunology - evolution of immunology.

Immune Systems: Anatomy of the lympho - reticular system, primary lymphoid organs - bone marrow & thymus, Secondary lymphoid tissues - spleen, lymph nodes & gut associated lymphoid tissue, immuno reactive cells - T and B lymphocytes, macrophages, granulocyte and NK cells.

UNIT-II

Antigens and Immunogenicity: Terminologies and definitions - antigen, immunogen, haptens, superantigens, tolerogen, epitope, paratope and antigenic determinants. Features associated with antigenicity and immunogenicity. Basis of antigen specificity.

Antigen receptors: Cell surface proteins of Major Histocompatibility Complex (MHC): types, - class I, II and III distribution and function, MHC in relation to transplantation and HLA typing. T cell receptor complex (TCR).

UNIT-III

Antibodies - B cell receptors. Three dimensional structure of immunoglobulin molecule - Types of immunoglobulins. Biological and chemical properties of immunoglobulin. Antigen, antibody attraction - forces, affinity, avidity and specificity. Monoclonal antibody production - Hybridoma technology.

Complement system: Basics of complement protein - different pathways of complement activation - the pathway of membrane attack (common pathway), classical and alternate.

UNIT-IV

Acquired immune response: Humoral immune response - various phases of humoral immune response. Cell mediated immune response - cell mediated cytotoxicity, delayed type hypersensitivity.

Immune regulation: Immune response - various events in induction of immune response. Means of immunosuppression - physical, chemical and biological. Tolerance - auto and acquired. Immunopotentiation - specific and non specific potentiations (adjuvants). Cytokines, Lymphokines and Chemokines.

UNIT-V

Prophylaxis: Vaccines - heat killed, attenuated, rDNA vaccine, synthetic peptide vaccine, plasma derived vaccine, anti - idiotypic vaccine and DNA vaccine. Active immunization - vaccines & toxoids – bacterial and viral. Passive immunization - antitoxins, immuno-globulin, specific immuno-globulin, hyper immuno-gamma globulin. Immuno Pathology - A brief account: Immunology of infectious diseases. Immunodeficiency disorders - primary and secondary. Autoimmune diseases.

TEXT BOOKS:

1. Sudha Gangal and Shubhangi Sontakke (2013) Textbook of Basic and Clinical Immunology, Universities Press (India) Private Ltd.
2. Ajoy Paul (2016). Text Book of Immunology, Books and Allied (P) Ltd, Kolkatha.
3. Ananthanarayan and Panikers (2013) Textbook Microbiology 9th edition, Universities Press (India) Private Ltd.
4. Chapel H and Halbey M (1986) Essentials of Clinical Immunology, ELBS.
5. Donal M. Weir, John Steward. (1993). Immunology VII edition. ELBS, London
6. Ivan M. Roit. (1994) Essential Immunology - Blackwell Scientific Publications, Oxford.

REFERENCE BOOKS

1. Jacqucline S, Williams and Wilkins A. (1998) Basic Immunology - Warerly Company.
2. Janeway Travers. (1997). Immuno biology - The immuno system in health and Disease. 3rd edition Current Biology Ltd., London, New York.
3. Lydyard P, Whelan A and Fanzer MW (2000) Instant notes in Immunology, Edited By Hames BD, Viva Books Private Ltd.
4. Mark Reakman Diego Vergani. Basic and clinical immunology, Longman Asia Ltd., Hong kong.
5. Paul (1998) Fundamental Immunology. III Edition.
6. Peter J. Delves, Ivan M. Roit (eds) (1998) Academic Press - Encyclopedia of Immunology - 2nd edition.
7. Richard M. Hyde. (1995). Immunology III edition. National Medical series, Williams and Wilkins, Harward Publishing Company.
8. Clark WR (1991). The experimental foundations of modern immunology, John Wiley and Sons Inc. New York.

PAPER-4

HUMAN ANATOMY AND PHYSIOLOGY

OBJECTIVES

To enable the students to understand the importance of human anatomy

UNIT-I: Respiratory System (RS) and Special Sensory Organs (SSS)

Introduction to applied human anatomy and physiology.

Respiratory System (RS): Different organs of the Respiratory System. Functions of the different organs of the Respiratory System.

Special Sensory Organs (SSS): Introduction to special sensory organs. Function and functions of eye, ear, nose, tongue, and skin.

UNIT-II: Gastro Intestinal (GI) System and Lympho-reticular System (LRS)

Gastro Intestinal (GI) System: Different organs associated with the Gastro Intestinal system: (Salivary glands, Pancreas, Liver and Gall bladder and others).

Lympho-reticular System (LRS): Different organs of LRS (Lymph, Lymphatic vessels and Lymph nodes), Functions of the different organs of Lympho-reticular system.

UNIT-III: Musculoskeletal System (MSS), Skin and Nervous System (NS)

Musculoskeletal System (MSS) and Skin: Introduction of musculo-skeleton system. Different parts of involved in skeleton system. Function of muscular system. Parts and function of skin.

Nervous System (NS): Introduction to nervous system. Central nervous system (CNS) and peripheral nervous system PNS and related to infection

UNIT-IV: Circulatory System (CS) and Endocrine System (ES)

Circulatory System (CS): Blood: Site of formation, composition, functions of blood cells, Different parts of the circulatory system and its function.

Endocrine System (ES): Introduction to endocrine system, Different organs and Functions of endocrine system.

UNIT-V: Reproductive System (RS) and Urinary System (US)

Reproductive System (RS): Introduction Male reproductive system – physiological anatomy, spermatogenesis and its regulation, testicular hormones, composition of semen Female reproductive system – menstrual cycle, pregnancy and parturition, lactation and family planning.

Urinary System (US): Different organs and Functions of Urinary System. Mechanism of urine formation and composition of urine.

TEXT BOOKS:

1. Sampath Madhyastha, (2016) Manipal Manual of Anatomy, 3rd Edition, CBS Publishers and Distributors Pvt Ltd. Chennai.
2. Chandar Sbekar, C.N. (2006). Manipal Manual of Physiology, CBS Publishers and distributors Pvt Ltd., Chennai.
3. Chaurasia, B.D, (2005) Handbook of Human anatomy 3rd Edition, CBS Publishers and Distributors Pvt Ltd. Chennai.
4. Human physiology, 2nd edition- BJ Mejer, HS Meij, AC Meyer, AITBs publishers abd distributers.

REFERENCES BOOKS:

1. Srivastava, (2013), Text book of Anatomy, Books and Allied (P) Ltd, Kolkatha.
2. Suresh.R, (2012), Essentials of Human Physiology, Books and Allied (P) Ltd, Kolkatha.
3. Asis Das (2006), Medical Physiology, Books and Allied (P) Ltd, Kolkatha.
4. Cell physiology by Giese, 5th edition, W.B Saunders Company, Tokyo, Japan.
5. A text book of animal physiology, KA Goel, KV Sastri, Rastogi publications Meerut.
6. Animal physiology and Biochemistry- RA Agarval, Anil. K, Srivastava, Kausshal Kumar, S. Chand & Co.
7. A Hand Book of Basic Human physiology- K. Saradha subramanyam, S. Chand & Co., Ltd.
8. Guide to physiology- Y. Rajakshmi, S. Chand & Co., Ltd. Cathleen JW Wilson OBE Anne Wangh: Anatomy and physiology in Health and illness. Churchill Livingstone Publication, UK, NK, 1996.
9. Waugh A., Grant, A Ross and Wilson's Anatomy and Physiology in Health and Illness, 9th Edition, Churchill Livingston, London.2001.
10. Guyton AC and Hall JE. Guyton Human Physiology and Mechanisms of Disease. Hartcourt Publishers, Limited, 1996.
11. Williams PL (Ed). Gray' anatomy, Churchill Livingstone, London.

ELECTIVE
PAPER-1
(to choose 1 out of 3)
BIOFERTILIZER TECHNOLOGY

OBJECTIVES

To make the students to understand the microorganisms as potential biofertilizer, the technology of inoculums production and to make the students entrepreneurs.

UNIT-I

Introduction to biofertilizers - Structure and characteristic features of the following biofertilizer organisms: Bacteria: *Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium* and *Frankia.* Cyanobacteria: *Anabaena, Nostoc, Hapalosiphon*. Fungi: *Glomus, Gigaspora, Sclerocystis, Amanita, Laccaria*.

UNIT-II

Biofertilization processes - Decomposition of organic matter and soil fertility and vermicomposting. Mechanism of phosphate solubilization and phosphate mobilization. Nitrogen fixation - Free living and symbiotic nitrogen fixation. Biotechnological application in nitrogen fixation.

UNIT-III

Nitrogenous Biofertilizers I: Bacteria - Isolation and purification of *Azospirillum* and *Azotobacter*, mass multiplication of *Azospirillum* and *Azotobacter*, formulation of inoculum of *Azospirillum* and *Azotobacter*, application of inoculants of *Azospirillum* and *Azotobacter*. Isolation and purification of *Rhizobium*, mass multiplication and inoculum production of *Rhizobium*, Methods of application of *Rhizobium* inoculants.

UNIT-IV

Isolation and purification of Cyanobacteria. Mass multiplication of cyanobacterial bioinoculants - Trough or Tank method, Pit method, Field method; methods of application of cyanobacterial inoculum. *Azolla* - mass cultivation and application in rice fields.

UNIT-V

Mycorrhizae - Ecto and endomycorrhizae and their importance in agriculture. Isolation of AM fungi - Wet sieving method and sucrose gradient method. Mass production of AM inoculants and field applications. Isolation and Purification of phosphate solubilizers. Mass multiplication and field applications of phosphate solubilizer (*Pseudomonas striata*). Biofertilizers - Storage, shelf life, quality control and marketing.

TEXT BOOKS:

1. Bagyaraj, D.J. and A. Manjunath. 1990. Mycorrhizal symbiosis and plant growth, Univ. of Agricultural Sciences, Bangalore, India.

2. Purohit, S.S., P.R. Kothari and S.K. Mathur, 1993. Basic and Agricultural Biotechnology, Agro Botanical Pub. India.

3. Subba Rao, N. S. 1988. Biological nitrogen fixation: recent developments, Mohan Primlani for Oxford and IBH Pub. Co. (P) Ltd., India.

4. Subba Rao, N.S., G.S. Venkataraman and S. Kannaiyan 1993. Biological nitrogen fixation, ICAR Pub., New Delhi.

5. Somani, L.L., S.C. Bhandari, K.K. Vyas and S.N. Saxena. 1990. Biofertilizers, Scientific Publishers - Jodhpur.

6. Tilak, K.V.B. 1991. Bacterial Biofertilizers, ICAR Pub., New Delhi.

PAPER-1
B. FUNDAMENTALS IN BIOLOGY

OBJECTIVES

Students completing this paper should be able to understand concepts of fundamentals in biology.

UNIT-I

Biology of cells: Cells as a unit of life, structure of prokaryotic and eukaryotic cells. An overview of organelles (Mitochondria, chloroplasts, ER, Golgi, ribosomes, lysosomes and peroxysomes, nucleus and nucleolus). Differences and similarities in plant and animal cells. Cellular membrane: structure, transport, channels, carriers, receptors, endocytosis, membrane potentials.

UNIT-II

DNA replication; Transcription and Translation.

Cell-cell interactions and signal transductions: Intercellular junctions, signaling by hormones and neurotransmitters; receptors, G-proteins, protein kinases and second messengers. Protein traffic in cells.

UNIT-III

Cell Cycle and regulation - Mitosis, Meiosis.

Mutation - Types of mutations, types of mutagenic agents and their molecular mechanism; DNA repair; Chromosomal types and structure; Mechanism by which genome undergoes changes, recombination, mutation, inversion, duplication, and transposition.

UNIT-IV

Molecules of Life: Introduction to carbohydrates-Monosaccharide and their derivatives, Disaccharides, Polysaccharides.

Proteins - Structure of amino acids, Different levels of organization-Primary, secondary tertiary and quaternary structures.

Nucleic acids - Purines, pyrimidines, Nucleosides and Nucleotides, Different structural form of DNA, denaturation and renaturation of DNA

Lipids-Structure and function of Fatty acids, Triacylglycerols, sphingolipids, steroids and glycerophospholipids.

Water, small molecules-Alkaloids, glycosides, phenols, oligopeptides, Flavonoids, and terpenoids.

UNIT-V

Enzymes: Units of Activity,coenzymes and metal cofactors, temperature and pH effects, Michaelis - Menten kinetics, inhibitors and activators, active site and mechanism of enzyme action, Isoenzymes, allosteric enzymes.

Metabolism of glucose: glycolysis, TCA cycle, glycogenesis, glycogenolysis and gluconeogenesis, pentophosphate shunt, ETC. Digestion of protein and protein metabolism, nitrogen balance: transamination, oxidative deamination and urea cycle. Lipid metabolism: beta oxidation. Interconnection of pathways, metabolic regulations.

TEXT BOOKS:

1. Rafi, M.D. 2014. Textbook of Biochemistry. 2nd edition, Universities Press (India) Private Ltd.

2. Channarayappa 2010. Cell Biology, Universities Press (India) Private Ltd.

3. Ajoy Paul (2007). Textbook of Cell and Molecular Biology, Books and Allied (P) Ltd, Kolkatha.

4. Lehninger, A. L. 1984. Principles of Biochemistry. CBS publishers and distributors, New Delhi, India

5. Horton, Moran, Ochs, Rawn, Scrimgeour Principles of Biochemistry Prentice Hall Publishers.

6. David. E. Sadava Cell Biology: Organelle Structure and Function Jones & Bartlett publishers.

7. Shanmughavel, P. 2005. Principles of Bioinformatics, Pointer Publishers, Jaipur, India.

PAPER-1
C. MICROBIAL BIOTECHNOLOGY

OBJECTIVES

To enable the students to understand the basic knowledge in Microbial Biotechnology

UNIT-I

Definition, Concepts - biotechnological potentials of microalgae - food - feed - Colourant - fuel and pharmaceutically valuable compounds.

UNIT-II

Production of microbial biofertilizers - Mass cultivation of cyanobacteria (Spirullina), Azolla and other N2 fixers (*Azospirillum, Azatobacter & Rhizobium*)

UNIT-III

Basic principle - antagonism, amensalism, parasitism, nematophagy. Microbial herbicides, microbial insecticides - bacterial insecticide Pseudomonas, Bacillus sp. - Bacillus thuringiensis - toxins - BT cotton - viral insecticide - entomopathogenic fungi.

UNIT-IV

Production microbial products - malt beverages - alcohol - vinegar - lactic acid- citric acid- penicillin - streptomycin- L-lysine- L-glutamic acid - protease - lipase - pectinase and riboflavin.

UNIT-V

Microbes in abatement of heavy metal pollution - heavy metal tolerant microbes - Mechanism of heavy metal and antibiotic resistance - role of biosorption - biotransformation of Xenobiotics - Superbug - rDNA application. Biodegradation of oil and petroleum products. Microbial leaching - Copper - Uranium.

TEXT BOOKS:

1. Satyanarayana.U (2005) Biotechnology, Books and Allied (P) Ltd, Kolkatha.
2. Raledge C and Kristiansen B Eds (2001). Basic Biotechnology, 2nd edition, Cambridge University Press.
3. Balasubramanian D, Bryce CFA, Dharmalingam K, Green J, Jayaraman K. (1996). Concepts in Biotechnology University Press, India.
4. Borowitzka MA, Borowitzka LJ (1989). Microalgal Biotechnology, Cambridge University Press.
5. Alan T. Bull. Microbial Diversity and Bioprospecting. ASM press. Washington, D.C Gerbardt P, Murray RG, Wood WA, Kreig NR. (1994) Methods for General and Molecular Bacteriology - American Society for Microbiology Washington D.C.
6. Glazer AN, Nikaido H. (1994) Microbial Biotechnology - Fundamentals of Applied Microbiology WH Freeman and Company, New York.
7. Pnolella P (1998) Introduction to Molecular Biology, WCB Mc Graw Hill, Boston, Massacheutts.
8. Walsh G, Headon DR. (1994). Protein Biotechnology, John Wiley & Sons, New York.
9. Ellyn Daugherty (2008) Biotechnology, CBS publishers and distributors Pvt. Ltd., Chennai.
10. Arumugam, N. and Kumaresan, V. (2016) Fundamentals of Biotechnology, Saras Publication, Nagercoil.

SEMESTER II
PAPER-5
MEDICAL MICROBIOLOGY

OBJECTIVES

To create awareness of microbial diseases of human beings and causes and cures.

UNIT-I

Basics in Medical microbiology - Infectious diseases overview. Medically important microbes. Microbial diseases - sources, route of transmission. Pathogenesis - adhesion, invasion, host cell damage, release of pathogens. Microbial virulence and virulence factors - Signs and symptoms of microbial diseases. Treatment, Prevention and control of microbial infections. Immunity of microbial diseases.

UNIT-II

Diagnosis of microbial diseases - Collection, transport and preliminary processing of clinical pathogens. Clinical, microbiological, immunological and molecular diagnosis of microbial diseases. Modern methods of microbial diagnosis.

UNIT-III

Bacteriology - Characteristics, classification, pathogenesis, pathology, diagnosis, treatment, prevention and control of diseases caused by *Staphylococci, Streptococci, Bacillus, Clostridium, Corynebacterium, Escherichia, Salmonella, Shigella, Klebsiella, Proteus, Vibrio, Pseudomonas, Mycobacteria, Spirochaetes, Rickettsia*.

UNIT-IV

Virology - Structure, multiplication, classification and medical importance of DNA viruses - Pox, Herpes, Hepatitis, Adeno; RNA viruses - Picorna, Orthomyxo, Paramyxo, Rabdo and HIV virus. Viral vaccines and antiviral agents.

UNIT-V

Mycology - Human mycotic infections caused by Dermatophytes, *Histoplasma, Cryptococcus, Candida*, opportunistic mycoses. Mycotoxins. Parasitology - Medical importance of *Entamoeba, Giardia, Plasmodium, Taenia, Ascaris, Wucherhiria*. Laboratory techniques in parasitology.

TEXT BOOKS:

1. Ananthanarayan and Panikers (2013) Textbook Microbiology 9th edition, Universities Press (India) Private Ltd.

2. Balasubramanian, A. and Senthil kumar, P.K, (2017) Medical Microbiology. Darshan Publication, Rasipuram.

3. Rajesh P. Karyakarte and Ajit S. Damle. (2003). Medical Parasitology, Books and Allied (P) Ltd, Kolkatha.

4. Chaechter M. Medoff G. and Eisenstein BC. (1993) Mechanism of Microbial Diseases 2nd edition. Williams and Wilkins, Baltimore.

5. Collee, JG. Duguid JP, Fraser AG, Marimon BP. (1989) Mackie and Mc Cartney Practical Medical Microbiology, 13th Edition. Churchill Livingstone.

6. David Greenwood, Richard CD, Slack, John Forrest Peutherer. (1992) Medical Microbiology. 14th edition. ELBS with Churchill Livingstone.

REFERENCE BOOKS:

1. Hugo WB and Russell AD. (1989) Pharmaceutical Microbiology IV edition. Blackwell Scientific Publication, Oxford.

2. Joan Stokes E, Ridgway GL and Wren MWD. (1993). Clinical Microbiology, 7th edition. Edward Arnold. A division of Hodder and Stoughton.

3. Ronald M. Atlas. (1989) Microbiology. Fundamentals and Applications. II edition, Maxwell Macmillan international editions.

4. Topley & Wilsons's. (1990) Principles of Bacteriology, Virology and Immunity, VIII edition, Vol. III Bacterial Diseases, Edward Arnold, London.

PAPER-6

MICROBIAL PHARMACOLOGY

UNIT: I General principles of Microbial Pharmacology

Principles of pharmacokinetics and pharmacodynamics. Principles of toxicology and treatment of poisoning. Gene based therapy.

UNIT: II Systemic Pharmacology including recent advances of drug affecting:

Autonomic Nervous System- Neurohumoral transmission, Agonists and antagonist of cholinergic and adrenergic systems. Cardiovascular system- Cardiac electrophysiology, Drugs used in ischemic heart diseases, Hypertension C.C.F, Arrythmias and Hyperlipoproteineas. Renal- function, Physiology of urine formation. Diuretics and antidiuretics.

Central Nervous System- Neuro transmission in the central nervous system. General anaesthetics, Local anaesthetics, Sedatives and hypnotics, Antiepileptics, Analgesics- opioids non-opioids, Psychopharmacological agents, Drugs for CNS degenerative disorders and migrane.

UNIT: III Gastro Intestinal System- Drugs for peptic ulcer, Cathartics abd antidiarrhoeal agents, Emetics and antiemetics. Blood- Drugs affecting haemopoeitic system, Haematinics, coagulants, anticoagulants, fibrinolytics, antiplatelets. Autocoids- Histamine and antihistamine, 5-HT and its antagonists, Eicosanoides. Respiratory system - Drugs used for bronchial asthama and cough. Drugs affecting- uterine motility, Oxyocics and tocolytics. Heavy metals and chelating agents- Lead, mercury, iron, copper and arsenic. Drugs used for immunomodolation- Immunostimulants, Immunosuppresants.

UNIT: IV Hormones and Hormone Antagonists- Hypothalamic and pituitary hormones, Thyroid hormones and antithyroid drugs, Sex hormones and their antagonists, Adrenocorticosteroids and their antagonists, Antidiabetic drugs, Vit-D3. Chemotherapy of Microbial Diseases- Antimicrobial agents general considerations, Antimicrobial agents sulfonamides, Quinolones, β-lactum antibiotics, Aminoglycosides, Tetracyclines, chloramphenicol, Macrolide antibiotics, Miscellaneous antibiotics, Antimycobacterial agents, Antifungal agents, Antiviral agents, Antimalarial agents, Antiamoeibic agents, Antiprotozoal agents, Drugs for helminthiasis.

UNIT: V Chemotherapy of Neoplastic Diseases- Antihypertensives – Analgesics. Antiepileptics - Antiulcer drugs, antiinflammatory drugs, Principles and application of biostatics, Essential drug concepts, Drug addiction and drug abuse, important interactions and their mechanisms.

REFERENCE BOOKS:

1. Vyas, S.P. (2009). Theory and Practice in Novel Drug Delivery System, CBS publishers and distributors Pvt. Ltd., Chennai.
2. Text Book of The Therapeutics drugs and diseases management ED by Eric Harfindal, Dick R. Gourley.
3. Principles of drugs action by Glodstein, aranow and Kolman.
4. Herbal drug treatment by Agarwal.
5. Clinical pharmacology by D.R. Lawrence and P.N.Bennette.
6. The Pharmacology basis of Therapeutics by. Louis.S.Goodman and Alfred Gillman.
7. Handbook of experimental Pharmacology by S.K. Kulkarni, Vallabh Prakashan, Delhi.
8. ICH of technical requirements for registration of pharmaceutical for human use, ICH harmonized tripartite guidelines – guidelines for good clinical practice, E6, May 1996.
9. Good clinical practice – Guidelines for clinical trice on pharmaceutical products in India, central drugs standard control organization, New Delhi minister of health - 2001

PAPER-7
BIOINFORMATICS AND BIOSTATISTICS

OBJECTIVES

To enable the students to make use of the tools of bioinformatics and biostatistics to solve microbiological problems.

UNIT-I

Biology in the computer age - Computational Approaches to Biological questions.

Basics of computers - servers, workstations, operating systems, Unix, Linux. World Wide Web. Search engines, finding scientific articles - Pubmed - public biological databases.

UNIT-II

Sequence analysis - pairwise sequence comparison. Protein Data Bank, Swiss-prot, Genbank - sequence queries against biological databases - BLAST and FASTA - multifunctional tools for sequence analysis. Multiple sequence alignments, Phylogenetic alignment - profiles and motifs.

UNIT-III

Genomics and Proteomics - Sequencing genomes - sequence assembly - genome on the web - annotating and analysing genome sequences. Proteomics - biochemical pathway databases.

UNIT-IV

Predicting Protein structure and function from sequence - Determination of structure - feature detection - secondary structure prediction - predicting 3 D structure. Protein modelling.

UNIT-V

Biostatistics: Measures of Central tendency - mean (arithmetic, harmonic and geometric) median and mode; Correlation Co-efficient, Simple linear regression; basic idea of Significance Test, hypothesis tests, levels of significance, Student ‘t’, ‘Chi’ square and goodness of fit.

TEXT BOOKS:

1. Ruchi singh and Richa Sharma (2010). Bioinformatics Basics, Algorithms and Applications. Universities Press (India) Private Ltd.

2. Cynthia Gibas & Per Jambeck (2001). Developing Bioinformatics Computer Skills: Shroff Publishers & Distributors Pvt. Ltd (O'Reilly), Mumbai.

3. H.H. Rashidi & L.K Buehler (2002). Bioinformatics Basics: Applications in Biological Science and Medicine, CRC Press, London.

4. Des Higgins & Willie Taylor (2002). Bioinformatics: Sequence, structure and databanks, Oxford University Press.

5. Baxevanis A.D & Ouellette B.E.F (2001) Bioinformatics: A practical guide to the analysis of genes and proteins, Wiley Interscience - New York

6. Arora P.N & Malhon P.K (1996). Biostatistics Imalaya Publishing House, Mumbai.

7. Sokal & Rohif (1973). Introduction to Biostatistics, Toppan Co. Japan.

8. Stanton A & Clantz, Primer of Biostatistics - The McGraw Hill Inc., New York.

9. Chavali (2009). Bioinformatics and Bioprogramming in C. Universities Press (India) Private Ltd.

MAIN PRACTICAL
PAPER-1
(Subjects covering Paper 1, 2 and 3)

OBJECTIVES

To enable the students to get hands-on training on various aspects of general, food, agricultural and environmental microbiology and immunotechnology.

UNIT-I

1. Cleaning of glassware and sterilization.

2. Preparation and use of glassware cleaning solutions, sterilization.

3. Micrometry - counting and measurements.

4. Isolation of anaerobic and aerobic bacteria - cyanobacteria, actinomycetes and fungi.

5. Pure and axenic culture techniques - serial dilution - pour plate, spread plate, streak plate methods and stab culture techniques.

UNIT-II

1. Bacterial Staining methods - simple, Gram's, acid fast, flagella, capsule and spore.

2. Fungal Staining methods - Lacto-phenol cotton blue.

3. Motility of bacteria.

4. Determination of growth - growth curve - generation time - synchronous and asynchronous growth - estimation of growth - microscopic - plate - membrane filter - turbidometry - dry weight - wet weight - chlorophyll.

5. Study of virus infected plant samples

UNIT-III (Microbial Physiology)

Isolation and Colorimetric estimation of

Hands on:

1. Amino acids - ninhydrin method

2. Protein - Biuret method/Lowry's method

3. Carbohydrate reducing sugars - Anthrone method/Benedicts method.

Isolation and Colorimetric estimation of

Hands on:

1. DNA - Diphenylamine method

2. RNA - Orcinol method

3. Pigments (chlorophyll - carotenoids - phycobiliproteins)

(Human anatomy and physiology)

1. Absolute Eosinophil Count. Demonstration of ECG/Echo and its interpretation techniques. Demonstration of lymphoid organs. Determination of Erythrocyte Sedimentation Rate. Determination of Specific Gravity of Blood.

2. Hair perforation Test. Measurement of Pulse, BP. Preparation and Examination of Blood smear. Blood Sugar analysis. Study of different histological slides. Total Platelet count

UNIT-IV

1. Microbial analysis of food products - bacterial and fungal

2. Microbial spoilage of refrigerated food

3. Extracellular enzyme activities - cellulase, protease, lipase and phosphatase

4. Milk microbiology - direct microscopic count - standard plate count - reductase test (resazurin/methylene blue) - isolation of microbes from yoghurt, curd.

5. Quantification of microorganisms in air - solid and liquid impingement techniques

6. Microbial flora from different soil types and habitats - isolation of nitrogen fixing bacteria, cyanobacteria and phosphate solubilizing organisms- development of Winogradsky Column

7. Field trip to dairy, food industries, sewage treatment plants.

UNIT-V

1. Precipitation techniques
Hands on: Agar gel diffusion - Ouchterlony's method.
Theory: Single radial immunodiffusion - staining.
Counter immuno electrophoresis & Rocket Immuno Electrophoresis.
2. Agglutination techniques
Hands on: Blood grouping and Rh factor - Latex agglutination - RF & ASLO. Theory: Heme agglutination RPHA / IHA.

TEXT BOOKS:

1. Rajan. S and Selvi Christy (2015). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.

2. Ponmurugan, (2012) Experimental procedures in bioprocess technology, Anjanaa Book House Publishers, Chennai.

3. Aaronson S. (1970) Experimental Microbial Ecology, Academic Press, New York

4. Bhatia A (2000). Manual of Practical Immunology, Aruna Bhatia 1st Edition, Palani Paramount Publication

5. Benson H.J (1994). Microbiological Applications, WmC Brown Publishers, Oxford.

REFERENCE BOOKS:

1. Clesceri L.S, Greenberg A.E, Eaton AD. (1998) Standard methods for examination of water & waste water American Public Health Association.
2. Collins C.H, Lyne P.M, (1985). Microbiological methods. Butterworths, London.
3. Gerhardt P, Murray R.G, Wood W.A, Kreig, N.R. (ed) (1994). Methods of General and Molecular Bacteriology. American Society for Microbiology, Washington DC
4. Holt J.S, Kreig N.R, Sheath P.H.A, Williams S.T. (1994) Bergey's Manual of Determinative Bacteriology (9th ed.), Williams & Wilkins, Baltimore.
5. Hudson L and Henry FC (1999) Practical Immunology, 3rd edition, Blackwell Scientific Publishers, Oxford, London.
6. Miller L.E, Luke H.R, Peacock J.E and Tomar R.H (1990). Manual of Laboratory Immunology, 2nd edition, Lea and Febiger - London.
7. Official Methods of Analysis (1995), Arlington, Virginia, USA.

8. Patrick R. Murray. (editor chief) (1999) Manual of clinical microbiology, 7th edition, ASM Press, Washington D.C.

9. Prakash M., Arora, C.K. (1998) Pathological techniques - Anmol Publications Pvt. Ltd. N.D.

10. Rhodes P.M, Stanbury P.F. Applied Microbial Physiology - A practical approach. IRL Press, Oxford University Press, Oxford.

11. Talwar GP (ed). (1982) A handbook of Practical Immunology, Vikas Publishing House Pvt. Ltd.

12. Talwar GP (1983). Microscopic Immunoassays and Applications, Vikas International Students Edition, Vikas Publishing House Pvt. Ltd.

13. Tuffery AA (ed) (1996) Laboratory Animals - An Introduction, 2nd edition, John Wiley and Sons, New York.

14. Wilson K, Walker J. (1995) Practical Biochemistry Principles and Techniques, Cambridge University Press.

MAIN PRACTICAL
PAPER-2
(Subjects covering Paper 4, 5 and 6)

OBJECTIVES

To impart knowledge on microbial diseases, metabolism and hands on training on computer applications in biology.

UNIT-I (Medical Microbiology)

1. Collection and transport of pathological specimens for microbiological examinations.

2. Bacteriological methods: Microscopic examination - blood - feaces - pus - sputum - throat swab and nose swab - urine - body fluids

3. Isolation and identification of the pathogen - culture and biochemical tests.

UNIT-II (Medical Microbiology)

1. Mycological methods: Macroscopic observation - microscopic observation - culture

2. Identification of *Mucor, Rhizopus, Aspergillus, Penicillium, Candida, Trichophyton, Microsporum, Epidermophyton* - SDA/Corn Meal Agar - Slide culture method - Germ tube method - Sugar assimilation/fermentation tests. Examination of parasites in clinical specimens - ova/cyst in feaces.

UNIT-III (Medical Microbiology)

1. Clinical - observation: Theory: a) X ray chest 2) Mantoux test for Mycobacterium tuberculosis infection.

2. Haematology: Total count (TC): RBC and WBC, - Differential count (DC) - Haemoglobin level, - Bleeding time - Clotting time – ESR

3. Biochemical : Serum - SGOT, SGPT, cholestrol, creatinine bilirubin and protein. Urine - colour, turbidity, sugar, albumin, bile salt, - phenylketone urea, bence Jones protein, RBC, pus cells, pH, acidity and alkalinity.

UNIT-IV (Microbial Pharmacology)

Antimicrobial assay - sensitivity test - Stokes and Kirby Bauer methods - Disc diffusion - agar dilution - broth dilution - MBC/MIC. Quality control for antibiotics.

UNIT-V (Bioinformatics - Demonstration only)

1. Basics of computers - basic commands - file creation, copying, moving & deleting in Linux & Windows. Using email - Using browsers - search engines, - Pubmed.

2. Using biological databases - Swissprot - Protein Data Bank and Genbank.

3. Different types of sequence analysis queries in BLAST and FASTA.

4. Multiple sequence alignments and Phylogenetic alignments.

5. Protein structure prediction software.

6. Genomes and Proteomes available on the web and their use.

7. Statistical software available on the web and their use.

TEXT BOOKS:

1. Rajan. S (2013) Manual for medical lab technology, Anjanaa Book House Publishers, Chennai.

2. Rajan. S and Selvi Christy (2015). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.

3. Atlas RM (1993). Handbook of Microbiological Media, (ed) Parks L.C, CRC Press, London.

4. Balows A, Hansler Jr K.L, Isenberg H.D, Shalomy H.J (1991). Manual of Clinical Microbiology, American Society for Microbiology, Washington DC.

5. Boyer R (2001) Modern Experimental Biochemistry, 3rd edition: Benjamin / Cummings Publishing Company Inc.

6. Brawshaw L.J. (1988). Laboratory Immunology, Sandders College Publishing.

REFERENCE BOOKS:

1. Clark J.M Jr and Switzer RI (1977) Experimental Biochemistry, 2nd Edition. W.H. Freeman, San Francisco.
2. Gerhardt P, Murray R.G, Wood W.A and Kreig N.R. (ed) (1994) Methods for General and Molecular Bacteriology - American Society for Microbiology, Washington D.C.
3. Jayaraman J (1981). Laboratory manual in Biochemistry, New Age Int. Publishers, New Delhi.
4. Lorian V (1991) Antibiotics in Laboratory Medicine, 3rd edition, Williams and Wilkins, Baltimore.
5. Myers R.M, Koshi G (1982) Diagnostic procedures in medical microbiology. IELC Combodia Press.
6. Plummer D.T (1987) An introduction to Practical Biochemistry, 3rd edition, Tata McGraw Hill, New Delhi.
7. Switzer R.L and Garrity L.F (1999) Experimental Biochemistry, 3rd edition, WH Freeman and Co
8. Warton D.C and McCarthy R.E (1972) Experiments and Methods in Biochemistry. MacMillan, New York.
9. Wilson K and Walker J (2000) Practical Biochemistry Principles and Techniques, 5th Edition, Cambridge University Press.
10. Work T.S and Work E (1972) Laboratory Techniques in Biochemistry and Molecular Biology. Vol. 3 - North-Holland, Amsterdam
11. Ruchi singh and Richa Sharma (2010). Bioinformatics Basics, Algorithms and Applications. Universities Press (India) Private Ltd.
12. Pal, G.K and Pravathi Pal (2016), A text book of Practical Physiology, 4th Edition Universities Press (India) Pvt Ltd,

ELECTIVE
PAPER - 2
(to choose 1 out of 3)
A. FOOD ANALYSIS AND QUALITY CONTROL

OBJECTIVES: The paper focuses on physical, chemical, microbial and sensory analysis of food, concepts of quality control and quality management, national and international food loss and adulterants in various food products

UNIT-I

Sampling – Sampling techniques and preparation of food samples.

Techniques used in food analysis – Chromatography, Electrophoresis, Electrometric determinations, Refractometry and Polarimetry Spectrophotometry, Fluorimetry, Radio - active tracer techniques, Atomic absorption

UNIT-II

Physico chemical methods for food analysis - Moisture and Total solids, Carbohydrates, Proteins, Fats, Fiber, Ash and its types, Minerals, Vitamins. Enzymatic methods

Biological methods of food analysis - Standard plate count; Plate loop method; Spiral plate; Droplet technique; Dye reduction; Catalase test and ELISA. Testing of food for organisms such as *B. cereus, C. botulinum, E. coli, L. monocytogenes, S.aureus, Salmonella* and *Shigella.*

UNIT-III

Sensory assessment of food quality –Appearance of food, Flavor of food, Texture of food. Sensory Tests – Difference, Rating and Sensitivity tests. Types of panels, Testing area and schedule.

Quality control of following food products – Milk and milk products, Oils and Fats, Cereal grains and flours, Fruits and vegetable products, Canned foods, Egg and egg products, Meat and Meat products

UNIT-IV

Food quality management – Objectives, Importance and Functions of quality control. Total quality, management, Good manufacturing practices, seven principles of HACCP and codex in food. Quality control, methods of – a. raw materials, b. manufacturing process and c. finished products.

UNIT-V

Food Safety – Role of voluntary agencies and legal aspects of consumer protection. National and International food laws – PFA, FDA, BIS, AGMARK, Essential Commodity Act, Export (quality and inspection act, Consumer protection act), Nutritional labeling requirements of foods. Food adulteration.

INDUSTRIAL VISIT: Food and Pharmaceuticals Industry and Report.

TEXT BOOKS:

1. Yeshajahu Pomeranz and Clifton E. Meloan (1996), Food Analysis, CBS publishers and distributors Pvt. Ltd., Chennai.
2. Rajan. S and Selvi Christy (2010). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.
3. Adams, M.R and Moss M.O (1995) Food Microbiology, New Age International (p) Limited Publishers.
4. Ananthanarayanan R and CK Jayaram Panicker, 1994, Textbook of microbiology Orient Longman.
5. Chakraborty P 1995, A Text book of microbiology, New Central Book Agency Pvt Ltd. Calcutta.
6. Debnath, 2005, Tools & Techniques of Biotechnology, Pointer Publishers, Jaipur.
7. Frazier, W.C and Westhoff, D.C (1988). Food microbiology, 4th edition, Tata Mac Graw Hill, New Delhi.
8. Jacobs.M.B., 1999, Chemical Analysis of Food & Food Products, CBS Publiishers, New Delhi.
9. Jay.J.M, 1996, Modern Food Microbiology, CBS Publishers, New Delhi.
10. Nielsen, S.S, 2004, Introduction to chemical Analysis of foods, CBS Publishers, New Delhi.
11. Pomeranz.Y, Meloan.C.E, 1996, Food Analysis – Theory & Practice, CBS Publiushers, New Delhi.
12. Ranganna. S., 2001, Handbook of Analysis & Quality control for Fruit & Vegetable Products, Tata McGraw Hill, New Delhi.
13. Robinson R.K (1990) Dairy Microbiology, Elsevier Applied science, London.
14. Salle, A.J. (1992). Fundamental Principles of Bacteriology. 7th Edition, Mc. Graw Hill Publishing Co. Ltd., New York.

PAPER - 2
B. GENETIC ENGINEERING

OBJECTIVES

To enable the students to understand the basic knowledge in Genetic Engineering.

UNIT-I

Gene as a unit of mutation and recombination. Mutagenesis, mutations and mutants - biochemical basis of mutations, spontaneous and induced mutations, isolation of mutants, mutagenesis, reversion, suppression, genetic analysis of mutants. Recombination methods
- conjugation and transformation.

UNIT-II

Enzymes in Genetic Engineering - DNA Polymerase, Polynucleotide kinase, T4 DNA ligase, Nick translation system, Terminal deoxynucleotidyl transferase, Reverse transcriptase Restriction endonucleases Type I & II. Vectors - plasmid, bacteriophage and other viral vectors, cosmids, Ti plasmid, yeast artificial chromosome.

UNIT-III

Strategy of recombinant DNA technology; Gene library - Genomic library, cDNA library - Cloning strategies - Use of linkers, adoptors, homopolymer tails - Nucleic acid hybridization - Colony hybridization, plaque hybridization; Blotting techniques - Southern, Northern, Western and dot blotting.

UNIT-IV

PCR - principles, techniques and applications. Gene isolation, cloning and expression, DNA sequencing, oligonucleotide synthesis, Southern and Northern hybridization, FISH, RAPD, PCR-RFLP, STRR, LTRR. DNA fingerprinting and their applications for diagnosis of disease, site-directed mutagenesis, Gene silencing, Gene transfer technologies.

UNIT-V

DNA chips and microarray gene screen technology; site directed mutagenesis, transgenic animals and gene knockout techniques, cell culture based techniques Genetic diagnosis. Applications in medical field, biology, transgenic plants, transgenic animals, Recombinant vaccines development. Gene therapy; Molecular basis of genetic diseases, genetic counseling.

TEXT BOOKS:

1. Molecular biology and Microbial genetics (1994) David Frifielder, Stanely R. Maloy, 2nd edition Jones and Barlett Publishers.

2. Channarayappa (2015). Molecular Biology, Universities Press (India) Private Ltd.

3. Genetics by Peter J Russell (1997) 5th edition Benjamin-Cummings Publishing Company.

4. Molecular Biotechnology (2003) Bernard R. Glick and Jack J.Pasternak., 2nd edition by ASM press.

5. Gene Cloning and DNA analysis (2004) T.A.Brown 2nd edition. By ASM press.

REFERENCES BOOKS:

1. Ajoy Paul (2011). Text Book of Genetics- from Genes to Genomes, Books and Allied (P) Ltd, Kolkatha.

2. Principles of Gene Manipulation and Genomics (2006) Sandy Primrose. 7th Edition, Black Well Publishers.

PAPER - 2
C. MICROBIAL BIONANOTECHNOLOGY

OBJECTIVES

To enable the students to understand the basic knowledge in Microbial Bionanotechnology.

UNIT-I

History - bionanotechnology - concept and future prospects - application in Life Sciences. Terminologies - nanotechnology, bionanotechnology, nanomedicine, nanowires, quantum Dots, nanocomposite, nanoparticles.

UNIT- II

Molecular nanotechnology - nanomachines - collagen. Uses of nanoparticles - cancer therapy - manipulation of cell and biomolecules. Cytoskeleton and cell organelles. Types of nanoparticles production - physical, chemical and biological. Microbial synthesis of nanoparticles

UNIT-III

Nanoparticles - types, functions - Silver, Gold and Titanium. Physical and chemical properties of nanoparticles. Characterization of nanoparticles - UV-Vis spectroscopy, Electron Microscopy - HRTEM, SEM, AFM, EDS, XRD.

UNIT-IV

Uses of nanopartcles in biology: Drug delivery - protein mediated and nanoparticle mediated. Uses of nanoparticles in MRI, DNA and Protein Microarrays. Nanotechnology in health sectors. Toxicology in nanoparticles - Dosimetry.

UNIT-V

Advantages of nanoparticles - drug targeting, protein detection, MRI, development of green chemistry - commercial viability of nanoparticles. Disadvantages - health risk associated with nanoparticles, inadequate knowledge on nanoparticles research.

TEXT BOOKS:

1. Parthasarathy, B.K. (2007). Introduction to Nanotechnology, Isha Publication.

2. Elisabeth Papazoglou and Aravind Parthasarathy (2007). Bionanotechnology. Morgan & Claypool Publishers.

3. Bernd Rehm (2006). Microbial Bionanotechnology: Biological Self-assembly Systems and Biopolymer-based Nanostructures. Horizon Scientific Press.

4. David E. Reisner, Joseph D. Bronzino (2008). Bionanotechnology: Global Prospects. CRC Press.

5. Ehud Gazit (2006). Plenty of Room for Biology at the Bottom: An Introduction to Bionanotechnology. Imperial College Press.

SEMESTER III
PAPER-8
MICROBIAL GENETICS AND MOLECULAR BIOLOGY

OBJECTIVES

To enable the students to understand the basic and applied aspects of molecular biology and microbial genetics.

UNIT-I

Introduction to identification of Genetic Material (Griffith, Avery and Hershy and Chase Experiments). Gene as a unit of mutation and Recombination. Mutagenesis, Mutations and Mutants - Biochemical basis of Mutation, Spontaneous and induced mutations, Isolation of mutants, mutagenesis, reversion, suppression, genetic analysis of mutants.

UNIT-II

Gene Transfer Mechanisms - Transformation - competence cells, regulation, general process; Transduction - general and specialized; conjugation - Hfr, Triparental mating, self transmissible and mobilizable plasmids, pili.

UNIT-III

Biology of Plasmids - Extrachromosomal heredity - biology of bacterial plasmids, structure of the plasmids, F1,ColE1, pSC101 and Ti plasmids, - replication, control, partitioning, incompatibility and gene transfer.

UNIT-IV

Transposable genetic elements and Gene Mapping - Introduction - Discovery, insertion sequences, complex and compound transposons - T10, T5, and retroposon. Genetic mapping - Ecoli - Virus T4 phage – using r II system.

UNIT-V

Concept of gene and Gene regulation - Organization of gene in prokaryotes and Eukaryotes - Introduction, Operon concept, lac and Trp operons, promoters and repressors, regulation of gene expression - Transcriptional control - promoters, terminators, attenuators and anti terminators; Induction and repression; the lac operon - catabolite repression; Biosynthesis; trp operon - upstream activator sequences and enhancers, two component regulatory systems. Translational control - ribosome binding, codon usage, antisense RNA; post- translational modification (epigenetics).

TEXT BOOKS:

1. Antony JF, Griffiths, Gilbert WM, Lewontin RC and Miller JH (2002). Modern Genetic Analysis, Integrating Genes and Genomes, 2nd edition, WH Freeman and Company, New York.

2. Blackburn GM, Gait MJ. (1996). Nucleic acids in chemistry and biology. Oxford University press.

3. Friedberg EC, Walker GC, Siede W. (1995). DNA repair and mutagenesis. ASM press.

4. Malacinski GM and Freifelder D (1998) Essentials of Molecular Biology, 3rd edition, John and Bartlett Publishers.

5. Lewin B. (2000). Genes VII. Oxford University press

6. Maloy SR, Cronan Jr. JE, Freifelder D (1994). Microbial genetics. Jones and Bartlett publishers.

7. Singer M, Berg P. (1991). Genes and Genomes. University Science Books.

8. Stryer L. (2002). Biochemistry. 5th edition, W.H.Freeman and company.

REFERENCE BOOKS:

1. Watson JD, Hopkins NH, Roberts JW, Steitz JA, Weiner AM. (1998). Molecular biology of the gene, 4th edition, Benjamin/Cummings publishing company.

2. Ajoy Paul (2011). Text Book of Genetics- from Genes to Genomes, Books and Allied (P) Ltd, Kolkatha.

3. Basu. S.B and Hossain. M (2016), Principles of Genetics, Books and Allied (P) Ltd, Kolkatha.

PAPER-9
RECOMBINANT DNA TECHNOLOGY

UNIT-I

Basics of DNA cloning: Simple cloning and cloning using linkers and adaptors. Cloning into various kinds of vectors – plasmids, phages lambda and M13, phagemids, cosmids, BACs and YACs. Selection and screening of clones.

UNIT-II

Methods of DNA and protein analysis: Isolation and purification of DNA. Agarose, polyacrylamide and pulsed field gel electrophoresis of DNA. Southern and Northern Blotting. Radiolabelling probes. RFLP analysis. DNA fingerprinting and its application in forensic sciences. Native PAGE, SDS-PAGE and two-dimensional PAGE analysis of proteins. Blotting techniques.

UNIT-III

Polymerase Chain Reaction: Concept of PCR and various thermophilic enzymes used in PCR. Gradient PCR versus Touchdown PCR. Designing primers. Cloning PCR products. Differential Display PCR, RAPD fingerprinting of micro-organisms, Overlap PCR, Rolling Circle Amplification Technology.

Construction of cDNA and genomic DNA libraries: Vectors used in the construction of cDNA versus genomic DNA libraries. Steps and enzymes involved in the construction of cDNA versus genomic DNA libraries.

UNIT-IV

Genome sequencing: DNA sequencing by Enzymatic and chemical method – traditional and cycle sequencing. STS mapping. E-PCR. Whole genome shotgun cloning methods. Clone-by-clone shotgun sequencing of genome map construction, clone selection,

Transcriptional analysis of gene expression and transcriptomics: Gene expression analysis by Northern Blotting, RT-PCR, EST analysis and the use of reporter genes. Enzymatic and bioluminescent reporters. Reporters used in protein localization and trafficking studies. Transcriptome analysis by DD-PCR and EST analysis, DNA microarrays (cDNA arrays and oligo arrays), Serial Analysis of Gene Expresion (SAGE).

UNIT-V

Protein engineering and proteome analysis: Proteome analysis by 2D gel electrophoresis coupled to mass spectrometric analysis. Protein arrays and their applications.

Pharmaceutical products of DNA technology: Human protein replacements – insulin, hGH and Factor VIII. Human therapies – TPA, interferon, antisense molecules. Vaccines – Hepatitis B, AIDS, and DNA vaccines. Good hygienic procedure (GHP), Good manufacturing procedure (GMP), Good laboratory procedure (GLP) and ISO-9ooo-HACCP.

Transgenics and animal cloning: Creating transgenic animals and plants**.** Animal cloning.

TEXT BOOKS:

1. Molecular Biology by David P. Clarke, 1st edition; Elsevier Academic Press; 2005.
2. Satyanarayana.U, Biotechnology, Books and Allied (P) Ltd, Kolkatha: 2005.
3. Molecular Cloning: A laboratory manual by Joseph Sambrook & David Russell, 3rd edition; CSHL Press; 2001.
4. DNA Technology: The Awesome Skill by I. Edward Alcamo, 2nd edition; Hardcourt Academic Press; 2001.
5. Molecular Biology of the Gene by James Watson, Tania Baker, Stephen Bell, Alexander Gann, Michael Levine & Richard Losick , 6th Edition; CSHL Press; 2007

PAPER-10
INDUSTRIAL BIOTECHNOLOGY

OBJECTIVES

To enable the students to understand the microbial processes applicable in industries and scale-up processes.

UNIT-I

Industrially important microorganisms: Screening techniques - Detection and assay of fermentation products - Strain improvements - Mutations, protoplast fusion and rDNA techniques for strain development.

UNIT-II

Industrial fermentation : Primary and secondary metabolites; Microbial Growth kinetics; Basic functions of fermenter - body construction, aeration, agitation, theories of aeration, oxygen transfer kinetics; Concepts of Newtonian and non - newtonian fluids - antifoam - Submerged and solid state fermentation - Scale up; Fermentation Biosensors; Downstream Processing.

UNIT-III

Industrial Production: Typical Fermentation processes for the industrial production of Wine, Beer, Bacitracin, Streptomycin, Riboflavin, B-carotene, Gibberellins, glutamic acid and surfactants. Commercially useful non-microbial products produced through microbes - insulin, interferons, B-cell growth factors, tissue plasmonogen activator. Microbial Enzymes - Enzyme immobilization, Microbial Insecticides. Production of SCP - Spirulina and yeast.

UNIT-IV

Algal biotechnology: Biotechnological potential of microalgae, food, feed and fuel production - pharmaceutically valuable of microalgae, pigments and H2 gas from BGA.

UNIT-V

Nanobiotechnology: Introduction - history and recent developments - sources of nanoparticles - microbial producers of nanoparticles -advantages of microbial nanoparticles - applications - social and ethical implications - ethical concerns about patenting of living organisms and genetic materials.

TEXT BOOKS:

1. Balasubramanian D, Bryce CFA, Dharmalingam K, Green J, Jayaraman K. (1996). Concepts in Biotechnology, University Press, India.
2. Satyanarayana.U, Biotechnology, Books and Allied (P) Ltd, Kolkatha: 2005.
3. Glazer AN, Nikaido H. (1994) Microbial Biotechnology - Fundamentals of Applied Microbiology WH Freeman and Company, New York.
4. Glick BR, Pasternak JJ. (1994) Molecular Biotechnology, ASM Press, Washingon DC.
5. Arumugam, N. and Kumaresan, V. (2016) Fundamentals of Biotechnology, Saras Publication, Nagercoil.
6.

REFERENCE BOOKS:

1. Baxevanis AD and BFF Ouellette, Wiley O, (2001). Bioinformatics - A practical guide to the analysis of genes and proteins. Interscience, New York.
2. Borowitzka MA, Borowitzka LJ (1989) Microalgal Biotechnology, Cambridge University Press.
3. Doolittle RF. (1990). Molecular evolution. Computer Analysis of Protein and Nucleic acid Sequences Methods in Enzymology. Academic Press, New York.
4. Faber K. (1992), Biotransformation in Organic Chemistry Springer Vulag.
5. Gerbardt P, Murray RG, Wood W A., Kreig NR. (1994), Methods for General and Molecular Bacteriology - American Society for Microbiology Washington D.C.
6. Glick BR, Pasternak JJ (1998), Molecular Biotechnology - Principles and Applications of Recombinant DNA, ASM Press, Washington DC.
7. Higgins D, Taylor W. (2000). Bioinformatics, sequence, structure and databanks A practical approach. Oxford University Press.
8. Gibas C and P. Jambek. (2001). Developing Bioinformatics computer skills O'Reilly, USA.
9. Misener S, Krawetz SA. (2000) Bioinformatics Methods and Protocols. Humana Press, Totowa, New Jersey.
10. Miyamoto MM, Cracraft JL. Phylogenetic Analysis of DNA sequences. Oxford University Press. Oxford.
11. Pnolella P (1998) Introduction to Molecular Biology, WCB Mc Graw Hill, Boston, Massacheutts.
12. Rashidi HH, Buehler LK. (2000) Bioinformatics Basics. Applications in Biological Science and Medicine. CRC Press, Washington DC.
13. Raledge C and Kristiansen B Eds (2001) Basic Biotechnology, 2nd edition, Cambridge University Press.
14. Walsh G, Headon DR. (1994). Protein Biotechnology, John Wiley & Sons, New York.

ELECTIVE
PAPER - 3
(to choose 1 out of 3)
A. BIOLOGICAL TECHNIQUES

OBJECTIVES

To enable the students to understand the basic biological techmiques.

UNIT-I

Microscopy and Related Techniques - Light Microscopy : Microscopic optics, components of microscopes. Basic principles and method of Bright field, Dark field, Phase contrast. Fluorescence, Polarization and confocal microscopes. Applications of various types of microscopy such as immunofluorescence - In situ hybridization. Electron Microscopy - Principle, Techniques and applications of Transmission Electron microscope (TEM) and Scanning Electron Microscope (SEM), Atomic Force Microscope (AFM). Photomicrography and Video micrography Developing and printing of microphotographs.

UNIT-II

Analytical Techniques - Spectroscopic methods - UV-Visible, Atomic Absorption Spectrophotometer, Atomic Emission Spectroscopy. Centrifugation - Principles, various types including centrifugation Electroanalytical methods - electrolytic all 4 golvanic cell - Potentiometric, conductimetric, coulometric & voltametric analysis. Biosensors. Radioactive Analysis : Principles of radioactivity, GM counter & LS counter.

UNIT-III

Principles & Applications of Chromatographic Techniques : Adsorption - Ion exchange and gel permeation - affinity chromotography for separation of compounds including GC and HPLC.

UNIT-IV

Electrophoresis Techniques - protein - nucleic acid - immuno - two dimensional electrophoresis.

UNIT-V

Molecular Biological Techniques

a) Microbiological techniques - purification, storage, measurement of microbial growth rate.

b) Isolation and amplification of nucleic acid - Plasmid isolation, chromosomal DNA isolation.

Polymerase chain reaction

c) Gene cloning techniques - Restriction digestion and Phosphatase treatment of cloning vectors. Cloning technique, separation and staining of DNA, qualification of DNA, gene transfer mechanisms - chemical and electroporation.

d) Methods of detection of clones - Nucleic acid transfer by blotting, Hybridization plaque, colony hybridization, histochemical detection of A -galactosidase, antibody screening including colour development reaction.

TEXT BOOKS:

1. Lodish, H. Baltimore Daerk . A. Zipsury, S.L. Marsudaisa. P. Darnel. J. (1995) Molecular cell biology.

2. Old, R.S. and Primrose, S.B. (1995) Principles of Gene manipulation. An introduction to genetic Engineering. 5th Edition. Blackwell Scientific Publication, London.

REFERENCE BOOKS:

1. Cynthia Gibas & Per Jambek (2001). Developing Bioinformatics Computer Skills, Shroff Publishers & Distributors Pvt. Ltd., O'reilly) Mumbai.

2. Demain, A.L. and Davies, J.E. (1999). Manual of Industrial Microbiology & Biotechnology, ASM Press.

3. Glick, B.R. and Pasternak, J.J. (1994). Molecular Biotechnology, ASM Press.

4. John G. Webster. (2004). Bioinstrumentation. University of Wisconsin, John Wiley & Sons, Inc.

5. Misener, S. and Krawetz, S.A. (2000). Bioinformatics Methods and Protocols. Human Press, Totowa, New Jersey.

6. Rashidi, H.H., and Buehler, L.K. (2002). Bioinformatics Basics: Applications in Biological Science and Medicine, CRC Press, London.

7. Sambrrok, J. and Ruseell, D.W. (2001) Molecular Cloning – A Laboratory Manual (3rd eidition, Vol. 1,2,3) Cold Spring Laboratory Press, New York.

8. Savile Pradbury. (1991). Basic measurement techniques for light microscopy, Oxford University Press, Royal Microscopical Society.

9. Surzeki, S. (2000). Basic Techniques in Molecular Biology, Springer.

10. Westermeier, R (1993). Electroporesis in practice – VCH – Federal Republic of Germany. 11. Willett, J.E. (1991). Gas Chromatography, John Wiley & Sons. 12. Wilson, K. and Walker (1995). Practical Biochemistry Principles and Techniques, Cambridge University Press.

PAPER - 3
B. HERBAL TECHNOLOGY

OBJECTIVES

To enable the students to understand the basic knowledge in Herbal technology.

UNIT - I

Pharmacognosy: Pharmacology - Definition and history, Indian systems of medicine - Siddha, ayurvedha, and Unani systems. Taxonomy of locally available medicinal plants, their chemical constituents and medicinal uses - Classification of Crude drugs - Chemistry of Drugs - Future of pharmacognosy.

UNIT - II

Classification of medicinal plants - Vernacular name and family - Geographical source, cultivation, collection, and processing for market and commerce in crude drugs. Morphological and histological studies, chemical constituents - Therapeutic and other pharmaceutical uses. Underground stem - ginger, Alpinia - Roots - Rauolfia - Belladona - Aerial parts - Bark - Cinchona.

UNIT - III

Leaves - Adathoda, Eucalyptus - Flower - Clove fruits seeds - Nux vomica Nutmegs, Gooseberry - unorganized drugs - Gum - Acacia - Resin - Turpentine, fixed oil - castor oil.

UNIT - IV

Herbal medicines for Human ailments - Drugs acting on cardiac diseases, cerebral diseases, Nasal, diseases - Blood pressure Drugs acting on Nervous system - Depressants. - stimulants - Respiration and Drugs - Urogenital system and drugs - Psychoactive plants.

UNIT - V

Propagation of medicinal plants - Micro and macro propagation conservation of rare medicinal plants Role of biotechnology in medicinal plants banks - cultivation of medicinal and aromatic plants - Drug adulteration - methods of Drug evaluation, Herbal food - Food processing - packaging - Herbal sale and Export of medicinal plants - marketing - Intellectual property rights - Export laws.

TEXT BOOKS:

1. Agarwal and Paridhavi, (2007) Herbal Drug Tecnology, 2nd Edition. Universities Press (India) Private Ltd.
2. Wallis, T.E, Text book of pharmacognosy by 5th edition. CBS publishers and distributors Chennai.
3. Kuntal Das (2014). Herbal Plants and their Applications in Cosmeceuticals, CBS publishers and distributors Pvt. Ltd., Chennai.

REFERENCE BOOKS:

1. George Edward Trease and W.C. Evans - Pharmacognosy 12th edition, English Language Books Society, Baelliere Tindall.
2. Handa, S.S. and Kapoor, V.K. Pharamcognosy by 2nd Edition, Vallabh Prakashan Publishers, New Delhi.
3. Jain, S.K (1980) Indian Medicinal plants.
4. Kokate, C.K., Durohit, A.P. and Gokhale, S.R., Pharmacognosy by 12th edition - Nirali Prakasham Publishers, Pune.
5. Kumar N.C. (1993) An Introduction to Medical Botany and Pharmacognosy.
6. Nadkarni (1981) Indian Materia Medica.
7. Shah, S.C. and Qudary (1990) A text book of Pharmacognosy.

PAPER - 3
C. VACCINE BIOTECHNOLOGY

OBJECTIVES

To enable the students to understand the basic knowledge in Vaccine Biotechnology.

UNIT-I

Immune system - recognition of nonself and self ; Humoral Immunity - immunoglobulins, basic structure, classes and subclasses; Cellular Immunity, lymphocytes, lymphokines, cytokines and interferon; Antigen Recognition-membrane. Receptors for antigens, MHC classification and functions, super antigen.

UNIT-II

Recombinant vaccines; polynucleotide as vaccines; vector vaccines; naked DNA vaccines; biosynthetic and chemically synthesized vaccines; subunit vaccine; antiidiotype vaccines; fusion vaccines; mixed particle vaccines; human mucosal vaccines; Combination vaccines; Edible vaccines produced in transgenic plants and microencapsulation.

UNIT- III:

EPI vaccines - production and testing of tetanus toxoid, diphtheria toxoid, pertussis vaccine, BCG vaccines; preparation of Hepatitis B vaccine and tissue culture derived rabies vaccine and AIDS vaccine.

UNIT-IV

Adjuvants - classification and properties; carriers - types and functions - vehicles - types, functions and mode of action ; biodegradable polymers - microspheres, liposomes and ISCOM ; immunostimulators (IS) - classification and mechanism of action of IS.

UNIT-V

Germ free, Axenic, Monoxenic, dixenic, Gnotobiotic, conventional, xyloxenic, SPF; isolators, Gnotobiotic technique, gene knockout mice; transgenic and SCID mouse; Athynic nude mouse; animal models of human diseases and techniques of experimentations.

TEXT BOOKS:

1. Ajoy Paul (2016). Text Book of Immunology, Books and Allied (P) Ltd, Kolkatha.
2. Chapel H and Halbey M (1986) Essentials of Clinical Immunology, ELBS.
3. Donal M. Weir, John Steward. (1993). Immunology VII edition. ELBS, London
4. Ivan M. Roit. (1994) Essential Immunology - Blackwell Scientific Publications, Oxford.

REFERENCE BOOKS:

1. Jacqucline S, Williams and Wilkins A. (1998) Basic Immunology - Warerly Company.
2. Janeway Travers. (1997). Immuno biology - The immuno system in health and Disease. 3rd edition Current Biology Ltd., London, New York.
3. Lydyard P, Whelan A and Fanzer MW (2000) Instant notes in Immunology, Edited By Hames BD, Viva Books Private Ltd.
4. Mark Reakman Diego Vergani. Basic and clinical immunology, Longman Asia Ltd., Hong kong.
5. Paul (1998) Fundamental Immunology. III Edition.
6. Peter J. Delves, Ivan M. Roit (eds) (1998) Academic Press - Encyclopedia of Immunology - 2nd edition.
7. Richard M. Hyde. (1995). Immunology III edition. National Medical series, Williams and Wilkins, Harward Publishing Company.
8. Clark WR (1991). The experimental foundations of modern immunology, John Wiley and Sons Inc. New York.

SEMESTER IV
PAPER - 11
RESEARCH METHODOLOGY

OBJECTIVES

To enable the student to understand the principles and applications of classical and modern techniques in Biology develop skill in preparation of reports, writing research communications and thesis interpret and analyze the experimental data using different biostatistical tools.

UNIT-I

Microscopy: light microscope - basic principles, types, (phase contrast, dark field and fluorescent microscope). Electron microscopy - principles, working function, electron probe, transmitted electron, image formation, back scattering, secondary electrons. X-ray diffraction, Auger electron, cathode luminescence. Types of EM: TEM, SEM, STEM - sample preparation for EM analysis. Camera Lucida - Principles and uses.

UNIT-II

Electromagnetic radiation: definition, components, biological effective wavelength (UV and visible), Spectrophotometry: principles and working function of spectrophotometers, types (single beam, double beam, Atomic absorption spectrophotometer, IR and NMR. Applications of various spectrophotometers.

UNIT-III

Radioactivity: nature of radioactivity, types of radioisotopes, half-life, Unit of radioactivity, detection and measurements. Geiger Muller counter, liquid scintillation counter, principles and working function. Autoradiography, application of radioisotopes in biological research. Centrifugation: Basic principles, sedimentation coefficient, centrifugal forces. Types of centrifuges - clinical, high speed, refrigerated, ultra. Types of centrifugation - rotar types, density gradient, differential centrifugation. Applications of centrifugation.

UNIT-IV

Chromatography - Principle, types and working function (Paper chromatography, TLC, GC, GC-MS and HPLC), Applications. Electrophoresis - Principle, types and methods. Horizontal, vertical, PAGE, Agarose electrophoresis, Applications. Pulse Field gel electrophoresis (PFGE) - Principle and applications. Gel documentation and molecular weight analysis.

UNIT-V

Molecular Techniques - DNA and plasmid isolation. Amplification of 16S rRNA or specific genes using PCR techniques, RAPD, STRR and LTRR analysis using PCR, RFLP analysis cloning strategies, DNA sequencing - Sanger's Dideoxy and Maxam and

Gilbert's methods. Automated DNA sequencing, Blotting techniques - southern, western, Dot blot- hybridization. Immunoblotting, ELISA - Applications in biological research.
Thesis writing; defining research problem, research design, general format, literature survey, primary source - articles, reviews, abstract, current contents (both text and CCOD), reference card, data analysis, data interpretation, report writing, proof correction.

REFERENCES BOOKS:

1. Wrigglesworth, J.M. 1984, Biochemical research technique - a practical introduction. John Wiley, New York.

2. Patki, L.R., Bhalchandra, L. and Jeevaji, I.H., 1989, An introduction to microtechniques, S. Chand and Company Ltd., New Delhi.

3. Keith Wilson and John Walker, 1994. Practical Biochemistry - principles and techniques, Cambridge Press, New York.

4. Keith Wilson and Goulding, K.H. 1986, a biologists guide to principles and techniques of practical biochemistry, ELBS, London.

5. Kothari, C.R., 1988. Research methodology, Wiley Eastern Ltd., New Delhi.

6. Irfan A. Khan and Atiya Khanum, 1994. Fundamental of Biostatistics, Ukaaz publishers, India.

7. Anderson, J., Durosn, B.H. and Poole, M. 1986. Thesis and assignment writing, Wiley Eastern Ltd., New Delhi.

MAIN PRACTICAL
PAPER-3
(Subjects covering Paper 7, 8 and 9)

OBJECTIVES

To impart practical knowledge on various aspects of molecular biology, microbial genetics, gene technology and industrial biotechnology.

UNIT-I

1. Isolation of DNA and RNA from microbial system - quantification - chemical methods dinitrophenol, orcinol - physical methods - UV absorption.
2. Isolation of plasmid DNA from bacteria (mini preparation).
3. Isolation of plasmid DNA from cyanobacteria (mini preparation)
4. Size characterization of DNA by agarose gel electrophoresis.
5. Enzyme immobilization technique.

UNIT-II

1. Isolation of antibiotic resistant microbes.
2. Induction of mutation by ultra-violet radiation and chemical mutagens.

UNIT-III

1. Protoplast / Spheroplast isolation.
2. Purification of plasmids - large scale.

UNIT-IV

1. Preparation of competent E. coli cells.
2. Transformation of Plasmid DNA to the E. coli cells.
3. PCR amplification - 16S rRNA and RAPD.
4. Southern blotting
5. Northern blotting.

UNIT-V

1. Separation of proteins by coloum chromatography, ion exchange - gel exclusion - adsorption
2. Separation of proteins by SDS - PAGE and native gel.
3. Production of proteases - optimization of conditions - pH - temperature.
4. Antibiotic assays - MIC - antibiotic resistance
5. Lipid separation using TLC.

REFERENCE BOOKS:

1. Ausubel FM, Brent R, Kingston, RE, Moore, D.D, Seidman J.G., Smith J.A and Struhl K. (1994). Current Protocols in molecular biology. Vol. 1 & 2. John Wiley & Sons Inc.

2. Dharmalingam K. (1986). Experiments with M13, Macmillan India Ltd. Chennai.

3. Gerhardt P, Murray RG, Wood WA and Kreig NR. (1994), Methods for general and molecular Bacteriology.

4. Hames BD and Rickwood D. (1990) Gel Electrophoresis - a practical approach (1990), Oxford University Press, New York.

5. Harwod AJ. (1994). Protocols for Gene Analysis. Humana Press.

6. Lorian V. (1991) Antibiotics in Laboratory Medicine Williams & Wilkins.

7. Sambrook J and Russell DW (2001) Molecular cloning - A Laboratory manual (3rd edition, Vols - 1, 2, 3). Cold Spring Harbor Laboratory. Cold Spring Harbor Laboratory Press, New York.

8. Surzyeki S (2000). Basic Techniques in Molecular Biology. Springer.

9. Westermeier R. (1993) - Electrophoresis in Practice - VCH - Federal Republic of Germany

10. Willett JE. (1991) Gas Chromatography, John Wiley & Sons.

11. Wilson K and Walker. (1995) Practical Biochemistry Principles.

12. Rajan. S and Selvi Christy (2010). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.

9. Ponmurugan, (2012) Experimental procedures in bioprocess technology, Anjanaa Book House Publishers, Chennai.

MAIN PRACTICAL
PAPER-4
(Subjects covering Paper-10)

OBJECTIVES

To impart practical knowledge on various aspects of research methodology.

1. Analysis of microorganisms using Bright field, Dark field, Phase contrast and Fluorescent microscopy.
2. Microscopic diagram using camera Lucida.
3. Measurement of microbes using micrometry.
4. Preparation of samples for Density gradient.
5. Separation of pigments using paper chromatography.
6. Separation of compounds from crude extracts using TLC.
7. Separation of DNA, proteins using electrophoretic techniques.
8. Molecular weight analysis of DNA and proteins using gel documentation.
9. DNA and plasmid isolation - small scale.
10. RAPD finger printing using PCR.
11. Blotting techniques - Southern and western blotting and hybridization.
12. ELISA test.

ELECTIVE
PAPER-4 (to choose 1 out of 3)
A. BIOREMEDIATION

OBJECTIVES

To enable the students to understand the aspects of bioremediation.

UNIT-I

Definition of Bioremediation - Types of pollution - organic, inorganic in soil, water and air - Remediation by bacteria, fungi, microalgae and green plants.

UNIT-II

Bioaccumulation and biomagnification processes - microbial remediation by natural attenuation - biostimulation - bioaugmentation.

UNIT-III

Application of immobilized microbes in soil decontamination - use of genetically engineered microorganism and bioremediation.

UNIT-IV

Biodegradation of organic compounds - humification and polymerization reaction - bio-transformation of metal and metal compounds - phyto -remediation use of microalgae, green plants to remove pollutants.

UNIT-V

Phyto-extraction - Types of phytoextraction - induced phyto-extraction and continuous phyto-extraction - phyto-degradation - rhizofiltration - phyto-stabilisation - phyto-volatisation of metals - phyto-remediation of organic. Bioavailability and uptake. Biotransformation and compartmentalisation.

REFERENCE BOOKS:

1. Moo-Young, M., Anderson, W.A. and Chakrabarty, A.M. 1996. Environmental biotechnology: Principles and applications. Boston, Mass.: Kluwer Academic Publishers.

2. Wainwright, M. 1999. An introduction to environmental biotechnology. Boston, Mass. Klumer Academic Publishers.

PAPER-4
B. MARINE MICROBIOLOGY

UNIT-I

Marine environment - see-benthic & littoral zone, saltpan, mangroves and estuarine microbes, microbial loop - marine microbial community - planktons, bacteria, fungi, protozoa.

UNIT-II

Survival at extreme environments - starvation - adaptive mechanisms in thermophilic, alkalophilic, asmophilic and barophilic, psychrophilic microorganisms - hyperthermophiles and halophiles - importance in biotechnology.

UNIT-III

Microbe-microbe interactions - Lichens, antagonistic interactions - amensalism, mycoparasitism - Animal-microbe interaction - Ectosymbiosis of Protozoa, Runinant symbiosis - Plant-microbe interaction - Rhizobium, Mycorrhizae, Anabaena - sponge.

UNIT-IV

Marine food borne pathogens & Water borne pathogens - Aeromonas, Vibrio, Salmonella, Pseudomonas, Leptospira, Cornybacter.

UNIT-V Production and applications of marine microbial products - pigments - Astaxanthin, β carotene - enzyme - antibiotics - polysaccharide - sea food preservation methods.

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PAPER-4
C. CLINICAL MICROBIOLOGY

UNIT -I

Infection and Immunity: General principles of Infection, Antigens, Antibodies, Antigen- antibody reactions, complement system

UNIT -II

Immune system - structure and functions, immune response, immunodeficiency disease, hypersensitivity, autoimmunity, Immunology of transplantation and malignancy, immunohematology

UNIT -III

Pathogenic/parasitic organisms: Bacterial, viral and protozoal infections of the gastrointestinal system, nervous system, lung, liver and eye; Sexually transmitted diseases, skin infections, zoonoses, arthropod borne diseases. Transmission and spread of diseases - Disease epidemiology.

UNIT -IV

Control and prevention of infections - drugs and antibiotics - drug resistance, Mycobacteria, leprosy and malarial parasite - importance, lifecycle, spread and control.

Biochemical changes due to infections - Blood test and tissue analysis. Isolation and identification of organisms from tissue samples. Disease detection - conventional and molecular techniques.

UNIT -V

Normal microbial flora of human body, Laboratory control of antimicrobial therapy, Immunoprophylaxis. Vaccines - types and methods of action. Biotechnological approaches to disease control and vaccine production. Genetic disorders and Gene therapy. Control of vectors - Mosquito control - Biotechnological approaches.

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Industrial Visit (IV)

Factory Industrial Visit (M. Sc. Applied Microbiology)

Course Objectives: Students will be exposed to professional work environment to acquire the knowledge, independent working capacity and leadership so that at the end of the course they will be able to manage the laboratory and research work with full responsibility and reliability.

Factory Industrial Visit Guide Line: Internship will be conducted in an institute under the supervision of supervisor/s.

During the **Industrial Visit**, students should his/her visiting work should be submitted to the supervisor/department. A report of an industrial Visit should be submitted to the department after completion of the work should be authorized by the concerned supervisor of the institute/factory.

Project / Dissertation with viva voce (M. Sc. Applied Microbiology)

Course Objectives: This course is designed to provide the knowledge and practice for the students of public health research activity, to enable them to carry out researches and solve research related problems and to help them in writing thesis and defend their work. Upon successful completion of the course, the students shall be able to: 1. Search relevant scientific literature 2. Develop a research proposal 3. They find appropriate data collection techniques and tools 4. Manage collected data 5. Analyze data with appropriate statistical techniques 6. Write thesis 7. Defend the findings

Proposal Development: At the beginning of Second year (Fourth Semester), students should carry out with the consultation of designated faculties. Extensive literature survey will develop research proposal during the initial 3 months period.

Data Collection/ Thesis Writing Students will carry out data collection, data management, data analysis, and thesis writing during the remaining period (Fourth Semester).

The Dissertation should have following format: 1. Title 2. Introduction 3. Materials and Methods 4. Results 5. Discussion 6. Conclusion 7. Recommendation 8. References 9. Appendix

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THIRUVALLUVAR UNIVERSITY

MASTER OF SCIENCE
DEGREE COURSE

M.Sc. BIOCHEMISTRY
UNDER CBCS

(With effect from 2017 - 2018)

The Course of Study and the Scheme of Examinations

S. No.	Subject	Paper	Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I						**CIA**	**Uni. Exam**	**Total**
1	MAIN	Paper-1	6	4	Cell Dynamics and Environment Biology	25	75	100
2	MAIN	Paper-2	6	5	Chemistry of Macromolecules	25	75	100
3	MAIN	Paper-3	5	5	Human Physiology and Nutrition	25	75	100
4	MAIN Practical	Paper – 1	5	-	Isolation and Characterization studies, Quantitative Analysis, Techniques	-	-	-
5	Main Practical	Paper - 2	5	-	Enzymology – Purification and Kinetic Studies, Microbial Biochemistry	-	-	-
6	Elective	**Paper – 1**	3	3	**(to choose 1 out of 3)** 1. Biophysical and Bio organic chemistry 2. Pharmaceutical Biochemistry 3. Plant biochemistry and plant molecular biology	25	75	100
			30	**17**		**100**	**300**	**400**
SEMESTER II								
7	MAIN	Paper-4	5	4	Analytical Biochemistry	25	75	100
8	MAIN	Paper-5	5	4	Advanced Enzymology	25	75	100
9	MAIN	Paper-6	5	4	Intermediary Metabolism	25	75	100

10	MAIN Practical	Paper - 1	5	5	Isolation and Characterization studies, Quantitative Analysis, Techniques	25	75	100
11	MAIN Practical	Paper - 2	5	5	Enzymology – Purification and Kinetic Studies, Microbial Biochemistry	25	75	100
12	Elective	Paper – 2	3	3	**(to choose 1 out of 3)** 1. Microbiology 2. Diagnostic Biochemistry 3. Biochemical and Environmental	25	75	100
13	Compulsory paper		2	2	Human Rights	25	75	100
			30	**28**		**175**	**525**	**700**
SEMESTER III						**CIA**	**Uni. Exam**	**Total**
14	MAIN	Paper-7	6	5	Advanced Endocrinology	25	75	100
15	MAIN	Paper-8	6	5	Research Methodology	25	75	100
16	MAIN	Paper-9	5	5	Biotechnology	25	75	100
17	MAIN Practical	Practical-3	5	-	Biochemical analysis of blood, Immunological and Molecular Biology techniques	-	-	-
18	MAIN Practical	Practical-4	5	-	Haematological methods, Urine analaysis	-	-	-
19	Elective	Paper - 3	3	3	**(to choose 1 out of 3)** 1. Immunology 2. Bioinformatics 3. Nano biotechnology	25	75	100
			30	**18**		**100**	**300**	**400**

SEMESTER IV						CIA	Uni. Exam	Total
20	MAIN	Paper-10	6	5	Molecular Biology	25	75	100
21	MAIN	Paper – 11	6	5	**Advanced Clinical Biochemistry**	25	75	100
22	MAIN	Practical-12	5	5	Project / Dissertation with *Viva Voce*	50	150	200
23	MAIN Practical	Paper-3	5	5	Biochemical analysis of blood, Immunological and Molecular Biology techniques	25	75	100
24	Main Practical	Paper – 4	5	5	Hametological methods, Urine analysis	25	75	100
24	Elective	Paper - 4	3	3	(to choose 1 out of 3) 1. Stem cell technology 2. Herbal Technology 3. Genetic Engineering	25	75	100
			30	**28**		**175**	**525**	**700**

Subject	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total Marks**
Main	12	4-5	56	100	1300
Main Practical	4	5	20	400	400
Elective	4	3	12	100	400
Compulsory Paper	1	2	2	100	100
Total	**21**	**-**	**90**	**-**	**2200**

THIRUVALLUVAR UNIVERSITY

M.Sc. BIOCHEMISTRY

SYLLABUS

UNDER CBCS

(With effect from 2017-2018)

SEMESTER I

PAPER-1

CELL DYNAMICS AND ENVIRONMENTAL BIOLOGY

UNIT-I : CELLULAR ORGANIZATION, DIVISION AND CYTOSKELETONS

Cell types - organization of prokaryotic and eukaryotic cells, cell division - mitosis and meiosis, cell cycle - phases of cell cycle, and regulation of cell growth and cell cycle, cell motility - molecular motors, microtubules, structure and composition, micro tubular associated proteins - role in intracellular motility.

UNIT-II : CELLULAR ORGANELLES, CELLULAR COMMUNICATION AND TRANSPORT

Cellular organelles – morphology and function. Differentiation of cell membrane - microvilli, epithelia, Bell and sqot desmosomes - mechanical function, cell-cell interaction, cell adhesion proteins, cell junctions, tight junction and gap junction, cell surface of plant cells and cancer cells.
Overview of membrane protein - peripheral and integral, molecular model of cell membrane - fluid mosaic model and membrane fluidity, solute transport across membrane - passive transport, active transport by ATP powered pumps, types of transport systems.

UNIT-III : ENVIRONMENT AND ECOLOGICAL SUCCESSION

Physical environment – Biotic and abiotic environment; concept of habitat and niche, niche width and overlap, fundamental and realized niche, resource partitioning, character displacement. Ecological succession - types, mechanisms, and changes involved in succession.

UNIT-IV : POPULATION ECOLOGY & ORIGIN OF CELLS

Characteristics ofa population, population growth curves, population regulation, life history statergies (r and k selection). Concept of metapopulation – demes and dispersal, interdemic extinctions, age structured populations. Origin of basic biological molecules; abiotic synthesis of organic monomers and polymers; concept of oparin and Haldane, experiment of miller. Evolution of prokaryotes and eukaryotes.

UNIT V : PALEONTOLOGY , EVOLUTIONARY HISTORY AND MOLECULAR EVOLUTION

The evolutionary time scale, eras, periods and epoch; major events in the evolutionary time scale. Concepts of neutral evolution, molecular divergence and molecular clocks; molecular tools in phylogeny, classification and identification; Convergent evolution, sexual evolution and co-evolution.

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1. The World of the cell - Becker, Kleinsmith and Harden Academic Internet Publishers; 5th edition 2006.
2. The Cell: A Molecular Approach, Fourth Edition- Geoffrey M. Cooper and Robert E. Hausman.
3. Cell and Molecular Biology by concepts and experiments - Gerald Karp John Wiley sons & Inc, - 2005.
4. Molecular cell Biology - Harvey Lodish. W. H. Freeman; Sol edition, 2007.
5. The Cell - Biochemistry, physiology and morphology - J. Brachet and A. E. Mirsky, Academic Press, 1963.

PAPER-2

CHEMISTRY OF MACROMOLECULES

UNIT-I: HOMO AND HETEROGLYCANS

Polysaccharides - occurrence, structure, properties and functions of homoglycans - starch, glycogen, cellulose, dextrin, inulin, chitins. Occurrence, structure, properties, and functions of heteroglycans - bacterial cell wall polysaccharides, glycoaminoglycans, agar, alginic acid, pectins, amino sugars and deoxy sugars, blood group substances and sialic acids. Glycoprotein and their biological applications. Lectins structure and functions.

UNIT-II: AMINOACIDS AND PROTEINS

Classification, properties and function of aminoacids and proteins.Primary structure - determination of amino acid sequence of proteins. The peptide bond: Ramachandran plot. Secondary structure - weak interactions involved - alpha helix and beta sheet and beta turns structure. Collagen triple helix. Super secondary structures - helix-loop-helix. Tertiary structure - alpha and beta domains. Quaternary structure - structure of hemoglobin.

UNIT-III : NUCLEIC ACIDS

Watson - Crick model of DNA structure. A, B and Z - DNA Cruciform structure in DNA, formation and stability of cruciforms, miscellaneous alternative conformation of DNA, slipped mispaired DNA, parallel stranded, anisomorphic DNA, palindrome.Types of RNA, hnRNA, methods for nucleic acid sequence determination, denaturation and renaturation, Cot value curve, hypochromic effect, DNA-protein interactions.

UNIT-IV : LIPIDS

Lipids - classification, phospholipids - classification, structure and functions. Ceramides and sphingomyelins. Eicosanoids, structure and functions of prostaglandins, thromboxanes, leukotrienes Types and functions of plasma lipoproteins. Amphipathic lipids - membranes, micelles, emulsions and liposomes. Steroids - cholesterol structure and biological role - bile acids, bile salts.

UNIT-V : VITAMINS

Vitamins - water soluble - thiamine, riboflavin, niacin, pyridoxine, folic acid, ascorbic acid-sources, structure, biochemical functions, deficiency diseases, daily requirements; fat soluble - vitamin A, vitamin D, vitamin E and vitamin K - sources, structure, biochemical functions, deficiency diseases, daily requirements.

References

1. Biochemistry -L. Stryer, W.H. Freeman and Co, 5th 2002.
2. Fundamentals of Biochemistry - Voet and Voet, John Wiley and sons NY, 2002.
3. Lehninger's Principle of Biochemistry -David L. Nelsonand Michael M. Cox. W. H. Freeman; 4th edition, 2004.
4. Text Book of Biochemistry with clinical correlation - Thomas .M. Devlin, John Wiley-Liss, Hobokhen NJ publishers, 2006.
5. Biochemistry - Zubey, GL WCB Publishers.

PAPER-3

HUMAN PHYSIOLOGY AND NUTRITION

UNIT-I : DIGESTION, ABSORPTION AND EXCRETION

Digestive secretions - composition, functions and regulation of saliva, gastric, pancreatic, intestinal and bile secretions. Digestion and absorption of carbohydrates, lipids and proteins.

Excretory system - structure of nephron. Formation of urine - glomerular filtration, tubular reabsorption of glucose, water and electrolytes, tubular secretion.

UNIT-II : BLOOD AND CIRCULATION

Composition and functions of blood and plasma. Blood groups. Blood coagulation - mechanism, fibrinolysis. Hemoglobin - structure, abnormal types, anemia. Structure of heart, cardiac cycle, heart sounds, E.C.G (elementary knowledge), blood pressure, spleen, lymph, normal composition and function of lymph - role of different lymph cells.

UNIT-III : RESPIRATION AND REPRODUCTION

Structure of lungs, mechanism and regulation of respiration. Transport of blood gases - O_2 and CO_2. Acid-base balance - role of buffers, erythrocytes, respiratory system and kidneys. Acidosis and alkalosis - metabolic and respiratory. Fluid electrolyte balance - regulation of water balance and sodium balance - role of renin-angiotensin and ADH.

Structure and function of reproductive organs, composition of semen, physiology of pregnancy, parturition and lactation.

UNIT-IV : NEUROMUSCULAR FUNCTION

Structure and function of nerves, neurons, resting and action potential, transmission of nerve impulses, synaptic transmission, compounds affecting synaptic transmission, neuromuscular junction. Structure of muscle cells and muscle contraction, molecular organization of muscle, proteins of contractile element - their organization and role in contraction, energy for contraction.

UNIT-V : NUTRITION

Basal metabolism, basal metabolic rate, factors affecting BMR, determination of BMR - direct and indirect method, respiratory quotient. Role of fiber in diet, role of essential amino acids - relation with Marasmus, Kwashiorkar disease, role of essential fatty acids, disorders of fatty acid metabolism, Refsum's disease. Trace elements - macro and micro, daily requirements, functions, deficiency manifestations. Nutrition at different stages of life - during infancy, adolescence, pregnancy and old age.

References

1. Review of Medical Physiology - William. F. Ganong. McGraw-Hill Medical; 22 edition, 2005.
2. Human Physiology and Mechanisms of Disease - Guyton. Saunders Publications; 6th edition, 1996.
3. Human physiology - C.C. Chatterjee. 11th edition, 1985.
4. Human Nutrition and Dietetics - Davidson and Passmore. Churchill Livingstone; 8th edition, 1986.
5. Principles of Nutrition - M.S.Swaminathan
6. Modern Nutrition and Health Diseases - M.E. Skilis and V.R. Young

ELECTIVE

PAPER-1
(To choose 1 out 3)

A. BIOPHYISCAL AND BIOORGANIC CHEMISTRY

UNIT-I : BIOENERGETICS

Thermodynamics - basic concepts. First, second and third laws of thermodynamics - enthalpy and entropy, exothermic and endothermic reactions. Free energy - standard free energy. Temperature and pressure dependence of free energy. Equilibrium for biochemical reactions. High energy phosphates and free energy. Redox reactions and free energy changes in biological reactions.

UNIT-II : SPECTROSCOPY AND STRUCTURAL ELUCIDATION

The electromagnetic spectrum - quantization of energy. Regions of the spectrum. Basic principles of UV, NMR and mass spectrometry and their biological applications. FT-NMR Nuclear overhauzer effect. Use of X-ray crystallography and CD in the study of proteins and nucleic acids.

UNIT-III : ATOMIC STRUCTURE AND CHEMICAL BONDS

Atomic orbitals. quantum numbers. Shapes of s, p and d orbitals. Aufbau principle, Pauli exclusion principle and Hund's rule. Electronic configuration of atoms, formation of chemical bonds, octet rule, ionic bond, covalent bond and co-ordinate bonds with examples.

UNIT-IV : FUNCTIONAL GROUPS AND REACTIONS

Classification of organic compounds based on functional groups and their nomenclature. Biologically important organic compounds (names and structures). Hemolytic and heterolytic cleavage of covalent bonds. Reactive species: electrophiles, nucleophiles and radicals. Types of organic reactions with examples. Inductive effect and resonance.

UNIT-V : ISOMERISM

Isomerism in organic compounds. Types of isomerisms, tautomerism with special reference to lactic acid.

Stereoisomerism. Geometric isomerism with special reference to maleic acid and unsaturated fatty acids. Partial double bond character of C-N bonds in amides. Geometrical isomerism in such compounds.

Optical isomerism, optical activity, enantiomers, diastereomers. Meso and dl forms. R-S and D-L notations in amino acids and sugars. Conformational analysis, conformations of ethane and cyclohexane.

B. PHARMACEUTICAL BIOCHEMISTRY

UNIT-I

Drug - Structural feature and pharmacology activity, prodrug concept. Absorption -first – pass effect. Distribution, metabolism- Phase I, II reactions, action of cytochrome p450 & elimination of drug receptor- localization, type and subtypes, models and their drug – receptor interaction, agonist & antagonist.

UNIT-II

Adverse response to drugs, Drug tolerance, Drug intolerance, Idio syneracy (pharmacogenesis), drug allergy. Tachyphylaxis, Drug abuse, vaccination against infection, factor that modifies the effect of drug. Assay of drug potency- bioassay and immunoassay.

UNIT-III

Biotechnology and pharmacy: Genetically engineered protein and peptide agents. Novel drug delivery systems – non conventional routes of administration. Anti-AIDS drug development, oncogenes ras target for drugs, multi-drug resistance.

UNIT-IV

Mechanism of action of drugs used in therapy of: Respiratory system – cough, bronchial – asthma, pulmonary tuberculosis. GIT – Digestants, appetite suppressants. Hypolipidemia agents, vomiting, constipation and peptic ulcer. Antimicrobial drugs – sulfonamides, trimethoprim, cotrimoxazole, penicillin, and macrolides. Aminoglycosides, Cephalosporin and bacterial resistance. Insulin and oral diabetic drugs, antifertility and ovulation inducingdrugs.

UNIT-V

Drugs of plant origin: Drug dependence and abuse – Management of self poisoning cancer. Chemotherapy – Cytotoxic drug. Immuno suppressive drug therapy. New Biological Targets for Drug Development. Novel Drug Screening Strategies.

References:

1. The pharmacology Vol I and II- Goodman And Gillman, Mc Graw Hill
2. Basic pharmacology- Foxtercox Bulter Worth’s, 1980.
3. Pharmacology and pharmacotherapeutics- R.S.Satoskar. S.D.Bhandhakar & S.S.Anilapure Popular Prakashar Bombay.
4. Principles of medicinal chemistry- William O. Foge.B.I. Waverks Pvt Ltd, New Delhi.
5. Oxford textbook of clinicasl pharmacology and drug therapy. D.G. Burger’s medicinal Chemistry & Drug Discovery.
6. Principles and practice- Manfred.E. Wolf John Wiley and sons

ELECTIVE

PAPER-4

(to choose 1 out 3)

C. PLANT BIOCHEMISTRY AND PLANT MOLECULAR BIOLOGY

UNIT-I : ENERGY GENERATING MECHANISM

Photosynthetic Pigments, Light and Dark reactions of photosynthesis. Proton gradient and ATP synthesis of chloroplast and Bacterium. Mode of action of DCMU, Regulation of photosynthesis, Bacterio rhodopsin, CAM metabolism, RUBISCO, photorespiration and crop productivity.

UNIT-II: NITROGEN METABOLISM AND PLANT HORMONES

Nitrogen cycle, biochemistry of Symbiotic and Nonsymbiotic nitrogen fixation. Assimilation of ammonium , carbon-nitrogen ratio, Uride metabolism, nitrate metabolism, genetics of nitrogen fixation, genetic manipulation of Nif genes, Biosynthesis, Mode of action, transport, distribution and physiological effect of Auxin, Giberrilin, Cytokinin, Aba and ethylene.

UNIT-III : PLANT DISEASE AND SECONDARY METABOLITES

Biochemistry of plant disease, defence mechanism of plants, biosynthesis, distribution and biological functions of industrially important secondary metabolite, (Any 10) Principles of plant disease control.

UNIT-IV : PLANT PHYSIOLOGY

Water relations of plant, Mechanism of water absorption. Aquaporin Symplast - Apoplast concept. Ascent of sap, Transpiration and Stomatal mechanism. Source and sink relationship, Translocation of Inorganic and Organic substances, Bud and Seed dormancy. Senescence, Stress response in plant, Phytochromes- Properties, Photochemicals, transformation, Mode of action and physiological effect.

UNIT-V : PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY

DNA polymorphism – Importance of RFLP and RAPD in plant breeding management. Aspects of plant genetic engineering. Tacking, Mapping and Cloning of plant genes, Selectable markers. Reporter genes and promoters used in plant vectors. Ti plasmids and Crown gall tumor, Genetic engineering of plant for disease resistance, Cytoplasmic Male Sterility, Edible oil, Biodegradable plastics, Delay of fruit ripening. Methods and Application of plant tissue culture.

Text Books:

1. Modern Plant Physiology - R.K. Sinha, Narosa Publishing House, 2004.
2. Microbiology – M.J. Pelczar, E.C.S. Chan and N.R. Kreig, Tata McGraw Hill Publishing Co., 5th Edition, 1986.
3. Microbiology – L.M. Prescott, J.P. Harley and D.A. Klein, McGraw Hill, 6th Edition, 2004.

References:

1. Introduction to Plant Biochemistry – T.W. Goodwin, Pergamon Press, 1986.
2. Plant Biochemistry and Molecular Biology – P.J. Lea, L.L. Castle and Lea, 2nd Edition, John Wiley & Sons, 1999.
3. Microbiology – B.D. Davis, R. Dulbecco, H.N. Eisen and H.S. Ginsberg. 3rd Edition, Harper & Row, 1980.

SEMESTER II
PAPER-4
ANALYTICAL BIOCHEMISTRY

UNIT I - ELECTROCHEMICAL TECHNIQUES AND ELECTROPHORESIS

Electrochemical techniques – principles, electrochemical cells – pH, Henderson – Hasselbalch equation, buffer capacity, pH measurement, glass electrode. Oxygen electrode – principle and application. Biosensors.

Separation of DNA fragments – Pulsed field gel electrophoresis. Autoanalyser – principal, instrumentation and applications. Isoelectric point-2D gel electrophoresis

UNIT II - ENZYME ASSAY, CENTRIFUGATION AND RADIOCHEMICAL TECHNIQUES

Enzyme monitoring technique – Assay methods, Immobilized enzymes.

Centrifugation: Preparative and Analytical ultracentrifuges.

Radiochemical methods – Basis concepts, counting methods and application. Autoradiography.

UNIT III – CHROMATOGRAPHY AND SPECTROSCOPY TECHNIQUES

GC, HPLC – principle, components, limitations and applications.

HPTLC – technique and applications

Optical rotatory dispersion, Circular dichroism, X-ray diffraction, Nuclear magnetic resonance, Electron spin resonance and Mass spectrometry – basic principle and application principle and applications of trubidimetry and nephelometry. Flow cytometry and cell separation.

UNIT IV – MOLECULAR TECHNIQUES

Restriction endonucleases, Restriction mapping, Nucleic acid probes – cloned probes, oligonucleotide probes and labelling of nucleic acid probs. Membrane blotting and hybridization of nucleic acids – Southern, Northern, Western, dot-plot and Fluorescent insitu hybridization. RFLR – Technique & applications.

PCR basic principle, technique, diagnostic and laboratory applications of PCR, RAPD

Construction of DNA and Oligonucleotide microarray.

UNIT V–MOLECULAR MARKERS ANALYSIS

Diagnostic applications of nucleic acid probes – sickle cell anaemia, thalassemia, haemophilia and lymphoid malignancy. Mutagenicity testing – Ames test. Comet assay and DNA fragmentation assay. Identifying protein – DNA interactions – DNA foot printing, DNA finger printing – Technique and applications. HLA typing – applications.

REFERENCES

1. Keith Wilson and John Walker - Principles and techniques of Biochemistry and Molecular Biology, Cambridge University Press, 6th Edition,2006.
2. Boyer R. - Experimental Biochemistry, Addison Wesley, 3rd Edition, 2002.
3. Bernard R. Glick and Jack.J. Pasternak - Molecular Biotechnology, ASM Press Washington 3rd Edition, 2003.
4. D W Brown - Organic Spectroscopy, Wiley New York 1st Edition, 1998.
5. M.Valcatcel - Principles of analytical chemistry-A Text book. Springer, 2000.
6. David James Holme and Hazel Pack - Longman, 1994.

PAPER-5
ADVANCED ENZYMOLOGY

UNIT-I : CLASSIFICATION, PURIFICATION AND ACTIVE SITE

Nomenclature and classification of enzymes, isolation and purification of enzymes – enzymeprotein determination by different methods, criteria of purity - specific activity.Enzyme units - Katal, IU. Measurement of enzyme activity - two point assay, kinetic assay, using radiolabelled substrates. Active site - determination of active site amino acids - chemical probe, affinity label, and site-directed mutagenesis, intrinsic and extrinsic regulations.Investigation of 3-D structure of active site.A brief account of nonprotein enzymes - ribozymes and DNA enzymes.

UNIT-II : ENZYME KINETICS

Kinetics of single substrate enzyme - catalysed reactions - Michaelis - Menten equation, importance of Vmax, Km, MM equation, and turnover number; Lineweaver - Burk plot, Eadie - Hofstee plot, and Hanes - Woolf plot .

Presteady - state kinetics and relaxation kinetics.Kinetics of Allosteric enzymes - MWC and KNF models Hill' equation coefficient. Kinetics of multi - substrate enzyme - catalysed reactions - Ping-pong bi-bi, random order and compulsory order mechanism.

UNIT-III : ENZYME CATALYSIS AND INHIBITION

Mechanism of enzymicaction , mechanism of serine proteases - chymotrypsin, lvsozyme, carboxy peptidase A and ribonuclease.

Reversible inhibition - competitive, uncompetitive, noncompetitive, mixed, substrate and allosteric inhibition.Irreversible inhibition.

UNIT-IV : COENZYMES AND ISOENZYMES

Coenzymes - prosthetic group, classification - vitamin and nonvitamin coenzymes, thiamine pyrophosphate - mechanism of oxidative and nonoxidative decarboxylation, transketolase reaction, PALP and PAMP - role of PALP in transamination and decarboxylation reaction, folate coenzymes and vitamin C, metabolite and nonvitamin coenzymes, lipoic acid, coenzyme Q, nucleoside triphosphate and S-adenosyl methionine. Isoenzymes.

UNIT-V : INDUSTRIAL AND CLINICAL USES OF ENZYMES

Industrial uses of enzymes - sources of industrial enzymes, thermophilic enzymes, amylases, glucose isomerases, cellulose degrading enzymes, lipases, proteolytic enzymes in meat and leather industry, detergents and cheesed production.

Clinical enzymology - Enzymes as thromblytic agents, anti-inflammatory agents.Immobilization of enzymes and their applications.

References

1. Enzymes - Dixon and Webb, Academic Press, 1964

2. Understanding enzymes - Palmer. Prentice Hall; 4 Sub edition, 1995

3. Enzymes - Boyer. Academic Press; 3rd edition, November 1983

4. Biochemistry - Metzler. Academic Press, 2000.

5. Biochemistry - Stryer. W. H. Freeman; 6 edition, 2006.

PAPER-6

INTERMEDIARY METABOLISM

UNIT-I : BIOENERGETICS AND BIOLOGICAL OXIDATION

Free energy and entropy.Phosphoryl group transfers and ATP. Enzymes involved in redox reactions. The electron transport chain - organization and role in electron capture.

Oxidative phosphorylation - Electron transfer reactions in mitochondria. F_1F_0 ATPase - Structure and mechanism of action. The chemiosmotic theory.Inhibitors of respiratory chain and oxidative phosphorylation - Uncouplers and ionophores.Regulation of oxidative phosphorylation.

Mitochondrial transport systems - ATP/ADP exchange, malate / glycerophosphae shuttle, creatine - phosphate shuttle.

UNIT-II : CARBOHYDRATE METABOLISM

Glycolysis ,citric acid cycle andgluconeogenesis-pathway, key enzymes and coordinate regulation.The pentose phosphate pathway. Metabolism of glycogen and regulation.Metabolism of galactose and fructose.The glyoxylate cycle.Cori cycle. Futile cycles, anaplerotic reactions.

UNIT-III : LIPID METABOLISM

Oxidation of fatty acids - α,β and ω. Metabolism of ketone bodies - Formation, utilization, excretion and clinical significance. Biosynthesis of fatty acids.Metabolism of triglycerides, phospholipids and sphingolipids. Cholesterol - Biosynthesis, regulation, transport and excretion. Eicosanoid metabolism.

UNIT-IV : AMINO ACID, PURINE AND PYRIMIDINE METABOLISM

Biosynthesis of aromatic aminoacids.Catabolism of amino acid nitrogen - Transamination, deamination, ammonia formation and the urea cycle.Disorders of the urea cycle.Catabolism of carbon skeletons of amino acids.Conversion of amino acids to specialized products.

Metabolism of purines - *De novo* and salvage pathways for biosynthesis.Purine catabolism.Biosynthesis and catabolism of pyrimidines.

UNIT-V PORPHYRINS,PHOTOSYNTHESIS AND METABOLIC INTEGRATION

Biosynthesis and degradation of heme.

Photosynthesis - Photosynthetic apparatus, light reaction, cyclic and noncyclic photophosphorylation. Dark reaction - Calvin cycle, Hatch-Slack pathway.Photorespiration.Starch biosynthesis and degradation.Bioluminescence.
Integration of metabolism - Interconversion of major foodstuffs.Metabolic profile of the liver, adipose tissue and brain.Altered metabolism in starvation.

Text Books

1. Biochemistry 4th ed. Brooks/Cole Pub Co - Campbell and Farrell, 2002.
2. Biochemistry NMS. 4th ed. Lippincott. Willams and Wilkins - Davidson and Sittman, 1999.
3. Biochemistry - Donald Voet, J.G. Voet and John Wiley, 1995.
4. Biochemistry, 2nd ed. Schaum's Outlines McGraw Hill - Kuchel and Ralston, 1998.
5. Harper's Biochemistry. 26th ed. McGraw Hill - Murray, et al. 2003.
6. Lehninger's Principles of Biochemistry, 4th ed. McMillan Worth - Nelson Cox, 2004.
7. Biochemistry - Stryer. W. H. Freeman; 6 editions, 2006.

MAIN PRACTICAL

PAPER-1

A. ISOLATION AND CHARACTERIZATION STUDIES

1. Isolation and estimation of glycogen from liver.

2. Isolation and estimation of DNA from liver and spleen.

3. Isolation and estimation of RNA from plant tissues or yeast.

4. Isolation of lecithin from egg yolk.

5. Denaturation of DNA and UV absorption studies. (demonstration).

B. QUANTITATIVE ANALYSIS

1. Estimation Of Ascorbic Acid

2. Estimation of inorganic phosphorus by Fiske and SubbaRao method.

3. Determination of pyruvate or lactate

4. Determination of tryptophan.

5. Determination of protein by Lowry's method.

6. Estimation of sodium by flame photometry.

7. Estimation of glutathione from tissue/blood

8. Estimation of Iron

C. TECHNIQUES

1. Preparation of buffers and measurement of pH using indicators and pH meter.

2. Separation of amino acids sugars and lipids by thin layer chromatography.

3. Separation of plant pigments by column chromatography.

4. Separation of serum proteins by PAGE.

5. PCR Technique - Demonstration

References

1. Practical Biochemistry - K. Wilson and I. Walker. 5th edition, Cambridge University press, 2000.

2. Practical Biochemistry – Shawney.

3. Biochemical Methods - S.Sadasivam & A.Manickam, New Age International.

MAIN PRACTICAL

PAPER-2

A. ENZYMOLOGY - PURIFICATION AND KINETIC STUDIES

1. Subcellular fractionation of organelles from liver cells and identification by marker enzyme - LDH

2. Isolation of acid phosphatase from potato.

a. Determination of optimum pH.
b. Determination of optimum temperature.
c. Effect of substrate concentration on acid phosphatase activity.
d. Inhibition of acid phosphatase activity.

3. Assay of clinically important enzymes.

a. Assay of serum/tissue alkaline phosphatase activity.
b. Assay of serum acid phosphatase activity.
c. Assay of serum creatinine phosphokinase activity
d. Assay serum alanine aminotransferase activity.
e. Assay of serum aspartate aminotransferase activity

B. MICROBIAL TECHNIQUES

1. Handling and maintenance of microscopy.
2. Sterilization techniques - principles, methods, moist heat, dry heat, filter types CDC, safety levels.
3. Preparation of media - liquid, solid, agar deep. Slant and plate.
4. Staining techniques - simple, differential and special staining.
5. Pure culture techniques - streak plate, pour plate.
6. Growth curve - non-visual method turbidity method.
7. Identification and enumeration of microorganisms from soil - streak plate, pour plate.
8. Identification and enumeration of microorganisms from water - standard plate count, MPN test and membrane filtration technique.
9. PCR Technique - Demonstration

References

1. Practical Biochemistry - K. Wilson and I. Walker. 5th edition, Cambridge University press, 2000.

2. Practical Biochemistry – Shawney.

3. Biochemical Methods - S.Sadasivam & A.Manickam, New Age International.

4. Medical laboratory Technology Volume I, II & III - KL Mukherjee

ELECTIVE

PAPER-2

(to choose 1 out of 3)

A. MICROBIOLOGY

UNIT-I : MORPHOLOGY AND ULTRASTRUCTURE

Ultrastructure of bacteria, fungi, algae and protozoa.Classification of microbes, molecular taxonomy, cell walls of eubacteria - peptidoglycan and related molecules.Structure and synthesis of cell wall and cell membrane of gram - positive and negative bacteria.Flagella and motlility.Cell inclusion bodies.

Blue and green bacteria.Budding and appendaged bacteria, spirilla, spirochaetes, gliding and sheathed bacteria, pseudomonads, lactic and propionoc acid bacteria.Endospore forming rods and cocci, myobacteria, rickettsia and mycoplasma.Archaebacteria.

UNIT-II : MICROBIAL GROWTH AND METABOLISM

Microbial growth - definition.Mathematical expression of growth, growth curve, measurement of growth and factors affecting growth.

Microbial metabolism - overview, photosynthesis in microbes.Role of chlorophylls, carotenoids and phycobilins, Calvin cycle.Chemolithotrophy: hydrogen - iron - nitrite oxidizing bacteria: nitrate and sulfate reduction: methanogenesis and acetogenesis, fermentations - diversity, syntrophy - role of anoxic decompositions. Nitrogen metabolism, nitrogen fixation, hydrocarbon transformation.

UNIT-III : MICROBIOLOGICAL TECHNIQUES

Methods in microbial identification.Pure culture techniques.Theory and practice of sterilization.Principles of microbial nutrition, construction of culture media.Enrichment culture techniques for isolation of chemoautotrophs, chemoheterotrophs and photosynthetic microbes.

UNIT-IV : VIRUSES

Bacteria, plant, animal and tumor viruses.Classification and structure of viruses.Lytic cycle and lysogeny. DNA viruses: positive and negative strand. Double stranded RNA viruses. Replication: example of herpes, pox, adenoviruses, retroviruses, viroids and prions.

UNIT-V : MEDICAL MICROBIOLOGY

Disease reservoirs; Epidemiological terminologies.Infectious disease transmissions. Respiratory infections caused by bacteria and viruses; Tuberculosis, sexually transmitted diseases including AIDS; Vector bone diseases, water borne diseases, Public health and water quality. Pathogenic fungi, Antimicrobial agents, Antibiotics.Penicillins and cephalosporins, Broad spectrum antibiotics.Antibiotics from prokaryocytes, antifungal antibiotics - mode of action, Resistance to antibiotics.

Text Books

1. Medical Microbiology- Jawetz, Melnick and Adelberg's, Lange Med. Brooks, et al 1998.
2. Microbiology. 4th ED - Davis, et al. Lippincott Williams and Wilkins, 1989.
3. Microbiology -Joklik, et al. Zinsser's McGraw Hill Professional, 1995.
4. Brack Biology of Microorganisms, 10th ed- Madigan, et al. Prentice Hall, 2002.
5. Microbiology, 5th Ed. - Pelczar et al. McGraw Hill, 2000.
6. Microbiology -Prescott et al. Mcgraw Hill, 1999.
7. General Microbiology. 5thed,Stainer RY, et al. Prentice Hall, 1986.

ELECTIVE

PAPER-2 (to choose 1 out of 3)

B. BIOCHEMICAL AND ENVIRONMENTAL TOXICOLOGY

UNIT-I

Definition and scope of toxicology: Eco-toxicology and its environment significance toxic effects. Basis for general classification & nature, dose - response relationship. Synergism and Antagonism, Determination of ED 50 & LD 50.

Acute and chronic exposures. Factors influencing toxicity. Pharmaco dynamics & Chemo dynamics.

UNIT-II

Principles & procedures of testing for acute toxic effects. Regulators guidelines, mammalian systems affected & the clinical signs of systemic toxicity. Factors affecting acute toxicity studies. Biochemical basis of toxicity. Mechanism of toxicity: disturbance of excitable membrane function altered calcium homeostasis. Covalent binding to cellular macromolecules. Genotoxicity. Tissue specific toxicity.

UNIT-III

Toxicity testing : Test Protocol, Genetic Toxicity Testing & Mutagenesis Assays: *Invivo* test systems- Bacterial Mutation Tests: Reversion Tests, Ames test, Fluctuation Tests & Eukaryote Mutation Tests In Vivo Mammalian Mutation Tests – host mediated assay & dominant lethal test. Use of drosophila in toxicity testing. DNA repair assays. Chromosome damage test. Toxicological Evaluation of Recombinant DNA –Derived Proteins.

UNIT-IV

Food toxicology: Toxicology of food additives. Metal toxicity: Toxicology of Arsenic, Mercury, Lead and Cadmium. Environmental Factors Affecting Metal Toxicity- Effect of Light, Temperature & PH. Diagnosis of toxic changes in liver and kidneys: Metabolism of Haloalkanes. Haloalkenes & Paracetomol with their toxic effects on tissues.

UNIT-V

Air pollution: common air pollutants and their sources. Air pollution & ozone. Air pollution due to chloroflurocarbons (CFCS) and asbestos. Occupational toxicology and assessment of occupational hazards: industrial effluent toxicology & environmental health. An overview of regulatory agencies: responsibilities of regulatory agencies. Management of toxicological risks. Regulatory approaches. Regulatory systems and organizations.

References:

1. Casarett and Doull's Toxicology, III rd edition - Klaassen C D, Amdur M O & Doull J (1986), Macmillan publishing company, New York. 26

2. Industrial Toxicology - Williams P L & Burson J L Van- Nostrand Reinhold, New York, 1985

3. Principles and methods of toxicology, II nd edition -Hayes A W, Raven press New York, 1988

4. Toxicology, Vol I - Stewart C P&Stolman A Academic press, New York, 1960

SEMESTER III

PAPER-7

ADVANCED ENDOCRINOLOGY

UNIT-I : CLASSIFICATION AND MECHANISM

Hormones - definition, classification based on receptors, hormone cascade system involving CNS, hypothalamus, anterior pituitary, target gland, feedback mechanisms, classification of hormones (polypeptides, glycoproteins and POMC peptides), genes and formation of polypeptide hormones - POMC peptides and vasopressin, insulin, Parathyroid.

UNIT-II : AMINO ACID DERIVED HORMONES

Synthesis of amino acid derived hormones-epinephrine and thyroxine, inactivation and degradation of hormones, signal transduction and second messengers - adenylate cyclase system, cAMP, adrenalin and glycogen degradation. G-protein as cellular transducer, inositol triphosphate and calcium release, glycogen phosphorylase kinase, DAG and protein kinase C-pathway.

UNIT-III : CYCLIC HORMONAL CASCADE SYSTEM AND PROTEIN KINASES

Cyclic hormonal cascade system - chronotropic control, melatonin and serotonin - light and dark cycle, ovarian cycle and role of hormones, hormone - receptor interactions, multiple hormone subunits Sactchard analysis, structure beta -adrenergic receptor and insulin receptor, internalization of receptors, intracellular action - protein kinases, insulin receptor - transduction through tyrosine kinase, vasopressin - protein kinase A, GnRH-protein kinase C, atrial natriuretic factor - protein kinase G.

UNIT-IV : HORMONE RECEPTORS AND REGULATION

Steroid hormone receptors, intracellular protein receptors, structural organization of receptor protein, hormone binding domain, antigenic domain and DNA binding domain, organizations of functional elements - hormone response elements, positive and negative transcriptional effects of S.R, receptor activation - upregulation and down regulation, apoptosis - steroid hormone action at cell level, multiple endocrine neoplasia - different types.

UNIT-V : STEROID HORMONES

Structure, biosynthesis, transport of steroid hormones in blood and metabolic inactivation of steroid hormones, control of synthesis and release of steroid hormones, Hormones that directly stimulate synthesis and release of steroid hormone with reference to the second messengers and the signal pathway (cortisol, aldosterone, testosterone, 17B - estradiol, progesterone and calcitriol).

References

1. Textbook of biochemistry (with clinical correlation) by Devlin, Wiley-Liss; 6 edition (2005)

2. Textbook of endocrinology by Wilson and Foster, W.B. Saunders Co.

3. Harper's Biochemistry by R.K. Murray et al. McGraw-Hill Medical; 27 edition (2006)

PAPER-8

RESEARCH METHODOLOGY

UNIT- I : SCIENTIFIC RESEARCH & WRITING

Importance and need for research. Ethics and scientific research. Formulation of hypothesis. Types and characteristic designing a research work. Scientific writing - Characteristics - Logical format for writing thesis and papers. Essential features of abstract, introduction, review of literature, materials and methods, and discussion. Effective illustration - tables and figures. Reference styles - Harvard and Vancouver systems.

UNIT-II : BIOSTATISTICS

Collection and classification of data - diagrammatic and graphic representation of data- measurement of central tendency - standard deviation - normal distribution - test of significance based on large samples - small samples - Student t test -correlation and regression - Chi square test for independence of attributes - ANOVA.

UNIT- III : BIOINFORMATICS

Introduction to bioinformatics, scope of bioinformatics, role of computers in biology The internet. The World Wide Web. Useful search engines - Boolean searching, search engine algorithms. Finding scientific articles – PubMed,Science direct.

UNIT-IV : DATABASES

Data base concepts - database, database system, database management systems - hierarchical , rational and network, database security. Biological databases - types, sequence and structure. Data submission and data retrieval. Searching sequence databases - sequence similarity searches, amino acid substitution matrices. Database search - FASTA and BLAST, CLUSTAL.

UNIT-V : BIOETHICS AND PATENTING

Declaration of Bologina. Ethics in animal experimentation. CPCSEA guidelines - Animal care and technical personnel environment, animal husbandry, feed, bedding, water, sanitation and cleanliness, waste disposal, anesthesia and euthanasia.

Composition of (Human) institutional Ethical Committee (IEC) - General ethical issues. Specific principles for chemical evaluation of drugs, herbal remedies and human genetics research, Ethics in food and drug safety. Environmental release of microorganisms and genetically engineered organisms Ethical issues in human gene therapy and human cloning.

Patenting - definition of patent. Product and process patents. Patenting multicellular organisms. Patenting and fundamental research.

Books Recommended

1. How to write a scientific paper- R.A. Day.. Cambridge University Press.
2. Guide to scientific and technical writing - Cooray P.G.
3. Methods of Research - Carter V. Good and Douglas E seats.
4. The craft of scientific writing - Alley, Michael. Englewood Cliffs. N.N. Prentice 1987.
5. Desk Top Publishing on PC - M.C. Sharma, BPB Publications, 1997.
6. Introduction to Bioinformatics - Lesk, A.M. Oxford 2002.
7. Bioinformatics Computing 1st Edition - Bergeron BP 2002 Printice Hall
8. Fundamental concepts of bioinformatics - Krane et al Benjamin Cummings.
9. An Introduction to Biostatistics - Sundar Rao, Jesudian Richard.
10. Fundamentals of statistics - S.P. Gupta , Sultan Chand.
11. Ethics and the use of alternatives to animals in research and education, ShiraneePereira, CPCSEA.
12. CPCSEA guidelines for laboratory animal facility (CPCSEA) - No.13 Seaward road, Valmiki Nagar, Chennai-41.
13. Ethical guidelines for biomedical research on human subjects. ICMR, New Delhi,2000.
14. Dickson. Molecular and cell biology of human gene therapeutics. Series Chapman and Hall 1995.

PAPER-9

BIOTECHNOLOGY

UNIT-I : TOOLS OF GENETIC ENGINEERING

Basic principles - mechanism of natural gene transfer by Agrobacterium, generation of foreign DNA molecules, restriction enzymes, their types and target sites, cutting and joining DNA molecules, linkers, adapters, homopolymers, enzymes used in genetic engineering, cloning vehicles and their properties, natural plasmids, i*nvitro* vectors, cosmids and T-DNA based hybrid vectors.

UNIT-II : DNA CLONING AND SEQUENCING

Cloning strategies - cloning with single strand DNA vectors, cDNA cloning and gene libraries, recombinant selection and screening methods, expression of cloned genes-problems and solutions, shuttle vectors, DNA sequencing strategies - Sanger's and Maxam Gilbert's methods, PCR-types and applicationsand DNA hybridization, Southern, Northern andWestern blotting.

UNIT-III : GENE TRANSFER AND APPLICATIONS

Techniques of tissue culture-culturing explants and haploids, protoplasts fusion, methods of gene transfer to plants, animals and bacteria-Ca transfection, electroporation, shotgun and others, transgenic plants, GM foods, and biopesticides, gene knockouts and transgenic animals, xenogarfting, biodegradation, stimulation and its applications, bioleaching.

UNIT-IV : INDUSTRIAL BIOTECHNOLOGY

Applications of biotechnology-industrial biotechnology-fermentors, principle, types product recovery and purification of ethanol, citric acid, vitamin B 12, streptomycin, enzyme biotechnology-production and uses of industrially important enzymes such as protease.

UNIT-V : BIOSAFETY AND BIOETHICS

Biotechnology - potential hazards, biological weapons, biosafety of GM foods and GMOs - substantial equivalence and safety testing, gene drain, the tangled genes, human genome research - the objectives and approaches, the controversies, issues of biotechnology-social and scientific, technology protecting systems and the terminator, IPR, its concepts and conditions -patenting of genes, cells and life forms, evaluation of life patenting.

References

1. Genes - VIII by Lewin B, Oxford University Press, 2003
2. Basic Biotechnology - Ratledge & Kristianeen, Cambridge University press 2nd ed.
3. Gene cloning - an introduction by TA Brown, Chapman and Hall.
4. Molecular Biotechnology, 2nd ed - Glick & Pasternak, Panima Publications.

ELECTIVE
PAPER – 3
(To choose 1 out of 3)

A. IMMUNOLOGY

UNIT-I : LYMPHOID SYSTEM, ANTIGENS AND ANTIBODY

Lymphoid system - central and peripheral lymphoid organs and cells involved in immune system. Antigen, haptens, adjuvants, antigenicity, antigenic determinants and epitopes. Immunoglobulins basic structure, classification, functions, allotypes and idiotypes. Theories of antibody formation- side chain and clonal selection theory. Antibody diversity - mechanisms contributing to diversity - somatic recombination, rearrangement and generation of antibody diversity.

UNIT-II : IMMUNITY AND COMPLEMENT SYSTEM

Types of immunity - innate and acquired immunity, antitoxin, antibacterial and antiviral immunity. Immune response - primary and secondary - humoral and cell mediated immunity. Antigen recognition - T cell and B cell receptor complexes, antigen processing and presentation. Interaction of T and B cells, cytokines. Immunological memory, cytotoxicity - immunotolerance, immunosuppression.

Complement system - components, nomenclature, activation of complement, complement receptors and alternate pathway.

Immunity toextracellular and intra cellular microbes-Bacteria,Virus,Fungi and Parastites

UNIT-III : VACCINES AND IMMUNOLOGICAL TECHNIQUES.

Vaccines - killed attenuated organisms, toxoid, recombinant vaccines, subunit vaccines, DNA vaccines, synthetic peptide vaccines, antiidiotypic vaccines. Immunization practices- immunoprophylaxis and immunotherapy.

Immunological techniques - Production of polyclonal and monoclonal antibodies. Immunoprecipitation, RIA, ELISA, fluorescent immunoassay, avidin-biotin mediated assay, immunohistochemistry, immunoelectrophoresis, immunoblotting. Complement fixation test.

UNIT-IV : GENETIC BASIS OF IMMUNOLOGY, TRANSPLANTATION AND TUMOR IMMUNOLOGY

MHC complex - gene organization - HLA genes class I and II antigens. Structure and function. Histocompatibility testing - lymphocytotoxicty test - cross matching. MHC and disease association.

Transplantation - types, genetics of transplantation - graft versus host reactions. Tissue matching and immuno suppressive agents.

Tumor immunology - immune surveillance, tumor antigens, immune response to tumors, immunotherapy of tumors.

UNIT-V : HYPERSENSITIVITY, AUTOIMMUNE AND IMMUNODEFICIENCY DISORDERS

Hypersensitivity - definition and classification - type I, II, III, IV and V hypersensitivity, mechanism involved, diagnosis and treatment.

Autoimmunity and autoimmune diseases - mechanism of development, diagnosis and treatment.

Immunodeficiency disorders-B cell deficiencies, T cell deficiencies, secondary immunodeficiency diseases-pathogenesis, diagnosis and treatment of AIDS.

References

1. Essential Immunology - Ivon Roitt, Blackwell Publishing, Incorporated; 11 edition, 2006
2. Cellular and Molecular Immunology -Abul K. Abbas, Andrew Lichtman, Saunders; 5th edition,2005
3. Practical Immunology - Frank C. Hay, Olwyn M. R. Westwood, Paul N. Nelson, and Leslie Hudson, Blackwell Science Ltd. Blackwell Publishing, Incorporated; 4 edition, December 1, 2001.
4. Immunological Techniques - D. M. Weir.
5. Basic and Clinical Immunology -Daniel P. Stites, John D. Stobo,J. Vivian Wells,Appleton & Lange; 6th edition,1987.

B. BIOINFORMATICS

UNIT-I

Computer peripherals and hardware description: computer system design. Recognition and Structure of Different Components of A Computer System And Their Respective Usage. I/O and Storage Devices with Data Communication with Introduction of Internet. Connections to the internet, internet service requirements and applications – e-mail - World Wide Web, URL, HTML, TCP/IP

UNIT-II

Operating systems: system and applications software, evolution of operating systems, layered structure of operating system, CUI and GUI's DOS internet and external commands, batch files: WIN 95/98: Anatomy of windows and features, multitasking.
Office applications : MS-Office 95/97/2000/2003 including MS-Word, MS-Excel, MS Powerpoint.

Logic developments: generation of programming languages, emulation of common DOS commands using C and C++, data structures in C objects and classes, pointers arravasione and two dimensional) normal string and file handling in C.

UNIT-III

Introduction to bioinformatics – biological data bases- sequence analysis-need and importance-pajirwise alignments – dot plot, dynamic programming – global(needle man-wunsch) and local (smith-waterman) alignment algorithms- scoring and substitution matrix – data base searching. Basics of Entrez, BLAST, and FASTA search procedures- multiple alignment. CLUSTAL – Njplot-Phylogenetis trees.

UNIT-IV

Secondary structure prediction of RNA and protein – detecting ORFs- restriction maps, algorithm for Tm calculations, primer design and probe synthesis – structural classification of proteins (SCOP and CATH) – structural genomics-functional genomics and proteomics – DNA microarrays – present status and future prospects.

UNIT-V

3-D Structural analysis of biomolecules – Molecular Visualization Tools – rasmol, Chime, weblab Viewer, Deep View, ISIS Draw, chemdraw, molmol, etc – computer modeling of proteins. Simulation studies and virtual reality – Simulation Of ES Complex Interaction and stereodynamic concept- structural studies of substrate – Ligand Binding – Drug Designing-introduction to PERL and BIOPERL to facilitate Biological Analysis.

References:

1. . Introduction to Bioinformatics-Lesk, A.M Oxford, 2002.
2. Campbell and Heyer. Discovering Genomics, Proteomics and Bioinformatics. Cold Spring Harbour Laboratory. Press & Benjamin Cummings, 2002.
3. Developing Bioinformatics Computer Skills-Gibas and Per Jambeck. O'Reilly & Associates, 2001.
4. Fundamental concepts of bioinformatics -Benjamin Cummings,Krane et al, 2002.
5. Bioinformatics computing Bergeron BP. 1st ed. - Printice Hall, 2002.
6. Bioinformatics: A practical guide to analysis of genes and proteins.2nd ed. - Baxevanis & Ouellette, Wiley-Inter Sci, 2001.

C. NANO BIOTECHNOLOGY

UNIT I: NANOBIOMATERIALS

Introduction – Biocompatibility - Antibacterial activity- Principles involved - Applications. Biomaterial Nanocircuitry: Protein based nanocircuity: Neurons for network formation. DNA nanostructures for mechanics and computing and DNA based computation: DNA based nanomechanical devices.

UNIT II: NANOBIOTECHNOLOGY

Interaction between Biomolecules and Nanoparticle surface, Different types of inorganic materials used for the synthesis of Hybrid Nano-bio assemblies, Application of Nano in biology, Nanoprobes for analytical applications- A new methodology in medical diagnostics and biotechnology, Current status of Nanobiotechnology, Future perspectives of Nanobiology, Nanosensors.

UNIT III: NANOMEDICINES

Developing of Nanomedicines, Nanosystems in use, Protocols for Nanodrug administration, Nanotechnology in Diagnostics applications, Materials used in diagnostics and therapeutic applications - Molecular Nanomechanics, Molecular devices, Nanotribology, Studying Tribology at Nanoscale, Nanotribology applications.

UNIT IV: MOLECULAR AND CELLULAR BIOLOGY

Molecular and cellular biology applications, 2-D electrophoresis and mass spectrometry of proteins, Protein Microarrays (Fabrication – Fluorescencedetection) - Binding Assays and Immunosensors- Integrated Nanobiotechnology Systems.

UNIT V: BIOLOGICAL METHODS OF SYNTHESIS

Use of Bacteria, Fungi, Actinomycetes for Nanoparticle Synthesis, Magnetotactic Bacteria for Natural Synthesis of Magnetic Nanoparticles: Mechanism of Formation: Viruses As Components for the Formation of Nanostructured materials: Synthesis Process and application, Role Of Plants in Nanoparticle Synthesis.

Reference:

1. Nanotechnology - Mark Ratner and Daniel Ratner, Pearson education.
2. Nanomaterials - A.K.Bandyopathy: New Age International Publishers
3. Bionanotechnology: Lessons From Nature - David S.Goodsell
4. Nanomedicine, Vol IIA: Biocomnpatibility - ROBERT A. FREITAS
5. Handbook of Nanostructured Biomaterials and their applications in nanobiotechnology – Harisingh Nalwa
6. Nanobiotechnology: ed. C.M.Niemeyer, C.A.Mirkin.
7. Nanocomposite Science and Technology Ajayan,Schadler &Braun.
8. BioMEMS(Microsystems)- Gerald A.Urban.
9. Introduction to Nanoscale Science And Technology (Nanostructure Science And Technology) – Massimiliano Diventra
10. Nanosystems: molecular : Molecular Machinery, Manufacturing And Composition- K.Eric Drexler
11. Springer handbook of nanotechnology- Bharat Bhusha
12. Nanobiotechnology: ed - C.M. Niemeyer, C.A.Mirkin.

SEMESTER IV

PAPER-10

MOLECULAR BIOLOGY

UNIT-I : DNA REPLICATION

Types of replication, evidence for semiconservative replication - Meselson and Stahl experiment, Replication in prokaryotes and inhibitors of replication, replication bubble, bidirectional replication, replicon, action of SSB, primase, DNA gyrase, topoisomerases, DNA polymerase I, II, and III, lagging and leading strand synthesis, Okazaki fragments, replication in RNA virus, plasmid replication (x174) reverse transcriptase, retroviruses, temporal control of replication. Eukaryotic replication and inhibitors of replication,

UNIT-II : TRANSCRIPTION

Transcription - definition, coding strand, template strand, sense strand and antisense strand, promotor, foot-printing experiment, DNA - dependent RNA polymerase role of Prinbnow box, template binding, prokaryotic transcription, Rho - dependent and independent transcription, posttranscriptional processing in prokaryotes, split genes, overiapping genes, housekeeping genes, biosynthesis of rRNA and tRNA, eukaryotic transcription, RNA editing - post-transcriptional modifications of eukaryotic RNAs, RNA splicing, introns and splicing reactions, self-splicing introns - group I and group II, exons, spacer sequences, enhancers.

UNIT-III : GENETIC CODE AND TRANSLATION

Genetic code - definition, deciphering of the genetic code, codon dictionary, salient features of genetic code. structure of tRNA, activating enzymes, binding of amino acids to tRNA, wobble mechanism and its significance, composition of prokaryotic and eukaryotic ribosomes, leader region, Shine-Dalgarno sequence, reading frameshift, prokaryotic and eukaryotic protein biosynthesis - initiation, elongation, translocation and termination, polysomes, post-translational modifications in prokaryotes and eukaryotes, inhibitors of protein synthesis.

UNIT-IV : PROTEIN TRANSPORT AND GENE EXPRESSION

Protein targeting, translocation, heat shock proteins, glycosylation, SNAPs and SNAREs, bacterial signal sequences, heat shock proteins, mitochondrial, chloroplast and nuclear protein transport, endocytosis-viral entry, ubiquitin TAG protein destruction, gene expression and regulations, molecular mechanism of regulation, prokaryotes - operon model, lac, trp, arabinose operons, repression and attenuation, eukaryotes - C value paradox, repetitive DNA, gene dosage and gene amplifications.

UNIT-V : MUTAGENESIS, DNA DAMAGE AND REPAIR

Mutagenesis and replication fidelity, misincorporation of nucleotides during DNA synthesis, transient and spontaneous chemical changes in DNA, frameshift mutagenesis, DNA damage - different types, DNA repair - direct reversal repair, direct repair of nicks, excision repair, nucleotide excision repair, mismatch repair, long and short patch mismatch repair, recombination error, SOS response and mutagenic repair.

References

1. Molecular biology -Robert F. WeaverMcGraw-Hill 4 edition, 2007
2. Advanced molecular biology -R. M. Twyman,1998
3. Genes VII - B. Lewin Oxford University Press, Cell Press, London, 2000.
4. Cell and molecular biology - G. Karp, John Wiley & Sons Inc, 2002.
5. Biochemistry - D.Voet and J. Voet. John Wiley and Sons Ltd, 1990

PAPER-11

ADVANCED CLINICAL BIOCHEMISTRY

UNIT-I : SPECIMEN COLLECTION AND ANALYSIS

Concepts of accuracy, precision, reproducibility, reliability, and other factors in quality control. Normal values. Clinical significance of sugars, proteins, ketone bodies, bilirubin and porphyrins. CSF - collection, composition and analysis. Amniotic fluid - Origin, collection, composition.

UNIT-II : DISORDERS OF CARBOHYDRATE AND LIPID METABOLISM

Disorders of carbohydrate metabolism - blood sugar levels, hyper-and hypoglycemia, regulation of blood glucose, renal threshold, diabetes mellitus - etiologic classification and diagnostic criteria, glucose tolerance test, metabolic complications - acute and late complications. Hypoglycemic agents. Glycogen storage diseases, galactosemia, fructosuria.

Disorders of lipid metabolism - plasma lipids and lipoprotein abnormalities, lipidosis, Xanthomatoses, hypocholestremic agents, fatty liver. Atherosclerosis. Tay Sach's disease, Niemann Picks disease, Gaucher's disease, inherited disorders of familiar hyper and hypolipoproteinemias.

UNIT-III : DISORDERS OF PROTEIN METABOLISM AND CLINICAL ENZYMOLOGY

Disorders of protein metabolism - non-protein nitrogenous constituents in blood - urea, uric acid and creatinine. Plasma protein abnormalities - deficiency, agammaglobulinemia, multiple myeloma, proteinuria, glomerulonephritis, nephrotic syndrome. Haemoglobinopathies - sickle cell anaemia and thalassimia. Phenylketonuria, tyrosinosis, alkaptonuria, maple syrup urine disease, Hartnup disease, homocystinuria, albinism.

Serum enzyme activities in diseases - Principle and assay of aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, acid phosphatase, streptokinase, asparaginase, isocitrate dehydrogenase, ceruloplasmin, y -glutamyl transpeptidase, creatine kinase and lactate dehydrogenase.

UNIT-IV : HEPATIC AND RENAL FUNCTIONAL TESTS

Normal structure and functions of liver, diseases of the liver, hepatitis types, cirrhosis, alcoholic liver disease, hepatic tumor and bilary tract diseases, liver function tests, disorders of bilirubin metabolism. Gastric function tests.
Renal function tests and related disorders - acute and chronic renal failure, urinary tract obstruction and analysis of urinary calculi.

UNIT-V: FREE RADICALS, CANCER AND DISORDERS OF NUCLEIC ACID METABOLISM

Free radicals in health and disease - Endogenous and exogenous free radicals. Oxidative damages to lipids, proteins and DNA. Role of enzymatic and non-enzymatic antioxidants. Cancer: Morphological and metabolic changes in tumor cells. Tumor markers - AFP, CEA, hCG. Carcinogenic agents.

Inborn errors of nucleic acid metabolism - Lesch Nyhan syndrome, immunodeficiency diseases associated with defects in purine nucleotide metabolism, gout, oratic aciduria, xanthinuria. Serology: C-reactive protein.

References

1. Text book of Biochemistry with clinical correlation - TM. Devlin, John Wiley and Sons, 1994
2. Clinical chemistry in diagnosis and treatment - P.D.Mayne. A Hodder Arnold Publication; 6Rev Ed edition, 1994.
3. Enzymes - P. Asokan, Chinnaa Publications, 2003.
4. Clinical biochemistry - Metabolic concepts and clinical aspects by W.J. Marshall and S.K. Bangeit, Churchill Livingstone, 1995.
5. Text Book of Medicine - K.V. Krishna Das, Jaypee Brothers Medical Publishers (P) Ltd, 1996.
6. Text Book of Medical Physiology - A.C. Guyton and J.E. Hall, Harcourt Asia, 2000.

MAIN PRACTICAL

PAPER -3

A. BIOCHEMICAL ANALYSIS OF BLOOD

1. Estimation of blood glucose by o-toluidine method.
2. Glucose tolerance test
3. Estimation of blood glucose by GOD-POD method using semiautoanalyser. (Demonstration)
4. Estimation of serum proteins by Bradford's Method.
5. Estimation of plasma fibrinogen.
6. Estimation of A.G. ratio in serum.
7. Estimation of blood urea by DAM method.
8. Estimation of serum uric acid by phosphotungstate method.
9. Estimation of serum creatinine by alkaline picrate method.
10. Estimation of serum triglycerides.
11. Estimation of serum cholesterol by Zlatkis, Zak and Boyle method.
12. Estimation of serum phospholipids.
13. Estimation of serum calcium.
14. Estimation of serum bilirubin by Evelyn Malloy method.
15. Estimation of glycosylated hemoglobin.

B. IMMUNOLOGICAL AND MOLECULAR BIOLOGY TECHNIQUES

1. Grouping of blood and Rh typing.
2. Latex agglutination test for rheumatoid factor and pregnancy.
3. ELISA - demonstration.
4. Extraction of genomic DNA and electrophoresis in agarose gel. (Demonstration)
5. Determination of molecular size of DNA. (Demonstration)
6. Restriction enzyme digestion and electrophoresis. (Demonstration)
7. Immunodiffusion
8. Production of antisera

References

1. Practical Biochemistry For Medical Students - Raghu, JAYPEE, 2006
2. Practical Clinical BiochemistryHardcover–Harold Varley,Sixth Edition, Alan H Gowenlock.
3. An Introduction to Practical Biochemistry - David T. Plummer Third Edition, Tata Mc Graw Hill
4. Medical laboratory Technology Volume I, II & III - KL Mukherjee
5. Haematology for students Practitioners - Ramnik Sood
6. Biochemical Methods - S.Sadasivam & A.Manickam, New Age International.

MAIN PRACTICAL

PAPER-4

A. HAEMATOLOGICAL METHODS

1. Collection, storage of blood and anticoagulants
2. Total RBC count
3. Total WBC count
4. Total platelet count
5. Differential WBC count
6. Absolute eosinophil count
7. Determination of hemoglobin content
8. Determination of clotting time.
9. Determination of prothrombin time
10. Determination of ESR.
11. Pathological examination of blood film.
12. Prothrombin time

B. URINE ANALYSIS

1. Collection and preservation of urine
2. Qualitative analysis of normal and pathological constituents in urine.
3. Microscopic analysis of urine
4. Estimation of titrable acidity of urine.
5. Estimate of true acidity.
6. Estimation of protein in urine by biuret method
7. Analysis of urinary calculi.
8. Estimation area in urine
9. Estimation uric acid in urine.
10. Estimation of calcium in urine.

C.Industrial study tour (Research institute/Industry one visit per year)

D. One week hands ontraining on any biochemical instrument.

References

1. Practical Biochemistry For Medical Students - Raghu, JAYPEE, 2006
2. Practical Clinical BiochemistryHardcover–Harold Varley,Sixth Edition, Alan H Gowenlock.
3. An Introduction to Practical Biochemistry - David T. Plummer Third Edition, Tata Mc Graw Hill
4. Medical laboratory Technology Volume I, II & III - KL Mukherjee
5. Haematology for students Practitioners - Ramnik Sood
6. Biochemical Methods - S.Sadasivam & A.Manickam, New Age International.

Elective

A. STEM CELL TECHNOLOGY

UNIT-I

Stem cells -Introduction, Definition and basics of stem cells. Classification of stem cells-different types of stem cells- Human embryonic stem cells, Adult stem cells. Sources of stem cells - Fetus and various adult tissues – Advantages of stem cells.

Blastocyst culture- Various stages of embryonic development. In vitro fertilization. Xeno-free derivation of stem cells – Alternative feeder cells and feeder free culture. Cryopreservation of stem cells – Conventional slow- freezing method and Vitrification method. Properties of stem cells - self renewel, clonality and plasticity. Pluripotent nature of stem cells - Extrinsic and Intrinsic factors. Characterization of human embryonic stem cells – Expression of cell surface marker, Karyotyping.

UNIT-II

Stem Cells and their developmental potentials, Characteristics of stem cells-Transdifferntiation of stem cells. Controlled differentiation of human embryonic stem cells. In vivo and invitro differentiation of stem cells. Application of stem cells.

UNIT-III

Therapeutic cloning strategies, derivation and propagation of human embryonic stem cells. Reproductive cloning by SCNT. Use of SCNT. Limitations of cloning – Hurdles to improve the efficiency of therapeutic cloning. Stem cell research and ethics – translational medicine ethics.

UNIT-IV

Hematopoietic stem cells (HSC) - Basics, Development and Regulation of HSC. Clinical Application of HSC – Gene Therapy – using haematopoietic stem cells HSC for Leukemia.

Mesenchymal stem cells (MSC) - Differentiation and Identification. Characteristics of mesenchymal stem cells. Clinical applications of stem cells. Stem cells and regenerative medicine. Ips –induced pluripotent stem cells.

UNIT-V

Skeletal Muscle Stem Cells – Development and functions. Liver stem cells – Organization and functions. Tumor stem cells – Basics differences and Similarities of cancer stem cells and stem cells. Cancer stem cell signaling – NOTCH pathway. Canonical wnt signaling pathways in hematopoietic stem cells. Stem cell therapies in animal models. Use and benefits of stem cell for human beings.

References:

1. Handbook of stemcells- Robert Lanza.
2. Stem cell research and therapeutic.s. – Yanhong Shi
3. Stem cells reviews- Humana Press
4. Stem cells – C.S. Potten
5. Adult stem cells – Kursad Turksen.

B. HERBAL TECHNOLOGY

UNIT – I : PHARMACOGNOSY

Definition and history, Indian systems of medicine - Siddha, ayurvedha, and Unani systems. Taxonomy of locally available medicinal plants, their chemical constituents and medicinal uses - Classification of Crude drugs - Chemistry of Drugs - Future of pharmacognosy.

UNIT – II : CLASSIFICATION OF MEDICINAL PLANTS

Vernacular name and family - Geographical source, cultivation, collection, and processing for market and commerce in crude drugs. Morphological and histological studies, chemical constituents - Therapeutic and other pharmaceutical uses. Underground stem - ginger, Alpinia - Roots - Rauolfia - Belladona - Aerial parts - Bark - Cinchona.

UNIT – III : BIOMEDICAL IMPORTANCE OF MEDICINAL PLANTS

Leaves - Adathoda, Eucalyptus - Flower - Clove fruits seeds - Nux vomica Nutmegs, Gooseberry - unorganized drugs - Gum - Acacia - Resin - Turpentine, fixed oil - castor oil.

UNIT – IV : HERBAL MEDICINES FOR HUMAN AILMENTS

Drugs Acting on Cardiac Diseases, Cerebral Diseases, Nasal diseases - Blood pressure Drugs acting on Nervous system – Depressants, Stimulants. Respiration and Drugs - Urogenital system and drugs - Psychoactive plants.

UNIT – V : PROPAGATION OF MEDICINAL PLANTS

Micro and macro propagation, conservation of rare medicinal plants, Role of biotechnology in medicinal plant's banks,cultivation of medicinal and aromatic plants. Drug adulteration - methods of Drug evaluation. Herbal food - Food processing - packaging - Herbal sale and Export of medicinal plants - marketing - Intellectual property rights - Export laws.

References

1. George Edward Trease and W.C. Evans - Pharmacognosy 12th edition, English Language Books Society, Baelliere Tindall.
2. Handa, S.S. and Kapoor, V.K. Pharamcognosy - 2nd Edition, Vallabh Prakashan Publishers, New Delhi.
3. Indian Medicinal plants - Jain, S.K,1980.
4. Kokate, C.K., Durohit, A.P. and Gokhale, S.R., Pharmacognosy - 12th edition - Nirali Prakasham Publishers, Pune.
5. An Introduction to Medical Botany and Pharmacognosy - Kumar N.C., 1993.
6. Indian Materia Medica – Nadkarni, 1981.
7. A text book of Pharmacognosy - Shah, S.C. and Qudary, 1990.
8. Text book of pharmacognosy , 5th edition -Wallis, T.E, CBS publishers and distributors, New Delhi.

C. GENETIC ENGINEERING

UNIT-I

Introduction to gene cloning: Early development of Genetics - Gene cloning - Specialized tools and techniques - Importance of gene cloning

Intellectual property rights and types, Patenting, Isolation and Purification of DNA; Preparation of total cell DNA, Plasmid DNA, Bacteriophage DNA, Plant cell DNA.

UNIT-II

Cloning And Expression Vectors : Plasmids- Bacteriophages (M13 and λ) PUC vectors yeast vectors, agrobacterium, medicated gene transfer, YAC, BAC, Human artificial chromosomes, Ti plasmid, SV40, baculoviruses, adenoviruses, papilloma viruses and retroviruses.

UNIT-III

Multipulation of purified DNA: DNA manipulative enzymes – Nucleases, Ligases, polymerases, Topoisomerases, Restriction enzymes performing restriction digests, Ligation-joining DNA molecules together – Random labeling Nick translation and End filling.

UNIT-IV

Introduction to DNA into living cells: Biolistics, Electroporation, Microinjection, Liposome – mediated method and Calcium phosphate method.

UNIT-V

Construction of libraries – Studying gene and genome structure – Blotting techniques, PCR, Insitu hybridization, DNA Sequencing, Chromosome Walking and Jumping, DNA foot printing, Restriction analysis of DNA, RFLP, RAPD –Principles, Procedures and Applications.

References:

1. Molecular cloning, vol. I, II, III, II nd edition, Sambrook J, Fritsch E. F. and Maniatis, 1989 Cold spring harbor laboratory press, New York.
2. DNA Cloning : A practical approach D.M. Glover and D.B. Hames, RL Press, Oxford, 1995.

3. Molecular and cellular methods in Biology and Medicine, P.B. Kaufman, W. Wu , D. Kim and L.J. Cseke, CRC Press Florida, 1995.

4. Methods in Enzymology Guide to Molecular Cloning Techniques, Vol. 152 S.L. Berger and A. R. Kimmel, Academic Press Inc, San Diego, 1996.

5. Methods in Enzymology Gene Expression Technology, Vol. 185D. V. Goedel, Academic Press Inc, San Diego, 1990.

6. DNA Science: A First Course in Recombinant Technology, D. A. Mickloss and G. A Freyer, Cold Spring Harbor Laboratory Press, New York, 1990.
7. Molecular Biotechnology, 2nd Ed. S. B. Primrose, Blackwell Scientific publishers, Oxford, 1994.
8. Milestones in Biotechnology, Classic Papers on Genetic Engineering, J. A. Davis and W. S. Reznikoff, Butterworth-Heinemann Boston, 1992.
9. Route Maps in Gene Technology, M. R. Walker, and R. Rapley, Blakwell Science, Oxford, 1997.
10. Genetic Engineering: An Introduction to Gene Analysis and Exploitation in Eukaryotes, S. M. Kingsman, Blackwell Scientific Publications, Oxford, 1998.

PROJECT / DISSERTATION

WITH *VIVA VOCE*

PAPER-12

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THIRUVALLUVAR UNIVERSITY
VELLORE - 632 115

MASTER OF SCIENCE

M.Sc. CHEMISTRY DEGREE COURSE

UNDER CBCS
(With effect from 2017 - 2018)

REVISED SYLLABUS SUBMITTED

ON

DECEMBER - 2016

THIRUVALLUVAR UNIVERSITY

MASTER OF SCIENCE

M.Sc. CHEMISTRY

DEGREE COURSE

UNDER CBCS

(With effect from 2017-2018)

The Course of Study and the Scheme of Examinations

S. No.	Study Components		Ins. Hrs/ week	Credit	Title of the Paper	Maximum Marks		
	Course Title							
1ST YEAR- SEMESTTER I						CIA	Uni. Exam	Total
1	MAIN	Paper-1	4	4	Organic Chemistry- I	25	75	100
2	MAIN	Paper-2	4	4	Inorganic Chemistry- I	25	75	100
3	MAIN	Paper-3	4	4	Physical Chemistry- I	25	75	100
4	MAIN PRACTICAL	Paper-1	5	0	Organic Chemistry Practical- I	-	-	-
5	MAIN PRACTICAL	Paper-2	5	0	Inorganic Chemistry Practical- I	-	-	-
6	MAIN PRACTICAL	Paper-3	5	0	Physical Chemistry Practical- I	-	-	-
7	ELECTIVE	Paper-1	3	3	(to choose 1 out of 3) A. Advanced Polymer Chemistry B. Heterocyclic Chemistry C. Materials Chemistry	25	75	100
			30	**15**		**100**	**300**	**400**

1ST YEAR- SEMESTER II						CIA	Uni. Exam	Total
8	MAIN	Paper-4	3	3	Organic Chemistry- II	25	75	100
9	MAIN	Paper-5	3	3	Inorganic Chemistry- II	25	75	100
10	MAIN	Paper-6	4	4	Physical Chemistry- II	25	75	100
11	MAIN PRACTICAL	Paper-1	5	5	Organic Chemistry Practical- I	25	75	100
12	MAIN PRACTICAL	Paper-2	5	5	Inorganic Chemistry Practical- I	25	75	100
13	MAIN PRACTICAL	Paper-3	5	5	Physical Chemistry Practical- I	25	75	100

14	Compulsory paper		2	2	Human Rights	25	75	100
15	ELECTIVE	Paper-2	3	3	(to choose 1 out of 3) A. Green Chemistry B. Supramolecular and Nanochemistry C. Modern Separation Techniques	25	75	100
			30	**30**		**200**	**600**	**800**

2nd YEAR- SEMESTER III						**CIA**	**Uni. Exam**	**Total**
16	MAIN	Paper-7	4	4	Organic Chemistry- III	25	75	100
17	MAIN	Paper-8	4	4	Inorganic Chemistry- III	25	75	100
18	MAIN	Paper-9	4	4	Physical Chemistry- III	25	75	100
19	MAIN PRACTICAL	Paper-4	5	0	Organic Chemistry Practical- II	-	-	-
20	MAIN PRACTICAL	Paper-5	5	0	Inorganic Chemistry Practical- II	-	-	-
21	MAIN PRACTICAL	Paper-6	5	0	Physical Chemistry Practical- II	-	-	-
22	ELECTIVE	Paper-3	3	3	(to choose 1 out of 3) A. Scientific Research Methodology B. Advanced Bioinorganic Chemistry C. Advanced analytical techniques	25	75	100
			30	**15**		**100**	**300**	**400**

2nd YEAR- SEMESTER IV						**CIA**	**Uni. Exam**	**Total**
23	MAIN	Pape-10	4	4	Organic Chemistry- IV	25	75	100
24	MAIN	Paper-11	4	4	Inorganic Chemistry- IV	25	75	100
25	MAIN	Paper-12	4	4	Physical Chemistry- IV	25	75	100
26	MAIN PRACTICAL	Paper-4	5	5	Organic Chemistry Practical- II	25	75	100
27	MAIN PRACTICAL	Paper-5	5	5	Inorganic Chemistry Practical- II	25	75	100
28	MAIN PRACTICAL	Paper-6	5	5	Physical Chemistry Practical- II	25	75	100

29	ELECTIVE	Paper-4	3	3	(to choose 1 out of 3) A. Environmental Chemistry B. Inorganic Photochemistry C. Medicinal Chemistry and Drug Design	25	75	100
			30	**30**		**175**	**525**	**700**

SUBJECT	PAPERS	CREDIT	TOTAL CREDITS	MARKS	TOTAL MARKS
MAIN PAPER	12	3-4	46	100	1200
MAIN PRACTICAL	6	5	30	100	600
ELECTIVE PAPER	4	3	12	100	400
COMPULSORY PAPER	1	2	2	100	100
TOTAL	**23**	**-**	**90**	**-**	**2300**

Note:

1. Theory Papers: Internal 25 marks; External 75 marks
2. Practical Papers: Internal 25 marks; External 75 marks

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THIRUVALLUVAR UNIVERSITY
M.Sc. CHEMISTRY
SYLLABUS
UNDER CBCS
(with effect from 2017-2018)

FIRST YEAR

SEMESTER I
PAPER - 1
ORGANIC CHEMISTRY I

OBJECTIVES:

To make the students learn and understand the concept of stereochemistry, conformational analysis and their application in the determination of reaction mechanism. To understand the mechanism of nucleophilic and electrophilic substitution reactions.

UNIT-I: STEREOCHEMISTRY

Optical activity and chirality, classification of chiral molecules as asymmetric and dissymmetric. A brief study of dissymmetry of allenes, biphenyls, spiro compounds, trans-cyclooctene, cyclononene and molecules with helical structures. Absolute configuration - R, S notation of biphenyls and allenes. Fischer projection. Inter conversion of Sawhorse, Newman and Fischer projections. Erythro and threo nomenclature, E and Z nomenclature - Asymmetric synthesis - Cram's rule.

UNIT-II: CONFORMATIONAL ANALYSIS

Conformational analysis of disubstituted cyclohexane and their stereochemical features (geometrical and optical isomerism (if shown) by these derivatives). Conformation and reactivity of substituted cyclohexanol (oxidation and acylation), cyclohexanone (reduction) and cyclohexane carboxylic acid derivatives (esterification and hydrolysis). Conformation and stereochemistry of cis and trans-decalin and 9 - methyldecalin.

UNIT-III: ALIPHATIC SUBSTITUTION REACTIONS

Nucleophilic substitution reactions: S_N1, S_N2 and S_Ni mechanisms - Neighboring group participation – Reactivity - structural and solvent effects - substitution in norbornyl and bridgehead systems - substitution at allylic and vinylic carbons - substitution by ambident nucleophiles - substitution at carbon doubly bonded to oxygen and nitrogen - alkylation and acylation of amines, halogen exchange, Von-Braun reaction, alkylation and acylation of active methylene carbon compounds, hydrolysis of esters, Claisen and Dieckmann condensation.

Electrophilic substitution reactions: S_E1, S_E2 and S_Ei mechanism, double bond shift - Reactivity. Migration of double bond, keto-enol interconversion, Stark- Enamine reaction, halogenation of aldehydes and ketones and decarboxylation of aliphatic acids.

UNIT-IV: ELIMINATION REACTIONS

E1, E2 and $E1_CB$ mechanism - E1, E2 and E1cB spectrum - Orientation of the double bond - Hoffman and Saytzeff rules - Competition between elimination and substitution. Typical elimination reactions- dehydration, dehydrohalogenation and dehalogenation. Stereochemistry of E2 eliminations in cyclohexane systems. Mechanism of pyrolytic eliminations. Chugaev and Cope eliminations.

UNIT-V: AROMATIC SUBSTITUTION REACTIONS

Electrophilic substitution reactions: The arenium ion mechanism. Orientation and reactivity (ortho, meta and para directing groups). Typical reactions including Reimer - Tieman reaction, Vilsmeier - Haack, Gattermann, Gattermann - Koch reaction and Kolbe reaction. Synthesis of di and tri substituted benzene (symmetrical tribromo benzene, 2-amino-5-methyl phenol, 3-nitro-4-bromobenzoic acid, 3, 4- dibromonitrobenzene and 1, 2, 3 - trimethylbenzene) starting from benzene or any monosubstituted benzene.

Nucleophilic substitution reactions: Mechanisms: S_N1, S_NAr and Benzyne mechanisms. Methods for the generation of benzyne intermediate and reactions of aryne intermediate. Nucleophilic substitution involving diazonium ions. Aromatic nucleophilic substitution of activated halides, Ziegler alkylation and Chichibabin reaction.

Recommended Books

1. C. Wentrup, Reactive Molecules, John Wiley and Sons, New York (1984).
2. C.K. Ingold,Structure and mechanism in organic chemistry, Cornell Universitypress.
3. E. S. Gould, Mechanism and Structures in Organic Chemistry, Holt, New York (1959).
4. Ernest Eliel, Stereochemistry of carbon compounds, McGraw Hill, New York (1962).
5. Francis A. Carey and Richard J. Sundberg, Advanced Organic Chemistry, Part A and B, III Edition, Plenum Press (1990).
6. Graham Solomons, Organic Chemistry.
7. J. March, Advanced organic reaction mechanism and structure, Tata McGraw Hill.
8. J. Miller, Advanced Organic Chemistry, III Edition.
9. J. Miller, Aromatic Nucleophilic Substitution
10. Longman, A Guide book to mechanism in organic chemistry.
11. Marc London,Organic Chemistry.
12. Nasipuri, Stereochemistry, Alhed Publishers, 2003.
13. Mc Murry, Organic Chemistry, V Edition, Asian Books Pvt Ltd (2000).
14. Niel Isaacs, Physical Organic Chemistry, ELBS Publications (1987).
15. P. Ramesh, Basic principles of Organic Stereochemistry, Madurai Kamaraj University.
16. P. S. Kalsi, Stereochemistry and mechanism through solved problems, WileyEastern Ltd., (1994).
17. P. S. Kalsi, Stereochemistry, Conformation analysis and Mechanism, II Edition, Wiley Eastern Limited, Chennai (1993).
18. R. K. Bansal, Organic Reaction Mechanism.
19. R.O.C. Norman, Organic Synthesis, Chapman and Hall, New York (1980).
20. S. M. Mukherji and S.P. Singh, Organic Reaction Mechanism, MacMillan India Ltd., Chennai (1990).
21. Stanley. H. Pines, Organic Chemistry, 5^{th} Edn, McGraw Hill International Edition. 1987.
22. T. L. Gilchrist and C.W. Rees, Carbenes, Nitrenes and Arynes, Thomas Nelson and Sons Ltd., London.
23. Peter Sykes, A Guide book to mechanism in organic chemistry, Pearson Edition (2006).
24. C. N. Pillai, Textbook of Organic Chemistry, University press (India) private Ltd (2009).

PAPER -2
INORGANIC CHEMISTRY I

OBJECTIVES:
To learn about the inorganic polymers. To study the concept of coordination chemistry, stability of the complexes and stereochemistry of complexes. To know about the structure and bonding of inorganic compounds.

UNIT-I: STRUCTURE AND BONDING - I

Polyacids: Isopolyacids and heteropolyacids of vanadium, chromium, molybdenum and tungsten.
Inorganic Polymers: Silicates, structure - properties - correlation and applications - molecular sieves, polysulphur - nitrogen compounds and poly – organophosphazenes
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UNIT-II: STRUCTURE AND BONDING - II

Boron hydrides: Polyhedral boranes, hydroboration, carboranes and metallocarboranes.
Metal clusters : Chemistry of low molecularity metal clusters (upto) trinuclear metal clusters, multiple metal-metal bonds. Cubane clusters and Zintl clusters.

UNIT-III: COORDINATION CHEMISTRY - I

Stability of complexes; thermodynamic aspects of complex formation; factors affecting stability, HSAB approach. Determination of stability constants by spectrophotometric, polarographic and potentiomteric methods.

UNIT-IV: COORDINATION CHEMISTRY - II

Stereochemical aspects; stereoisomerism in inorganic complexes; isomerism arising out of ligand distribution and ligand conformation; chirality and nomenclature of chiral complexes; optical rotatory dispersion and circular dichroism. Macrocyclic ligands; types; porphyrins; corrins, Schiff bases; crown ethers and cryptates.

UNIT-V: COORDINATION CHEMISTRY - III

Evidences for metal-ligand orbital overlap, molecular orbital theory and energy level diagrams, concept of weak and strong field ligands, Jahn-Teller distortion, charge - transfer spectra. Term states for "d"- ions, energy diagrams, d-d transitions, Orgel and Tanabe - Sugano diagrams, spin orbit coupling, nephelauxetic effect, spectral and magnetic characteristics of transition metal complexes.

TEXT BOOKS

1. F. A. Cotton and G.W. Wilkinson, Advanced Inorganic Chemistry– A comprehensive Text, John Wiley and Sons (1988).
2. J. E. Huheey, Inorganic Chemistry, Harper and Collins, NY, IV Edition, (1993).
3. K. F. Purcell and J. C. Kotz, Inorganic Chemistry WB Saunders Co., USA, (1977).
4. M. C. Shrivers, P.W Atkins, CH. Langford, Inorganic Chemistry, OUP, (1990).
5. N. N. Greenwood and Earnshaw, Chemistry of the Elements, Pergamon Press, New York (1984).
6. N. H Ray, Inorganic Polymers, Academic Press, (1978)
7. S. F. A. Kettle, Coordination Chemistry, ELBS, (1973).

Suggested References

8. A. B. P. Lever, Inorganic Electronic Spectroscopy, II Edn., Elsevier, New York, (1984).
9. B.E. Dogulas DH McDaniel's and Alexander, Concepts and Models of Inorganic Chemistry, Oxford IBH, (1983).
10. B.N. Figgis, Introduction to Ligand Fields, Interscience, (1966).
11. E.L. Mutterties, Polyhedral Boranes, Academic Press, New York (1975).
12. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., NY (1974).
13. W.U. Mallik, G.D. Tuli, R.D. Madan, Selected topics in Inorganic Chemistry, S. Chand and Co., New Delhi, (1992).
14. D. M.P.Mingos and D. J. Wales, Introduction to Cluster Chemistry, Prentice Hall, 1990.
15. R. Gopalan, Text book of Inorganic Chemistry, University press (India) private Ltd.

PAPER-3
PHYSICAL CHEMISTRY I

OBJECTIVE:

To study the partial molar property, fugacity and its significance. Theories and basic concepts of chemical kinetics - mechanism of acid, base and enzyme catalysis reaction. To acquire knowledge on phase equilibria of three component system. To study the basics of colloids.

UNIT-I: THERMODYNAMICS

Partial molar properties -Partial molar free energy (chemical potential), Partial molar volume and Partial molar heat content - Their significance and determination of these quantities. Variation of chemical potential with temperature and pressure.
Definition of fugacity - determination of fugacity by graphical method - variation of fugacity with temperature and pressure - the concept of activity and activity coefficients – determination of activity and activity coefficient by emf method - determination of activity and activity coefficients for non-electrolytes - determination of standard free energies - choice of standard states.

UNIT-II: PHASE EQUILIBRIA

Physical equilibria involving phase transition: Two component system - Congruent system (phenol-aniline) and Incongruent system (sodium chloride- water) - Peritectic reactions. Three component system: Solid - Liquid equilibria - hydrate formation (sodium chloride - sodium sulphate - water); Liquid - Liquid equilibria - one pair of partially miscible liquids (acetic acid - chloroform - water and alcohol - benzene - water); two pairs of partially miscible liquids (water - ethyl alcohol - succinic nitrile).

UNIT-III: COLLOIDS

Surface phenomena - surfactants, micellization, critical micelle concentration (CMC), factors affecting CMC of surfactants, micro emulsions, reverse micelles and surface films (electro kinetic phenomena).

Structure and stability of colloids - Zeta potential (derivation), electro osmosis, protective colloids, gold number, sedimentation potential, streaming potential and Donnan membrane equilibrium.

UNIT-IV: CHEMICAL KINETICS

Absolute Reaction Rate Theory (ARRT) - Potential energy surfaces - partition function and activated complex- Eyring equation - estimation of free energy, enthalpy and entropy of activation and their significance.

Reactions in solutions - effect of pressure, dielectric constant and ionic strength on reactions in solutions - kinetic isotope effects - linear free energy relationships. Hammett and Taft equation.

UNIT-V: CATALYSIS

Acid - Base catalysis - mechanism of acid - base catalyzed reactions - Bronsted catalysis law. Catalysis by enzymes - Kinetics of enzyme catalyzed reaction - Michaelis - Menten equation and its interpretation. Effect of substrate concentration, pH and temperature on enzyme catalyzed reactions - inhibition of enzyme catalyzed reactions - Competitive, Non-competitive and Uncompetitive inhibition.

TEXT BOOKS

1. S. Glasstone, Thermodynamics for Chemists, Affiliated East West Press, New Delhi (1950).
2. J. Rajaram and J. C. Kuriacose, Thermodynamics for Students of Chemistry, Lal Nagin Chand, New Delhi (1986).
3. Samuel Glasstone, Textbook of Physical Chemistry, Macmillan India Limited, 2nd Edition
4. Terence Cosgrove – Colloid Science - Principles, methods and applications
5. Robert J. Hunter - Foundations of Colloid Science, 2nd Edition
6. J. Rajaram and J.C. Kuriacose, Kinetics and Mechanism of Chemical Transformations. Mac Millan India Ltd (1993).
7. K. J. Laidler, Chemical Kinetics, Harper and Row, New York (1987).

Suggested References

1. W. J. Moore, Physical Chemistry, Orient Longman, London (1972).
2. K. G. Denbiegh, Thermodynamics of Steady State, Methien and Co. Ltd, London (1951).
3. K. Nash, Elements of Chemical Thermodynamics, Addision Wesley (1962).
4. Alexander and Johnson- "Colloid science"- Oxford University Press
5. R. G. Frost and Pearson, Kinetics and Mechanism, Wisely, New York (1961).
6. Amdur and G. G. Hammes, Chemical Kinetics, Principles and Selected Topics, McGraw Hill, New York (1968).
7. M.V. Sangaranarayanan and V. Mahadevan, Text book of Physical Chemistry, University press (2011).

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ELECTIVE
PAPER-I
(to choose 1 out of 3)

A. ADVANCED POLYMER CHEMISTRY

OBJECTIVE:

To gain the knowledge in the preparation, properties, characterization and applications of polymers.

UNIT- I: BASIC CONCEPTS

Classification - Nomenclature and isomerism - functionality - Molecular forces and chemical bonding in polymers - molecular weight – linear, branched and cross linked polymers. Thermoplastic and thermosetting polymers - Elastomers, fibers and resins. Techniques of polymerization - bulk solution, emulsion and suspension.

UNIT- II: KINETICS AND MECHANISM

Kinetics and mechanism of polymerization - free radical, cationic, anionic and co-ordination polymerization (Ziegler-Natta Catalyst). Copolymerization - kinetics (Detailed Study). General characterization-kinetic chain length-degree of polymerization, chain transfer - initiators - inhibitors - retarders.

UNIT-III: A. STRUCTURE AND PROPERTIES

Structure - property relationship - mechanical properties, thermal properties - glass transition temperature - factors affecting glass transition temperature - crystallinity and melting point - related to structure.

B. POLYMER CHARACTERIZATION AND ANALYSIS

Crystalline nature - X-Ray diffraction - Differential Scanning Calorimetry (DSC) - Thermo Gravimetric Analysis - molecular weight determination - Osmometry (membrane), viscosity, ultra centrifuge and gel permeation chromatography.

UNIT-IV: INDUSTRIAL AND NATURAL POLYMERS

Important industrial polymers - preparation and application of polyethylene, poly vinyl chloride, poly urethanes, polytetrafluro ethylene (TEFLON), nafion and ion - exchange resins. Importance of natural polymers - application and structures of starch, cellulose and chitosan derivatives.

UNIT-V: ADVANCES IN POLYMERS

Biopolymers - biodegradable polymers - biomedical polymers - poly electrolytes - conducting polymers - high temperature and fire retardant polymers - polymer blend - polymer composites - polymer nanocomposites - IPN inter penetrating network polymers - electroluminescent polymers.

TEXT BOOKS:

1. F. W. Bill Meyer. Text book of polymer science, III Edition, John Wiley and sons, New York.
2. P. J. Flory. Principles of Polymer Chemistry, Cornell Press (recent edition).
3. V. R. Gowarikar, B. Viswanathan, J. Sridhar, Polymer Science - Wiley Eastern, 1986.
4. F. S. Misra - Introduction to Polymer Chemistry, Wiley Eastern Ltd.,
5. P. Bahadur, N. V. Sastry, Principles of Polymer Science, Narosa Publishing House.
6. G. Odian, Principles of Polymerization, McGraw Hill Book Company, New York, 1973.
7. Charles E. Carraher, Jr, Seymour/Carraher's polymer chemistry. -- 7th Edition

Suggested References

1. Rudin, The Elements of Polymer Science and Engineering. Academic Press, New York, 1973.
2. E. H. Brawn, The Chemistry of High Polymers, Butter worth & Co., London, 1948.
3. G. S. Krishenbaum, Polymer Science Study Guide, Gordon Breach Science publishing, New York, 1973.
4. E. A. Coolins, J. Bares and E. W. Billmeyer, Experiments in Polymer Science, Wiley Interscience, New York, 1973

PAPER-1

B. HETEROCYCLIC CHEMISTRY

OBJECTIVES:

To know the student about chemistry of heterocyclic compounds. To understands the strategies for designing the chemical synthesis. To make the students knowledgeable in higher heterocycles.

UNIT I: NOMENCLATURE OF HETEROCYCLES

Introduction, nomenclature systems- systematic nomenclature system (Hantzsch – Widman system) and replacement nomenclature system for monocyclic, fused, spiro and bridged heterocycles. Aromatic heterocycles: Introduction, chemical behavior of aromatic heterocycles, classification (structural types). Criteria of aromaticity in heterocycles (bond lengths, dipole moments, empirical resonance energy, delocalization energy, Dewar resonance energy, chemical shits and ^{1}HNMR spectra).

UNIT- II: NONAROMATIC HETEROCYCLES

Introduction, strain, bond angle strain, torsional strain and their consequences in small ring heterocycles, conformations of six membered heterocycles – molecular geometry, barriers to ring inversion, pyramidal inversion and 1,3 diaxial interactions. Stereoelectronic effect in saturated six membered heterocycles- anomeric effect, other related effects and attractive interactions through space.

UNIT III: SMALL RING HETEROCYCLES

Three membered and four membered heterocycles: Synthesis and reactions of aziridines, oxiranes, thiranes, azetidines, oxetanes and thietanes. Benzo- fused five membered heterocycles: Synthesis and reactions including medicinal applications of benzopyrroles, benzofurans and benzothiophenes.

UNIT- IV: MESO IONIC HETEROCYCLES

General classification, chemistry of some important meso-ionic heterocycles of type A and B and their applications. Six membered heterocycles with on heteroatom: Synthesis and reactions of pyrylium salts and pyrones and their comparisons with pyridinium and thiopyrylium salts and pyridones.

UNIT- V: HIGHER HETEROCYCLES

Six membered heterocycles with two or more heteroatom: Synthesis and reactions of diazines. triazines and tetrazines. Seven and large membered heterocycles: Synthesis and reactions of azepines, oxepines , thiepines and diazepines. Synthesis of five and six membered heterocycles with P, As, Sb and Bi.

Text book:

1. Heterocyclic Chemistry, Vol. 1-3, R. R. Gupta, M. Kumar and V.Gupta , Spinger Verlag.

Suggested references:

2. The Chemistry of Heterocycles, T. Eicher and S. Hauptmann, Thieme.
3. Heterocyclic Chemistry, J. A. Joule, K. Mills and G. F. Smith, Chapman and Hall.
4. Heterocyclic Chemistry, T. L. Gilchrist, Longman Scientific Technical.
5. Contemporary Heterocyclic Chemistry, G. R. Newkome and W.W. Paudler, Wily –inter Science.
6. An Introduction to the Heterocyclic Compounds, R. M. Acheson, John wiely.
7. Comprehensive Heterocyclic Chemistry, A. R. Katrizky and C.W. Rees, eds. Pergamon press.

PAPER-1
C. MATERIALS CHEMISTRY

OBJECTIVES:

To learn about different types of materials. To understand the classifications of materials. To learn the advancements of material chemistry.

UNIT-I: MULTIPHASE MATERIALS

Ferrous alloys**:** Fe-C phase transformation in ferrous alloys, stainless steels, non- ferrous alloys, properties of ferrous and non-ferrous alloys and their applications.
Glasses**:** Glassy state, glass formers, glass modifiers and applications.
Ceramics**:** Ceramic structures, mechanical properties, clay products, refractories-characterizations, properties and applications.
Composites**:** Microscopic composites- dispersion-strengthened and particle reinforces-fibre-reinforced composites and macroscopic composite.
Nanomaterials**:** Nanocrystalling phase- preparation- special properties and applications.
Thin films and Langmuir - Blodgett films**:** Preparation techniques; evaporation/sputtering and sol-gel methods. Photolithography, properties and application of thin films.

UNIT-II: LIQUID CRYSTALS

Mesomorphic behaviour, thermotropic liquid crystals, positional order, bond orientational order, nematic and smectic mesophases; smectic-nematic transition and clearing temperature-horneotropic, planar and schlieren textures, twisted nematics, chiral nematics, molecular arrangement in smectic A and smectic C phases, optical properties of liquid crystals. Dielectric susceptibility and dielectric constants.

UNIT-III: IONIC CONDUCTORS

Types of ionic conductors, mechanism of ionic conduction, interstitial jumps (Frenkel). Vacancy mechanism, diffusion super ionic conductors; phase transitions and mechanism of conduction in super ionic conductors, examples and applications of ionic conductors.

High Tc Materials**:** Defect perovskites, high Tc superconductivity in cuprates, preparation and characterization of 1-2-3 and 2-1-4 materials, anisotropy, normal state properties: temperature dependence of electrical resistance, optical phonon modes, super conducting state; heat capacity;

Coherence length, elastic constants, position lifetimes and microwave absorption - Applications of high Tc materials.

UNIT-IV: MATERIALS FOR SOLID STATE DEVICES

Rectifiers, transistors, capacitors- IV-V compounds, low dimensional quantum structures, optical properties.
Organic solids: Conducting organic solids, organic superconductors and magnetism in organic materials.
Fullerenes: doped fullerenes as superconductors.
Molecular devices**:** Molecular rectifiers and transistors, artificial photosynthetic devices, optical storage memory and switches-sensors.
Nonlinear optical materials: nonlinear optical effects. Second and third order - molecular hyper polarisability and second order electric susceptibility - materials for second and third harmonic generation.

UNIT-V: ADVANCED MATERIALS

Brief study of the following: Fiber reinforced plastics (FRP), fiber reinforced metals (FRM), metal matrix composites (MMC), surface acoustic wave (SAW) materials, ceramics and cermets, electrets and SMART materials.

BOOKS SUGGESTED:

1. Solid State Chemistry and its applications, Anthony R.West, (1998), John Wiley & Sons, New York.
2. Material Science and Engineering. An Introduction. W.D. Callister. Wiley.
3. Principles of the Solid State, H.V. Keer. Wiley Eastern.
4. Materials Science for Engineers: J. C. Anderson, K.D. Leaver, P. Leevers and R.D. Rawlings, 5^{TH} Edition, Nelson Thornes Ltd.
5. Thermotropic Liquid Crystals. Ed. G.W. Gray. John Wiley.
6. Handbook of Liquid Crystals. Kelker and Hafz. Chemie Verlag.
7. Materials science, M. Arumugam ,Anuradha publications (2012) , Chennai.
8. Materials Science, S. L. Kakani, Amit Kakani, (2006), New Age International (P) Limited, Publishers, Chennai.

9. Material Science and Engineering: A First Course, V. Raghavan, 5TH Edition (2007), Prentice-Hall of India (P) limited.
10. A.R. West, Solid State Chemistry and its Applications, (1984) John Wiley & Sons, Singapore.
11. C.N R. Rao and J. Gopalkrishnan, New Directions in Solid State Chemistry, (1997) Cambridge Univ. Press.
12. T. V. Ramakrishnan and C. N. R. Rao, Superconductivity Today, (1992) Wiley Eastern Ltd., New Delhi.
13. P. Ball, Designing the Molecular World: Chemistry at the Frontier, (1994) Princeton University Press.

SEMESTER II

PAPER - 4

ORGANIC CHEMISTRY II

OBJECTIVES:

To understand the nature of carbon-hetero atom multiple bond additions and the mechanism of a chemical reactions.To understand the techniques involved in the rearrangements and their synthetic utility. To know the methods of synthetic strategies and applications. To apply the knowledge of chemical reactions in organic synthesis.

UNIT-I: ADDITION TO CARBON - CARBON AND CARBON – HETERO MULTIPLE BONDS

Electrophilic, nucleophilic and neighbouring group participation mechanisms - addition of halogen and nitrosyl chloride to olefins. Hydration of olefins and acetylenes. Hydroboration, hydroxylation, Michael addition, 1, 3 - dipolar additions, Simon - Smith reaction. Mannich, Stobbe, Darzen, Wittig, Wittig - Horner and Benzoin reactions. Carbenes and nitrenes: Methods of generation, structure, addition reactions with alkenes and insertion reactions.

UNIT-II OXIDATIONS AND REDUCTIONS

Mechanism - study of the following oxidation reactions - oxidation of alcohols - use of DMSO in combination with DCC and acetic anhydride in oxidising alcohols - oxidation of methylene to carbonyl, oxidation of aryl methane - allylic oxidation of olefins - ozonolysis - oxidation of olefinic double bonds and unsaturated carbonyl compounds - oxidative cleavage of C-C bond. Reduction: Selectivity in reduction of 4-t-butylcyclohexanone using selecterides. Hydride reductions - reduction with $LiAlH_4$, $NaBH_4$, tritertiarybutyloxyaluminium hydride, sodium cyanoborohydride, trialkyltin hydride and hydrazines.

UNIT-III: MOLECULAR REARRANGEMENTS

A detailed study with suitable examples of the mechanism of the following rearrangements: Wagner - Meerwein, Pinacol - Pinacolone, Demjanov, Dienone - phenol, Favorski, Baeyer - Villiger, Wolf, Stevens and Von Richter rearrangements.

UNIT-IV: MODERN SYNTHETIC METHODS, REACTIONS AND REAGENTS

Synthesis of simple organic molecules using acetylation and alkylation of enamines, Grignard reactions, Diels - Alder reaction, phosphorus and sulphur ylides, Robinson annulations. Retrosynthetic Analysis: Basic principles and terminology of retrosynthesis, one group and two group C-X disconnections, one group C-C and two group C-C disconnections, amine and alkene synthesis. Protection and deprotection of functional groups (R-OH, R-CHO, RCO-R, R-NH_2 and R-COOH). Uses of the following reagents: DCC, Trimethylsilyliodide, 1, 3-Dithiane (umpolung), and diisobutylaluminiumhydride (DIBAL).

UNIT-V: HETEROCYCLES, VITAMINS AND STEROIDS

Synthesis of imidazole, oxazole, thiazole, flavones, isoflavones, anthocyanins, pyrimidines (cytocine, uaracil only) and purines (adenine, guanine only). Synthesis of vitamin-A_1 using Wittig method. Conversion of cholesterol to progesterone, estrone and testosterone.

Recommended Books

1. E. S. Gould, Mechanism and Structure in Organic Chemistry Holt, Rinehart and Winston Inc., 1959.
2. Francis A. Carey and Richard J, Sundberg, Advanced Organic Chemistry - Part B, 3rd Edition (1990).
3. H. O. House, Modern Synthetic Reactions, Benjamin Cummings Publishing Company, London (1972).
4. I. L. Finar, Organic chemistry, Vol. I and II, 5th Edition, ELBS Publication.
5. J. March, Advanced organic reaction mechanism and structure, Tata McGraw Hill.
6. Mc Murry, Advanced organic chemistry, Thomas Pvt. Ltd.,
7. Michael B. Smith, Organic Synthesis, McGraw Hill, International Edition (1994).
8. L.F. Fieser and M. Fieser, Organic Chemistry, Asia Publishing House, Bombay, 2000.
9. Michael Smith, Organic synthesis.
10. Parmer and Chawla, Organic reaction mechanisms, S. Chand and Co.,
11. Paul de Mayo, Molecular Rearrangements, Vol. I and II.
12. R. E. Ireland, Organic synthesis, Prentice Hall of India
13. R.O.C. Norman, Principles of organic synthesis, Chapman and Hall, London. 1980.

14. Raymond K. Mackie and David M. Smith,Guide book to Organic synthesis, ELBS Publication.
15. S. M. Mukherji and S.P. Singh, Organic Reaction Mechanism, MacMillan India Ltd., Chennai (1990).
16. Stuart Warren, Work book for organic synthesis, The Disconnection Approach,John Wiley & Sons (Asia) Pvt. Ltd.
17. W. Carruther, Jain Coldham, Modern Methods of organic synthesis, IV Edition.
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19. C. N. Pillai, Textbook of Organic Chemistry, University press (India) private Ltd (2009).

PAPER – 5

INORGANIC CHEMISTRY II

OBJECTIVES:

To make the students knowledgeable in solid state chemistry. To equip the students for their future career in nuclear industry. To learn the chemistry of lanthanides, to learn about nanotechnology and use of inorganic compounds in biological chemistry.

UNIT-I: THE CHEMISTRY OF SOLID STATE

Structure of solids; Comparison of X-ray and Neutron Diffraction; structure of pyrovoskite, cadmium iodide and nickel arsenide; spinels and antispinels, defects in solids, non-stoichometeric compounds. Electrical, magnetic and optical properties of solids, band theory. Semiconductors, superconductors, solid state electrolytes. Types of magnetic behaviour, dia, para, ferro, antiferro and ferrimagnetism, hysterisis.
Solid state lasers, inorganic phosphors and ferrites.

UNIT- II: NUCLEAR CHEMISTRY-I

Nuclear properties: Nuclear spin and moments, origin of nuclear forces, Nuclear models: liquid drop model and nuclear shell model. Modes of radioactive decay: Orbital electron capture, nuclear isomerism, internal conversion. Detection and determination of activity by cloud chamber, nuclear emulsion, bubble chamber, Geiger-Muller, scintillation and Cherenkov counters.
Nuclear reactions: Types, cross section, compound nucleus theory, high energy nuclear, direct nuclear, photonuclear and thermonuclear reactions.

UNIT- III: NUCLEAR CHEMISTRY-II

Stellar energy: synthesis of elements, hydrogen burning, carbon burning. Nuclear reactors: fast breeder reactors, particle accelerators, linear accelerators, cyclotron and synchrotron. Radio analytical methods: Isotope dilution analysis, radiometric titrations, radio immuno assay. Neutron activation analysis.

UNIT-IV: THE CHEMISTRY OF LANTHANIDES, ACTINIDES AND NANOTECHNOLOGY

The chemistry of solid state, lanthanides and actinides, oxidation state, spectral, magnetic characteristics, coordination numbers, stereochemistry, nuclear and non-nuclear applications.

Nanotechnology: Introduction - preparatory methods, characterization, application as sensors, biomedical applications, application in optics and electronics.

UNIT-V: BIOINORGANIC CHEMISTRY

Transport proteins: Oxygen carriers, metalloenzymes, carboxy peptidase, carbonic anhydrase, redox process, iron-sulphur proteins, chlorophyll, salient features of the photo synthetic process, vitamin-B_{12}, role of sodium, potassium, calcium, zinc and copper; fixation of nitrogen, nitrogen cycle.

Text Books

1. A. R. West, Basic solid state chemistry, John Wiley, (1991).
2. S. Glasstone, Source Book on Atomic Energy, Van Nostrand Co., (1969).
3. G. Frielander, J. W. Kennedy and J. M. Miller, Nuclear and Radiochemistry, John Wiley and Sons (1981).
4. Hari Jeevan Arnikar , Essentials of nuclear chemistry, New Age International (P) Ltd., (2005).
5. Hari Jeevan Arnikar,Nuclear Chemistry Through Problems, New Age International (P) Ltd., (2007).
6. G. T. Seaborg, Transuranium elements, Dowden Hitchinson and Ross, (1978).
7. Nishit Mathur, Nanochemistry, RBSA publishers (2010).
8. Patric Salomon, A hand book on Nano Chemistry, Dominant publishers and distributors (2008).
9. G. B. Sergeev, Nanochemistry ,Elsevier Science and Technology (2007).
10. U. Saityanarayana, Essentials of Biochemistry, Books and Allied (P) Ltd.,
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Suggested References

11. W. E. Addison, Structural principle in inorganic chemistry, Longman (1961).
12. D. M. Adams, Inorganic solids, John Wiley Sons (1974).
13. Azaroff, Solid State Chemistry, John Wiley.
14. B. E. Dogulas DH McDaniel's and Alexander, Concepts and Models of Inorganic Chemistry, Oxford IBH, (1983)
15. M. C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., New York (1974).
16. J.E. Huheey, Inorganic Chemistry - Principles, Structure and Reactivity, Harper Collins, New York, IV Edition (1993).
17. N. Greenwood and A. Earnshaw, Chemistry of Elements, Pergamon, NY, (1984).
18. F.A. Cotton and G. Wilkinson Advanced Inorganic Chemistry - A Comprehensive Text, John Wiley and Sons, V Edition (1988).
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20. W. U. Mallik, G.D. Tuli, R.D. Madan, Selected topics in Inorganic Chemistry, S. Chand and Co., New Delhi, (1992).
21. M.N. Hughes, The Inorganic Chemistry of Biological processes, Wiley London, II Edition (1982).
22. Jonathan W. Stead, David R. Turner and Karl. J. Wallace., Core concepts in Supramolecular Chemistry and Nanochemistry, John Wiley sons Ltd (2007).
23. Beoffry A.Ozin, Andre Arsenault, Ludovico &Cademartiri. Nano chemistry - A chemical approach to nano materials, Royal Society of chemistry (2009).
24. Kenneth J. Klabunde, Nano scale materials in Chemistry A. John Wiley & Sons Publishers (2001).
25. L. Stryer, Biochemistry, V Edition, Freeman & Co., New York (2002) .
26. D. L. Nelson and M. M. Cox, Lehninger, Principles of Biochemistry, III edition, McMillan North Publication (2002).
27. W. Kaim and B. Schwederski, Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life, an Introduction and Guide, Wiley, New York (1995).
28. S. J. Lippard and J. M. Berg, Principles of Bioinorganic Chemistry, University Science Books (1994).
29. I. Bertini, H. B. Grey, S. J. Lippard and J. S. Valentine, Bioinorganic Chemistry, Viva Books Pvt. Ltd., New Delhi (1998).
30. R. Gopalan, Text book of Inorganic Chemistry, University press (India) private Ltd.

PAPER-6
PHYSICAL CHEMISTRY II

OBJECTIVES:

To understand the behavior of kinetic reactions and fast reaction. To understand the behavior of electrolytes in solution. To know the structure of the electrode surface. To differentiate electrode kinetics from other types of kinetic studies. To know the applications of electrode process. To study the concept and applications of group theory.

UNIT-I: KINETICS OF COMPLEX REACTIONS & FAST REACTIONS

Kinetics of complex reactions, reversible reactions, consecutive reactions, parallel reactions, chain reactions, general treatment of chain reactions - chain length - Rice Herzfeld mechanism - explosion limits.
Study of fast reactions - relaxation methods - temperature and pressure jump methods- stopped flow and flash photolysis methods.

UNIT-II: ELECTROCHEMISTRY – I

Mean ionic activity and mean ionic activity coefficient - activity coefficient of strong electrolytes - determination of activity coefficient by electrochemical method.
Debye Huckel limiting law - qualitative and quantitative verification - limitation - Debye Huckel limiting law at appreciable concentrations of electrolytes - Debye - Huckel - Bronsted equation.

UNIT-III: ELECTROCHEMISTRY – II

Electrode - electrolyte interface - adsorption at electrified interface - electrical double layer - electro capillary phenomenon - Lippmann equation - Structure of double layers - Helmholtz - Perrin, Guoy - Chapman and Stern model of electrical double layers.
Diffusion - Fick's law of diffusion - Effect of ionic association on conductance-electro kinetic phenomena -membrane potential.

UNIT-IV: GROUP THEORY – I

Definition of basic terms in group theory – Group – Abelian group, cyclic group, subgroup, group multiplication table - similarity transformation and class, symmetry elements and symmetry operations -Point groups (any examples limited to n = 4 of C_{nv}, C_{nh}, D_{nh}, D_{nd}, & T, T_d, O, O_h), Reducible and Irreducible representations - direct product representation. Character Table - explanation of various column and Mullliken Symbol.

UNIT-V: GROUP THEORY – II

Orthogonality theorem and its consequences - construction of character table for C_{2V}, C_{3V}, C_{2h}, and D_{2d} point groups - hybrid orbitals in nonlinear molecules (CH_4, BF_3, and NH_3). Determination of representations of vibrational modes in nonlinear molecules (H_2O, NH_3, BF_3 and $[PtCl_4]^{2-}$). Symmetry selection rules of Infra-red and Raman spectra.

TEXT BOOKS

1. J. Rajaram and J. C. Kuriacose, Kinetics and Mechanism of Chemical Transformations. Mac Millan India Ltd (1993).
2. K. J. Laidler, Chemical Kinetics, Harper and Row, New York (1987).
3. K. L. Kapoor, A text book of Physical Chemistry, Mac Millan India Ltd., (2001).
4. S. Glasstone, Introduction to Electrochemistry, Affiliated East West Press, New Delhi (1960).
5. D. R. Crow, Principles and Applications to Electrochemistry, Chapman and Hall (1991).
6. K.V. Raman, Group Theory and its Applications to Chemistry, Tata Mc Graw Hill Publishing Co., (1990).
7. P. K. Bhattacharya, Group Theory and its Applications, Himalaya Publishers.
8. K.V. Ramakrishnan and M. S. Gopinath, Group Theory in Chemistry, Vishal Publications (1998).

SUGGESTED REFERENCES

1. R. G. Frost and Pearson, Kinetics and Mechanism, Wisely, New York (1961).
2. C. Capellos and B. H.J. Bielski, Kinetic Systems, Wisely Interscience, New York (1972).
3. Amdur and G.G. Hammes, Chemical Kinetics, Principles and Selected Topics, McGraw Hill, New York (1968).
4. G. M. Harris, Chemical Kinetics, D. C. Health and Co., (1966).
5. J. Robbins, Ions in Solution - An Introduction of Electrochemistry, Clarendon Press, Oxford (1972).

6. John O. M. Bockris, Amulya K.N. Reddy, Modern Electrochemistry 2B: Electrodics in Chemistry, Engineering, Biology and Environmental Science
7. F. A. Cotton, Chemical Applications of Group Theory, John Wiley and Sons inc., New York (1971).
8. N. Thinkham, Group Theory and Quantum Mechanics, McGraw Hill Book Company, New York (1964).
9. S. Schonland, Molecular Symmetry, Vannostrand, London (1965).
10. Alan Vincent, Molecular Symmetry and Group Theory-Programme Introduction to Chemical Application, Wiley, New York (1977).
11. S. Swarnalakshmi, T. Saroja and R. M. Ezhilarasi, A simple Approach to Group Theory in Chemistry, University press (India) private Ltd (2008).

ELECTIVE
PAPER-2
(to choose 1 out of 3)

A. GREEN CHEMISTRY

OBJECTIVES:

To know the principle and importance of green chemistry. To understand the student green chemistry strategies for designing the chemical synthesis. To know the solvent free synthesis. To make the students knowledgeable ultrasound and microwave assisted green synthesis.

UNIT- I: BASIC PRINCIPLES OF GREEN CHEMISTRY

Basic principles, prevention of waste/by-products, maximum incorporation of the reactants (starting materials and reagents) into the final product, prevention or minimization of hazardous products, designing safer chemicals, energy requirements for synthesis, selection of appropriate solvent, selection of starting materials, use of protecting groups, use of catalyst and products designed should be biodegradable.

UNIT- II: ULTRASOUND AND MICROWAVE ASSISTED GREEN SYNTHESIS

Ultrasound: Introduction, instrumentation, the phenomenon of cavitation. Sonochemical esterification, substitution, addition, alkylation, oxidation, reduction and coupling reactions.

Microwaves: Introduction, concept, reaction vessel/ medium, specific effects, atom efficiency (% atom utilization), advantages and limitations. N-alkylation and alkylation of active methylene compounds and Diels –Alder reactions. Reactions in water and reaction in organic solvents. Solvent free reactions and deprotection of esters.

UNIT- III: IONIC-LIQUIDS AS GREEN SOLVENTS

Introduction, structure, synthesis and applications of some important ionic liquids in organic synthesis.

Polymer supported reagents in green synthesis**:** Introduction - properties and advantages of polymer supported reagents and choice of polymers.

Substrate covalently bound to the support: Synthesis of oligosaccharides, intramolecular cyclisation. Selective chemical reactions on one aldehyde group of symmetrical aldehydes - Asymmetric synthesis.

Reagent linked to a polymeric material: Preparation of sulfonazide polymer and application in diazotransfer reaction. Synthesis of polymer bound per acid and its applications, synthesis of polystyrene tin dichloride resin and its applications.

Polymer supported catalytic reactions: Preparation of polymer supported $AlCl_3$ and applications - polymer supported photo sensitizers.

UNIT- IV: PHASE TRANSFER CATALYSIS IN GREEN SYNTHESIS

Introduction, mechanism of phase transfer catalyst reaction, types and advantages of phase transfer catalyst, types and applications of phase transfer reaction: Nitriles from alkyl or acyl halides, alkyl fluorides, alcohols, azides from alkyl halides, generation of dichlorocarbenes, addition to olefins, elimination reaction, alkylation reactions, Willamson synthesis, Benzoin condensation, Darzen reaction, Michael reaction, Wittig reaction, oxidation under PTC condition and reduction.

UNIT-V: INDUSTRIAL CASE STUDIES

Methyl Methacrylate (MMA)-Greening of Acetic acid manufacture, Vitamin-C- Leather manufacture-Types of Leather- Difference between Hide and Skin- Tanning –Reverse tanning-Vegetable tanning-Chrome tanning- Fat liquoring- Dyeing- Application-Polyethylene-Ziegler Natta Catalysis, Metallocene Catalysis- Eco friendly Pesticides-Insecticides.

Text Books:

1. New Trends in Green Chemistry, V. K. Ahluwalia, M. Kidwai, II Edn., Anamaya publishers New Delhi(2007).
2. Green Chemistry and Introductory text, Mike Lancaster, II Edition
3. Organic synthesis: Special techniques, V. K. Ahluwalia and R. Aggarwal, Narosa, New Delhi, 2003.

References:

4. Green Chemistry environment friendly alternatives, R. Sanghi and M M Srivastava, Narosa, New Delhi, 2003.
5. Green Chemistry – an introduction text, Royal Society of Chemistry, UK, 2002
6. P. T. Anastas and J. C. Warner, Green Chemistry theory and Practice, Oxford University press. Oxford (1988).
7. Phase Transfer Catalysis in Organic Synthesis, W. B. Weber, G. W. Gokel, Springer, Berlin, 1977.
8. Phase Transfer Catalysis, E. V. Dehmlov, S. S. Dehmlov, 2nd Edn., Verlagchemie, Wienhein, 1983.
9. Polymers as aids in Organic Synthesis, N. K. Mathur, C. K. Narang and R. E. Williams, Academic Press, NY, 1980.

PAPER-2

B. SUPRAMOLECULAR AND NANOCHEMISTRY

OBJECTIVES:

To know the student the basis of suprmolecular chemistry, metal-organic framework solids, nano materials and their applications.To understand the various techniques available to characterize the advanced nano materials. To identify the applications of nanotechnology.

UNIT-I: SUPRAMOLECULAR CHEMISTRY

Definition of supramolecular chemistry. Nature of binding interactions in supramolecular structures: ion-ion, ion-dipole, dipole-dipole, H-bonding, cation-p, anion-p, p-p, and vander Waals interactions. Supramolecular synthons.

Self-assembly molecules: Design, synthesis and properties of the molecules, self-assembling by H-bonding, metal-ligand interactions and other weak interactions, metallomacrocycles, catenanes, rotaxanes, helicates and knots.

UNIT-II: FRAMEWORK SOLIDS

Introduction-definition of porosity, pore size, pore volume, pore density-zeolites-synthesis and applications-metal organic frame work solids-definition-classifications-uses of different types of organic ligands- tuning of structure and properties - synthetic methods- advantage of MOF solids over zeolites- cracking of petroleum products

UNIT-III: SYNTHESIS OF SUPRAMOLECULES

Synthesis and structure of crown ethers, lariat ethers, podands, spherands, cyclophanes, cryptophanes, carcerands and hemicarcerands., Host-Guest interactions, lock and key analogy. Binding of cationic, anionic, ion pair and neutral guest molecules.
Molecular devices: molecular electronic devices, molecular wires, molecular rectifiers, molecular switches and molecular logic.

UNIT-IV: NANOCHEMISTRY

Introduction and definition of nanoparticles and nanomaterials, emergence of nanotechnology, challenges of nanotechnology. Synthesis of nanoparticles of ZnO_2, TiO_2, silver, gold, rhodium, palladium and platinum; carbon materials- fullerene- porous nano carbon (PNC).

Techniques of synthesis: Electroplating and electrophoretic deposition, conversion through chemicalreactions and lithography; Thin films: Chemical vapor deposition and atomic layer deposition techniques; Carbon fullerenes and nanotubes.

UNIT-V: ANALYTICAL CHARACTERIZATION AND APPLICATIONS

X-rays, Infrared, UV-Vis, Laser Raman, Electron microscopic techniques (SEM and TEM) - Thermal analysis (TG/DTA/DSC) methods.

Application of nanotechnology: modern technology in electronic, biological, consumer and domestic applications. Energy related application: photo-voltaic cells, energy storage nanomaterial. Drug delivery, drug targeting. Sensors and biosensors.

Reference Books

1. C.N.R. Rao, A. Muller, A.K. Cheetam (Eds), The Chemistry of Nanomaterials, Vol.1, 2, Wiley – VCH, Weinheim, 2004
2. Nanochemistry, Kenneth J. Klabunde and G.B.Sergeev
3. G.Zhong Cao. Nanostructures and Nanomaterials: Synthesis, Properties and Applications, Imperial College Press (2004)
4. Metal-Organic Frameworks Applications from Catalysis to Gas Storage. Cejka, J, ed. (2011). Wiley-VCH. ISBN 978-3-527-32870-3
5. Zeolites and Catalysis: Synthesis, Reactions and Applications. Jiri Cejka; Avelino Corma; Stacey Zones (2010). John Wiley & Sons. ISBN 978-3-527-63030-1.
6. J.-M. Lehn; Supramolecular Chemistry-Concepts and Perspectives (Wiley-VCH, 1995)
7. P. D. Beer, P. A. Gale, D. K. Smith; Supramolecular Chemistry (Oxford University Press, 1999)

8. J. W. Steed and J. L. Atwood; Supramolecular Chemistry (Wiley, 2000).
9. C. P. Poole Jr, F. J. Owens, Introduction to nanotechnology, 2nd edition, Wiley-India, Delhi, 2008.
10. C. C. Kouch, Nanostructures materials: Processing, properties and applications, William Andrew publications, Newyork, 2002.
11. T. Pradeep, Nano: The essentials., McGrew Hill Education.(2007)

PAPER-2

C. MODERN SEPARATION TECHNIQUES

OBJECTIVES:

To learn the basic concept of chromatography. To understand the different chromatographic techniques. To study the applications of chromatography. To know the separation and purification methods.

UNIT-I: BASIC CONCEPTS OF CHROMATOGRAPHY

General description: Definitions, terms and parameters used in chromatography. Classification of chromatographic methods. Elution chromatography on columns. Migration rates of solutes, zone broadening, column efficiency and optimization of column performance.

UNIT-II GAS CHROMATOGRAPHY(GC)

Principles of gas-liquid chromatography, instrumentation, carrier gas, sample injection, column configuration and detection system (FID, TCD, ECD). Gas chromatographic columns (open tubular columns and packed columns) and stationary phases. Interfacing GC/MS.

UNIT-III: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)

Column efficiency. Instrumentation: pumping system, sample injection system. Liquid chromatographic columns - types of column packing. Detectors: Absorbance detector and electrochemical detectors. Partition chromatography.

UNIT-IV: ION-EXCHANGE CHROMATOGRAPHY (IEC)

Definition, requirements for ion exchange resin. Synthesis and types of ion-exchange resins. Principle and basic features of ion - exchange reactions. Exclusion chromatography: Theory and principle of size exclusion chromatography. Experimental techniques of gel-filtration chromatography (GFC) and gel-permeation chromatography (GPC). Materials for packing-factors governing column efficiency. Methodology and applications.

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UNIT-V: PURIFICATION AND EXTRACTION TECHNIQUES

Principle and techniques: Desiccants, precipitation: types of precipitation, factors affecting the precipitation. Distillation: fractional, steam, azeotropic, vacuum distillations. Recrystalization and sublimation.

Solvent extraction: Principle and techniques. Factors affecting the extraction efficiency: Ion association complexes, chelation, synergistic extraction and pH. Role of chelating ligands in solvent extraction. Introduction to solid phase extraction (SPE) and microwave assisted extraction (MAE) and applications.

REFERENCES

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8th Edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th ed., 2001 John Wiley & Sons, Inc, India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, 1993, prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, 6th edition, Third Inidan Reprint.2003 Pearson Education Pvt. Ltd., New Delhi.
5. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders College Publishing, California, 1990.
6. Introduction to Chromatography Theory and practice, V.K.Srivastava, K.K.Srivastava, Chand &.Company Ltd , New Delhi
7. Principles of Instrumental Analysis, , D.A. Skoog,,F.James Holler, Timothy.A.Nieman ,Harcourt Asia (P) Ltd
8. Principles of Instrumental Analysis, D.A. Skoog, , Saunders College Pub. Co, III Edn., 1985
9. Text Book of Quantitative Organic Analysis A.I Vogel, , ELBS III Edn, 1987.
10. Fundamentals of Analytical Chemistry, D.A. Skoog and D. M. West, Holt Rinehart and Winston Publications, IV Edn, 2004.
11. Instrumental Methods of Analysis, Willard, Merit, Dean and Settle, , CBS Publishers and Distributors, IV Edn.,1989
12. G. D. Christian and J. E. O. Reilly, Instrumental Analysis, Allyn and Bacon Inc, II Edn., 1988.
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MAIN
PRACTICAL PAPER – 1
ORGANIC CHEMISTRY PRACTICAL- I

A) Identification of components in a two component mixture and preparation of their derivatives. Determination of b.p. / m.p. for components and m.p. for the derivatives.

B) Any Six preparations from the following:

1. Preparation of o-benzoyl benzoic acid (Fridel Crafts Reaction)
2. p-Nitrobenzoic acid from p-nitrotoluene (Oxidation)
3. Anthroquinone from anthracene (Oxidation)
4. Glucose pentaacetate from Glucose (Acetylation)
5. m-Nitroaniline from m-dinitrobenzene (Reduction)
6. Benzophenone oxime from benzophenone (Addition reaction)
7. p-Chlorotoluene from p-toluidine (Sandmeyers' Reaction)
8. 2,3 - Dimethylindole from phenyl hydrazine and 2 - butanone (Fisher Indole Synthesis)
9. 1,2,3,4 - Tetrahydrocarbazole from cyclohexanone (Fisher Indole Synthesis)
10. Methyl orange from sulphanilic acid (Diazo Reaction)

University Examination	**Marks**
Qualitative organic Analysis	40
Preparation	20
Viva voce	10
Record	05
Total	**75**

CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK)
MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	**25**

References:

1. Arthur I. Vogel, "A Textbook of Practical Organic Chemistry", ELBS.
2. N.S. Gnanapragasam and B. Ramamoorthy, "Organic Chemistry Lab Manual" (2006), S. Visvanathan Printers & Publishers.

PRACTICAL PAPER – 2
INORGANIC CHEMISTRY PRACTICAL – I

A) Semimicro qualitative analysis of mixture containing two common and two rare cations. The following are the rare cations to be included. W, Ti, Te, Se, Ce, Th, Zr, V, U, Li, Mo and Be.

B) Complexometric Titrations (EDTA): Estimation of Ca, Mg and Zn.

C) Preparation of the followings:

1. Potassium tris (oxalate) aluminate (III) trihydrate
2. Tris (thiourea) copper (I) chloride
3. Potassium tris (oxalato) chromate (III) trihydrate
4. Sodium bis(thiosulphato) cuprate (I)
5. Tris (thiourea) copper (I) sulphate
6. Sodium hexanitrocobaltate (III)
7. Chloropentammine cobalt (III) chloride
8. Bis (acetylacetonato) copper (II)
9. Hexamminenickel (II) chloride
10. Bis (thiocyanato) pyridine manganese (II)

D). Separation of zinc and magnesium on an anion exchange.

Marks distribution:

University Examination	Marks
Qualitative Inorganic Analysis	25
EDTA Complexometric Titration	20
Preparation	15
Viva Voce	10
Record	05
Total	**75**

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CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK)
MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	**25**

PRACTICAL PAPER-3
PHYSICAL CHEMISTRY PRACTICAL- I

Experiments in Thermodynamics, colligative properties, phase rule, chemical equilibrium and chemical kinetics.

Typical examples are given and a list of experiments is also provided from which suitable experiments can be selected as convenient.

1. Heat of solution from Solubility measurements
2. Determination of Molecular weight
3. Determination of activity and activity coefficient
4. Construction of Phase diagram involving two / three component systems
5. Determination of partial molar quantities
6. Verification of Freundlich Adsorption isotherm
7. Reaction rate and evaluation of other kinetic parameters using polarimetry
8. Determination of Reaction rate and Rate constant using Analytical techniques: Conductometry and Dilatometry
9. Verification of Beer Lambert law.

Detailed list of Experiments for Physical Chemistry Practical I

Typical list of possible experiments is given.
Experiments of similar nature and other experiments may also be given.
Any 15 experiments have to be performed in a year.

1. Determine the temperature coefficient and energy activation of hydrolysis of ethyl acetate.
2. Study the kinetics of the reaction between acetone and iodine in acidic medium by half-life method and determine the order with respect to iodine and acetone.
3. Study the effect of solvent (DSMO-water, acetone-water system) on the rate of acid catalysed hydrolysis of acetal by dilatometry.
4. Study the Saponification of ethyl acetate by sodium hydroxide conductometrically and determine the order of the reaction.
5. Determine the order with respect to Silver (I) in the oxidation and rate constant and for uncatalysed reaction.
6. Study the inversion of cane sugar in the presence of acid using Polarimeter.
7. Determine the rate constant and order of the reaction between potassium persulphate and potassium iodide and determine the temperature coefficient and energy of activation of the reaction.
8. Study the effect of ionic strength on the rate constant for the saponification of an ester.
9. Study the salt effect on the reaction between acetone and iodine.

10. Study the kinetics of the decomposition of sodium thiosulphate by mineral acid (0.5M HCI).
11. Study the primary salt effect on the kinetics of ionic reactions and test the Bronsted relationship (iodide ion is oxidized by persulphate ion).
12. Study the kinetics of enzyme catalysed reactions (Activity of tyrosinase upon tyrosine spectrophotometrically).
13. Study the salt effect, the solvent effect on the rate law of alkaline hydrolysis of crystal violet.
14. Study the reduction of aqueous solution of ferric chloride by stannous chloride.
15. Determine the molecular weight of benzoic acid in benzene and find the degree of association.
16. Determine the activity coefficient of an electrolyte by freeing point depression method.
17. Study the phase diagram form-toluidine and glycerine system.
18. Construct the phase diagram for a simple binary system naphthalene - phenantherene and benzophenone-diphenyl amine.
19. Construct the boiling point composition diagram for a mixture having maximum boiling point and minimum boiling point.
20. Study the complex formation between copper sulphate and ammonia solution by partition method.
21. Study the simultaneous equilibria in benzoic acid - benzene - water system.
22. Determine the degree of hydrolysis and hydrolysis constant of aniline hydrochloride by partition method.
23. Determine the molecular weight of a polymer by viscosity method.
24. Determine the viscosities of mixtures of different compositions of liquids and find the composition of a given mixture.
25. Determine the partial molal volume of glycine / methanol and formic acid / sulphuric acid by graphical method and by determining the densities of the solutions of different compositions.
26. Study the temperature dependence of the solubility of a compound in two solvents having similar inter molecular interactions (benzoic acid in water and in DMSO water mixture) and calculate the partial molar heat of solution
27. Construct the phase diagram of the three component of partially immiscible liquid system (DMSO-water benzene; acetone-chloroform -water; chloroform-acetic acid-water)
28. Construct the phase diagram of a ternary aqueous system of glucose -potassium chloride and water
29. Study the surface tension - concentration relationship for solutions (Gibb's equation)

30. Study the absorption of acetic acid by charcoal (Freundlich isotherm).
31. Study the complex formation and find the formula of silver-ammonia complex by distribution method.
32. Determine the dissociation constant of picric acid using distribution law

Marks distribution:

University examination	Marks
Procedure	10
Manipulation	25
Result	25
Viva voce	10
Record	05
Total	**75**

CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK): MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	**25**

SECOND YEAR
SEMESTER III

PAPER - 7
ORGANIC CHEMISTRY III

OBJECTIVE:
To understand the concepts of spectral techniques and to apply these techniques for the quantitative and structural analysis of organic compounds. To learn the chemistry of terpenes, alkaloids and free radicals and their importance.

UNIT-I: UV AND IR SPECTROSCOPY AND THEIR APPLICATIONS

Ultraviolet-Visible spectroscopy: Types of electronic transitions - chromophores and auxochromes - factors influencing the positions and intensity of absorption bands - absorption spectra of dienes, polyenes and unsaturated carbonyl compounds - Woodward - Fieser rules and its applications.

Infra Red Spectroscopy: Vibrational frequencies and factors affecting them - identification of functional groups - intra and inter molecular hydrogen bonding – functional group region- finger print region - far IR region.

UNIT-II: NMR SPECTRA AND ITS APPLICATIONS

Nuclear spin - magnetic moment of a nucleus - nuclear energy levels in the presence of magnetic field - basic principles of NMR experiments - CW and FT NMR - ^{1}H NMR - Chemical shift and coupling constant - factors influencing proton chemical shift and vicinal proton - proton coupling constant- ^{1}H NMR spectra of simple organic molecules such as CH_3CH_2Cl and CH_3CHO.

AX and AB spin system - nuclear overhauser effect- chemical exchange.

^{13}C NMR - proton decoupling and Off resonance decoupling spectra - factors affecting ^{13}C NMR chemical shift - ^{13}C NMR spectra of simple organic molecules.

UNIT-III: PHYSICAL METHODS OF STRUCTURAL DETERMINATION

Mass spectroscopy - Principles - measurement techniques - (El, Cl, FD, FAB, SIMS) - presentation of spectral data - molecular ions - isotope ions - fragment ions of odd and even electron types - rearrangement ions - factors affecting cleavage patterns - simple and multicentre fragmentation – Mc Lafferty rearrangement - Mass spectra of hydrocarbons, alcohols, phenols, aldehydes and ketones. ORD and its applications - Octant rule - cotton effect - axial halo ketone rule - Problem solving (for molecules with a maximum number of C10).

UNIT-IV: TERPENES AND ALKALOIDS

Introduction - classification - isoprene rule - structural determination of terpenoids'- Citral, geraniol - linalool - farnesol - α-pinene and camphor.
Introduction - isolation of alkaloids - total synthesis of quinine - morphine and reserpine.

UNIT-V: FREE RADICALS

Long and short-lived free radicals - methods of generation of free radicals - detection of free radicals by ESR - Addition of free radicals to olefinic double bonds - aromatic radical substitutions reactions - decomposition of diazo compounds – phenol coupling - Sandmeyer reaction - Gomberg reaction - Pschorr reaction - Ulmann reaction and Hunsdiecker reaction.

RECOMMENDED BOOKS

1. Francis A. Carey and Richard J. Sundberg, Advanced organic chemistry, III Edition (1990). G.A Swan,Introduction to alkaloids
2. I.L. Finar, Organic chemistry, Vol. II, 5thedition ELBS publication.
3. J. Dyer, Application of absorption spectroscopy of organic compounds, Prentice and Hall of India, Pvt., New Delhi.
4. J. March, Advanced organic reaction mechanism and structure, Tata McGraw Hill.
James verghese ,Terpene Chemistry.
5. Neil S. Issac, Physical organic chemistry, ELBS publication 1987.
6. O.P. Agarwal, Chemistry of organic Natural Products, Goel Publishing House, Meerut.
7. P.S. Kalsi, Spectroscopy of organic compounds,Wiley Eastern Ltd., Chennai.
8. R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric identification of organic compounds, John Wiley and Sons, New York.
9. S.M. Mukherji and S.P. Singh,Organic Reaction Mechanism, MacMillan India Ltd., Chennai (1990).
10. Schliemann, Introduction to the spectroscopic methods for the identification organic compounds, 2 volumes, Pergamon Press.
11. W. Kemp, Spectroscopy, Macmillan Ltd.,
12. Y.R. Sharma,Structural identification of organic compounds, S. Chand & Co.

PAPER- 8
INORGANIC CHEMISTRY III

OBJECTIVE:
To study about the Coordination complexes, Substitution in Coordination complexes and Inorganic Photochemistry.

UNIT-I: ORGANO METALLIC CHEMISTRY - I

Carbon donors: Alkyls and aryls metallation, bonding in carbonyls and nitrosyls, chain and cyclic donors, olefins, acetylene and allyl system. Synthesis, structure and bonding of metallocenes (ferrocene only).
Reactions: Association, substitution, addition and elimination reactions, ligand protonation, electrophilic and nucleophilic attack on ligands. Carbonylation, decorboxylation, oxidative addition and fluxionality.

UNIT-II: ORGANO METALLIC CHEMISTRY - II

Catalysis: Hydrogenation of olefins (Wilkinson's catalyst), hydroformylation of olefins using cobalt or rhodium catalysts (Oxo process), oxidation of olefins to aldehydes and ketones (Wacker process), polymerization (Zeigler - Natta Catalyst); cyclo oligomerisation of acetylene using nickel catalyst (Reppe's catalyst); polymer-bound catalysts.

UNIT-III: COORDINATION CHEMISTRY - IV

Electron transfer reactions, outer and inner sphere processes; atom transfer reaction, formation and rearrangement of precursor complexes, the bridging ligand, precursor and successor complexes. Marcus theory. Complementary, non-complementary and two electron transfer reactions.

UNIT-IV: COORDINATION CHEMISTRY - V

Substitution Reactions: Substitution in square planar complexes, reactivity of platinum complexes, influences of entering, leaving and other groups, the Trans effect.

UNIT-V: COORDINATION CHEMISTRY - VI

Substitution of octahedral complexes of cobalt and chromium, replacement of coordinated water, solvolytic (acids and bases) reaction applications in synthesis (platinum and cobalt complexes only).
Inorganic Photochemistry: Photo-substitution, Photoredox and isomerisation process, application of metal complexes in solar energy conversion.

Text books

1. R.C. Mehrothra, A. Singh, Organo Metallic Chemistry, Wiley Eastern Co., (1992).
2. F. Basolo and R.G. Pearson, Mechanism of Inorganic Reaction, Wiley NY (1967).
3. J. Huheey, Inorganic Chemistry, Harper and Collins, NY IV Edition, (1993).
4. K.F. Purcell and J.C. Kotz, Inorganic Chemistry, W. Saunders Co., (1977).
5. S. FA Kettle, Coordination Chemistry, ELBS, (1973).
6. F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry, John Wiley and Sons, V Edition (1988).
7. D.F. Shrivers, Pw. Atkins and C.H. Langford, Inorganic Chemistry, OUP (1990).
8. Guillermo J. Ferraudi, Elements of inorganic photochemistry, Wiley (1988).
9. Arthur W. Adamson, Paul D. Fleischauer, Concepts of inorganic photochemistry, Wiley(1975).

Suggested References

1. G. Coates M.l. Green and K. Wade. Principles of Organometallic chemistry, Methven Co., London (1988).
2. P. Powell, Principles of Organometallic chemistry, Chappman and Hall. (1998).
3. G.S. Manku, Theoretical Principles of Inorganic Chemistry, McGraw-Hill Education, (1984).
4. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., New York (1974).
5. R.B. Heslop and K. Jones, Inorganic Chemistry, Elsevier Scientific Publ., (1976).
6. F. Basolo and R.G. Pearson, Mechanism of Inorganic Reaction, Wiley NY (1967).
7. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., New York (1974).
8. B.E. Dogulas DH McDaniel's and Alexander, Concepts and Models of Inorganic Chemistry, Oxford IBH (1983).
9.WU. Mallik, G.D. Tuli, R.D. Madan, Selected topics in Inorganic Chemistry, S. Chand and Co., New Delhi (1992).

PAPER-9
PHYSICAL CHEMISTRY III

OBJECTIVES:

To study the electrochemical kinetics, over potential, corrosions and fuel cells. To know the solid state and its properties. To Study the principles and applications of spectroscopy. To study statistical thermodynamics,

UNIT-1: ELECTROCHEMISTRY- III

Mechanism of electrode reactions - polarization and over potential - the Butler-Volmer equation for one step and multistep electron transfer reactions - significance of electron exchange current density and symmetry factors - transfer coefficient and its significance - mechanism of the hydrogen and oxygen evolution reactions.

Corrosion and passivation of metals - Pourbaix diagram - Evan's diagram - fuel cells - electrodeposition - principle and applications.

UNIT-II: SOLID STATE

Classification of solids - Imperfection in solids - point, line and plane defect - Electrons and holes - Non-stoichiometry - Imperfection and physical properties of solids (brief study). **Electrical properties** - electrical conductivity - Hall effect - dielectric properties - piezo electricity, Ferro electricity and conductivity; **Optical properties** - Photo conductivity -luminescence - color center - lasers - refraction - birefringence;

Magnetic properties - diamagnetism - paramagnetism - ferro - antiferro and ferrimagnetisms. Calculation of magnetic moments. Mechanical and thermal properties.

UNIT-III: SPECTROSCOPY - I

Microwave spectroscopy – Rotational spectroscopy of rigid rotator - non rigid rotator - diatomic and polyatomic molecules.

Vibrational spectroscopy - Harmonic oscillator - anharmonicity - vibrational spectra of polyatomic molecules - vibrational frequencies - group frequencies - vibrational coupling- overtones - Fermi resonance.

Raman Spectroscopy- Raman effect, Stoke’s and Anti-stoke’s lines, rotational and vibrational Raman spectra.

Electronic spectroscopy - Progressions and sequences, selection rules, Franck - Condon principle, types of electronic transitions - solvent effects.

UNIT-IV: SPECTROSCOPY- II

Resonance spectroscopy - Zeeman effect - equation of motion of spin in magnetic fields - chemical shift - spin-spin coupling - NMR of simple AX and AMX type molecules - calculation of coupling constants - ^{13}C, ^{19}F, ^{31}P NMR spectra - applications - a brief discussion of Fourier Transformation Resonance Spectroscopy.

UNIT-V: STATISTICAL THERMODYNAMICS- I

Objectives of statistical thermodynamics - concept of thermodynamic and mathematical probabilities - permutations and combinations, distribution of distinguishable and non-distinguishable particles. Stirling approximation, Maxwell - Boltzmann distribution law - Fermi - Dirac and Bose - Einstein statistics - comparison with Maxwell -Boltzmann distribution law and their applications - radiation law - electron gas in metals.

Partition function - evolution of translational, vibrational and rotational partition functions for mono and diatomic ideal gases.

Text Books

S.Glasstone, Introduction to Electrochemistry, Affiliated East West Press, New Delhi (1960).

D.R. Crow, Principles and Applications to Electrochemistry, Chapman and Hall (1991).

S. Glasstone, Introduction to Electrochemistry, Affiliated East West Press, New Delhi (1960).

P.H.Rieger, Electrochemistry, Chapman and Hall, New York (1994).

R.Crow, Principles and Applications to Electrochemistry, Chapman and Hall (1991).

Lesley E.Smart, Elaine A.Moore, Solid State Chemistry - An Introduction

Charles Kittel - Introduction to Solid State Physics

Anthony R. West - Solid State Chemistry and its Applications

C.N. Banwell and E.M. McCash, Fundamentals of Molecular spectroscopy, IV - Edition, Tata McGraw Hill (2005).

N. Sathyanarayana, Vibrational Spectroscopy, New Age International Publishers (2004).

Caringtion and Ad. Mclachlan, Introduction to Magnetic Resonance, Harper and Row, New York (1967).

M. C.Gupta, Statistical thermodynamics, Wiley Easter, New Delhi (1990).

R.Hasee, Thermodynamics Of Irreversible Process, Addition Wesley, Reading, Mass (1969).

Suggested References

J.O.M. Bokris and A. K. N. Reddy, Electrochemistry, Vol. 1 and 2, Plenum, New York (1977).

P. Dalahay, Electrode Kinetics and Structure of Double Layer, Inter Science, New York (1965).

J.Robbins, Ions in Solution-An Introduction to Electrochemistry, Clarendon Press, Oxford (1993).

H.Reiger, Electrochemistry, Chapman and Hall, New York (1994).

W.J. Moore, Physical Chemistry, Orient Longman, London (1972).

J.M. Murrell, S.F.A. Kettle and J.M. Tedder, The Chemical Bond, Wiley (1985).

R.C. Ropp, Solid State Chemistry

C N. Banwell, Fundamentals of Molecular Spectroscopy, Mc Graw Hill (1966).

Raymond Chang, Basic Principles of Spectroscopy, McGraw Hill Ltd., New York (1971).

G M. Barrow, Introduction to Molecular Spectroscopy, Mc Graw Hill, New York (1962).

W. Kemp, NMR in Chemistry, Mc Millan Ltd., (1986).

D. Mclauchlan, Magnetic Resonance, Oxford Chemistry Series, Oxford (1970).

P. Staughan and S. Walker, Spectroscopy, Vol. I, II & III, Chapman and Hall (1976).

J.K. Sanders and B.K. Hunter, Modern NMR Spectroscopy, A Guide for Chemists, Oxford University Press, Oxford (1987).

Jk.M. Sanders, E.C. Constable and B.K. Hunter, Modern NMR Spectroscopy - a Work Book of Chemical Problems, Oxford (1989).

Francis W Sears and Gerhard L Salinger, Thermodynamics, kinetic theory, and statistical thermodynamics.

P. Dalahay, Electrode Kinetics and Structure of Double Layer, Inter Science, New York (1965).

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ELECTIVE
PAPER-3
(to choose 1 out of 3)

A. Scientific Research Methodology

OBJECTIVES:

To study about the importance of research, literature survey, error analysis, statistical treatment. To study about the conventions of writing thesis.

UNIT-I: INTRODUCTION

Nature and importance of research - aims, objective, principles and problems - selection of research problem - survey of scientific literature - primary and secondary sources - citation index for scientific papers and journals - patents.

UNIT-II: CONDUCT OF RESEARCH WORK

Physical properties useful in analysis and methods of separation prior to analysis - Isolation techniques - extraction - Soxhlet extraction, crystallization, sublimation - methods for vacuum sublimation and distillation under reduced pressure.
Chemistry of working with hazardous materials - acid / base / water sensitive, corrosive, toxic, explosive and radioactive materials.

UNIT-III: EVALUATION OF ANALYTICAL DATA

Precision and accuracy - Reliability - determinate and random errors - distribution of random errors - normal distribution curve.

UNIT-IV: STATISTICAL TREATMENT OF ANALYTICAL DATA

Statistical treatment of finite samples - the students test and F test - criteria for rejection of an observation - the Q test, significant figures and computation rules - data plotting - least square analysis.

UNIT-V: THESIS AND ASSIGNMENT WRITING

Conventions of writing - the general format - page and chapter format - use of quotations and footnotes - preparation of tables and figures - referencing - appendices - revising editing and evaluating the final product - proof reading - meanings and examples of commonly used abbreviations.

REFERENCES

1. Douglas A. Skoog and Donald, M. West, Fundamental of analytical chemistry, Halt Saundersons International Edition.
2. J. Anderson, H.M. Durston and M.Poole, Thesis and assignment writing - Wiley Eastern Ltd., (1970).
3. J. March, Advanced organic chemistry - reactions, Mechanism & Structure. McGraw Hill Student Edition.
4.Vogel's Textbook of quantitative chemical analysis, ELBS edition.
5. Rajammal P. Devados, Research Methodolgy.

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PAPER-3
B. ADVANCED BIOINORGANIC CHEMISTRY

OBJECTIVES:

1. *To learn the importance of Bioinorganic Chemistry*
2. *To learn the role of metal ions in the biologically important complexes*
3. *To learn mechanism of photosynthesis*

UNIT - I: SCOPE OF BIOINORGANIC CHEMISTRY

Introduction: Trace elements, complex formation, hard and soft acids and bases (HSAB), inert and labile complexes. Amino acids and proteins - structure of proteins, peptide bond - enzymes - nucleic acid - carbohydrates - blood - plasma.

Concepts of essentiality - evolution of essential trace elements - future essential trace elements- role of minerals - working of essential trace elements - essential ultra trace elements - essential ultra trace nonmetals.

UNIT - II: METALLOPORPHYRINS

Respiratory proteins: Hemoglobin and Myoglobin - structure and functions - oxygenation reactions - structure and functions relationship - structural models for dioxygen binding - synthetic models for oxygen binding - models for Hemoproteins – Hemerythrin - Hemocyanin. Non-redox metalloenzymes: Peroxidase, Catalayse and Alcohol Dehydrogenase (Structure, mechanism of action and model compound)

UNIT - III: METALLOENZYMES

Copper enzymes: Superoxide dismutase, cytochrome oxidase and ceruplasmin - Molybdenum enzymes: Pyridoxyal oxidase and xanthine oxidase. Zinc enzymes: Carbonic anhydrase and carboxy peptidase. Cobalt enzyme: Vitamin B_{12}. Biomineralization – Siderophores - Ferritin and Transferrin,

UNIT - IV: METALS IN MEDICINE

Metal deficiency and disease - toxicity of mercury, cadmium, lead, beryllium, selenium and arsenic - biological defence mechanism - meaning and example of chelation therapy - Metals used for diagnosis (Tc, Fe and Co) - Metals in medicine: platinum complexes as anticancer drugs, Pt-DNA binding, complexes of gold, copper, zinc, mercury, arsenic and antimony as drugs.

UNIT - V: NITROGEN FIXATION AND PHOTOSYNTHESIS

Nittogenase enzyme: Reactivity, reduction involving nitride / diazene intermediate, dinitrogen complexes and their reactivity in vitro nitrogen fixation. Photosynthesis: Structure of chlorophyll in green plants (Z- Scheme) - ATP synthesis - Role of manganese complex in oxygen evolution - dark reaction (Calvin cycle).

TEXT BOOKS

1. K. Hussain Reddy, Bioinorganic Chemistry, New Age international publishers (2007)
2. S. J. Lippard & J. M. Berg. Principles of Bioorganic Chemistry, Panima Publ. Corpn. (2005). 3. E. I. Ochiai. Bioinorganic Chemistry – An Introduction, Allyn and Bacon Inc. (1977).
4. M.N. Hughes, Inorganic Chemistry of Biological Processes, John Wiley &Sons, 2nd Edition, 1985
5. R.P. Hanzlik. Inorganic Aspects of Biological and Organic Chemistry, Academic Press (1976)

REFERENCE BOOKS

1. H. Kraatz & N. Metzler-Nolte (Eds.). Concepts and Models in Bioinorganic Chemistry, Wiley (2006).
2. I. Bertini, H. B. Gray, S. J. Dippard & J. S. Valentine, Bioinorganic Chemistry, Viva Books Pvt. Ltd. (2004).
3. A.W. Addison, W.R. Cullen, D. Dolphin & B.R. James (eds.). Biological Aspects of Inorganic Chemistry, John Wiley (1977).
4. R.J.P. Williams & J.R.R.F. Dasilva. New Trends in Bioinorganic Chemistry, Academic Press (1978).
5. A. E. Martel. Inorganic Chemistry in Biology and Medicine, ACS Symp. Series, ACS (1980).
6. S. J. Lippard. Progress in Inorganic Chemistry: Bioinorganic Chemistry, Vol. 38, John Wiley (1990).
7. N. Kaim & B. Schwederski. Bioinorganic Chemistry: Inorganic Elements in the Chenistry of Life, John Wiley (1994).
8. Advanced Inorganic Chemistry, F.A. Cotton and G. W. Wilkinson. John Wiley &Sons, 5th Ed. 1988.
9. Inorganic Chemistry, Principles of Structure and Reactivity, J. E. Huheey,E.A. Keiter 4th Ed. Harper Collins, 1993.
10. Bioinorganic chemistry, R. W. Hay, Halsted Press, 1984.
11. Principles of Bioinorganic Chemistry, S. J. Lippard and J.M. Berg, Panima Publishing Corporation, 2nd Ed., 1995.

PAPER-3
C. ADVANCED ANALYTICAL TECHNIQUES

OBJECTIVES:
On the completion the course the students will have the knowledge of various instrumental techniques. The students should have learnt data analysis and electroanalytical techniques.

UNIT-1: ELECTROANALYTICAL TECHNIQUES:

Voltametry - coulometry - amperometry – potentiometry – polarography - electrolytic conductivity - impedance spectroscopy.

UNIT-1I: CHEMICAL ANALYSIS:

Non-destructive techniques: Wavelength and energy dispersive X-ray fluorescence spectroscopy (WDS and EDS) - X-ray absorption spectroscopy (XANES and EXAFS) - secondary ion mass spectrometry (SIMS) - temperature programmed desorption (TPD) - thermal desorption spectroscopy (TDS).

Destructive techniques: Atomic absorption spectroscopy (AAS) - inductively coupled plasma-atomic emission spectroscopy (ICP-AES).

UNIT-1II: IMAGING AND DEPTH PROFILING:

Basic concepts in surface imaging - secondary electron microscopy (SEM) - secondary Auger microscopy (SAM) - scanning probe microscopy (SPM) - scanning tunneling microscopy (STM) - transmission electron microscopy (TEM) - surface imaging - depth profiling. Associated techniques of microscopy and spectroscopy.

UNIT- IV: THERMAL ANALYSIS:

Thermo gravimetric and differential thermal analysis - thermometric titrations - differential scanning colourimetry - basic instrumentation and applications.

UNIT–V: RADIOCHEMICAL METHODS

Hot atom chemistry – the Szilard – chalmers process, chemistry of recoil atoms, chemical effects on radioactive decay, solvated electron. Uses of radiations in the study of matter, neutron activation analysis, dilution analysis, dosimetry, synthesis of organic and inorganic compounds by irradiation. Radiometric analysis and radiography.

TEXT BOOKS:

1. R. Wiesendanger, *Scanning Probe Microscopy and Spectroscopy,* Cambridge University Press, 1994.
2. Frank A. Settle, Handbook of instrumental techniques for analytical chemistry, Prince Hall, New Jersey, 1997.
3. K. W. Kolasinski, Surface science: Foundations of catalysis and nanoscience, John Wiley and Sons, West Susses, 2002.
4. D. A. Skoog, D. M. West, F. J. Holler and S. R. Couch, Fundamentals of analytical chemistry. Brooks/ColeCengage learning, New Delhi, 2004.
5. P. Atkins and J. de Paula, Atkins' physical chemistry, 8th Ed., Oxford University Press, New Delhi, 2008.
6. T. Pradeep, Nano: The essentials, McGraw-Hill Education, New Delhi, 2010.
7. F. Scholz, Electroanalytical Methods, Springer, 2nd Ed., 2010.
8. Allen J. Bard and Larry R. Faulkner, Electrochemical Methods: Fundamentals and Applications, 2nd edition 2001, John Wiley & Sons
9. Allen J. Bard (Ed), Electroanalytical Chemistry, Vol.13, Plenum Press 1983
10. Joseph Wang, Analytical Electrochemistry, 3rd edition 2006, John Wiley & Sons
11. D.A .Skoog, 1985, Principles of Instrumental Methods of analysis, III Edition, Saunders College Publ.
12. Willard Merrit, Dean and Settle, 1986, Instrumental methods of analysis, VI Edition, CBS Publ.
13. D.A. Skoog and D.M. West, 1982, Fundamentals of Analytical Chemistry, IV Edition, old Reinhord & Winston, Publication

SUGGESTED REFERENCE BOOKS:

1. G.D.Christian & J.E.O. Reily, 1986, Instrumental Analysis, II Edition, Allegn Recon.
2. H.A. Strobel, 1976, Chemical Instrumentation, Addition- Wesely Publ Co.
3. Kolthoff and Elwing (All Series) - Treatise on Analytical Chemistry.
4. Willson Series - Comprehensive Analytical Chemistry.
5. Willard, Merit, Dean and Settle, Instrumental Methods of Analysis, CBS Publishers and Distributors, IV Edn. 1986
6. Schoog, Holler, Nieman, Principles of Instrumental Analysis**,** Thomson Asia Pte Ltd., Singapore, 2004.

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SEMESTER IV

PAPER - 10
ORGANIC CHEMISTRY IV

OBJECTIVE:

To understand the concepts of Aromaticity, Photochemical Reactions, Antibiotics and proteins. Applications and Techniques of Dyeing.

UNIT-I: AROMATICITY

Aromaticity of benzenoid - non-benzenoid and heterocyclic compounds - Huckel's rule - Aromatic systems with π electron numbers other than six - non-aromatic (cyclo octatetraene etc,) and anti aromatic system (cyclobutadiene etc.) - system with more than 10π electrons - Annulenes upto C18 (synthesis of all these compounds is not expected).

UNIT-II: PHOTOCHEMISTRY

Photochemical excitation - fate of the excited molecules - Jablonski diagram - study of photochemical reactions of ketone - photo reduction - photo cycloaddition - Paterno - Buchi reaction - di pi-methane rearrangement - Pericyclic analysis of electrocyclic - cyclo addition and sigmatropic reactions - correlation diagrams for butadiene - cyclobutene system - hexatriene to cyclohexadiene systems - structure of bulvalene - fluxional molecule - Cope and Claisen rearrangement.

UNIT-III PROTEINS AND NUCLEIC ACIDS

Proteins - peptides and their synthesis - synthesis of tripeptide - merrifield synthesis - determination of tertiary structure of protein - biosynthesis of proteins - nucleic acids - types - DNA & RNA polynucleotide chain - components - biological functions - structure and role of (genetic Code) DNA and RNA (nucleotides only) - Biosynthesis of cholesterol.

UNIT-IV: ANTIBIOTICS

Introduction - structural elucidation and synthesis of penicillin – streptomycin - chloromycetin and tetracyclines.

UNIT-V: DYES

Introduction - classification and various methods of dyeing - preparations and applications of dyes - Nitroso dyes - Azodyes - Fast green - Methyl Orange - Methyl Red - Fast Red - Tripheylmethane dyes - Malachite green - Rosaniline - Aniline blue - Crystal violet - Xanthene dyes - Fluorescein - Rhodamine-B - Anthroquinone dyes - Alizarin.

Recommended Books:

1. Charles H.Depey and Orville, Molecular Reaction and Photochemistry,L. Chapman, Prentice Hall of India Pvt., Ltd., New Delhi.
2. Eric E.Conn, Paul. R. Stumpf, George Bruening and Roy H. Dole, Outlines of Biochemistry, V Edition, John Wiley and Sons.
3. Francis A. Carey and Richard J. SandburgAdvanced Organic Chemistry, Plenum Press, New York.
4. I. L. Finar, Organic Chemistry, Vol. II, VEdition ELBS publication.
5. J. March,Advanced organic reaction mechanism and structure, Tata McGraw Hill.
6. L.Smith, Robert L.Hill I. Robert Lehman, Robert J.Let Rowitz, Philip Handlar and Abraham white, Principles of Biochemistry General Aspects, VII EditionMcGraw Hill Int.,
7. Lubert Stryer, Biochemistry, Freeman and Co.,New York.
8. O.P. Agarwal, Chemistry of organic Natural Products, Goel Publishing House, Meerut.

PAPER-11
INORGANIC CHEMISTRY - IV

OBJECTIVE:
To study about the Inorganic Spectroscopy and Nuclear Chemistry.

UNIT-I: INORGANIC SPECTROSCOPY - I

Applications to inorganic systems of the following: ultra violet, visible, infra-red and Raman spectra of metal complexes, organometallic and simple inorganic compounds with special reference to coordination sites and isomerism.

UNIT-II: INORGANIC SPECTROSCOPY - II

Application to Inorganic systems of the followings
NMR, NQR and Mossebauer spectra - NMR of ^{31}P, ^{19}F, NMR shift reagents. NQR - Nitrosyl compounds. Mossebauer spectra of Fe and Sn systems.

UNIT-III: INORGANIC SPECTROSCOPY - III

ESR Introduction - Zeeman equation, g-value, nuclear hyperfine splitting, interpretation of the spectrum, simple carbon centered free radicals. Anisotropy - g-value and hyperfine splitting constant. McConnell's equation, Kramer's theorem.ESR of transition metal complexes of copper, manganese and vanadyl complexes.

Photoelectron spectroscopy (UV and X-ray) - photo electron spectra - Koopman's theorem, fine structure in PES, chemical shift and correlation with electronic charges.

UNIT-IV: INSTRUMENTAL ANALYSIS - I

AAS, AES and AFS – Principle, instrumentation and applications, advantages of AAS, interferences; GLC and HPLC – Principle, instrumentation and working, types of detectors; Inductively coupled plasma spectroscopy (ICP)- introduction, instrumentation, interferences and applications.

UNIT-V INSTRUMENTAL ANALYSIS - II

Laser Raman spectroscopy - principle, interfaces, advantages and applications.
Magnetic susceptibility and its determination - Guoy method, Faraday method and applications.
Polarography and Amperometry - Principle, instrumentation and applications.

TEXT BOOKS

1. A. Earnshaw, Introduction to Magneto Chemistry, Academic Press, London, (1968).
2. C.N.R. Rao, I.R. Ferraro, Spectroscopy in Inorganic Chemistry, Vol. I and Vol. II, Academic Press, (1970).
3. D. A. Skoog and D.M.West, Principles of Instrumental Methods of Analysis, Saunder's College Publ. III Edition, (1985).
4. E. A. V. Ebsworth, D. W. H. Rankin and S. Cradock, Structural Methods in Inorganic Chemistry, II Edition, Blackwell Scientific Publications, Oxford, London (1991).
5. G.D. Christian and J.E.G. Reily, Instrumental Analysis, Allegn Becon, II Edition, (1986).
6. H.A. Strobel, Chemical Instrumentation, Addison - Wesley Pub. Co., (1976).
7. R. S. Drago, Physical Methods for Chemists,Saunders College Publishing, Philadelphia (1992).
8. Willard Merrit, Dean and Settle, Instrumental methods of analysis, CBS Publ. VI edition, (1986).

Suggested References

1. AI Vogel, Text book of Qualitative Analysis - IV Edition (1985).
2. C. N. Banwell and E.M. Mc Cash, Fundamentals of Molecular Spectroscopy, IV edition, Tata McGraw Hill, New Delhi (1994).
3. D.A. Skoog D.M. West, Holt Reinhert and Winston, Fundamental of Analytical Chemistry, Publication, IV Edition (1982).
4. D.N. Sathyanarayana, Electronic Absorption Spectroscopy and Related Techniques, Universities Press (India) Ltd., Hyderabad (2001).
5. FA Cotton and G Wilkinson, Advanced Inorganic Chemistry, John Wiley and Sons, V Edition (1988).
6. G. Aruldhas, Molecular Structure and spectroscopy, Prentice Hall of India Pvt. Ltd., New Delhi (2001).
7. J. Huheey, Inorganic Chemistry, Harper and Collins, NY, IV Edition, (1993).
8. J. M. Hollas, Modern Spectroscopy, IVedition, John Wiley & Sons, Ltd., Chichester (2004).
9. M.C. Shrivers, P.W Atkins, CH. Langford, Inorganic Chemistry, OUP (1999).
10. Nakamoto, Infrared and Raman Spectra of Inorganic and Coordination Compounds, III Edn., John Wiley and Sons, New York, (1986).
11. O. Khan, Molecular Magnetism, New York, VCH (1993).
12. R.L. Carlin, Magneto chemistry, Springer-Verlag, New York, (1986).
13. S.F.A.Kettle, Physical Inorganic Chemistry: A Coordination Chemistry Approach, Oxford University Press, (1998)

PAPER-12
PHYSICAL CHEMISTRY-IV

OBJECTIVE

To study the principles of photochemical reactions. To study the Experimental methods and kinetics studies of photochemical reactions. Study of electrode - electrolytic interface. To study the fundamental principles of quantum chemistry and its application to chemical bonding. Schrödinger wave equation and its applications. To study statistical thermodynamics, quantum statistics and irreversible thermodynamics.

UNIT- I: PHOTOCHEMISTRY - I

Absorption and emission of radiation - Franck - Condon Principle - decay of electronically excited states - Jablonski diagram - radiative and non-radiative processes - fluorescence and phosphorescence - spin forbidden radiative transition - Internal conversion and intersystem crossing - energy transfer process - kinetics of unimolecular and bimolecular photophysical processes - excimers and exciplexes - static and dynamic quenching - Stern-Volmer analysis.

UNIT- II: PHOTOCHEMISTRY - II

Experimental methods - quantum yield and life time measurements - steady state principle - quantum yield and chemical actinometry.

Kinetics of photochemical reactions: hydrogen and halogen reactions,

Brief study about photoredox, photosubstitution, photoisomerization and photosensitized reactions - photovoltaic and photogalvanic cells, photo electrochemical cells, photo-assisted electrolysis of water, aspects of solar energy conversion.

UNIT- III: QUANTUM CHEMISTRY - I

Failure of classical mechanics - Compton effect - wave particle duality - uncertainty principle - waves - wave equation for electrons - quantum mechanical postulates - The concept of operators - Hermitian property. Schrodinger wave equation - application of Schrodinger's equation - the particle in a box (one, and three dimensional cases) - particle in a ring, solution to rigid rotor and harmonic oscillator. Schrodinger equation for hydrogen atom (no derivation is required) and the solutions.

UNIT- IV: QUANTUM CHEMISTRY - II

Approximation methods - Perturbation and Variation methods - application to hydrogen

molecule and helium atoms. Born - Oppenheimer approximation - valence bond theory for hydrogen molecule - LCAO - MO theory for diatomic molecules. Concept of hybridization - Huckel theory for conjugated molecules (Ethylene, butadiene and benzene).

UNIT- V: STATISTICAL THERMODYNAMICS - II

Thermodynamic functions in terms of partition functions - application of partition function to heat capacity of ideal gases - nuclear partition function - contribution to heat capacity of ortho and para hydrogen. Heat capacity of solids - Einstein and Debye models, Negative Kelvin temperature. Entropy of monoatomic gases - Sackur-Tetrode equation.

Irreversible thermodynamics - forces and fluxes - linear force - flux relation - phenomenological equations.

TEXT BOOKS

N.J.Turro, Modern Molecular Photochemistry, Benjamin, Cumming, Menlo Park, California (1978).

K.K.Rohatgi, Mukherjee, Fundamentals of Photochemistry, Wiley Eastern Ltd., (1978).

R.K. Prasad, Quantum Chemistry, Wiley Eastern, New Delhi (1992).

D.A. Mcquarrie, Quantum Chemistry, University Science Books, Mil Valley, California (1983).

Quantum Chemistry, Allyn and Bacon, Boston (1983).

R.Anantharaman, Fundamentals of Quantum Chemistry, Mac Millan India Limited (2001).

M.W. Hanna, Quantum Mechanics in Chemistry, W.A. Benjamin Inc. London (1965).

M.C.Gupta, Statistical thermodynamics, Wiley Easter, New Delhi (1990).

R.Hasee, Thermodynamics Of Irreversible Process, Addition Wesley, Reading, Mass (1969).

L.K. Nash, Elements of Chemical Thermodynamics, Addision Wesley (1962).

G.M. Barrow, Physical Chemistry, McGraw Hill (1988).

R.L. De Koch and H.B. Gray, Chemical Structure and Bonding, Benjamin- Cumming, Menlo Park, California. S.Glasstone, Text Book of Physical Chemistry.

Suggested References

A.K. Chandra, Introductory Quantum Chemistry, Tata Mc Graw Hill.

D.A. Mc Quarrie, Quantum Chemistry, University Science Books, Mill Valley, California (1983).

P.W. Atkins, Molecular Quantum Mechanics, Oxford University Press, Oxford (1983).

J.G.Clavert and J.N.Pitts, Photochemistry, Wiley, London (1966).

R.P.Wayne, Photochemistry, Butterworths, London (1970).

B.J.Mc Clenlland, Statistical Thermodynamics, Chapman and Hall, London (1973).

Cleyde, Physical Chemistry, Schaum Series, Mc Graw Hill (1976).

Dole, Thermodynamics, Prentice Hall, New York (1954).

Prigogine, Introduction to Thermodynamics of Irreversible Process, Interscience, New York (1961).

N.O.Smith, Elementary Statistical Thermodynamics - A Problem Approach, Plenum Press, NewYork (1961).

G.Clavert and J.N.Pitts, Photochemistry, Wiley, London (1966).

R.P.Wayne, Photochemistry, Butterworths, London (1970).

Francis W Sears and Gerhard L Salinger, Thermodynamics, kinetic theory, and statistical thermodynamics.

ELECTIVE
PAPER- 4
(to choose 1 out of 3)

A. ENVIRONMENTAL CHEMISTRY

OBJECTIVES:

To understand the concept of different types of pollution. To learn the various techniques involved in the analysis of pollutants. To know the methods for the control of pollution

UNIT-I AIR POLLUTION AND WATER POLLUTION

Classification of air pollution according to origin, chemical composition and state of matter - effects of air pollutants on living and nonliving things - ambient air quality standards - problems of air pollution in India - pollutions in industrial area (cement industry and thermal power plant) - Effect and consequences of air pollution: acid rain, green house effect, global warming and ozone depletion - major air pollution disasters - Bhopal Gas Leak - Chernobyl Nuclear Accident and Three Mile Island disaster.

Classification of water pollutants: DOD, BOD and COD - Effects of water pollutant on life and Environment.

UNIT-II SAMPLING AND ANALYSIS OF WATER AND AIR POLLUTANTS

Methods of sampling of gaseous, liquid and solid pollutant - analysis and effect of sulfur oxides, nitrogen oxides and carbon monoxide - biochemical effects and toxicology of Cd, Cr, As, Pb and Cu. Environmental implications of fertilizers, insecticides, pesticide - effect of pesticide residue on life - analytical techniques for pesticides residue analysis (Neutron Activation Analysis, Anodic Stripping Voltammetry and Atomic Absorption Spectroscopy) .

UNIT-III METHODS OF CONTROL OF AIR AND WATER POLLUTION

Methods of control of air pollution: Electrostatic precipitations - wet and dry scrubber, filters, gravity and cyclonic separation - adsorption, absorption and condensation of gaseous effluent.

Methods of control of water pollution: Water and waste water treatment - aerobic and anaerobic - aeration of water - principle of coagulation, flocculation, softening, disinfection, demineralization and fluoridation.

UNIT – IV NOISE POLLUTION

The decibel scale - effect: physiological, psychological, acute and chronic - Measurement of noise level (Sound level meter, Magnetic tap recorder, noise limit indicator) - noise control in industries: Administrative, engineering and path control - Protection of the personne (ear plugs, ear muffs. Helmets) - acoustic absorptive materials - noise control methods in industrial plants.

UNIT-IV RADIOACTIVE POLLUTION

Classification: Non-ionizing and ionizing radiation - radioactive pollution and their sources - natural and anthropogenic - biological effect of radiation on the human body - radiation doses -preventive measure from nuclear radiation - regulations from safety measure.

Radioactive wastes: Classification - low level and high level - radioactive waste disposal - geological disposal - ocean dumping - sub-sea bed dumping - subductive waste disposal method - transmutation of high - level radioactive waste - radioactive waste management in India.

TEXT BOOKS

1. S.S Dara ," A Text Book of Environmental chemistry and Pollution Control ",S.. Chand & company Ltd, New Delhi
2. V. K. Ahluwalia," Environmental chemistry", Ane Books India, Chennai.
3. Anu Gopinath and Chandradasan, Environmental Chemistry., Vishal Publishing Co, Delhi.

REFERENCE BOOKS

1. A. K. De. "Environmental Pollution", New age intenational publishers, New Delhi
2. G. S. Sodhi, "Fundamental Concepts of Environmental Chemistry", Narosa Publishing House, New Delhi.
3. S.M. Khopkar, Environmental Pollution Analysis,
4. S. P.Mahajan, Pollution control in process industries.

http://www.nios.ac.in/media/documents/313courseE/L36.pdf

http://www.iisc.ernet.in/currsci/dec252001/1534.pdf

http://www.sciencelog.net/2014/12/radioactive-pollution-causes-and-effect.html

http://collegesat.du.ac.in/UG/Envinromental%20Studies_ebook.pdf

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PAPER- 4
B. INORGANIC PHOTOCHEMISTRY

UNIT-I: BASICS OF PHOTOCHEMISTRY

Absorption, excitation, photochemical laws, quantum yield, electronically excited states, life times-measurements of the times. Flash photolysis, energy dissipation by radiative and non-radiative processes, absorption spectra, Frank-Condon principle, photochemical stages-primary and secondary processes.

UNIT-II: EXCITED STATES OF METAL COMPLEXES

Excited states of metal complexes: Comparison with organic compounds, electronically excited states of metal complexes, charge transfer spectra and charge transfer excitations.

UNIT-III: LIGAND FIELD PHOTOCHEMISTRY

Photosubstitution, photooxidation and photoreduction, lability and selectivity, zero vibrational levels of ground state and excited state, energy content of excited state, zero-zero spectroscopic energy, development of the equations for redox potentials of the excited states.

UNIT-IV: REDOX REACTIONS BY EXCITED METAL COMPLEXES

Energy transfer under condition of a weak interaction and strong interaction-examples formation; condition of the excited states to be useful as redox reactants, excited electron transfer, metal complexes as attractive condidates, (2,2-bipyridine and 1,10-phenanthroline complexes), illustration of reducing and oxidising character of Ru (II) (bipyridal complex, comparison with Fe(bipy); role of spin-orbit coupling-life time of these complexes. Application of redox processes of electronically excited states for catalytic purposes, transformation of low energy reactants into high energy products and conversion of chemical energy into light.

UNIT-V: METAL COMPLEX SENSITIZERS

Metal complex sensitizers, electron relay, metal colloid systems, semiconductor supported metal or oxide systems, water photolysis, nitrogen fixation and carbon dioxide reduction.

Book Suggested:

1. Concepts of Inorganic Photochemistry, A.W. Adamson and P.D. Fleischauer, Wiley.
2. Inorganic Photochemistry, J.Chem. Educ. vol. 60 No. 10, 1983.
3. Progress in Inorganic Chemistry, Vol. 30ed. S.J. Lippard. Wiley.
4. Coordination Chem. Revs. 1981, vol. 39, 121, 1231, 1975, 14, 321,; 1990 97, 313.
5. Photochemistry of Coordination Compounds, V. Balzari and V. Carassiti, Academic Press.
6. Elements of Inorganic Photochemistry, G.J. Ferraudi, Wiley.
7. S.Arunachalam, "Inorganic Photochemistry - An Introduction to Photochemical andPhotophysical Aspects of Metal Complexes", Kala Publications, Tiruchirappalli, India, 2002.
8. D.M. Roundhill, “Photochemistry and photophysics of Metal complexes”, Springer;Edition, 1994

PAPER – 4
C. MEDICINAL CHEMISTRY AND DRUG DESIGN

Objectives:

Students should be able to understand concepts of drug design and mechanism of drug action of different drugs. Students will be aware of metabolism and delivery methods of different classes of drugs.

UNIT-I: DRUG DESIGN

Development of new drugs, concepts of pro-drugs and soft drugs, Principles of drug design, Quantitative structure activity relationships. History and development of QSAR (Quantitative Structure Activity Relationships) - Concepts of drug parameters. High throughput Screening.

UNIT-II: IMPORTANCE AND MECHANISM OF DRUG ACTION

Antibiotics: Drug action of penicillin, cephalosphorin, tetracycline and macrocyclic antibiotics (no synthesis). Antimalerials: Trimethoprim- NSAIDS: Paracetamol, Meperidine, Aminopyrine-Ibuprofen, Oxyphenylbutazone, Diclophenac sodium, Indomethacin-Antitubercular and antileprotic: Ethambutol, Isoniazide and Daspone - Anaesthetics: Lidocaine, - Antihistamines: Phenobarbital, Diphenylhydramine- Tranquilizers: Diazepham, Trimeprazine, Thiopental - Anti AIDS agents: Acylovir, Ganciclovir.

UNIT-III: PHYSICO-CHEMICAL FACTORS AND BIOLOGICAL ACTIVITIES

Physical properties - Features governing drug action - Structurally specific - nonspecific drugs -Thermodynamic activity - Theories - Cut-off point - Factors governing ability of drugs -Absorption - Distribution - Excretion - Biotransformation - Intramolecular distances -Dissociation constants - Isosterism and Bioisosterism.

UNIT-IV: CLASSIFICATION OF MEDICINAL COMPOUNDS

Central Nervous system acting drugs – (General and Local anaesthetics, Sedatives and Hypnotics, Anticonvulsants, Narcotic and Non-narcotic analgesics, Anti-Parkinsonian agents, Anti-depressants, Tranquilizers, Psychomimetics) - Pharmacodynamic agents (Anti-arrythmics, Anti-anginals, Vasodialators, Anti-hypertensives, Diuretics, Antihistamines) - Chemotherapeutic Agents (Antibiotics, Antivirals, Antifungals) - Drugs for metabolic and endocrine disorders (Anti-thyroid drugs, Anti-diabatic drugs, biosynthetic insulin) – Therapeutic Index (Definitions with examples).

UNIT-V: DRUG ANALYSIS

Principles of quantitative analysis of the following drugs in formulations: Aspirin - benzyl penicillin - ascorbic acid - isoniazid - codeine - chloramphenical - riboflavin and folic acid.

Reference Books

1. Burger's Medicinal Chemistry & Drug discovery, Vol 1-3, 5th Ed, 1995.
2. Wilson, Gisvold & Dorque: Text book of Organic Medical and Pharmaceutical Chemistry, 10th Ed, Lippincoh pover publishers, 1998.
3. David A Williams, William O. Foye & Thomas L. Lemke, Foye's Principles of medicinal Chemistry, 6th Edition, Lippincott Williams & Wilkins, 2002.
4. Zubay G, Biochemistry, Maxwell Macmillan International Editions, second edition, 1987.
5. R. L. Foster, The Nature of Enzymology, Croom Helm, 1980.
6. D. L. Purich, (Ed), Contemporary Enzyme kinetics and Mechanisms, Academic Press, 1983.
7. Dugas H, Bio-organic Chemistry, A chemical approach to enzyme action, Springer 2003.
8. Chemistry of drug design and drug action-. R. B. Silverman (2004) Acad. press
9. Graham Patrick, An Introduction to Medicinal Chemistry- 2nd Edn. Qxford, 2010
10. N. K. Jain, Advances in Controlled and Novel Drug Delivery, CBS, 2001.
11. Lednicer, The Organic Chemistry of Drug Synthesis, Vol. 1, 5th Edition, John Wiley & Sons, 2001.
12. Foye's Principles of Medicinal Chemistry, Sixth Edition, Wolters Kluwer, 2008
13. G.R. Chatwal, Medicinal Chemistry, Himalaya Publishing House.
14. V.K. Ahluwalia and M. Chopra, Medicinal Chemistry, Ane Book Pvt. Ltd., 2008.
15. J. B. Taylor and P . D. Kenewell., Introductory medicinal chemistry.
16. D. C. Garratt., Quantitative analysis of drugs.
17. G. L. Patrick., An introduction to medicinal chemistry.
18. Beckett and Stenlake., Practical pharmaceutical chemistry. Vol 1 and 2.

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MAIN PRACTICAL
PRACTICAL PAPER-4
ORGANIC CHEMISTRY PRACTICAL- II

I. ANY SIX PREPARATIONS FROM THE FOLLOWING INVOLVING TWO STAGES

1. sym-Tribromo benzene from aniline (bromination, diazotization and hydrolysation)
2. Benzanilide from benzophenone (addition and Beckmann rearrangement)
3. m-Nitro benzoic acid from methyl benzoate (nitration and hydrolysation)
4. 2, 4.- Dinitrobenzoic acid from p-nitrotoluene (oxidation and nitration)
5. m-Nitro benzoic acid from benzaldehyde (oxidation and nitration)
6. Benzil from benzaldehyde (rearrangement)
7. Anthraquinone from phthalic anhydride (Fridel Crafts reaction)
8. Acetyl salicylic acid from methyl salicylate (hydrolysis and acetylation)
9. 2- Phenyl indole from phenyl hydrazine (Fisher indole reaction)
10. m-nitroaniline from nitrobenzene (nitration and reduction)

II. ANY TWO EXERCISES IN THE EXTRACTION OF NATURAL PRODUCTS

1. Caffeine from tea leaves
2. Lactose from milk
3. Citric acid from lemon
4. Piperine from black pepper

III. CHROMATOGRAPHIC SEPARATIONS

1. Column chromatography - Separation of anthracene and picric acid from anthracene picrate.
2. Thin layer chromatography - Separation of green leaf pigments.
3. Paper chromatography - Identification of amino acid.

IV. ANY FIVE ESTIMATIONS

1. Estimation of aniline
2. Estimation of phenol
3. Estimation of glucose
4. Estimation of ethyl methyl ketone
5. Estimation of amino group
6. Estimation of amide group
7. Saponification of fat or an oil
8. Iodine value of an oil
9. Estimation of sulphur in an organic compound

V.SPECIAL INTERPRETATION OF ORGANIC COMPOUNDS USING UV, IR, PMR AND MASS SPECTRA OF THE FOLLOWING 15 COMPOUNDS

[See ANNEXURE – I]

Recommended Books

Arthur I.Vogel, A text book of Practical Organic Chemistry, ELBS
Raj K. Bansal, Laboratory Manual of Organic Chemistry, Wiley Eastern limited.

UNIVERSITY EXAMINATION MARKS

University Examination	Marks
Estimation	25
Preparation	25
Interpretation of spectra	10
Viva Voce	10
Record	05
Total	**75**

CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK)
MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	**25**

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PRACTICAL PAPER - 5
INORGANIC CHEMISTRY PRACTICAL - II

1. ANALYSIS OF ORES

1. Determination of percentage of calcium and magnesium in dolomite.
2. Determination of percentage of MnO_2 in pyrolusite.
3. Determination of percentage of lead in galena.

II. ANALYSIS OF ALLOYS

1. Estimation of tin and lead in solder.
2. Estimation of copper and zinc in brass.
3. Estimation of chromium and nickel in stainless steel.

III. ANALYSIS OF INORGANIC COMPLEX COMPOUNDS

1. Preparation of cis and trans potassium bis (oxalato) diaquochromate(III) and analysis of each of these for chromium.
2. Preparation of potassium tris (oxalato) ferrate (III) and analysis for iron and oxalate.

IV. QUANTITATIVE ANALYSIS OF THE FOLLOWING MIXTURES
(one by volumetric and one by gravimetric method)

1. Copper and Nickel
2. Copper and Zinc
3. Iron and Nickel
4. Iron and Magnesium

V. COLORIMETRIC ANALYSIS USING PHOTOELECTRIC METHOD

1. Estimation of iron
2. Estimation of nickel
3. Estimation of manganese
4. Estimation of copper

VI. AMPEROMETRIC TITRATIONS (With dead stop endpoint)

1. Thiosulpate - iodine system
2. Iron (II) - cerium (IV) systems.

Reference book.
N.N. Greenwood and A. Earnshaw, Chemistry of the Elements, Vol.II, Pergamon Press (1997

VII. SPECTRAL INTERPRETATION OF THE FOLLOWING INORGANIC COMPOUNDS

[See ANNEXURE – II]

UNIVERSITY EXAMINATION MARKS

University Examination	Marks
I. Estimation of mixture containing two metal ions	
procedure	5
Volumetric analysis	15
Gravimetric analysis	10
II. Colorimetric estimation (or) Amperometric titration	
Estimation	15
Procedure	5
III. Interpretation of spectra	10
Viva Voce	10
Record	05
Total	**75**

CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK)
MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	**25**

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PRACTICAL PAPER-6
PHYSICAL CHEMISTRY PRACTICAL- II

EXPERIMENTS IN ELECTROCHEMISTRY:
CONDUCTOMETRY, POTENTIOMETRY, PH METRY AND SPECTROSCOPY.

I.CONDUCTIVITY MEASUREMENTS

1. Determination of equivalent conductance of a strong electrolyte and verification of Debye - Huckel - Onsager Equation
2. Verification of Debye-Huckel limiting law
3. Verification of Ostwald's Dilution law for a weak electrolyte.
4. Determination of pK_a values of weak acids and weak bases.
5. Conductometric titrations between acid (simple and mixture of strong and weak acids) - base,
6. Precipitation titrations including mixture of halides.

II. E.M.F MEASUREMENTS

1. Determination of standard potentials (Copper, Silver & Zinc)
2. Determination of thermodynamic quantities from EMF measurements –
3. Potentiometric titrations – Neutralization reactions
4. Determination of pH of buffer solution and calculation of pK_a.
5. Determination of stability constant of a complex.
6. Determination of solubility product of a sparingly soluble salt.
7. Potentiometric titrations – Redox titrations.
8. Potentiometric titrations – Precipitation titration of mixture of halides by EMF measurements.

III. SPECTROSCOPY: INTERPRETATION OF SPCTRA [See ANNEXURE – III].

1. Experiments given only to familiarize the interpretation of spectra provided.
2. Interpretation of UV-Visible spectra of simple molecules for the calculation of molecular data
3. Identification of functional groups (5 typical spectra will be provided).
4. IR and NMR spectral calculations of force constant and coupling constants respectively
5. Identification and interpretation of a spectra (5 each in IR and NMR will be provided)

LIST OF EXPERIMENTS SUGGESTED FOR PHYSICAL CHEMISTRY PRACTICAL II

Typical list of possible experiments are given.
Experiments of similar nature and other experiments may also be given.
The list given is only a guideline.
Any 15 experiments have to be performed in a year.

1. Determination of the equivalent conductance of a weak acid at different concentrations and verify Ostwald's dilution law and calculate the dissociation constant of the acid.
2. Determination of equivalent conductance of a strong electrolyte at different concentrations and examine the validity of the Onsager's theory as limiting law at high dilutions.
3. Determination of the activity co-efficient of Zinc ions in the solution of 0.002M Zinc sulphate using Debye-Huckel limiting law.
4. Determination of the solubility product of silver bromate and calculate its solubility in water and in 0.01 M $KBrO_3$ using Debye-Huckel limiting law.
5. Conductometric titrations of a mixture of HCl, CH_3COOH and $CuSO_4$ and NaOH.
6. Determination of the dissociation constant of an acid at different dilution.
7. Determination of the solubility of the lead iodide in water , 0.04 M KI and 0.04 M $Pb(NO_3)_2$ at 298 K
8. Determination of the solubility product of leadiodide at 298 K and 308 K and calculate the molar heat of solution of lead iodide.
9. Compare the relative strength of acetic acid and mono chloroacetic acid by conductance method.
10. Determine the basicity of organic acids (oxalic /benzoic).
11. Determine the electrode potentials of Zn and Ag electrodes in 0.1M and 0.001M solutions at 298 K and fine the standard potentials for these electrodes and test the 12.
12. Determine the activity co-efficient of an electrolyte at different molalities by EMF measurements.
13. Determine the dissociation constant of acetic acid titrating it with sodium hydroxide using quinhydrone as an indicator electrode and calomel as a reference electrode.

14. Study of the electrolytic separation of metals (Ag, Cu, Cd and Zn)
15. Determine the strength of a given solution of KCl using differential potentiometric titration technique.
16. Determine the dissociation constant of acetic acid in DMSO, DMF, acetone and dioxane by titrating it with KOH.
17. Determine the transport number of Ag ions and nitrate ions by Hittorf's method.
18. Determine the transport number of cadmium ions and sulphate ions by measuring emf of concentration cells with and without transference.
19. Determine the dissociation constant of monobasic or dibasic acid by all the Alber-Serjeant method.
20. Determine the pH of the given solution with the help of indicators using buffer solutions and by colorimetric method.
21. Perform acid-base titration in a non aqueous medium.
22. Determine the pH of a given solution by EMF method using glass and calomel electrodes and evaluate pKa value of an acid.
23. Determine the pH of a given solution by emf methods using hydrogen electrode and quinhydrone electrode.
24. Estimate the concentration of cadmium and lead ions by successive reduction in polarography. Verify Illkovic equation.
25. Determine lead ion by amperometric titrations with potassium dichromate.
26. Determine ferric ion by amperometric titration.
27. Determine pH value of an acid-base indicator (methyl red) by colorimetry.
28. Determine the composition and instability constant of a complex by mole ratio method.
29. By colorimetry determine simultaneously Mn and Cr.
30. Study the effect of solvent on the conductivity of $AgNO_3$/acetic acid and determine the degree of dissociation and equilibrium constant in different degree of dissociation and mixtures (DMSO, DMF, dioxane, acetone, water) and test the validity of Debye-Huckel Onsager's equation.
31. Determine the solubility of $Ca(TiO_3)_2$ in deionised water and in dilute solution of KCl at 298 K. Determine the solubility product graphically.
32. Determine the equivalent conductivity of a Ca electrolyte and dissociation constant of the electrolyte.
33. Determine the equivalent dissociation constant of a polybasic acid.
34. Calculate the thermodynamic parameters for the reaction $Zn + H_2SO_4$ gives $ZnSO_4 + H_2$ by emf method.

35. Determine the formation constant of silver-ammonia complex and stoichiometry of the complex potentiometrically.
36. Determine the stability constant of a complex by polarographic method.
37. Determine the g value from a given ESR spectrum.

UNIVERSITY EXAMINATION MARKS

University Examination	Marks
Procedure	10
Manipulation	25
Result	15
Interpretation of spectra	10
Viva Voce	10
Record	05
Total	**75**

CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK)
MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	**25**

THIRUVALLUVAR UNIVERSITY

MASTEROF SCIENCEDEGREECOURSE

M.Sc. COMPUTER SCIENCE

UNDERCBCS
(With effect from 2017-2018)

The Course of Study and the Scheme of Examinations

S.NO.	Study Components / Course Title		Ins. Hrs. /week	Credit	Title of the Paper	Maximum Marks		
SEMESTERI						**CIA**	**Uni. Exam**	**Total**
1	MAIN	Paper-1	5	5	Formal Languages and Automata Theory	25	75	100
2	MAIN	Paper-2	4	3	Advanced Java Programming	25	75	100
3	MAIN	Paper-3	4	3	Web Application using C#	25	75	100
4	MAIN	Paper-4	4	3	Data Base Management Systems	25	75	100
5	MAIN PRACTICAL	Paper-1	3	2	Advanced Java Programming Lab	25	75	100
6	MAIN PRACTICAL	Paper-2	3	2	Web Application using C# Lab	25	75	100
7	MAIN PRACTICAL	Paper-3	3	2	Data Base Management Systems Lab	25	75	100
8	ELECTIVE	Paper-1	4	3	***(to choose either A or B or C)*** A. Object Oriented Analysis and Design B. Cloud Computing C. Principles of Programming	25	75	100
			30	**23**				**800**
SEMESTERII						**CIA**	**Uni. Exam**	**Total**
9	MAIN	Paper-5	4	4	Compiler Design	25	75	100
10	MAIN	Paper-6	4	3	Enterprise Java Programming	25	75	100
11	MAIN	Paper-7	4	3	Enterprise Applications using C#	25	75	100
12	MAIN	Paper-8	4	3	Unix Network Programming	25	75	100
13	MAIN PRACTICAL	Paper-4	3	2	Enterprise Java Programming Lab.	25	75	100
14	MAIN PRACTICAL	Paper-5	3	2	Enterprise Applications using C# Lab	25	75	100
15	MAIN PRACTICAL	Paper-6	2	2	Unix Programming Lab	25	75	100
16	**Compulsory Paper**		2	2	**Human Rights**	25	75	100

17	ELECTIVE	Paper-2	4	3	***(to choose either A or B or C)*** A. Software Testing B. Web Services C. Cryptography and Network Security	25	75	100
			30	**24**				**800**
SEMESTE III						**CIA**	**Uni. Exam**	**Total**
18	MAIN	Paper-9	5	5	Distributed Operating Systems	25	75	100
19	MAIN	Paper-10	4	3	Software Project Management	25	75	100
20	MAIN	Paper-11	4	3	Mobile Computing	25	75	100
21	MAIN	Paper-12	4	3	Design and Analysis of Algorithms	25	75	100
22	MAIN PRACTICAL	Paper-7	3	2	Mobile Computing Lab	25	75	100
23	MAIN PRACTICAL	Paper-8	3	2	Design and Analysis of Algorithms Lab	25	75	100
24	MAIN PRACTICAL	Paper-9	3	2	Mini Project	25	75	100
25	ELECTIVE	Paper-3	4	3	***(to choose either A or B or C)*** A. Software Quality Assurance B. Big Data C. Soft Computing	25	75	100
			30	**23**				**800**
SEMESTER IV						**CIA**	**Uni. Exam**	**Total**
26		Paper-11	30	20	Project Work	80	120	200
			30	**20**		**80**	**120**	**200**

Subject	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total marks**
MAIN	12	3-5	41	100	1200
ELECTIVE	3	3	9	100	300
MAIN PRACTICAL	8	2	16	100	800
MINI PROJECT	1	2	2	100	100
MAIN PROJECT	1	20	20	200	200
COMPULSORY PAPER	1	2	2	100	100
Total	**26**	**-**	**90**	**-**	**2700**

Structure of the Course and Evaluation Pattern:

The duration of University examination for theory and practical subjects shall be3 hours. The maximum mark for each theory is 100 with25 for Continuous Internal Assessment (CIA) and75 for University Examination.

CIA Theory Exam		
I	Two tests	15 Marks
II	Assignment /Seminar	5 Marks
III	Attendance	5 Marks
	Total	**25 Marks**

The maximum marks for each practical is 100 with 25 for Internal Assessment and75 for University Examination.

CIA Practical Exam		
I	One Test	20 Marks
II	Record	5 Marks
	Total	**25 Marks**

Semester Practical Exam		
1.	Experiment 1	25 Marks
2.	Experiment 1	25 Marks
3.	Viva – Voce	15 Marks
4.	Record	10 Marks
	Total	**75 Marks**

THIRUVALLUVARUNIVERSITY

M.Sc. COMPUTERSCIENCE
SYLLABUS

UNDERCBCS

(With effect from 2017-2018)

SEMESTER –I **MAIN PAPER-1** **5H/5C**

FORMAL LANGUAGES AND AUTOMATA THEORY

UNIT–I

Fundamentals - String, Alphabets, Operations, Finite State Machine – Definitions, Divisibility by Three Tester - Set Theory – Relations – Functions- Counting Techniques – Logic-Methods of Proof

UNIT-II

Finite Automata –Deterministic and Nondeterministic Finite Automata – Equivalence of NFA and DFA – Finite Automata with Outputs –Finite Automata with Null Moves – Finite Automata and Sequential Circuits

UNIT-III

Chomsky classification of grammars -Regular Expression – Relation between Regular languages and Finite Automata- Closure Properties – Automata for Union, Intersection and Difference of Languages – Context free grammars – Normal forms for Context Free Grammar – Parse Trees – Ambiguity Grammars – Removing Ambiguity from Grammars

UNIT-IV

Basic Structure – Types of Acceptance by PDA – Correspondence between PDA and CFL – Parsing and PDA -Languages of PDA – Equivalence of PDA and CFG – Deterministic PDA

UNIT-V

Basic structure of TM – Instantaneous Description of Turing Machine – Language of TM – Turing Machine as Computer for Positive Integer- Universal Turing Machine – Turing Machine for 1's Complement, 2's Complement- TM for Well Formed Parenthesis – TM for Unary addition and Multiplication – TM for Palindrome Recognition – TM for GCD – TM for 0^n1^n

TEXT BOOKS

1. C.K. Nag pal“ Formal Languages and Automata Theory” , Oxford University Press, Fourth Edition, 2013

2. Hop croft and Ullman, “Introduction to Automata Theory, Languages and Computation”, Narosa Publishing House, Delhi, 2002

3. E.V. Krishnamurthy “Theory of Computer Science” East West Press Pvt. Ltd.

REFERENCES

1. Juraj Hromkovic, “Theoretical Computer Science”, Springer Indian Reprint, 2010

2. John E. Hocroft, “Introduction to Automata Theory, Languages and Computation”, Paperback, 2008.

3. K.V.N. Sunitha, “Formal Languages and Automata Theory”, Paperback, 2015.

4. A Puntambekar, “Formal Languages and Automata Theory for JNTU”, Paperback, 2015.

SEMESTER –I **MAIN PAPER -2** **4H/3C**

ADVANCED JAVA PROGRAMMING

UNIT-I

Design Patterns: Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern, Prototype Pattern, Singleton Pattern- Adapter Pattern- Proxy Pattern-Decorator Pattern-Command Pattern- Template Pattern- Mediator Pattern-Collection Framework – Array List class – Linked List class – Array List vs. Linked List - List Iterator interface - Hash Set class- Linked Hash Set class-Tree Set class Priority Queue class - Map interface-Hash Map class- Linked Hash Map class –Tree Map class - Comparable interface -Comparator interface-Comparable vs. Comparator

UNIT-II

Applet Fundamentals- Applet Class - Applet lifecycle- Steps for Developing Applet Programs- Passing Values through Parameters- Graphics in Applets- GUI Application - Dialog Boxes - Creating Windows - Layout Managers – AWT Component classes – Swing component classes- Borders – Event handling with AWT components - AWT Graphics classes - File Choosers - Color Choosers – Tree – Table – Tabbed panels–Progressive bar - Sliders.

UNIT-III

JDBC -Introduction - JDBC Architecture - JDBC Classes and Interfaces – Database Access with MySQL -Steps in Developing JDBC application - Creating a New Database and Table with JDBC - Working with Database Metadata; Java Networking Basics of Networking - Networking in Java- Socket Program using TCP/IP - Socket Program using UDP- URL and In et address classes.

UNIT–IV

Servlet: Advantages over Applets - Servlet Alternatives - Servlet Strengths - Servlet Architecture - Servlet Life Cycle – Generic Servlet, Http Servlet - First Servlet - Invoking Servlet - Passing Parameters to Servlets - Retrieving Parameters - Server-Side Include – Cookies- JSP Engines - Working with JSP - JSP and Servlet - Anatomy of a JSP Page.

UNIT-V

Client-Side Programming: Client-side programming technologies - Form design using HTML, XHTML and DHTML and CSS - Client side validation Using Java Script - Content Structuring using XML - Adding Interactivity with AJAX - Query Framework- Server-side Programming- Web Servers - Handling request and response - Handling Form data - Session management - Database Access.

TEXT BOOK

1. S.Sagayaraj, R.Denis, P.Karthik & D.Gajalakshmi, “Java Programming“, Universities Press, 2017.

REFERENCES

1. Patrick Naughton& Herbert Schildt, “The Complete Reference: Java 2”, Tata McGraw Hill, 1999
2. Bruce W.Perry, “Java Servlet and JSP Cook Book”, O'Reilly, 2004.

SEMESTER –I **MAIN PAPER -3** **4H/3C**

WEB APPLICATION USING C#

UNIT – I

Introduction to ASP.NET: Evolution of .NET – Benefits of .NET – Overview of .NET - ASP.NET overview: Exploring new features of ASP.NET - ASP.NET Technologies- Exploring an ASP.NET 4.0 Web Application – Creating an ASP.NET website.

UNIT – II

Developing a Web Application: Specifying a location for a web application – File types in ASP.NET - Exploring ASP.NET Web pages - ASP.NET Coding Models – Application Structure and State: Structure of an application- The Global. Sax Application file – States.

UNIT – III

ASP.NET Controls: Standard Controls: The Control Class – The Web Control class- The Label Control- the Button Control – The Text Box Control - The Image Control - The List Box Control – Navigation Controls: The Tree View Control - Creating Static Menus - Validation Controls: Using the Required Field Validator Control- Using the Range Validator Control – HTML Controls: HTML Server Controls – HTML Form Class.

UNIT - IV

Accessing Data in ASP.NET : Working with Database Controls: The Grid View Control The Data list control-The Details view control- LINQ Queries: Introducing LINQ Queries-Data Structures in LINQ – Deffered Query Execution and Immediate Execution LINQ and Generic Types – ADO.NET Entity Framework: Exploring ADO.NET Entity Framework – Exploring the features of Entity Framework – Working with Files and Streams: Introducing the System.IO Namespace – Working with Drives and Directories- Exploring the Directory class.

UNIT – V

ASP.NET Web Services: Introduction – Infrastructures of ASP.NET web services – Web Service Properties – Security in ASP.NET: Working with Login Controls – Working with User Profiles – Crystal Reports: Understanding Crystal Reports.

TEXT BOOK

1. KOGENT Learning Solutions, "ASP.NET 4.0 (Covers C# 2010 and VB 2010 codes) Black Book", Dream-Tech Press

REFERENCES

1. Pankaj Agarwal "Principles of .NET Framework", Vayu Education of India.
2. Mathew MacDonald, Adam Freeman and Mario Szpuszta, "Pro ASP.NET 4 in C# 2010", Fourth Edition. Press.
3. Scott Millett, "Professional ASP.NET Design Patterns", Paperback, 2011.
4. Shivprasad Koriala and Rajesh Pillai, "C# and ASP.NET Projects", Paperback, 2007.

SEMESTER –I **MAIN PAPER- 4** **4H/3C**

DATABASE MANAGEMENT SYSTEMS

UNIT-I

File System vs. DBMS- Database System Applications- View of Data- Data base language-Database design-ER Mode l_ Relational Model-Network Data Model-Hierarchical Data Model-Data Storage & Querying- Data Architecture.

UNIT-II

Relational Model-Structure of Relational Databases - Relational Algebra and Calculus- SQL - Basic Structure- Set Operations- Aggregate Functions- Null Values- Nested Queries-Complex Queries-Views - Modification of the Database - Advanced SQL- Triggers.

UNIT-III

Functional Dependencies – Features of Relational designs-Decomposition and Normalisation using Functional Dependencies and Multi valued Dependencies-Join dependencies-Domain key Normal form.

UNIT-IV

Overview of Physical Storage Media- Magnetic disks-RAID- Tertiary Storage-File Organization – Organization of records in Files- Indexing and Hashing-Ordered Indices- B+ -Tree Index Files - B-Tree Index Files – multiple Key Access - Static and Dynamic Hashing-QueryProcessing-TransactionManagement-Transactions-Concurrency.

UNIT-V

Distributed Databases - Homogeneous and Heterogeneous Databases-Distributed Data Storage - Distributed Transactions-Commit Protocols - Concurrency Control - Object BasedDatabases-ComplexDatatypes-StructuredTypesandInheritanceinSQL–Object identity and Reference-Types in SQL-XML-structure of XML data- XML Document - Schema - Querying and Transformation - Data Mining and Data Ware housing.

TEXTBOOK

1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan-“Database System Concepts”, Fifth Edition, McGraw-Hill, 2006.

REFERENCES

1. Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, Tata McGraw-Hill Publishing Company, 2003.
2. Ramez Elmasri and Shamkant B. Navathe, “Fundamental Database Systems”, Third Edition, Pearson Education, 2003.
3. Hector Garcia–Molina, Jeffrey D.Ullmanand Jennifer Widom- “Database System Implementation”-PearsonEducation-2000.
4. Narang,”DatabaseManagementSystems”, 2nd ed., PHI.

SEMESTER –I **MAIN PRATICAL PAPER- 1** **3H/2C**

ADVANCED JAVA PROGRAMMING LAB

1. Collections using Set, List and Map interfaces
2. Applet programs
3. AWT Controls
4. CRUD operation Using JDBC
5. Displaying Query Results in a Table
6. TCP Socket
7. UDP Socket
8. Web application using Servlet and JDBC
9. Cookies and Session tracking
10. Web application using JSP and JDBC

SEMESTER –I **MAIN PRATICAL PAPER- 2** **3H/2C**

WEB APPLICATIONUSING C# LAB

1. Web Configuration File
2. HTML Control Classes, Control Events, Container and Input Control Classes,
3. HTTP Request Classes & Response Classes
4. Web Control Classes & Control Tags
5. Validation Controls
6. Rich Controls
7. Data Access
8. Components
9. Custom Controls
10. User Controls

SEMESTER –I **MAIN PRATICAL PAPER- 3** **3H/2C**

DATABASE MANAGEMENT SYSTEMS LAB

1. Creating data base tables and using data types. - Create table- Modify table - Drop table

2. Practical Based on Data Manipulation- Adding data with Insert - Modify data with Update -Deleting records with Delete

3. Practical Based on Implementing the Constraints - NULL and NOT NULL - Primary Key and Foreign Key Constraint - Unique, Check and Default Constraint

4. Practical for Retrieving Data Using following clauses - Simple select clause - Accessing specific data with Where - Ordered By - Distinct and Group By

5. Practical Based on Aggregate Functions - AVG –COUNT – MAX –MIN –SUM -CUBE

6. Practical Based on implementing all String functions and Date and Time Functions, union, intersection, set difference.

7. Implement Nested Queries & JOIN operation.

8. Practical Based on performing different operations on a view.

9. Practical Based on implementing use of triggers, cursors & procedures.

10. Make Database connectivity with front end tools MS-Visual Studio with C# programming.

SEMESTER –I **ELECTIVE PAPER- 1** **4H/3C**

(To choose either A or B or C)

A. OBJECT ORIENTED ANALYSIS AND DESIGN

UNIT - I

System Development - Object Basis-Development life cycle - Methodologies-Patterns - Frame works-Unified Approach-UML.

UNIT - II

Use - Case Models-Object Analysis-Object relations-Attributes-Methods-Class and object responsibilities-Case Studies.

UNIT - III

DesignProcess-DesignAxioms-ClassDesign-Objectstorage-ObjectInterpretability-Case Studies.

UNIT - IV

User interface design-View layer classed-Micro-level processes-View Layer Interface-Case Studies.

UNIT - V

Quality Assurance Tests - Testing strategies - Object O riented on Testing - Test Cases - Test Plans - Continuous Testing – Debugging Principles – System usability – Measuring user satisfaction-Case Studies.

TEXTBOOK

1. Ali Bahrami, "Object Oriented Systems Development", McGraw Hill International Edition, 1999

REFERENCES

1. Grady Booch, "Object Oriented Analysis and Design", Pearson Education-2nd Edition

2. -Oriented Analysis and Design using UML", PHI.

3. Carol Britton and Jill Doake, "Object – Oriented System Development: A Gentel Introduction", Paperback, 2012.

4. David West and Brett McLaughlin, "Head First Object-Oriented Analysis and Design", Kindle Edition, 2011.

SEMESTER –I **ELECTIVE PAPER- 1** **4H/3C**

(To choose either A or B or C)

B. CLOUD COMPUTING

UNIT - I

Fundamentals – Cloud computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why cloud computing Matters – Advantages of Cloud computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services

UNIT- II

Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services –On-Demand computing –Discovering Cloud Services Development Services and Tools – Amazon Ec2- Google App Engine – IBM Clouds.

UNIT -III

Centralizing Email communications –collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.

UNIT -IV

Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications–Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing – Collaborating on Databases – Storing and Sharing Files – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis.

UNIT -V

OGSA – Sample Use Cases – OGSA Platform Components – OGSI – OGSA Basic Services. Globus Toolkit – Architecture – Programming Model – High Level Services – OGSI.Net. Middleware Solutions.

TEXT BOOK

1. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, 2008.

REFERENCES

1. Haley Bear, "Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", Que Publishing, 2009.

2. Thomas Erl, "Cloud Computing", Paperback, 2014.

3. Arshdeep Bahga, Vijay Madisetti, "Cloud Computing: A Handa-on Approach", Universities Press, August 2014.

4. Rajkumar Buyya and James Broberg, " Cloud Computing: Principles and Paradigms", Paperback, 2013

SEMESTER –I **ELECTIVE PAPER- 1** **4H/3C**

(To choose either A or B or C)

C. PRINCIPLES OF PROGRAMMING LANAGUES

UNIT - I

Language design Issues: Reasons for studying concepts of programming language language evaluation criteria-influences on language design-structure and operation of computer virtual computers and binding times-language paradigms.

UNIT - II

Data types: Properties of types and objects-elementary data types- structured data types. Abstraction: Abstract data types-encapsulation by sub programs-type definition-storage management.

UNIT - III

Sequence Control: Implicit and explicit sequence control-sequencing with arithmetic and non-arithmetic expressions-sequence control between statements**.** Subprograms control: subprogram sequence control-attributes of data control shared data in subprograms.

UNIT - IV

Inheritance: Inheritance-polymorphism; Language Translation Issues: Programming language syntax-stages in translation-formal translation models.

UNIT - V

Advances in language design: variations on subprogram control-language constructors for parallel processing language semantics-software architecture.

TEXTBOOK

1. Terrance W.Pratt, Marvin V Zelkowitz, "Programming Languages, Design and Implementation", PHI, 2002, (4^{th} edition).

REFERENCES

1. Ravi Sethi, "Programming Languages Concepts &Constructs", Addison-Wesley, (2nd edition), 1996.
2. E.Horowitz, "Fundamentals of programming languages", Galgotia Publishers, 1984.
3. A.B.Tucker, "Robert, Noonan, Programming Languages", McGrawHill, 2002.
4. 4. D.Appleby, J.J.Vande Kopple, "Programming languages Paradigm and practice", McGraw Hill, International Editions, (2ndedition), 1997.

SEMESTER –II **MAIN PAPER- 5** **4H/4C**

COMPILER DESIGN

UNIT-I

Lexic an analysis: Regular expression- Non deterministic automata-deterministic automata EquivalenttoNFAs-minimizingthestatesofDFA-implementationoflexicalanalyzer.

UNIT-II

Syntax analysis: Top down parsing concepts-recursive descent parsing - predictive parsers-non recursive predicate parsing- bottom-up parsing- handle pruning- shift reduce parsing-operator parsing-LR parsers-parser generators -YACC.

UNIT-III

Intermediate code generation: Syntax directed definitions - construction of syntax trees-top down translation-bottom up evaluation of inherited attributed -recursive evaluators-assigning space at compiler construction time-type checking-overloading of functions and operators -polymorphic function.

UNIT-IV

Storage organization: Storage organization -storage allocation strategies - parameter passing - symbol tables-dynamic storage allocation - intermediate languages - representation of declarations - assignment statement - Boolean expression - back patching-procedure calls.

UNIT-V

Code generation and Code optimization: Design of code generators - runtime storage management - basic blocks-flow graphs-register allocation and assignment-DAG representation of basic blocks - peephole optimization - code optimization - the principle sources of optimization - optimization of basic blocks - global data flow analysis-loop optimizations.

TEXTBOOK

1. AlfredAho, RaviSethi, JeffyD.Ullman, “Compilers-Principles, Techniques and Tools”, Pearson, 1986.

REFERENCES

1. David Galles, “Modern Compiler Design”, Pearson Education Asia, 2007
2. Steven S. Muchnick, “Advanced Compiler Design & Implementation”, Morgan Kaufmann Pulishers, 2000
3. C. N. Fisher and R. J. LeBlanc, “Crafting a Compiler with C”, Pearson Education, 2000

SEMESTER –II **MAIN PAPER- 6** **4H/3C**

ENTERPRISE JAVA PROGRAMMING

UNIT-I

Introduction -Enterprise Architecture Styles - J2EE Architecture - Containers - J2EE Technologies - Developing J2EE Applications - Naming and directory services - Using JNDI - JNDI Service providers Application Servers - Implementing the J2EE Specifications - J2EE packaging and Deployment - J2EE packaging overview - Configuring J2EE packages

UNIT-II

JSP Benefits - Framework roles - Simple JSF application - User Interface Component Model - Navigational Model - Life Cycle of JSF page - Using JSF in JSP Pages – Setting up a page, using core tags - using HTML tags - using localized messages - Using converters.

UNIT-III

Introduction to Enterprise Beans - Session Bean - Entity Bean - Message driven Bean - defining clients access with interfaces - contents of an enterprise Bean - life cycle of enterprise Bean - creation of Enterprise Bean - application client - web client - other Enterprise Bean features-handling exceptions.

UNIT–IV

Struts Architecture - Struts classes - Action Forward, Action Form, Action Servlet, Action classes - Understanding struts - config.xml, Understanding Action Mappings, Struts flow with an example application.

UNIT-V

Hibernate - Architecture of Hibernate - Life cycle of Hibernate Entities- Exploring HQL - Understanding Hibernate O/R Mapping - Collection Mapping - Association Mapping - Relationships in Java and Databases.

TEXT BOOKS

1. Marty Hall, Larry Brown., “Core Servlets and Java Server Pages”, 2nd Edition, Pearson Education, 2004
2. Stephanie Bodoffetl., “The J2EE™ Tutorial”, Pearson Education, Second Edition, 2005.
3. Minter Dave, Linwood Jeff, “Beginning Hibernate, From Novice to Professional”, Apress, Second Edition, 2006
4. *http://www.tutorialspoint.com/hibernate/*

REFERENCES

1. Patrick Naughton& Herbert Schildt, “The Complete Reference: Java 2”, Tata McGraw Hill, 1999
2. Bruce W.Perry, “Java Servlet and JSP Cook Book”, O'Reilly, 2004.

SEMESTER –II **MAIN PAPER- 7** **4H/3C**

ENTERPRISE APPLICATION USING C#

UNIT – I

Introduction – Creating a Simple Component – Properties and State – Database Components – Consuming the Database Component –Enhancing the Component with Error Handling – Aggregate Information–Data Objects.

UNIT - II

User Controls–Creating a Simple User Control–Visual Studio .NET Custom Control Support – Independent User Controls –Integrated User Controls –User Control Events – Limitations – Deriving Custom Controls.

UNIT - III

Designing for Scalability–Profiling –Caching-Output Caching–Client Side–Query Structuring– Events–CustomCachingControl–CachingwithHTTPCachePolicyClass–Fragment Caching – Data Caching –A Simple Cache Test–Caching to Provide Multiple Views.

UNIT – IV

Determining Security Requirements –Restricted File Types – Security Concepts –ASP .NET Security Model–Security Strategies – Certificates – SSL –Forms Authentication –Web. Config Settings– Login Page – User Lists – Protecting User Passwords with Encryption – Custom Roles – Windows Authentication–IIS Settings –Web. Config Setting –A windows Authentication Test.

UNIT – V

EnterpriseLibrary–DevelopingApplicationswithEnterpriseLibrary–DesignBlocks–Caching– Cryptography–Data Access – Exception Handling –Logging – Policy Injection – Security – Unity – Validation – Deployment Tools –Development of Deployment Tools –Choosing a Deployment Strategy–Click once Update Strategy – Deployment and Security.

TEXTBOOK

1. Matthew Mac Donald, “The Complete Reference–ASP .NET”, Tata McGraw Hill, 2002.

REFERENCES

1. Stephen Walther, "ASP .NET 2.0 Unleashed", SAMS Publishing, 2006.
2. ImarSpaanjaars, "Beginning ASP.NET 4.5 in C# and VB", Paperback, 2012.
3. Scott Millett, "Professional ASP.NET Design Patterns", Paperback, 2011.
4. Shivprasad Koriala and Rajesh Pillai, "C# and ASP .NET Projects", Paperback, 2007.

SEMESTER –II **MAIN PAPER- 8** **4H/3C**

UNIX NETWORKING PROGRAMMING

UNIT-I

Overview of UNIXOS - File I/O-File Descriptors -File sharing-Files and directories-File types-File access permissions-Files systems-Symbolic links-Standard I/Library- Streams and file objects-Buffering-System data files and information-Password file- Group file-Login accounting-system identification.

UNIT-II

Environment of a UNIX process - Process termination - command line arguments - Process control-Process identifiers-Process relationships terminal logins-Signals- threads.

UNIT-III

Introduction -Message passing (SVR4)-pipes-FIFO-message queues-Synchronization (SVR4)-Mutexes-condition variables-read-write locks–file locking-record locking-semaphores-Shared memory (SVR4).

UNIT-IV

Introduction -transport layer-socket introduction-TCP sockets-UDP sockets-raw sockets-Socket options-I/O multiplexing-Name and address conversions.

UNIT-V

Application-Debugging techniques-TCPecho client server-UDPecho client server- Ping-Trace route-Client server applications like file transfer and chat.

TEXTBOOKS

1. W.Richard Stevens, Advanced programming in the UNIX environment, Addison Wesley, 999. (Unit1, 2 &3)
2. W. Stevens, Bill Fenner, Andrew Rudoff, "Unix Network Programming", Volume 1, The Sockets Networking API, 3rd Edition, Pearson education, Nov2003. (unit4&5)

REFERENCES

1. Meeta Gandhi, Tilak Shetty and Rajiv Shah – The 'C' Odyssey Unix –The open Boundless C, 1st Edition, BPB Publications 1992.

2. Stvens,"Unix Network Programming: Inter process Communications",Vol2,2nded., PHI.

3. Bill Fenner, "Unix Network Programming: The Sockets Networking", Vol 1, 3rd ed., Paperback, 2012.

4. Mark G.Sobell, "A Practical Guide to Linux Commands, Editors and Shell Programming", Paperback, 2012.

SEMESTER –II **MAIN PRACTICAL PAPER- 4** **3H/2C**

ENTERPRISE JAVA PROGRAMMING LAB

1. Simple JSF application using JSP in JSF
2. HTML render kit in JSF
3. Core render kit in JSF
4. Creating Enterprise Bean
5. Creating Web Client
6. Using Session Bean
7. Struts Action
8. Struts Forward Action
9. Object Relational Mapping
10. Collection Mapping

SEMESTER –II **MAIN PRATICAL PAPER- 5** **3H/2C**

ENTERPRISE APPLICATION USING C# LAB

1. Creation and consumption of a simple component and database component and components using aggregate functions.

2. Creation of a Custom control which includes the following operation
A textboxes that parses the separator and identifies the first name and last name.

2. Create a popup calendar control that consists of a textbox and calendar control. The calendar control pops uponly by clicking the calendar control

3. Cache the output of the page for a specified time using Output Caching

5. Cache the data content of the web page using the Data Caching

6. Cache portion of a web page using Fragment caching

7. Create a simple profile and provide customized settings for the user.

8. Using the Forms Authentication, authenticate the user and encrypt the password using either SHA or RSA algorithm.

9. Implementation of deployment tools (XCOPY or Web Setup wizard)

10. Working with enterprise library tool with various features (Data access, exception, Cryptography, logging).

SEMESTER –II **MAIN PRATICAL PAPER- 6** **2H/2C**

UNIX PROGRAMMING LAB

1. Write a shell script to copy, rename and print multiple files using choice menus.

2. Write a shell script to display logged in users who are using high CPU percentage.

3. Write a shell script to list processes based on CPU percentage and memory un usage.

4. Write a shell script to display total used and free memory space.

5. Write a shell script that takes as command – line input a number and a word. The program should then print the word times, one word per line.

6. Write a shell scripts using the following statements.

a) While-loop

b) For-loop

c) If-then-else

d) Switch

7. Write a shell script using grep statement.

8. Write a shell script that can search all immediate sub-directories of the current- directory for a given file and then quit if it finds one.

9. Write a shell script program to include verbose Debug option for debugging.

10. Write a shell script program to include trace Debug option for debugging.

SEMESTER –II **COMPULSORY PAPER** **2H/2C**

HUMAN RIGHTS

UNIT-I

Definition of Human Rights - Nature, Content, Legitimacy and Priority - Theories on Human Rights - Historical Development of Human Rights.

UNIT-II

International Human Rights - Prescription and Enforcement up to World War II - Human Rights and the U .N .O. - Universal Declaration of Human Rights - International Covenant on Civil and Political Rights - International Convenant on Economic, Social and Cultural Rights and Optional Protocol.

UNIT-III

Human Rights Declarations - U.N. Human Rights Declarations - U.N. Human Commissioner.

UNIT-IV

Amnesty International - Human Rights and Helsinki Process - Regional Developments - European Human Rights System - African Human Rights System - International Human Rights in Domestic courts.

UNIT-V

Contemporary Issues on Human Rights: Children's Rights - Women's Rights - Dalit's Rights - Bonded Labour and Wages - Refugees - Capital Punishment.
Fundamental Rights in the Indian Constitution - Directive Principles of State Policy - Fundamental Duties - National Human Rights Commission.

TEXT BOOKS

1. International Bill of Human Rights, Amnesty International Publication, 1988.
2. Human Rights, Questions and Answers, UNESCO, 1982
3. Mausice Cranston - What is Human Rights
4. Desai, A.R. - Violation of Democratic Rights in India
5. Pandey - Constitutional Law.
6. Timm. R.W. - Working for Justice and Human Rights.

SEMESTER –II **ELECTIVE PAPAER- 2** **4H/3C**

(to choose either A or B or C)

A. SOFTWARE TESTING

UNIT - I

Introduction - Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs. Flow graphs and Path testing: - Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT - II

Transaction Flow Testing:-transaction flows, transaction flow testing techniques. Dataflow testing: - Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT – III

Domain Testing:-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability. Paths, Path products and Regular expressions: - path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

UNIT - IV

Logic Based Testing- overview, decision tables, path expressions, kv charts, specifications. State, State Graphs and Transition testing- state graphs- good & bad state graphs- state testing, Testability tips.

UNIT - V

Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like J Meter or Win runner).

TEXT BOOKS

1. Baris Beizer, Dream tech, "Software Testing techniques", second edition, Paperback, 2002.

2. Dr.K.V.K.K. Prasad, Dream tech, "Software Testing Tools", Paperback, 2004.

REFERENCES

1. Brian Marick, "The craft of software testing", Pearson Education.

2. P.C.Jorgensen, "Software Testing", 3rd edition, Aurbach Publications

3. Edward Kit, "Software Testing in the Real World", Pearson.

4. Perry and John Wiley, "Effective methods of Software Testing", 2nd Edition, 1999.

SEMESTER –II **ELECTIVE PAPAER- 2** **4H/3C**

(to choose either A or B or C)

B. WEB SERVICES

UNIT – I

Overview of Distributed Computing. Introduction to web services– Industry standards-Technologiesandconceptsunderlyingwebservices–theirsupporttowebservices.Applications that consume web services.

UNIT – II

XML–itschoiceforwebservices–networkprotocolstobackenddatabases-technologies–SOAP, WSDL–exchangeofinformationbetweenapplicationsindistributedenvironment–locatingremote web services–its access and usage. UDDI specification– an introduction.

UNIT - III

A brief outline of web services – conversation –static and interactive aspects of system interface and its implementation, workflow –orchestration and refinement, transactions, security issues– the common attacks – security attacks facilitated within web services quality of services – Architecting of systems to meet users requirement with respect tolatency, performance, reliability, QOS metrics, Mobile and wireless services– energy consumption, network band width utilization, portals and services management.

UNIT - IV

Buildingrealworldenterpriseapplicationsusingwebservices–samplesourcecodestodevelopweb services–
stepsnecessarytobuildanddeploywebservicesandclientapplicationstomeetcustomersrequirement– Easier development, customization, maintenance, transactional requirements, seamless porting to multiple devices and platforms.

UNIT - V

Deployment of Web services and applications onto Tomcat application server and axis SOAP server–Web services platform as a set of enabling technologies for XML based distributed computing.

TEXT BOOK

1. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services: Architects Guide, Prentice Hall, Nov2003.

REFERENCES

1. Kirk Zurell- "C Programming for Embedded Systems" R&D, Books- 2000.
2. David. E, Simon,"Anembedded software primer", Pearson Education Asia-Addison Wesley Longman (Singapore), Low Priced Edition, 2001,ISBN- 81- 7808- 045- 1.
3. Michael Barr, "Programming Embedded Systems in C and C++", Shroff Publishers & Distributors Pvt. Ltd., Calcutta. March 2001, ISBN- 81- 7366 - 076 – X.
4. Andreas Witting, Michael Wittig, "Amazon Web services in Action", Paperback, 2015

SEMESTER –II **ELECTIVE PAPAER- 2** **4H/3C**

(To choose either A or B or C)

C. CRYPTOGRAPHY AND NETWORK SECURITY

UNIT - I

Security Problems: Security problem in computing- Security Attacks – Security Services – Security Mechanisms – OSI security attack-Standards and standard setting organizations

UNIT - II

Data Security: Basic encryption and decryption-Substitution-Transposition-Block ciphers Data encryption standard encryption and decryption-Differential and linear crypto analysis Advanced encryption–Standard encryption and decryption - Block cipher models-Triple DES with two keys-Stream cipher-RC4- RSA algorithm – Diffie -Hellman key exchange algorithm.

UNIT - III

Message Authentication: Hash Functions – MD5-Hash algorithm - SHA 512 logic - Authentication Protocols-Digital signature standards

UNIT - IV

Network Security: IP security overview, IP security architecture, Authentication header, Encapsulating security pay load, combining security association, Key management-Web security considerations, secure socket layer, secure electronic transaction.

UNIT - V

System Security: Intruders and intrusion detection-Malicious software, Viruses and related threats, virus counter measures, distributed denial of services attack-Firewalls design principles-Trusted systems.

TEXT BOOK

1. William Stallings,"Cryptography and Network Security – Principles & Practice", Third Edition Pearson Education.

REFERENCES

1. Charles P. Pleeger, "Security in Computing", PHI Learning, 1998.
2. Prakash C. Gupta, "Cryptography and Network Security", Paperback, 2005.
3. Alfred J.Menezes and Paul C. Van Oorschot, "Handbook of Applied Cryptography", Kindle edition, 1996.
4. Nicholar J. Daras and Michael Th. Rassias, "Computation, Cryptography and Network Security", hard cover, 2015.

SEMESTER –III **MAIN PAPER -9** **5H/5C**

DISTRIBUTED OPERATING SYSTEMS

UNIT-I

Evolution –Models – Popularity - Distributed Operating System – Issues – Distributed Computed Environment - Features of a Good Message Passing – Issues- Synchronization – Buffering - – Multi data gram Messages – Encoding and Decoding of Message Data – Process Addressing – Failure Handling – Group Communication.

UNIT-II

The RPC Model –Transparency – Implementation – Stub – Messages – Marshaling - Server Management –Parameter Passing Semantics – Call Semantics – Communication protocols – Complicated – Client server Binding – Exception Handling – Security – Special types – Heterogeneous – Light Weight – Optimization

UNIT-III

Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithms - Process Migration – Threads.

UNIT–IV

Meet Hadoop: Data - Data Storage and Analysis - Comparison with Other Systems - A Brief History of Hadoop - The Apache Hadoop Project – Map Reduce: A Weather Dataset - Analyzing the Data with UNIX Tools - Analyzing the Data with Hadoop - Scaling Out - Hadoop Streaming - Hadoop Pipes

UNIT-V

The Configuration API - Configuring the Development Environment - Running Locally on Test Data - Running on a Cluster - The Map Reduce Web UI - Using a Remote Debugger - Tuning a Job - Map Reduce Workflows

TEXT BOOKS

1. Pradeep K. Sinha, “Distributed Operating System Concepts and Design”, PHI, New Delhi, 2007.
2. Tom White, “Hadoop: The Definitive Guide”, Published by O’Reilly Media, Third Edition, 2009

REFERENCES

1. Andrew S Tanaenbaum, "Modern Operating System", PHI, New Delhi, 2001
2. D.M. Dhamdhare, 2002, Operating System, Tata McGraw-Hill, New Delhi.
3. A.S. Tanenbaum, Operating Systems: Design and Implementation, Prentice-Hall of India, New Delhi.
4. Nutt, 2005, Operating Systems, 3 rd Edition, Pearson Education, Delhi.

SEMESTER –III **MAIN PAPER -10** **4H/3C**

SOFTWARE PROJECT MANAGEMENT

UNIT-I

Project Management-Introduction to Project and Project management- problems with software projects - Project Management Knowledge Area and Framework- Stages of project - Feasibility study -cost-benefit analysis - Planning - project execution - project and product lifecycle - Project Stakeholders - All Parties of project - role of project manager - Exploration of Open Source Software tools for project management. Checkpoints And Processes of Project -Major Milestones- Minor Milestones- Periodic status assessments. Project Processes- Initiating Processes- Planning Processes- Control Processes- Executing Processes- Closing Processes- Process Groups- Process Interactions.

UNIT-II

Project Planning -Integration Management - Introduction - Project plan development – Plan Execution - Scope Management - Introduction - methods for selecting projects - project charter - scope statement - work breakdown structure - Stepwise Project Planning -Overview - Main steps in project planning. Project Scheduling-Time Management- Importance of project schedules- Schedules and activities - Sequencing and scheduling activity - Project Network Diagrams - Network planning models- Duration Estimating and schedule development- Critical path analysis- Program evaluation and review Techniques.

UNIT-III

Technical Metrics For Software-Software Process and Project Metrics- Size Oriented Metrics- Function-Oriented Metrics- Extended Function Point Metrics- A Framework for Technical Software Metrics- Metrics for Requirement Specification Quality- Metrics for Analysis- Metrics for Design- Metrics for Source Code- Metrics for Testing- Metrics for Maintenance. Technical Metrics For Object-Oriented Systems-Intent of Object-Oriented Metrics- Characteristics of Object-Oriented Metrics - Metrics for OO Design Model- Class-Oriented Metrics- Operation-Oriented Metrics- Metrics for Object-Oriented Testing- Metrics for Object-Oriented Projects.

UNIT–IV

Overview- Benefits- Technologies related to ERP- E R P packages- Business Process Re-engineering- Implementation Life Cycle of ERP- Training - Team Training- End User Training- Post Implementation (Maintenance Mode) - Implementation in large-scale organization- Applications of ERP in functional areas- Marketing- Personnel- Financial & Production.

UNIT-V

Decision structure- Decision Support Trends- DSS Components- Using DSS- What-if analysis- sensitivity analysis- Goal Seeking Analysis- Optimization Analysis- Executive Information Systems- Enterprise portals and decision support- knowledge management systems.

TEXT BOOKS

1. James A O'Brien, George M maracas, Ramesh Behl, "Management Information Systems", McGraw Hill.
2. Walker Royce: Pearson Education, 2005: Software Project Management.
3. Indu Chhabra, "Software Engineering: A Concise Study", Publishers, 1st Edition.

REFERENCES

1. A Guide to the Project Management Body of Knowledge (PMBOK), Project Management Institute, PA, (2004).
2. Harold Kerzner, Frank P. Saladis, Project Management Workbook and PMP/CAPM Exam Study Guide, Wiley Publishers (2006)
3. Claudia M. Baca, Patti, PMP: Project Management Professional Workbook, Sybex, Workbook (2003).
4. Joel Henry, Pearson Education: Software Project Management.
5. PankajJalote, Pearson Education, 2005: Software Project Management.

SEMESTER –III **MAIN PAPER -11** **4H/3C**

MOBILE COMPUTING

UNIT-I

Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.

UNIT-II

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.

UNIT-III

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

UNIT–IV

Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.

UNIT-V

MOBILE PLATFORMS AND APPLICATIONS Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: i OS, Android, BlackBerry, Windows Phone – M Commerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

TEXT BOOK

1. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt. Ltd, New Delhi – 2012. 64

REFERENCES

1. Jochen H. Schller, “Mobile Communications”, Second Edition, Pearson Education, New Delhi, 2007.
2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
4. William.C.Y.Lee, “Mobile Cellular Telecommunications-Analog and Digital Systems”, Second Edition, Tata McGraw Hill Edition, 2006.
5. C.K.Toh, “AdHoc Mobile Wireless Networks”, First Edition, Pearson Education, 2002.
6. Android Developers : http://developer.android.com/index.html
7. Apple Developer : https://developer.apple.com/
8. Windows Phone Dev Center: http://developer.windowsphone.com 9. BlackBerry Developer : http://developer.blackberry.com/

SEMESTER –III **MAIN PAPER -12** **4H/3C**

DESIGN AND ANALYSIS ALGORITHMS

UNIT-I

Algorithm Analysis – Time Space Tradeoff – Asymptotic Notations – Conditional asymptotic notation – Removing condition from the conditional asymptotic notation - Properties of big-Oh notation – Recurrence equations – Solving recurrence equations – Analysis of linear search.

UNIT-II

Divide and Conquer: General Method – Binary Search – Finding Maximum and Minimum – Merge Sort – Greedy Algorithms: General Method – Container Loading – Knapsack Problem.

UNIT-III

Dynamic Programming: General Method – Multistage Graphs – All-Pair shortest paths – Optimal binary search trees – 0/1 Knapsack – Travelling salesperson problem .

UNIT–IV

Backtracking: General Method – 8 Queens problem – sum of subsets – graph coloring – Hamiltonian problem – knapsack problem.

UNIT-V

Graph Traversals – Connected Components – Spanning Trees – Biconnected components – Branch and Bound: General Methods (FIFO & LC) – 0/1 Knapsack problems – Introduction to NP-Hard and NP-Completeness.

TEXT BOOKS

1. Ellis Horowitz, SartajSahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007. (For Units II to V)

2. K.S. Easwarakumar, Object Oriented Data Structures using C++, Vikas Publishing House pvt. Ltd., 2000 (For Unit I)

REFERENCES

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.

2. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", Second Edition, Prentice Hall of India Pvt. Ltd, 2003.

3. Alfred V. Aho, John E. Hop croft and Jeffrey D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, 1999.

SEMESTER –III **MAIN PRACTICAL PAPER -73H/2C**

MOBILE COMPUTING LAB

1. Creation of simple application using Button, Text View and Edit Text
2. Creating an application which uses Radio buttons & Option Group
3. Creating an application with Alert Dialog box
4. Creating an application with Date Picker Widget
5. Creating an application which creates Progress Bar
6. Creating an application with Spinner
7. Creating an application with Menus and Intents
8. Creating an application with File I/O
9. Creating an application which connects RDBMS (SQ Lite / My SQL)
10. Creating an application with Phone services (SMS, Call etc.)

SEMESTER –III **MAIN PRACTICAL PAPER -83H/2C**

DESIGN AND ANALYSIS OF ALGORITHMS LAB

1. Liner &Binary search using Divide and Conquer
2. Quick sort using Divide and Conquer
3. Merge Sort using Divide and Conquer
4. Selection Sort using Divide and Conquer
5. Maximum and Minimum using Divide and Conquer
6. 0/1 knapsack using Dynamic Programming
7. All pairs of Shortest path algorithm
8. Minimum Cost Spanning Tree using Prims Algorithm & Kruskal Algorithm
9. N-Queens Problem using Backtracking
10. Sum of Subset of numbers

SEMESTER –III **MAIN PRACTICAL PAPER -93H/2C**

MINI PROJECT

REGULATIONS

a) Students should do their Mini Project work in the College during 3rd semester.
b) The Candidate should submit the filled in format as given in **Annexure-I** to the department for the approval during the 2nd week of July.
c) Each internal guide shall have maximum of eight Students.
d) Periodically the project should be reviewed minimum three times by the advisory committee.
e) The Students should prepare two copies of the project work and submit the same on the date fixed by the Department for the evaluation. After evaluation one copy is to be retained in the College Library and the student can hold one copy.
f) A Sample Cover page format of the Mini project work is enclosed in **Annexure-II**.
g) Format of the **Title page** and **certificate** are enclosed in **Annexure-III.**
h) The Students should use Presentation during their Mini Project Viva voce Examinations.
i) To pass the Mini Project and viva-voce a candidate should secure 50% marks. The candidate should compulsorily attend viva-voce examination to secure pass in that paper.

The evaluation of Mini Project is as follows:

The maximum mark for each Mini Project is 100 with 25 for Continuous Internal Assessment (CIA) and 75 for Semester Examination.

CIA Project Work		
I	First Review	10 Marks
II	Second Review	10 Marks
III	Report Preparation	5 Marks
	Total	**25 Marks**
Semester Project Work		
1.	Evaluation of Project Work Document	55 Marks
2.	Viva – Voce	20 Marks
	Total	**75 Marks**

SEMESTER –III **ELECTIVE PAPAER- 3** **4H/3C**

(to choose either A or B or C)

A. SOFTWARE QUALITY ASSURANCE

UNIT-I

The Role of SQA – SQA Plan – SQA considerations – SQA people – Quality Management – Software Configuration Management

UNIT-II

Managing Software Organizations – Managing Software Quality – Defect Prevention – Software Quality Assurance Management

UNIT-III

Software Quality – Total Quality Management (TQM) – Quality Metrics – Software Quality Metrics Analysis

UNIT–IV

Software Quality Program Concepts – Establishment of a Software Quality Program – Software Quality Assurance Planning – An Overview – Purpose & Scope.

UNIT-V

Software Standards–ISO 9000 Quality System Standards - Capability Maturity Model and the Role of SQA in Software Development Maturity – SEI CMM Level 5 – Comparison of ISO 9000 Model with SEI's CMM

TEXT BOOKS

1. Watts S Humphrey, "Managing the Software Process", Pearson Education Inc
2. Mordechai Ben-Menachem / Garry S Marliss, "Software Quality", Vikas Publishing House, Pvt, Ltd., New Delhi

REFERENCES

1. Gordon G Schulmeyer, "Handbook of Software Quality Assurance", Third Edition, Artech House Publishers 2007
2. Nina S Godbole, "Software Quality Assurance: Principles and Practice", Alphab Science International, Ltd, 2004

SEMESTER –III **ELECTIVE PAPAER- 3** **4H/3C**

(to choose either A or B or C)

B. BIGDATA

UNIT-I

Big Data in the Enterprise: Search at Scale – Multimedia Content - Sentiment Analysis – Enriching and Contextualizing Data – Data Discovery and Exploratory Analytics – Operational Analytics or Exploratory Analytics – Realizing opportunities from Bid Data – Taming the "Big Data" – New Information Management Paradigm: New Approach to enterprise Information management for Big Data – Implications of Big Data to Enterprise IT – Big Data Implications for Industry: Big Data uses cases by Industry Vertical.

UNIT-II

Scale-Out architecture – Database Workloads – Database Technologies for managing the workloads – Columnar Database - Polyglot persistence: The next generation architecture - Big Data warehouse and analytics – How Hadoop Works – Additional consideration for BDW – Data Quality implications for Big Data.

UNIT-III

Understanding Data Integration Patterns – Big Data Workload Design Approaches – Map reduce patterns, algorithms and use cases, No SQL Modeling Techniques.

UNIT–IV

Challenges in Big Data Analysis – Big Data Analytics Methodology – Analyze and Evaluate Business Use case – Develop Business Hypotheses – Setting up Big Data Analytics System – Gathering Data with Apache Flume.

UNIT-V

In-Memory Computing Technology: Guidelines – Real Time Analytics and CAP Theorem – Hadoop and No SQL Conundrum – Using an In-Memory Data Grid for Real time Data Analysis – Map Reduce and real Time Processing – Big Data Workflow – Design Principles for Contextualizing Big Data.

TEXT BOOK

1. Soumendra Mohanty, Madhu Jagadeesh, and Harsha Srivatsa, "Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics", Apress Publication.

REFERENCES

1. Bid Data Now 2012 Edition", O'Reilly, First Edition, 2012
2. Paul Zikopoulos, Thomas Deutsch, Dirk Deroos, David Corrigan, Krishnan Parasuraman and James Giles, "Harness the power of Big Data", McGraw Hill, 2013

SEMESTER –III **ELECTIVE PAPAER- 3** **4H/3C**

(to choose either A or B or C)

C. SOFT COMPUTING

UNIT-I

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set – Theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT-II

Derivative based Optimization – Descent Methods – The Method of Steepest Descent – classical Newton's Method – Step Size Determination – Derivative Free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT-III

Supervised Learning Neural Networks – Perceptrons – Adaline Back propagation Multilayer perceptrons – Radial Basis Function Networks – Unsupervised Learning and Other Neural Networks – Competitive Learning Networks – Kohonen Self – Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT–IV

Adaptive Neuro – Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework – Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT-V

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TEXT BOOK

1. J.S.R. Jang, C.T. Sun and E. Mizutani, "Neuro Fuzzy and Soft Computing", PHI,Pearson Education, 2004.

REFERENCES

1. Timothy J. Ross, "Fuzzy Logic with Engineering Application, " McGraw Hill, 1977.
2. Davis E. Goldberg, "Genetic Algorithms Search, Optimization and Machine Learning", Addision Wesley, 1989.
3. S. Rajasekaran and G.A.V. Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003. Emereo Pty Limited, July 2008.
4. Ahmar, Abbas, "Grid Computing A Practical Guide to technology and Applications", Charles River media, 2003.

SEMESTER –IV **MAIN PAPER- 11**

PROJECT WORK

REGULATIONS

a. Students should do their four months Project work in Company / Institutions during fourth semester.
b. The Candidate should submit the filled in format as given in **Annexure-IV** to the department for approval during the Ist Week of January.
c. Each internal guide shall have maximum of eight Students.
d. Periodically the project should be reviewed minimum three times by the advisory committee.
e. The Students should prepare three copies of the project work and submit the same on the date fixed by the department for the evaluation. After evaluation, one copy is to be retained in the College Library and one copy is to be submitted to the University (Registrar) and the student can hold one copy.
f. A Sample Cover page format of the Project Work is enclosed in **Annexure-V**.
g. Format of the **Title page** and **certificate** are enclosed in **Annexure-VI.**
h. The Students should use Presentation during their Project Viva voce Examinations.
i. For the project work and viva-voce a candidate should secure 50% of the marks for pass. The candidate should compulsorily attend viva-voce examination to secure pass in that paper.

The evaluation of project is as follows:

The maximum mark for each Project is 200 with 80 for Continuous Internal Assessment (CIA) and 120 for Semester Examination.

CIA Project Work		
I	First Review	25 Marks
II	Second Review	25 Marks
III	Report Preparation	30 Marks
	Total	**80 Marks**
Semester Project Work		
1.	Evaluation of Project Work Document	80 Marks
2.	Viva – Voce	40 Marks
	Total	**120 Marks**

For the conduct of University Examinations in practical subjects and Project work the University will appoint two external examiners.

ANNEXURE - I

THIRUVALLUVAR UNIVERSITY

College Name :

Course :

Student Name :

Register Number :

Title of the Project :

Name of the Internal Guide :

Qualification :

Teaching Experience :

Place :

Date : Signature of Internal Guide

Name of the HOD :

Designation :

Place:

Date : Signature of the HOD
(with seal)

ANNEXURE-II

COLLEGE BONAFIDE CERTIFICATE

ACKNOWLDGEMENT

ABSTRACT
TABLE OF CONTENTS
TABLE OF FIGURES

CONTENTS

Title Page No.

1. INTRODUCTION
   1.1 ORGANIZATIONPROFILE
   1.2 SYSTEM SPECIFICATION
      1.2.1 HARDWARECONFIGURATION
      1.2.2 SOFTWARESPECIFICATION
2. SYSTEM STUDY
   2.1 EXISTINGSYSTEM
      2.1.1 DRAWBACKS
   2.2 PROPOSEDSYSTEM
      2.2.1 FEATURES
3. SYSTEM DESIGN ANDDEVELOPMENT
   3.1 FILEDESIGN
   3.2 INPUT DESIGN
   3.3 OUTPUT DESIGN
   3.4 DATABASE DESIGN
   3.5 SYSTEM DEVELOPMENT
      3.5.1 DESCRIPTION OF MODULES (Detailed explanation about the project work)
4. TESTINGAND IMPLEMENTATION
5. CONCLUSION BIBLIOGRAPHY

APPENDICES
   A. DATA FLOW DIAGRAM
   B.TABLE STRUCTURE
   C.SAMPLE CODING
   D. SAMPLE INPUT
   E.SAMPLE OUTPUT

ANNEXURE-III

a. Format of the Cover Page

TITLE OF THE PROJECT WORK

Mini Project work submitted in partial fulfillment of the

requirements for the degree of

Master of Science in Computer Science

to

Thiruvalluvar University, Serkkadu, Vellore - Pin code

By

STUDENTNAME REG. NO.

College Emblem

MONTH – YEAR

COLLEGE NAME

(AFFILIATED TO THIRUVALLUVAR UNIVERSITY)

PLACE with Pin Code

b. Format of the certificate

MINI PROJECTWORK

TITLE OF THE PROJECT WORK

Bonafide Work Done by

STUDENTNAME

REG. NO.

Mini Project Work submitted in partial fulfillment of the
requirements for the degree of

Master of Science in Computer Science

to the **College Name and Address, Affiliated college from Thiruvalluvar University, Serkkadu, Vellore – Pin code.**

INTERNALGUIDE HEAD OF THE DEPARTMENT

Submitted for the Viva-Voce Examination held on _____

Internal Examiner External Examiner

NNEXURE-IV

THIRUVALLUVAR UNIVERSITY

College Name :

Course :

Student Name :

Register Number :

Title of the Project :

Address of Organization / Institution:

Name of the Internal Guide :

Qualification :

Teaching Experience :

Place :

Date : Signature of Internal Guide

Name of the HOD :

Designation :

Place:

Date : Signature of the HOD
(with seal)

Principal

ANNEXURE-V

Title Page
Original Copy of the Approved Proforma of the Project Proposal
Certificate of Authenticated work
Abstract
Acknowledgement
Table of Contents
Table of Figures

CONTENTS

Title Page No.

CHAPTER 1: INTRODUCTION
- 1.1 Background
- 1.2 Objectives
- 1.3 Purpose, Scope, and Applicability
  - 1.3.1 Purpose
  - 1.3.2 Scope
  - 1.3.3 Applicability
- 1.4 Achievements
- 1.5 Organization of Report

CHAPTER 2: SURVEY OF TECHNOLOGIES
CHAPTER 3: REQUIREMENTS AND ANALYSIS
- 3.1 Problem Definition
- 3.2 Requirements Specification
- 3.3 Planning and Scheduling
- 3.4 Software and Hardware Requirements
- 3.5 Preliminary Product Description
- 3.6 Conceptual Models

CHAPTER 4: SYSTEM DESIGN
- 4.1 Basic Modules
- 4.2 Data Design
  - 4.2.1 Schema Design
  - 4.2.2 Data Integrity and Constraints
- 4.3 Procedural Design
  - 4.3.1 Logic Diagrams
  - 4.3.2 Data Structures
  - 4.3.3 Algorithms Design
- 4.4 User interface design
- 4.5 Security Issues
- 4.6 Test Cases Design

CHAPTER 5: IMPLEMENTATION AND TESTING
- 5.1 Implementation Approaches
- 5.2 Coding Details and Code Efficiency
  - 5.2.1 Code Efficiency
- 5.3 Testing Approach
- 5.3.1 Unit Testing
  - 5.3.2 Integrated Testing
- 5.4 Modifications and Improvements

CHAPTER 6: RESULTS AND DISCUSSION
6.1 Test Reports
6.2 User Documentation
CHAPTER 7: CONCLUSIONS
7.1 Conclusion
7.2 Limitations of the System
7.3 Future Scope of the Project
REFERENCES
APPENDIX

ANNEXURE-VI

a. Format of the Cover Page

TITLE OF THE PROJECT WORK

Project work submitted in partial fulfillment of the

requirements for the degree of

Master of Science in Computer Science

to the

Thiruvalluvar University, Serkkadu, Vellore – Pin code

By

STUDENTNAME REG. NO.

College Emblem

MONTH – YEAR

COLLEGE NAME

(AFFILIATED TO THIRUVALLUVAR UNIVERSITY)

PLACE with Pin Code

b. Format of the certificate

PROJECTWORK

TITLE OF THE PROJECT WORK

Bonafide Work Done by

STUDENTNAME

REG. NO.

Project work submitted in partial fulfillment of the

requirements for the degree of

Master of Science
in
Computer Science

College Name and Address, Affiliated college from Thiruvalluvar University, Serkkadu, Vellore – Pin code.

INTERNALGUIDE HEAD OF THE DEPARTMENT

Submitted for the Viva-Voce Examination held on _____

Internal Examiner External Examiner

THIRUVALLUVAR UNIVERSITY
MASTER OF SCIENCE
DEGREE COURSE
M.Sc. MATHEMATICS
UNDER CBCS
(with effect from 2017 - 2018)

The Course of Study and the Scheme of Examinations

S.NO.	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
	Course Title							
	SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	MAIN	Paper-1	6	5	Algebra I	25	75	100
2	MAIN	Paper-2	6	5	Real Analysis I	25	75	100
3	MAIN	Paper-3	6	4	Ordinary Differential Equations	25	75	100
4	MAIN	Paper-4	6	5	Differential Geometry	25	75	100
5	ELECTIVE	Paper-1	6	3	**(to choose 1 out of 4)** A. Finite Element Method B. Discrete Mathematics C. Graph Theory D. Reliability & Queueing Theory	25	75	100
			30	**22**		**125**	**375**	**500**
	SEMESTER II					**CIA**	**Uni. Exam**	**Total**
6	MAIN	Paper-5	5	4	Algebra II	25	75	100
7	MAIN	Paper-6	6	5	Real Analysis II	25	75	100
8	MAIN	Paper-7	6	5	Partial Differential Equations	25	75	100
9	MAIN	Paper-8	6	4	Mechanics	25	75	100
10	**Compulsory Paper**		2	2	**Human Rights**	25	75	100
11	ELECTIVE	Paper-2	5	3	**(to choose 1 out of 4)** A. *Programming in C++ - Practical B. Fuzzy Mathematics C. Calculus of Variations and Integral Equations D. Mathematical Modelling	25	75	100
			30	**23**		**150**	**450**	**600**

SEMESTER III						CIA	Uni. Exam	Total
12	MAIN	Paper-9	6	5	Complex Analysis I	25	75	100
13	MAIN	Paper-10	6	5	Topology	25	75	100
14	MAIN	Paper-11	6	5	Operations Research	25	75	100
15	MAIN	Paper-12	6	5	Probability Theory	25	75	100
16	ELECTIVE	Paper-3	6	3	**(to choose 1 out of 4)** A. Tensor Analysis and Relativity Theory B. Analytic Number Theory C. Fluid Dynamics D. Algebraic Topology	25	75	100
			30	**23**		**125**	**375**	**500**
SEMESTER IV						**CIA**	**Uni. Exam**	**Total**
17	MAIN	Paper-13	6	5	Complex Analysis II	25	75	100
18	MAIN	Paper-14	6	5	Functional Analysis	25	75	100
19	MAIN	Paper-15	6	5	Mathematical Statistics	25	75	100
20	MAIN	Paper-16	6	4	Difference Equations	25	75	100
21	ELECTIVE	Paper-4	6	3	**(to choose 1 out of 4)** A. Number Theory and Cryptography B. Algebraic Number Theory C. Stochastic Processes D. *Mathematical Softwares – Practical	25	75	100
			30	**22**		**125**	**375**	**500**

***Programming in C++ and Mathematical Software Practical's:**

External = 75 Marks = 60 (Practical) + 15 (Record)

Internal (CIA) = 25 Marks = 20 (Test) + 5 (Observation)

Subject	Papers	Credit	Total Credit	Marks	Total Marks
Main	16	4 - 5	76	100	1600
Elective	4	3	12	100	400
Compulsory Paper	1	2	2	100	100
Total	**21**	**---**	**90**	**---**	**2100**

THIRUVALLUVAR UNIVERSITY
M.Sc. MATHEMATICS
SYLLABUS
UNDER CBCS
(with effect from 2017 - 2018)
SEMESTER - I
PAPER - 1
ALGEBRA - I

Objectives : To introduce the concepts and to develop working knowledge on class equation, finite abelian groups, linear transformations, real quadratic forms.

UNIT-I

Another counting principle - class equation for finite groups and its applications - Sylow's theorems (For theorem 2.12.1, Only First proof).

Chapter 2: Sections 2.11 and 2.12

UNIT-II

Direct products - Finite abelian groups- Modules

Chapter 2: Sections 2.13 and 2.14 (Only Theorem 2.14.1)
Chapter 4: Section 4.5

UNIT-III

Linear Transformations: Canonical forms - Triangular form - Nilpotent transformations.

Chapter 6: Sections 6.4 , 6.5

UNIT-IV

Jordan form - rational canonical form.

Chapter 6 : Sections 6.6 and 6.7

UNIT-V

Trace and transpose - Hermitian, unitary, normal transformations, real quadratic form.

Chapter 6 : Sections 6.8, 6.10 and 6.11

Recommended Text

I.N. Herstein. *Topics in Algebra* (II Edition) Wiley Eastern Limited, New Delhi, 1975.

Reference Books

1. M.Artin, *Algebra,* Prentice Hall of India, 1991.
2. P.B.Bhattacharya, S.K.Jain, and S.R.Nagpaul, *Basic Abstract Algebra* (II Edition) Cambridge University Press, 1997. (Indian Edition)
3. I.S.Luther and I.B.S.Passi, *Algebra*, Vol. I –Groups(1996); Vol. II Rings, Narosa Publishing House , New Delhi, 1999
4. D.S.Malik, J.N. Mordeson and M.K.Sen, *Fundamental of Abstract Algebra*, McGraw Hill (International Edition), New York. 1997.
5. N.Jacobson, *Basic Algebra,* Vol. I & II W.H.Freeman ; also published by Hindustan Publishing Company, New Delhi, 1980.

PAPER - 2
REAL ANALYSIS - I

Objectives : To work comfortably with functions of bounded variation, Riemann - Stieltjes Integration, convergence of infinite series, infinite product and uniform convergence and its interplay between various limiting operations.

UNIT-I : FUNCTIONS OF BOUNDED VARIATION

Introduction - Properties of monotonic functions - Functions of bounded variation - Total variation - Additive property of total variation - Total variation on [a, x] as a function of x - Functions of bounded variation expressed as the difference of two increasing functions - Continuous functions of bounded variation.

Chapter - 6 : Sections 6.1 to 6.8

UNIT-II : THE RIEMANN - STIELTJES INTEGRAL

Introduction - Notation - The definition of the Riemann - Stieltjes integral - Linear Properties - Integration by parts- Change of variable in a Riemann - Stieltjes integral - Reduction to a Riemann Integral - Euler’s summation formula - Monotonically increasing integrators, Upper and lower integrals - Additive and linearity properties of upper and lower integrals - Riemann's condition.

Chapter - 7 : Sections 7.1 to 7.13

UNIT-III : THE RIEMANN-STIELTJES INTEGRAL

Integrators of bounded variation-Sufficient conditions for the existence of Riemann-Stieltjes integrals-Necessary conditions for the existence of Riemann-Stieltjes integrals-Mean value theorems for Riemann - Stieltjes integrals - The integrals as a function of the interval - Second fundamental theorem of integral calculus-Change of variable in a Riemann integral-Second Mean Value Theorem for Riemann integral-Riemann-Stieltjes integrals depending on a parameter-Differentiation under the integral sign.

Chapter - 7 : 7.15 to 7.25

UNIT-IV : INFINITE SERIES AND INFINITE PRODUCTS

Absolute and conditional convergence - Dirichlet's test and Abel's test - Rearrangement of series - Riemann's theorem on conditionally convergent series. Double sequences - Double series - Rearrangement theorem for double series - A sufficient condition for equality of iterated series - Multiplication of series - Cesaro summability - Infinite products.

Chapter 8 : Sections 8.8, 8.15, 8.17, 8.18, 8.20, 8.21 to 8.26

UNIT-V: SEQUENCES OF FUNCTIONS

Pointwise convergence of sequences of functions - Examples of sequences of real - valued functions - Definition of uniform convergence - Uniform convergence and continuity - The Cauchy condition for uniform convergence - Uniform convergence of infinite series of functions - Uniform convergence and Riemann - Stieltjes integration - Uniform convergence and differentiation - Sufficient condition for uniform convergence of a series - Mean convergence.

Chapter - 9 Sec 9.1 to 9.6, 9.8, 9.10,9.11, 9.13

Recommended Text

Tom M. Apostol : *Mathematical Analysis*, 2nd Edition, Addison-Wesley Publishing Company Inc. New York, 1997.

Reference Books

1. Bartle, R.G. *Real Analysis*, John Wiley and Sons Inc., 1976.
2. Rudin,W. *Principles of Mathematical Analysis*, 3rd Edition. McGraw Hill Company, New York, 1976.
3. Malik,S.C. and Savita Arora. *Mathematical Anslysis*, Wiley Eastern Limited.New Delhi, 1991.
4. Sanjay Arora and Bansi Lal, *Introduction to Real Analysis*, Satya Prakashan, New Delhi, 1991.
5. A.L.Gupta and N.R.Gupta, *Principles of Real Analysis*, Pearson Education, (Indian print) 2003.

PAPER - 3
ORDINARY DIFFERENTIAL EQUATIONS

Objectives : To develop strong background on finding solutions to linear differential equations with constant and variable coefficients and also with singular points, to study existence and uniqueness of the solutions of first order differential equations.

UNIT-I : LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS

Second order homogeneous equations-Initial value problems-Linear dependence and independence - Wronskian and a formula for Wronskian -Non-homogeneous equation of order two.

Chapter - 2 : Sections 1 to 6

UNIT-II : LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS

Homogeneous and non-homogeneous equation of order n - Initial value problems-Annihilator method to solve non-homogeneous equation - Algebra of constant coefficient operators.

Chapter - 2 : Sections 7 to 12.

UNIT-III : LINEAR EQUATION WITH VARIABLE COEFFICIENTS

Initial value problems - Existence and uniqueness theorems - Solutions to solve a non-homogeneous equation - Wronskian and linear dependence - reduction of the order of a homogeneous equation - homogeneous equation with analytic coefficients -The Legendre equation.

Chapter - 3 Sections 1 to 8

UNIT-IV : LINEAR EQUATION WITH REGULAR SINGULAR POINTS

Euler equation - Second order equations with regular singular points -Exceptional cases - Bessel Function.

Chapter 4 : Sections 1 to 4 and 6 to 8

UNIT-V: **EXISTENCE AND UNIQUENESS OF SOLUTIONS TO FIRST ORDER EQUATIONS**

Equation with variable separated - Exact equation - method of successive approximations - the Lipschitz condition - convergence of the successive approximations and the existence theorem.

Chapter 5 : Sections 1 to 6

Recommended Text

E.A.Coddington, *An introduction to ordinary differential equations* (3^{rd} Reprint) Prentice-Hall of India Ltd.,New Delhi, 1987.

Reference Books

1. Williams E. Boyce and Richard C. DI Prima, *Elementary differential equations and boundary value problems*, John Wiley and sons, New York, 1967.
2. George F Simmons, *Differential equations with applications and historical notes,* Tata McGraw Hill, New Delhi, 1974.
3. N.N. Lebedev, *Special functions and their applications*, Prentice Hall of India, New Delhi, 1965.
4. W.T. Reid. *Ordinary Differential Equations*, John Wiley and Sons, New York, 1971
5. M.D.Raisinghania, *Advanced Differential Equations*, S.Chand & Company Ltd. New Delhi 2001
6. B.Rai, D.P.Choudary and H.I. Freedman, *A Course in Ordinary Differential Equations,* Narosa Publishing House, New Delhi, 2002.

PAPER - 4
DIFFERENTIAL GEOMETRY

Objectives : This course introduces space curves and their intrinsic properties of a surface and geodesics. Further the non-intrinsic properties of surfaces are explored.

UNIT-I : SPACE CURVES

Definition of a space curve - Arc length - tangent - normal and binormal - curvature and torsion - contact between curves and surfaces - tangent surface - involutes and evolutes - Intrinsic equations - Fundamental Existence Theorem for space curves - Helics.

Chapter I : Sections 1 to 9

UNIT-II : INTRINSIC PROPERTIES OF A SURFACE

Definition of a surface - curves on a surface - Surface of revolution - Helicoids - Metric - Direction coefficients - families of curves - Isometric correspondence - Intrinsic properties.

Chapter II: Sections 1 to 9

UNIT-III : GEODESICS

Geodesics - Canonical geodesic equations - Normal property of geodesics - Existence Theorems - Geodesic parallels

Chapter II: Sections 10 to 14

UNIT-IV : GEODESICS (Contd . . .)

Geodesics curvature - Gauss - Bonnet Theorem - Gaussian curvature - surface of constant curvature.

Chapter II: Sections 15 to 18

UNIT-V : NON INTRINSIC PROPERTIES OF A SURFACE

The second fundamental form - Principal curvature - Lines of curvature - Developable - Developable associated with space curves and with curves on surface - Minimal surfaces - Ruled surfaces.

Chapter III: Sections 1 to 8

Recommended Text

T.J.Willmore, *An Introduction to Differential Geometry,* Oxford University Press,(17th Impression) New Delhi 2002. (Indian Print)

Reference Books

1. Struik, D.T. *Lectures on Classical Differential Geometry*, Addison - Wesley, Mass. 1950.
2. Kobayashi. S. and Nomizu. K. *Foundations of Differential Geometry*, Interscience Publishers, 1963.
3. Wilhelm Klingenberg: *A course in Differential Geometry*, Graduate Texts in Mathematics, Springer-Verlag 1978.
4. J.A. Thorpe *Elementary topics in Differential Geometry*, Under - graduate Texts in Mathematics, Springer - Verlag 1979.

ELECTIVE: PAPER - 1
(to choose any 1 out of the given 4)
A. FINITE ELEMENT METHOD

Objective: To give a basic expertise in the use of Finite Element Method Techniques.

Unit–I: SECOND ORDER DIFFERENTIAL EQUATIONS IN ONE DIMENSION

Finite element models Background – Basic steps of finite element analysis– Model boundary value problem–Discretization of the domain–Derivation of element equations– Connectivity of elements–Imposition of- boundary conditions–Solution of equations– Post computation of the solution–Some Remarks. (Numerical Example 3.2.1only).
Chapter 3: Sections: 3.1 to 3.3

Unit – II: SECOND ORDER DIFFERENTIAL EQUATIONS IN ONE DIMENSION: APPLICATIONS

Axi-symmetric problems–Model equation–weak form–finite element model– preliminary comments–Discrete systems–Linear elastic spring– Torsion of circular shafts–Electrical resistor circuits –Fluid flow through pipes– Heat transfer – Governing equations –Finite element models – Fluid mechanics – Governing equations – Finite element model. (Numerical Examples 3.4.1, 4.2.1, 4.2.2, 4.3.1, 4.4.1 only)
Chapter 3: Section: 3.4 , Chapter 4: Sections: 4.1– 4.4.

Unit – III: SECOND ORDER DIFFERENTIAL EQUATIONS IN ONE DIMENSION: APPLICATIONS

Solid and Structural Mechanics–Preliminary Comments–Finite Element Model of Bars and cables – Plane trusses: Introduction – Basic truss element–General truss element – Constraint equations – Penalty approach – Direct approach. (Numerical Examples4.6.1,4.6.2,4.6.5only)

Chapter4: Sections: 4.5 to 4.6

Unit–IV: BEAMS AND FRAMES

Introduction–Euler-Bernoulli beam element–Governing equation–Discretization of the domain – Derivation of element equations – Assembly of Element Equations – Imposition of boundary conditions– Post processing of solution – Timoshenko beam elements–Governing equations – Weak form–General finite element model.

Chapter5: Sections:5.1,5.2 (5.2.1to5.2.6),5.3 (5.3.1to 5.3. 3)

Unit–V: EIGEN VALUE AND TIME DEPENDENT PROBLEMS

Eigen value problems: Introduction – Formulation of Eigen value problems – Finite element formulation.Time dependent problems: Introduction–Semi discrete finite element models– Parabolic equations–Time Approximation (Numerical Example 6.1.1 only).

(Chapter 6: Sections: 6.1 (6.1.1to 6.1.3), 6.2 (6.2.1 to 6.2.3)

Book for Study:

J.N.Reddy, An Introduction to the Finite Element Method (Third Edition) Tata McGraw - Hill Publishing Company Limited, New Delhi, 2005.

Books for Reference

1. George R.Buchanan, Finite element analysis,Tata McGraw Hill company Limited, New Delhi, 2006.
2. David V.Hutton, Fundamentals of Finite element Analysis, Tata McGraw Hill company Limited, New Delhi, 2005.
3. Klaus Jurgen Bathe, Edward L. Wilson, Numerical methods in finite element Analysis, Prentice Hall of India private Limited, New Delhi,1987.
4. C.S.Krishnamoorthy, Finite element Analysis Theory and Programming (Eighteenth Reprint), Tata McGraw Publishing company Limited, New Delhi, 2007.

ELECTIVE: PAPER - 1
B. DISCRETE MATHEMATICS

Objectives: This course aims to explore the topics like lattices and their applications in switching circuits, finite fields, polynomials and coding theory.

UNIT - I: LATTICES

Properties and examples of Lattices - Distributive lattices - Boolean algebras - Boolean polynomials - Minimal Forms of Boolean Polynomials.
Chapters: 1 to 4 and 6.

UNIT - II: APPLICATIONS OF LATTICES

Switching Circuits - Applications of Switching Circuits
Chapters: 7 and 8.

UNIT - III: FINITE FIELDS AND POLYNOMIALS

Finite fields
Chapter: 13.

UNIT - IV: FINITE FIELDS AND POLYNOMIALS

Irreducible Polynomials over Finite fields - Factorization of Polynomials over Finite fields.
Chapters: 14 and 15.

UNIT - V: CODING THEORY

Introduction to Coding - Linear Codes.
Chapters: 16 and 17.

Recommended Text

Rudolf Lidl & Gunter Pilz. APPLIED ABSTRACT ALGEBRA, Second Indian Reprint 2006, Springer Verlag, NewYork.

Reference Books

1. A.Gill, *Applied Algebra for Computer Science*, Prentice Hall Inc., New Jersey.
2. J.L.Gersting, *Mathematical Structures for Computer Science*(3^{rd} Edn.), Computer Science Press, New York.
3. S.Wiitala, *Discrete Mathematics- A Unified Approach*, McGraw Hill Book Co.

ELECTIVE: PAPER - 1
C. GRAPH THEORY

Objectives : To study and develop the concepts of graphs, subgraphs, trees, connectivity, Euler tours, Hamilton cycles, matching, coloring of graphs, independent sets, cliques, vertex coloring, and planar graphs

UNIT-I : GRAPHS, SUBGRAPHS AND TREES

Graphs and simple graphs - Graph Isomorphism - The Incidence and Adjacency Matrices - Subgraphs - Vertex Degrees - Paths and Connection - Cycles - Trees - Cut Edges and Bonds - Cut Vertices.

Chapter 1 (Section 1.1 - 1.7) ; Chapter 2 (Section 2.1 - 2.3)

UNIT-II : CONNECTIVITY, EULER TOURS AND HAMILTON CYCLES

Connectivity - Blocks - Euler tours - Hamilton Cycles.

Chapter 3 (Section 3.1 - 3.2) ; Chapter 4 (Section 4.1 - 4.2)

UNIT-III : MATCHINGS, EDGE COLOURINGS

Matchings - Matchings and Coverings in Bipartite Graphs - Edge Chromatic Number - Vizing's Theorem.

Chapter 5 (Section 5.1 - 5.2) ; Chapter 6 (Section 6.1 - 6.2)

UNIT-IV : INDEPENDENT SETS AND CLIQUES, VERTEX COLOURINGS

Independent sets - Ramsey's Theorem - Chromatic Number - Brooks' Theorem - Chromatic Polynomials.

Chapter 7 (Section 7.1 – 7.2); Chapter 8 (Section 8.1 – 8.2, 8.4)

UNIT-V: PLANAR GRAPHS

Plane and planar Graphs - Dual graphs - Euler's Formula - The Five-Colour Theorem and the Four-Colour Conjecture.

Chapter 9 (Section 9.1 - 9.3, 9.6)

Recommended Text

J.A.Bondy and U.S.R. Murthy, *Graph Theory and Applications*, Macmillan, London, 1976.

Reference Books

1. J.Clark and D.A.Holton , *A First look at Graph Theory*, Allied Publishers, New Delhi, 1995.
2. R. Gould. *Graph Theory*, Benjamin/Cummings, Menlo Park, 1989.
3. A.Gibbons, *Algorithmic Graph Theory*, Cambridge University Press, Cambridge, 1989.
4. R.J.Wilson and J.J.Watkins, *Graphs : An Introductory Approach*, John Wiley and Sons, New York, 1989.
5. R.J. Wilson, *Introduction to Graph Theory*, Pearson Education, 4th Edition, 2004, Indian Print.
6. S.A.Choudum, *A First Course in Graph Theory*, MacMillan India Ltd. 1987.

ELECTIVE: PAPER - 1
D. RELIABILITY AND QUEUEING THEORY

Objectives : To study applications of Mathematics.

UNIT - I : RELIABILITY DEFINITION AND FAILURE DATA ANALYSIS

Introduction – Definition of Probability – Failure Data – Mean Failure Rate – Mean Time To Failure (MTTF) – Mean Time Between Failure (MTBF) – Graphical Plots.

Chapter-2: 2.1 - 2.2
Chapter-3: 3.2 - 3.6

UNIT - II : FAILURE DATA ANALYSIS

Four important points – MTTF in terms of Failure density – Generalization – Reliability in terms of Hazard rate and failure density – MTTF in integral form. Introduction – Definition of Probability – Failure Data – Mean Failure Rate – Mean Time To Failure – Mean Time Between Failure – Graphical Plots.

Chapter-3: 3.7 - 3.11

UNIT - III : SYTEM RELIABILITY

Introduction – Series Configuration – Parallel Configuration – Mixed Configuration – Application to specific hazard Models – An r out of n structure – Systems not reducible to mixed configuration.

Chapter-6: 6.1 - 6.6 and 6.8

UNIT - IV : INTRODUCTION TO QUEUEING PROCESS

Measuring system performance – Some general results Simple data book keeping for queues - Poisson process and the exponential distribution – Markovian Property of the exponential distribution.

Chapter-1: 1.4 - 1.8

UNIT - V : SIMPLE MARKOVIAN BIRTH-DEATH QUEUEING MODELS

Steady state solution for the M / M / 1 model – Methods of solving steady state difference equations – Queues with parallel channels and truncation (M / M / c / K).

Recommended Text

1. Srinath. L. S., Reliability Engineering, East West Press, New Delhi. (for Units I , II and III)
2. Donald Gross, Carl M. Harris, Fundamentals of Queueing Theory, Wiley India. (for Units IV and V)

Reference Books

1. Cox. D. R. and H.D. Miller, Theory of Stochastic Processes, Methuen, London, 1965.
2. Cramer. H. and M. Leadbetter, Stationary and Related Stochastic Processes, Wiley, New York, 1966.
3. Karlin. S and H. Taylor, A First Course in Stochastic Processes, 2^{nd} edition, Academic Press, New York, 1975.

SEMESTER - II
PAPER - 5
ALGEBRA - II

Objectives : To study field extension, roots of polynomials, Galois Theory, finite fields, division rings, solvability by radicals and to develop computational skill in abstract algebra.

UNIT-I

Extension fields - Transcendence of e.

Chapter 5: Section 5.1 and 5.2

UNIT-II

Roots or Polynomials.- More about roots

Chapter 5: Sections 5.3 and 5.5

UNIT-III

Elements of Galois theory.

Chapter 5 : Section 5.6

UNIT-IV

Solvability by Radicals - Finite fields - Wedderburn's theorem on finite division rings.

Chapter 5: Section 5.7.
Chapter 7: Sections 7.1 and 7.2 (Only Theorem 7.2.1)

UNIT-V

Solvability by radicals - A theorem of Frobenius - Integral Quaternions and the Four - Square theorem.

Chapter 7 : Sections 7.3 and 7.4

Recommended Text

I.N. Herstein. *Topics in Algebra* (II Edition) Wiley Eastern Limited, New Delhi, 1975.

Reference Books

1. M.Artin, *Algebra,* Prentice Hall of India, 1991.
2. B.Bhattacharya, S.K.Jain, and S.R.Nagpaul, *Basic Abstract Algebra* (II Edition) Cambridge University Press, 1997. (Indian Edition)
3. I.S.Luther and I.B.S.Passi, *Algebra,* Vol. I - Groups (1996); Vol. II *Rings,* Narosa Publishing House , New Delhi, 1999
4. D.S.Malik, J.N. Mordeson and M.K.Sen, *Fundamental of Abstract Algebra*, McGraw Hill (International Edition), New York. 1997.
5. N.Jacobson, *Basic Algebra,* Vol. I & II Hindustan Publishing Company, New Delhi.

PAPER - 6
REAL ANALYSIS II

Objectives : To introduce measure on the real line, Lebesgue measurability and integrability, Fourier Series and Integrals, in-depth study in multivariable calculus.

UNIT - I : FOURIER SERIES AND FOURIER INTEGRALS

Introduction - Orthogonal system of functions - The theorem on best approximation - The Fourier series of a function relative to an orthonormal system - Properties of Fourier Coefficients - The Riesz-Fischer Thorem - The convergence and representation problems in trigonometric series - The Riemann - Lebesgue Lemma - The Dirichlet Integrals - An integral representation for the partial sums of Fourier series - Riemann's localization theorem - Sufficient conditions for convergence of a Fourier series at a particular point - Cesaro summability of Fourier series- Consequences of Fejes's theorem - The Weierstrass approximation theorem

Chapter 11 : Sections 11.1 to 11.15 (Apostol)

UNIT - II : MULTIVARIABLE DIFFERENTIAL CALCULUS

Introduction - The Directional derivative - Directional derivative and continuity - The total derivative - The total derivative expressed in terms of partial derivatives - The matrix of linear function - The Jacobian matrix - The chain rule - Matrix form of chain rule - The mean - value theorem for differentiable functions - A sufficient condition for differentiability - A sufficient condition for equality of mixed partial derivatives - Taylor's theorem for functions of R^n to R^1

Chapter 12 : Section 12.1 to 12.14 (Apostol)

UNIT - III : IMPLICIT FUNCTIONS AND EXTREMUM PROBLEMS

Functions with non-zero Jacobian determinants - The inverse function theorem -The Implicit function theorem - Extrema of real valued functions of severable variables - Extremum problems with side conditions.

Chapter 13 : Sections 13.1 to 13.7 (Apostol)

UNIT - IV THE LEBESGUE INTEGRAL

Length of open sets and closed sets - Inner and outer measure : Measurable sets - Properties of measurable sets - Measurable functions - Definition and existence of the Lebesgue integral for bounded function.

Chapter 11 : Section 11.1 to 11.5 [R. R. Goldberg]

UNIT - V THE LEBESGUE INTEGRAL (Contd . . .)

Properties of the Lebesgue integral for bounded measurable functions - The Lebesque integral for unbounded functions - Some fundamental theorems - The metric space L^2 [a, b] - The integral on $(-\infty, \infty)$ and int plane.

Chapter 11 : Section 11.6 to 11.10 [R. R. Goldberg]

Recommended Texts

1. Tom M. Apostol : *Mathematical Analysis*, 2nd Edition, Addison-Wesley Publishing Company Inc. New York, 1974. (for Units I, II and III)
2. Richard R. Goldberg, Methods f Real Analysis, Oxford & IBH Publishing, New Delhi, 1975. (for Unit IV and V)

Reference Books

1. Burkill,J.C. *The Lebesgue Integral*, Cambridge University Press, 1951.
2. Munroe,M.E. *Measure and Integration*. Addison-Wesley, Mass.1971.
3. Roydon,H.L.*Real Analysis*, Macmillan Pub. Company, New York, 1988.
4. Rudin, W. *Principles of Mathematical Analysis*, McGraw Hill Company, New York,1979.
5. Malik,S.C. and Savita Arora. *Mathematical Analysis*, Wiley Eastern Limited. New Delhi, 1991.
6. Sanjay Arora and Bansi Lal, *Introduction to Real Analysis*, Satya Prakashan, New Delhi, 1991

PAPER - 7
PARTIAL DIFFERENTIAL EQUATIONS

Objectives : The aim of the course is to introduce to the students the various types of partial differential equations and how to solve these equations.

UNIT - I : PARTIAL DIFFERENTIAL EQUATIONS OF FIRST ORDER

Formation and solution of PDE- Integral surfaces - Cauchy Problem order equation - Orthogonal surfaces - First order non-linear - Characteristics - Compatible system - Charpits method.

Chapter 0: 0.4 to 0.11 (omit 0.1, 0.2, 0.3 and 0.11.1)

UNIT - II : FUNDAMENTALS

Introduction – Classification of Second Order PDE - Canonical forms – Adjoint Operators - Riemann's method.

Chapter 1 : 1.1 to 1.5

UNIT - III : ELLIPTIC DIFFERENTIAL EQUATIONS

Derivation of Laplace and Poisson equation - BVP - Separation of Variables - Dirichlet's Problem and Newmann Problem for a rectangle - Solution of Laplace equation in Cylindrical and spherical coordinates - Examples.

Chapter 2 : 2.1, 2 2 , 2.5 to 2.7, 2.11, 2.12(omit 2.3, 2.4, 2.8, 2.9, 2.10 and 2.13)

UNIT - IV : PARABOLIC DIFFERENTIAL EQUATIONS

Formation and solution of Diffusion equation - Dirac-Delta function - Separation of variables method - Solution of Diffusion Equation in Cylindrical and spherical coordinates - Examples.

Chapter 3 : 3.1 to 3.7.

UNIT - V : HYPERBOLIC DIFFERENTIAL EQUATIONS

Formation and solution of one-dimensional wave equation - canocical reduction – IVP - D'Alembert's solution - IVP and BVP for two-dimensional wave equation - Periodic solution of one-dimensional wave equation in cylindrical and spherical coordinate systems - Uniqueness of the solution for the wave equation - Duhamel's Principle - Examples.

Chapter 4: 4.1 to 4.12 (omit 4.5, 4.6 & 4.10)

Recommended Text

K. Sankar Rao, *Introduction to Partial Differential Equations*, 2nd Edition, Prentice Hall of India, New Delhi. 2005

Reference Books

1. R.C.McOwen, *Partial Differential Equations*, 2nd Edn. Pearson Eduction, New Delhi, 2005.
2. I.N.Sneddon, *Elements of Partial Differential Equations*, McGraw Hill, New Delhi, 1983.
3. R. Dennemeyer, *Introduction to Partial Differential Equations and Boundary Value Problems*, McGraw Hill, New York, 1968.
4. M.D.Raisinghania, *Advanced Differential Equations*, S.Chand & Company Ltd., New Delhi, 2001.

PAPER - 8
MECHANICS

Objectives : To study mechanical systems under generalized coordinate systems, virtual work, energy and momentum, to study mechanics developed by Newton, Langrange, Hamilton Jacobi and Theory of Relativity due to Einstein.

UNIT-I : MECHANICAL SYSTEMS

The Mechanical system - Generalised coordinates - Constraints - Virtual work - Energy and Momentum.

Chapter 1 : Sections 1.1 to 1.5

UNIT-II : LAGRANGE'S EQUATIONS

Derivation of Lagrange's equations- Examples - Integrals of motion.

Chapter 2 : Sections 2.1 to 2.3 (Omit Section 2.4)

UNIT-III : HAMILTON'S EQUATIONS

Hamilton's Principle - Hamilton's Equation - Other variational principle.

Chapter 4 : Sections 4.1 to 4.3 (Omit section 4.4)

UNIT-IV : HAMILTON-JACOBI THEORY

Hamilton Principle function - Hamilton-Jacobi Equation - Separability

Chapter 5 : Sections 5.1 to 5.3

UNIT-V : CANONICAL TRANSFORMATION

Differential forms and generating functions - Special Transformations - Lagrange and Poisson brackets.

Chapter 6 : Sections 6.1, 6.2 and 6.3 (omit sections 6.4, 6.5 and 6.6)

Recommended Text

D. T. Greenwood, *Classical Dynamics*, Prentice Hall of India, New Delhi, 1985.

Reference Books

1. H. Goldstein, *Classical Mechanics*, (2^{nd} Edition) Narosa Publishing House, New Delhi.
2. N.C.Rane and P.S.C.Joag, *Classical Mechanics*, Tata McGraw Hill, 1991.
3. J.L.Synge and B.A.Griffth, *Principles of Mechanics* (3^{rd} Edition) McGraw Hill Book Co., New York, 1970.

HUMAN RIGHTS
COMPULSORY PAPER

UNIT – I

Definition of Human Rights – Nature, Content, Legitimacy and Priority – Theories of Human Rights – Historical Development of Human Rights.

UNIT – II

International Human Rights – Prescription and Enforcement upto World War II – Human Rights and the U. N. O. – Universal Declaration of Human Rights – International Covenant on Civil and Political Rights – International Covenant or Economic, Social and Cultural Rights and Optional Protocol.

UNIT – III

Human Rights Declarations – U.N. Human Rights Declarations – U.N. Human Rights Commissioner.

UNIT – IV

Amnesty International – Human Rights and Helsinki Process – Regional Developments – European Human Rights System – African Human Rights System – International Human Rights in Domestic courts.

UNIT – V

Contemporary Issues on Human Rights: Children's Rights – Women's Rights – Dalit's Rights – Bonded Labour and Wages – Refugees – Capital Punishment.
Fundamental Rights in the Indian Constitution – Directive Principles of State Policy – Fundamental Duties – National Human Rights Commission.

Reference Magazines:

1. The Lawyer, Bombay.
2. Human Rights Today, Columbia University.
3. International Instruments of Human Rights, UN Publication.
4. Human Rights Quarterly, John Hopkins University, U.S.A.

Books for Reference:

1. International Bill of Human Rights, Amnesty International Publication, 1988.
2. Human Rights, Questions and Answers, UNESCO, 1982.
3. Mausice Cranston - What is Human Rights.
4. Desai, A.R - Violation of Democratic Rights in India.
5. Pandey - Constitutional Law.
6. Timm R.W - Working for Justice and Human Rights.
7. Human Rights - A Selected Bibliography, USIS.
8. J.C. Johari - Human Rights and New World order.
9. G.S. Bajwa - Human Rights in India.
10. Amnesty International - Human Rights in India.
11. P.C. Sinha & K. Cheous (Ed) - International Encyclopedia of Peace, Security, Social Justice and Human Rights (Vols. 1 - 7).
12. Devasia, V.V - Human Rights and Victimology.

ELECTIVE: PAPER-2
(to choose any 1 out of the given 4)
A. PROGRAMMING IN C++ PRACTICALS

Objectives: This courses introduces a higher level language C++ and numerical methods for hands-on experience on computers. Stress is also given on the error analysis.

- Functions in C++ - Classes and Objects.
- Constructors and destructors - Operator Overloading
- Inheritance : Pointers and Polymorphism.

Recommended Text

Balagurusamy, *Object Oriented Programming with* C++, Tata McGraw Hill, New Delhi, 1999.

Reference Books

D. Ravichandran, *Programming with* C++, Tata McGraw Hill, New Delhi, 1996.

COMPUTER LABORATORY PRACTICE EXERCISES

COMPUTER LANGUAGE EXERCISES FOR PROGRAMMING IN C++

1. Write a class to represent a vector (a series of float values). Include member functions to perform the following tasks: To create the vector, To modify the value of a given element, To multiply by a scalar value, To display the vector in the form (10, 20, 30,…). Write a program to test your class.
2. Create a class FLOAT that contains one float data member. Overload all the four arithmetic operators so that they operate on the objects of FLOAT.
3. Write a program which shows the days from the start of year to date specified. Hold the number of days for each month in an array. Allow the user to enter the month and the day of the year. Then the program should display the total days till the day.
4. Write a program to include all possible binary operator overloading using friend function.
5. Write a program to read an array of integer numbers and sort it in descending order. Use readdata, putdata, and arraymax as member functions in a class.
6. Write a program to read two character strings and use the overloaded '+' operator to append the second string to the first.
7. Develop a program Railway Reservation System using Hybrid Inheritance and Virtual Function.
8. Using overloaded constructor in a class write a program to add two complex numbers.
9. Create a class MAT of size(m,n). Define all possible matrix operations for MAT type objects.
10. Write a program that determines whether a given number is a prime number or not and then prints the result using polymorphism.
11. Write a program to illustrate the dynamic initialization of constructors.
12. Write a program to illustrate the use of pointers to objects.
13. Write a program to illustrate how to construct a matrix of size m x n .
14. Write a program to arrange the given data in ascending / descending order using various sorting algorithms
15. Write a program to find the biggest /smallest number in the given data using various search algorithms

ELECTIVE: PAPER-2
B. FUZZY MATHEMATCS

Objectives : To introduce the basic notions and study the techniques of Fuzzy Mathematics.

UNIT - I : FUZZY SETS

Fuzzy sets – Basic Types – Basic concepts – Characteristics – Significance of the paradigm shift – Additional properties of α – cuts.

Chapter 1 : Sections 1.3 to 1.5 and Chapter 2 : Section 2.1

UNIT - II : FUZZY SETS VERSUS CRISP SETS

Representation of Fuzzy sets – Extension principle of Fuzzy sets – Operation on Fuzzy sets – Types of operation – Fuzzy complements.

Chapter 2 : Sections 2.2 and 2.3 and Chapter 3 : Sections 3.1 and 3.2

UNIT - III : OPERATIONS ON FUZZY SETS

Fuzzy intersection – t-norms – Fuzzy unions – t-conorms.

Chapter 3 : Sections 3.3 and 3.4.

UNIT - IV : FUZZY ARITHMETIC

Fuzzy number – Linguistic variables – Arithmetic operation on intervals – Lattice of Fuzzy numbers.

Chapter 4 : Sections 4.1 to 4.4

UNIT - V : FUZZY RELATIONS

Crisp Versus fuzzy relations – Projection and Cylindric extension – binary fuzzy relations – binary relations on a single set.

Chapter 5 : Sections 5.1 to 5.4

Recommended Text

G. J. Klir and Bo Yuan, *Fuzzy Sets and Fuzzy Logic : Theory and Applications*, PHI, New Delhi, 2005.

Reference Books

1. H. J. Zimmerman, *Fuzzy Set Theory and its Applications*, Allied Publishers, 1996.
2. A. Kaufman, Introduction to the theory of Fuzzy Subsets, Academic Press, 1975.
3. V. Novak, Fuzzy Sets and their Applications, Adam Hilger, Bristol, 1969.

ELECTIVE: PAPER-2
C. CALCULUS OF VARIATIONS AND INTEGRAL EQUATIONS

Objectives : The aim of the course is to introduce to the students the concept of calculus of variation and its applications and second to introduce various types of integral equations and how to solve these equations.

UNIT-I : VARIATIONAL PROBLEMS WITH MOVING BUNDARIES

The concept of Variation and its properties – Euler's equation – Variational problems for functional – Functionals dependent on higher order derivatives – Functions of several independent variables – Some applications to problems of mechanics.

Chapter 1 : 1.1 to 1.7

UNIT - II : VARIATIONAL PROBLEMS WITH MOVING BOUNDARIES

Movable boundary for a functional dependent on two functions – One sided variations – Reflection and Refraction of extremals – Diffraction of light rays.

Chapter 2 : 2.1 to 2.5

UNIT - III INTEGRAL EQUATIONS

Introduction – Definition – Regularity conditions – Special kinds of Kernals – Eigen values and eigen functions – Convolution integral – Reduction to a system of algebraic equations – Examples – Fredholm alternative – Examples – An approximation method.

Chapter 1 : 1.1 to 1.5
Chapter 2 : 2.1 to 2.5

UNIT - IV METHOD OF SUCCESSIVE APPROXIMATIONS AND FREDHOLM THEORY

Method of successive approximations – Iterative scheme – Examples – Volterra integral equations – Examples – Some results about the resolvent kernel – The method of solution of Fredholm equation – Fredholm first theorem – Examples.

Chapter 3 : 3.1 to 3.5
Chapter 4 : 4.1 to 4.3

UNIT - V APPLICATIONS TO ORDINARY DIFFERENTIAL EQUATIONS

Initial value problems – Boundary value problems – Examples – Singular integral equations – The Abel integral equations - Examples.

Chapter 5 : 5.1 to 5.3
Chapter 8 : 8.1 to 8.2

Recommended Text

1. A. S. Gupta, *Calculus of Variations with Applications*, PHI, New Delhi, 2005. (for Units I and II)
2. Ram P. Kanwal, *Linear Integral Equations,* Theory and Techniques, Academic Press, New York, 1971. (for Units III, IV and V)

Reference Books

1. M. D. Raisinghania, Integral Equations and Boundary Value Problems, S. Chand & Co., New Delhi, 2007.
2. Sudir K. Pundir and Rimple Pundir, Integral Equations and Boundary Value Problems, Pragati Prakasam, Meerut. 2005.

ELECTIVE: PAPER-2
D. MATHEMATICAL MODELLING

Objective of the course:

This course aims at introducing mathematical modeling through differential equations, systems of ordinary differential equations, difference equations, graphs, calculus of variations and dynamical programming.

Unit – I: MATHEMATICAL MODELLING THROUGH SYSTEMS OF ORDINARY DIFFERENTIAL EQUATIONS OF THE FIRST ORDER

Mathematical modelling in Population Dynamics – Mathematical Modelling of Epidemics Through Systems of Ordinary Differential Equations of First Order– Mathematical Models in Medicine, Arms Race, Battles and International Trade in Terms of Systems of Ordinary Differential Equations – Mathematical Modelling in Dynamics Through Systems of Ordinary Differential Equations of First Order.
(Chapter 3:3.1, 3.2, 3.5, 3.6)

Unit – II: MATHEMATICAL MODELLING THROUGH DIFFERENCE EQUATIONS

The Need for Mathematical Modelling Through Difference Equations: Some Simple Models – Basic Theory of Linear Difference Equations with Constant Coefficients – Mathematical Modelling Through Difference Equations in Economics and Finance.
(Chapter 5: 5.1 – 5.3)

Unit – III: MATHEMATICAL MODELLING THROUGH DIFFERENCE EQUATIONS

Mathematical Modelling Through Difference Equations in Population Dynamics and Genetics – Mathematical Modelling Through Difference Equations in Probability Theory –Miscellaneous Examples of Mathematical Modelling Through Difference Equations.
(Chapter 5: 5.4 – 5.6)

Unit – IV: MATHEMATICAL MODELLING THROUGH GRAPHS

Situations that can be Modelled Through Graphs – Mathematical Models in Terms of Directed Graphs – Mathematical Models in Terms of Signed Graphs – Mathematical Modelling in Terms of Weighted Digraphs.

(Chapter 7: 7.1 – 7.4)

Unit – V: MATHEMATICAL MODELLING THROUGH CALCULUS OF VARIATIONS AND DYNAMIC PROGRAMMING

Optimization Principles and Techniques – Mathematical Modelling Through Calculus of Variations – Mathematical Modelling Through Dynamic Programming. (Chapter 9: 9.1 – 9.3)

Recommended Text:

J.N. Kapur, Mathematical Modelling, Wiley Eastern Limited, Reprint 2000.

Reference Books:

1. **D.J. G. James** and **J.J. Macdonald,** Case studies in Mathematical modelling, Stanly Thames, Cheltonham.
2. **J.N. Kapur,** Maximum entropy models.
3. **M. Cross and AO. Moscrcadini,** The Art of Mathematical Modelling, Ellis Harwood and John Wiley.
4. **C. Dyson, Elvery,** Principles of Mathematical Modelling, Academic Press, New York.
5. **D.N. Burghes,** Modelling with Difference Equations, Ellis Harwood and John Wiley.

SEMESTER - III
PAPER - 9
COMPLEX ANALYSIS - I

Objectives : To Study Cauchy integral formula, local properties of analytic functions, general form of Cauchy's theorem and evaluation of definite integral and harmonic functions

UNIT-I : ANALYTIC FUNCTIONS AS MAPPINGS

Analytic functions in regions- conformal mapping-Fundamental Theorems: Line integrals-Rectifiable arcs-line integrals as functions of arcs-Cauchy's theorem for a rectangle- Cauchy's theorem in a disk.

Chapter3: Section 2 : 2.2 and 2.3;
Chapter 4 : Section 1 : 1.1 to 1.5;

UNIT-II : CAUCHY'S INTEGRAL FORMULA

The Index of a point with respect to a closed curve - The Integral formula - Higher derivatives. Local Properties of Analytic Functions: Removable Singularities - Taylors's Theorem - Zeros and poles - The local Mapping - The Maximum Principle.

Chapter 4 : Section 2 : 2.1 to 2.3;
Chapter 4 : Section 3 : 3.1 to 3.4

UNIT-III : THE GENERAL FORM OF CAUCHY'S THEOREM

Chains and cycles- Simple Continuity - Homology - The General statement of Cauchy's Theorem - Proof of Cauchy's theorem - Locally exact differentials- Multilply connected regions - Residue theorem - The argument principle.

Chapter 4 : Section 4 : 4.1 to 4.7;
Chapter 4 : Section 5: 5.1 and 5.2

UNIT-IV : EVALUATION OF DEFINITE INTEGRALS AND HARMONIC FUNCTIONS

Evaluation of definite integrals - Definition of Harmonic function and basic properties - Mean value property - Poisson formula.

Chapter 4 : Section 5 : 5.3 ;
Chapter 4 : Sections 6 : 6.1 to 6.3

UNIT-V : HARMONIC FUNCTIONS AND POWER SERIES EXPANSIONS

Schwarz theorem - The reflection principle - Weierstrass theorem - Taylor's Series - Laurent series .

Chapter 4 : Sections 6.4 and 6.5 ; Chapter 5 : Sections 1.1 to 1.3

Recommended Text

- Lars V. Ahlfors, Complex Analysis, (3rd edition) McGraw Hill Co., New York, 1979

Reference Books

1. H.A. Presfly, Introduction to complex Analysis, Clarendon Press, oxford, 1990.
2. J.B. Conway, Functions of one complex variables Springer - Verlag, International student Edition, Naroser Publishing Co.1978
3. E. Hille, Analytic function Thorey (2 vols.), Gonm & Co, 1959.
4. M.Heins, Complex function Theory, Academic Press, New York,1968.

PAPER - 10
TOPOLOGY

Objectives : To study topological spaces, continuous functions, connectedness, compactness, countability and separation axioms.

UNIT-I : TOPOLOGICAL SPACES

Topological spaces - Basis for a topology - The order topology - The product topology on X x Y - The subspace topology - Closed sets and limit points.

Chapter 2 : Sections 12 to 17

UNIT-II : CONTINUOUS FUNCTIONS

Continuous functions - the product topology - The metric topology.

Chapter 2 : Sections 18 to 21 (Omit Section 22)

UNIT-III : CONNECTEDNESS

Connected spaces - connected subspaces of the Real line - Components and local connectedness.

Chapter 3 : Sections 23 to 25

UNIT-IV : COMPACTNESS

Compact spaces - compact subspaces of the Real line - Limit Point Compactness - Local Compactness.

Chapter 3 : Sections 26 to 29

UNIT-V: COUNTABILITY AND SEPARATION AXIOM

The Countability Axioms - The separation Axioms - Normal spaces - The Urysohn Lemma - The Urysohn metrization Theorem - The Tietz extension theorem.

Chapter 4 : Sections 30 to 35

Recommended Text

James R. Munkres, *Topology* (2nd Edition) Pearson Education Pve. Ltd., Delhi-2002 (Third Indian Reprint)

Reference Books

1. J. Dugundji , *Topology* , Prentice Hall of India, New Delhi, 1975.
2. George F.Sinmons, *Introduction to Topology and Modern Analysis*, McGraw Hill Book Co., 1963
3. J.L. Kelly, *General Topology*, Van Nostrand, Reinhold Co., New York
4. L.Steen and J.Subhash, Counter Examples in Topology, Holt, Rinehart and Winston, New York, 1970.
5. S.Willard, *General Topology*, Addison - Wesley, Mass., 1970

PAPER - 11
OPERATIONS RESEARCH

Objectives: This course aims to introduce decision theory, PERT, CPM, deterministic and probabilistic inventory systems, queues, replacement and maintenance problems.

UNIT – I: INTEGER LINEAR PROGRAMMING

Types of Integer Linear Programming Problems - Concept of Cutting Plane - Gomory's All Integer Cutting Plane Method - Gomory's mixed Integer Cutting Plane method - Branch and Bound Method.

Chapter-7: 7.1 - 7.6

UNIT – II: DYNAMIC PROGRAMMING

Characteristics of Dynamic Programming Problem - Developing Optimal Decision Policy - Dynamic Programming Under Certainty - DP approach to solve LPP.

Chapter-20: 20.1 - 20.5

UNIT - III:

CLASSICAL OPTIMIZATION METHODS : Unconstrained Optimization - Constrained Multi-variable Optimization with Equality Constraints - Constrained Multi-variable Optimization with inequality Constraints.
NON-LINEAR PROGRAMMING METHODS: Examples of NLPP - General NLPP - Graphical solution - Quadratic Programming - Wolfe's modified Simplex Methods.

Chapter-23: 23.1 - 23.4 and Chapter-24: 24.1 - 24.4

UNIT-IV

REVISED SIMPLEX METHOD : Standard forms for Revised simplex Method - Computational procedure for Standard form I - comparison of simplex method and Revised simplex Method.
BOUNDED VARIABLES LP PROBLEM: The simplex algorithm

Chapter-26: 26.1 - 26.4
Chapter-28: 28.1, 28.2

UNIT-V : DECISION THEORY

Steps in Decision theory Approach - Types of Decision-Making Environments - Decision Making Under Uncertainty - Decision Making under Risk - Posterior Probabilities and Bayesian Analysis - Decision Tree Analysis - Decision Making with Utilities.

Chapter-11 : 11.1 - 11.8

Recommended Text

J. K. Sharma, *Operations Research*, Theory and Applications, Third Edition (2007) Macmillan India Ltd.

Reference Books

1. Hamdy A. Taha, *Operations Research*, (seventh edition) Prentice - Hall of India Private Limited, New Delhi, 1997.
2. F.S. Hillier & J.Lieberman *Introduction to Operation Research* (7^{th} Edition) Tata-McGraw Hill ompany, New Delhi, 2001.
3. Beightler. C, D.Phillips, B. Wilde ,*Foundations of Optimization* (2^{nd} Edition) Prentice Hall Pvt Ltd., New York, 1979
4. S.S. Rao - *Optimization Theory and Applications*, Wiley Eastern Ltd. New Delhi. 1990

PAPER - 12
PROBABILITY THEORY

Objectives : To introduce axiomatic approach to probability theory, to study some statistical characteristics, discrete and continuous distribution functions and their properties, characteristic function and basic limit theorems of probability.

UNIT-I : RANDOM EVENTS AND RANDOM VARIABLES

Random events - Probability axioms - Combinatorial formulae - conditional probability - Bayes Theorem - Independent events - Random Variables - Distribution Function - Joint Distribution - Marginal Distribution - Conditional Distribution - Independent random variables - Functions of random variables.

Chapter 1: Sections 1.1 to 1.7
Chapter 2 : Sections 2.1 to 2.9

UNIT-II : PARAMETERS OF THE DISTRIBUTION

Expectation- Moments - The Chebyshev Inequality - Absolute moments - Order parameters - Moments of random vectors - Regression of the first and second types.

Chapter 3 : Sections 3.1 to 3.8

UNIT-III: CHARACTERISTIC FUNCTIONS

Properties of characteristic functions - Characteristic functions and moments - semi-invariants - characteristic function of the sum of the independent random variables - Determination of distribution function by the Characteristic function - Characteristic function of multidimensional random vectors - Probability generating functions.

Chapter 4 : Sections 4.1 to 4.7

UNIT-IV : SOME PROBABILITY DISTRIBUTIONS

One point , two point , Binomial - Polya - Hypergeometric - Poisson (discrete) distributions - Uniform - normal gamma - Beta - Cauchy and Laplace (continuous) distributions.

Chapter 5 : Section 5.1 to 5.10

UNIT - V: LIMIT THEOREMS

Stochastic convergence - Bernoulli law of large numbers - Convergence of sequence of distribution functions - Levy-Cramer Theorems - de Moivre-Laplace Theorem - Lindberg Theorem - Lyapunov Theroem.

Chapter 6 : Sections 6.1 to 6.4, 6.6 to 6.9.

Recommended Text

M. Fisz, Probability Theory and Mathematical Statistics, John Wiley and Sons, New York, 1963.

Reference Books

1. R.B. Ash, Real Analysis and Probability, Academic Press, New York, 1972
2. K.L.Chung, A course in Probability, Academic Press, New York, 1974.
3. R.Durrett, Probability : Theory and Examples, (2nd Edition) Duxbury Press, New York, 1996.
4. V.K.Rohatgi An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern Ltd., New Delhi, 1988(3rd Print).
5. S.I.Resnick, A Probability Path, Birhauser, Berlin,1999.
6. B. R. Bhat, Modern Probability Theory (3^{rd} Edition), New Age International (P)Ltd, New Delhi, 1999

ELECTIVE: PAPER - 3
(to choose any 1 out of the given 4)
A. TENSOR ANALYSIS AND RELATIVITY THEORY

Objectives : The course aims to introduce vector algebra and vector calculus and special relativity and relativistic kinematics, dynamics and accelerated systems.

UNIT-I : TENSOR ALGEBRA

Systems of Different orders - Summation Convention - Kronecker Symbols - Transformation of coordinates in S_n - Invariants - Covariant and Contravariant vectors - Tensors of Second Order - Mixed Tensors - Zero Tensor - Tensor Field - Algebra of Tensors - Equality of Tensors - Symmetric and Skew –symmetric tensors - Outer multiplication, Contraction and Inner Multiplication - Quotient Law of Tensors - Reciprocal Tensor of Tensor - Relative Tensor - Cross Product of Vectors.

Chapter I : I.1 - I.3, I.7 and I.8 and Chapter II : II.1 - II.19

UNIT-II : TENSOR CALCULUS

Riemannian Space - Christoffel Symbols and their properties

Chapter III: III.1 and III.2

UNIT-III : TENSOR CALCULUS (Contd . . .)

Covariant Differentiation of Tensors - Riemann - Christoffel Curvature Tensor - Intrinsic Differentiation.

Chapter III: III.3 - III.5

UNIT-IV : SPECIAL THEORY OF RELATIVITY

Galilean Transformation - Maxwell's equations - The ether Theory - The Principle of Relativity.

Relativistic Kinematics : Lorentz Transformation equations - Events and simultaneity - Example - Einstein Train - Time dilation - Longitudinal Contraction - Invariant Interval - Proper time and Proper distance - World line - Example - twin paradox - addition of velocities - Relativistic Doppler effect.

Chapter 7 : Sections 7.1 and 7.2

UNIT-V : RELATIVISTIC DYNAMICS

Momentum - Energy - Momentum - energy four vector - Force - Conservation of Energy - Mass and energy - Example - inelastic collision - Principle of equivalence - Lagrangian and Hamiltonian formulations.

Accelerated Systems : Rocket with constant acceleration - example - Rocket with constant thrust

Chapter 7 : Sections 7.3 and 7.4

Recommended Texts

1. U.C. De, Absos Ali Shaikh and Joydeep Sengupta, *Tensor Calculus*, Narosa Publishing House, New Delhi, 2004. (**For Units I,II and III**)
2. D. Greenwood, *Classical Dynamics*, Prentice Hall of India, New Delhi, 1985. (**For Units IV and V**)

Reference Books

1. J.L.Synge and A.Schild, *Tensor Calculus*, Toronto, 1949.
2. A.S.Eddington. *The Mathematical Theory of Relativity*, Cambridge University Press, 1930.
3. P.G.Bergman, *An Introduction to Theory of Relativity*, New York, 1942
4. C.E.Weatherburn, *Riemannian Geometry and the Tensor Calculus*, Cambridge, 1938.

ELECTIVE: PAPER - 3
B. ANALYTIC NUMBER THEORY

Objectives : This course introduces arithmetic function and Dirichlet multiplication, averages of arithmetic function, congruence and quadratic residues

UNIT-I

Arithmetical function and Dirichlet multiplication.

Chapter 2

UNIT-II

Averages of Arithmetical function.

Chapter 3

UNIT-III

Congruence - Finite Abelian Groups and their characters

Chapter 5 (Omit 5.10 and 5.11) ; Chapter 6: 6.1 to 6.4

UNIT-IV

Finite Abelian Groups and their characters (contd. . .) - Dirichlet's theorem on Primes in Arithmetic Progressions

Chapter 6: 6.5 to 6.10; Chapter 7: All sections except 7.9

UNIT-V

Quadratic residues and quadratic reciprocity law.

Chapter 9 (Omit 9.10 and 9.11)

Recommended Text

Tom Apostol, *Introduction to Analytic Number theory*, Narosa Publications, New Delhi,

Reference Books

1. I. Niven and Zuckermann H.S. : *An Introduction to the theory of numbers,* Wiley Eastern Ltd. 1972
2. C.Y. Hsiung : *Elementary Theory of Numbers*, Allied Publishers.
3. W.W. Adams and L. J. Goldstein, *Introduction to Number Theory*, Prentice Hall Inc.
4. S.G. Telang, *Number Theory*.

ELECTIVE: PAPER - 3
C. FLUID DYNAMICS

Objectives : This course aims to discuss kinematics of fluids in motion, Equations of motion of a fluid, three dimensional flows, two dimensional flows and viscous flows.

UNIT-I

Kinematics of Fluids in motion. Real fluids and Ideal fluids - Velocity of a fluid at a point, Stream lines , path lines , steady and unsteady flows- Velocity potential - The vorticity vector- Local and particle rates of changes - Equations of continuity - Worked examples - Acceleration of a fluid - Conditions at a rigid boundary.

Chapter 2. Sections 2.1 to 2.10.

UNIT-II: EQUATIONS OF MOTION OF A FLUID

Pressure at a point in a fluid at rest. - Pressure at a point in a moving fluid - Conditions at a boundary of two inviscid immiscible fluids- Euler's equation of motion - Discussion of the case of steady motion under conservative body forces.

Chapter 3. Sections 3.1 to 3.7

UNIT-III

Some three dimensional flows. Introduction- Sources, sinks and doublets - Images in a rigid infinite plane - Axis symmetric flows - stokes stream function

Chapter 4 Sections 4.1, 4.2, 4.3, 4.5.

UNIT-IV : SOME TWO DIMENSIONAL FLOWS

Meaning of two dimensional flow - Use of Cylindrical polar coordinate - The stream function - The complex potential for two dimensional, irrotational incompressible flow - Complex velocity potentials for standard two dimensional flows - Some worked examples - Two dimensional Image systems - The Milne Thompson circle Theorem.

Chapter 5. Sections 5.1 to 5.8

UNIT-V : VISCOUS FLOWS

Stress components in a real fluid. - Relations between Cartesian components of stress- Translational motion of fluid elements - The rate of strain quadric and principal stresses - Some further properties of the rate of strain quadric - Stress analysis in fluid motion - Relation between stress and rate of strain - The coefficient of viscosity and Laminar flow - The Navier - Stokes equations of motion of a Viscous fluid.

Chapter 8. Sections 8.1 to 8.9

Recommended Text

F. Chorlton, *Text Book of Fluid Dynamics* ,CBS Publications. Delhi ,1985.

Reference Books

1. R.W.Fox and A.T.McDonald. *Introduction to Fluid Mechanics*, Wiley, 1985.
2. E.Krause, *Fluid Mechanics with Problems and Solutions*, Springer, 2005.
3. B.S.Massey, J.W.Smith and A.J.W.Smith, *Mechanics of Fluids,* Taylor and Francis, New York, 2005
4. P.Orlandi, *Fluid Flow Phenomena,* Kluwer, New Yor, 2002.
5. T.Petrila, *Basics of Fluid Mechanics and Introduction to Computational Fluid Dynamics,* Springer, berlin, 2004.

ELECTIVE: PAPER-3
D. ALGEBRAIC TOPOLOGY

Objectives: To introduce the ideas of algebraic topology to other branches of Mathematics.

UNIT – I : CALCULUS IN THE PLANE: PATH INTEGRALS

Angles and Deformations – Differntial forms and path Integrals – Independence of Path – Criterion for exactness. Angles and Deformations: Angle functions and Winding numbers – Reparametrizing and Deforming the Paths. Winding Numbers: Definition – Homotopy and Reparametrization – Varying the point – Degrees and Local Degrees.

Chapter – 1: (a) to (c); Chapter – 2: (a) to (b); Chapter – 3: (a) to (d).

UNIT – II: COHOMOLOGY AND HOMOLOGY

De Rham Cohomology and the Jordan Curve Theorem. Definition of the De Rham Graphs – The Coboundary map – the Jordon Curve Theorem – Applications and Variations.

Homology: Chains, Cycles, and H_0U – Boundaries, H_1U, and Winding Numbers – Chains on Grids – Maps and Homology – The First Homology Group for General Spaces.

Chapter 5: (a) to (d); Chapter 6: (a) to (e)

UNIT – III: HOLES AND INTEGRALS

Multiply connected regions – Integrations over continuous Paths and Chains – Periods of Integrals – Complex Integration.

Mayer – Victoris: The Boundary map – Mayer – Victoris for Homology – Variations and applications – Mayer – Victoris for Cohomology.

Chapter 9: (a) to (d); Chapter 10: (a) to (d)

UNIT – IV: COVERING SPACES AND FUNDAMENTAL GROUPS

Covering spaces: Definition – Lifting paths and Homotopies – G-coverings – Covering Transformations. The Fundamental Groups: Definitions and Basic Properties – Homotopy – Fundamental group and Homology. Fundamental Groups and Covering Spaces: Fundamental Group and Coverings – Automorphisms of Coverings – The Universal Covering – Coverings and Subgroups of the Fundamental Group.

Chapter 11: (a) to (d); Chapter 12: (a) to (c); Chapter 13: (a) to (d)

UNIT – V: THE VAN KAMPEN THEOREM

G-Coverings from the Universal Covering – Patching Coverings together – The Van Kampen Theorem.

Cohomology: Patching Coverings and Cech cohomology – Cech Cohomology and Homology – De Rham Cohomology and Homology – Proof of Mayer – Victoris fro De Rham Cohomology.

Chapter 14: (a) to (d); Chapter 15: (a) to (d)

Recommended Text:

William Fulton, Algebraic Topology – A First Course, Springer – Verlag, New York, 1995.

Reference Books:

1. M. K. Agoston, Algebraic Topology – A First Course. Marcel Dekker, 1992.
2. Satya Deo, Algebraic Topology, Hindustan Book Agency, New Delhi, 2003.
3. M. Greenberg and Harper, Algebraic Topology – A First Course, Benjamin / Cummings, 1981.
4. C. F. Maunder, Algebraic topology, Van Nastrand, New York, 1970.
5. J. R. Munkres, Topology, Prentica Hall of India, New Delhi, 2002, [3rd Indian Print].

SEMESTER - IV
PAPER - 13
COMPLEX ANALYSIS - II

Objectives : To study Riemann Theta Function and normal families, Riemann mapping theorem, Conformal mapping of polygons, harmonic functions, elliptic functions and Weierstrass Theory of analytic continuation.

UNIT - I: PARTIAL FRACTIONS AND ENTIRE FUNCTIONS

Partial fractions - Infinite products - Canonical products - Gamma Function - Jensen's formula - Hadamard's Theorem

Chapter 5 : Sections 2.1 to 2.4 ; Chapter 5 : Sections 3.1 and 3.2

UNIT - II: RIEMANN THETA FUNCTION AND NORMAL FAMILIES

Product development - Extension of $\zeta(s)$ to the whole plane - The zeros of zeta function - Equicontinuity - Normality and compactness - Arzela's theorem - Families of analytic functions - The Classical Definition

Chapter 5 : Sections 4.1 to 4.4 ; Chapter 5 : Sections 5.1 to 5.5

UNIT - III: RIEMANN MAPPING THEOREM

Statement and Proof - Boundary Behavior - Use of the Reflection Principle.
Conformal mappings of polygons : Behavior at an angle - Schwarz-Christoffel formula - Mapping on a rectangle.
Harmonic Functions : Functions with mean value property - Harnack's principle.

Chapter 6 : Sections 1.1 to 1.3 (Omit Section1.4) ;
Sections 2.1 to 2.3 (Omit section 2.4)
Section 3.1 and 3.2

UNIT-IV : ELLIPTIC FUNCTIONS

Simply periodic functions: Representation by exponentials-The Fourier development-Functions of finite order- Doubly periodic functions:The Period Module-Unimodular transformations-The Canonical basis-General properties of Elliptic functions.

Chapter 7 : Sections 1.1 to 1.3 ; Sections 2.1 to 2.4

UNIT-V : WEIRSTRASS THEORY

The Weierstrass ρ-function - The functions $\zeta(z)$ and $\sigma(z)$- The differential equation -The modular function $\lambda(\tau)$ - The Conformal mapping by $\lambda(\tau)$.

Chapter 7 : Sections 3.1 to 3.5

Recommended Text:

Lars V. Ahlfors, Complex Analysis, (3rd Edition) McGraw Hill Book Company, New York, 1979.

Reference Books

1. H.A. Presfly, Introduction to complex Analysis, Clarendon Press, oxford, 1990.
2. J.B. Corway, Functions of one complex variables, Springer - Verlag, International student Edition, Narosa Publishing Co.
3. E. Hille, Analytic function Thorey (2 vols.), Gonm & Co, 1959.
4. M.Heins, Complex function Theory, Academic Press, New York,1968.

PAPER - 14
FUNCTIONAL ANALYSIS

Objectives : To study the details of Banach and Hilbert Spaces and to introduce Banach algebras.

UNIT-I : BANACH SPACES

Definition - Some examples - Continuous Linear Transformations - The Hahn -Banach Theorem - The natural embedding of N in N**

Chapter 9 : Sections 46 to 49

UNIT-II : BANACH SPACES AND HILBERT SPACES

Open mapping theorem - conjugate of an operator - Definition and some simple properties - Orthogonal complements - Orthonormal sets

Chapter 9 : Sections 50 and 51 ; Chapter 10 : Sections 52, 53 and 54

UNIT-III : HILBERT SPACE

Conjugate space H* - Adjoint of an operator - Self-adjoint operator - Normal and Unitary Operators - Projections

Chapter 10 : Sections 55, 56,57,58 and 59

UNIT-IV : PRELIMINARIES ON BANACH ALGEBRAS

Definition and some examples - Regular and single elements - Topological divisors of zero - spectrum - the formula for the spectral radius - the radical and semi-simplicity.

Chapter 12 : Sections 64 to 69

UNIT-V: STRUCTURE OF COMMUTATIVE BANACH ALGEBRAS

Gelfand mapping - Applications of the formula $r(x) = \lim \| x^n \|^{1/n}$ - Involutions in Banach Algebras - Gelfand-Neumark Theorem.

Chapter 13 : Sections 70 to 73

Recommended Text:

G.F.Simmons , *Introduction to topology and Modern Analysis*, McGraw Hill International Book Company, New York, 1963.

Reference Books

1. W. Rudin *Functional Analysis*, Tata McGraw-Hill Publishing Company, New Delhi, 1973
2. G. Bachman & L.Narici, *Functional Analysis* Academic Press, New York, 1966.
3. H.C. Goffman and G.Fedrick, *First course in Functional Analysis*, Prentice Hall of India, New Delhi, 1987
4. E. Kreyszig *Introductory Functional Analysis with Applications*, John wiley & Sons, New York.,1978.

PAPER - 15
MATHEMATICAL STATISTICS

Objectives : This course introduces sampling theory, significance tests ,estimation, testing of hypotheses, ANOVA and sequential analysis with rigorous mathematical treatment.

UNIT-I : SAMPLE MOMENTS AND THEIR FUNCTIONS

Notion of a sample and a statistic - Distribution of the arithmetic mean of independent normally distributed random variables – The χ^2 - distribution – The distribution of the statistics ($\bar{X}$, S) – Student's t - distribution - Fisher's Z - distribution - Snedecor's F - distribution - Distribution of sample mean from non-normal populations.

Chapter 9 : Sections 9.1 to 9.8

UNIT-II : SIGNIFICANCE TEST

Kolmogorov Theorem 10.11.1 - Smirnov Theorem 10.11.2 - Concept of a statistical test - Parametric tests for small samples and large samples - χ^2 test - Tests of Kolmogorov and Smirnov type - The Wald-Wolfovitz and Wilcoxon -Mann-Whitney tests - Independence Tests by contingency tables.

Chapter 10 : Section 10.11; Chapter 12 :Sections 12.1 to 12.7

UNIT-III : ESTIMATION

Preliminary notion - Consistent estimation - Unbiased estimates - Sufficiency of an estimate - Efficiency of an estimate - Asymptotically most efficient estimates - methods of finding estimates - confidence Interval.

Chapter 13 : Sections 13.1 to 13.8

UNIT-IV : Analysis of Variance

One way classification and two-way classification. **Hypotheses Testing:** The Power functions and OC function - Most Powerful test - Uniformly most powerful test - unbiased test.

Chapter 15 : Sections 15.1 and 15.2
Chapter 16 : Sections 16.1 to 16.5

UNIT-V : SEQUENTIAL ANALYSIS

SPRT - Auxiliary Theorem - Wald's fundamental identity - OC function and SPRT – The expected value of $E(n)$ - Determination of A and B - Testing a hypothesis concerning p of zero – one distribution - Testing a hypothesis concerning the expected value m of a Normal population.

Chapter 17 : Sections 17.1 to 17.9

Recommended Text:

M. Fisz , *Probability Theory and Mathematical Statistics,* John Wiley and sons, New Your, 1963.

Reference Books:

1. E.J.Dudewicz and S.N.Mishra , *Modern Mathematical Statistics*, John Wiley and Sons, New York, 1988.
2. V.K.Rohatgi *An Introduction to Probability Theory and Mathematical Statistics,* Wiley Eastern New Delhi, 1988(3rd Edn)
3. G.G.Roussas, *A First Course in Mathematical Statistics,* Addison Wesley Publishing Company, 1973
4. B.L.Vander Waerden, *Mathematical Statistics,* G.Allen & Unwin Ltd., London, 1968.

PAPER - 16
DIFFERENCE EQUATIONS

Objectives : To introduce the process of discretization, Discrete version of Differential Equations, Discrete oscillation and the asymptotic behaviour of solutions of certain class of difference equations for linear cases only. Solution of difference equations using z-transforms is stressed.

UNIT-I : LINEAR DIFFERENCE EQUATIONS OF HIGHER ORDER

Difference Calculus - General Theory of Linear Difference Equations - Linear Homogeneous Equations with Constant coefficients - Linear non-homogeneous equations - Method of Undetermined coefficients, the method of variation of constants - Limiting behavior of solutions.

Chapter 2: Sections 2.1 to 2.5

UNIT-II : SYSTEM OF DIFFERENCE EQUATIONS

Autonomous System - The Basic Theory - The Jordan form - Linear periodic system.

Chapter 3: Section 3.1 to 3.4

UNIT-III : THE Z-TRANSFORM METHOD

Definition, Example and properties of Z-transform - The Inverse Z-transform and solution of Difference Equations: Power series method, partial fraction method, the inverse integral method - Volterra Difference Equation of convolution types - Volterra systems.

Chapter 5: Sections 5.1 to 5.3, 5.5 (omit 5.4)

UNIT-IV : ASYMPTOTIC BEHAVIOUR OF DIFFERENCE EQUATION

Tools and Approximations - Poincare's Theorem - Second order difference equations - Asymptotic diagonal systems - Higher order Difference Equations.

Chapter 8 : Sections 8.1 to 8.5

UNIT-V : OSCILLATION THEORY

Three-term difference Equation - Non-linear Difference Equations - Self-Adjoint second order equations.

Chapter 7 : Sections 7.1 to 7.3

Recommended Text:

Saber N. Elaydi, *An Introduction to Difference Equations*, Springer Verlag, New York, 1996.

Reference Books:

1. R.P.Agarwal., *Difference Equations and Inequalities*, Marcel Dekker, 1999.
2. S. Goldberg, *Introduction to Difference Equations*, Dover Publications, 1986
3. V. Lakshmi kantham and Trigiante, *Theory of Difference Equations*, Academic Press, New York, 1988.
4. Peterson, A *Difference Equations, An Introduction with Applications,* Academic Press, New York, 1991.

ELECTIVE: PAPER - 4
(to choose any 1 out of the given 4)
A. NUMBER THEORY AND CRYPTOGRAPHY

Objectives : This course aims to give elementary ideas from number theory which will have applications in cryptology.

UNIT-I : Elementary Number Theory

Time Estimates for doing arithmetic - Divisibility and Euclidean algorithm - Congruences - Applications to factoring.

Chapter – I Sec – 1.1 to 1.4

UNIT-II : Cryptography

Some simple crypto systems - Enciphering matrices

Chapter – III Sec – 3.1 and 3.2

UNIT-III : Finite Fields and quadratic Residues

Finite fields - Quadratic residues and Reciprocity

Chapter – II Sec – 2.1 and 2.2

UNIT-IV : Public Key Cryptography

The idea of public key cryptography - RSA - Discrete log - Knapsack

Chapter-IV Sec – 4.1 to 4.4

UNIT-V : Primality and Factoring

Pseudo primes - The rho method - Fermat factorization and factor bases - The Continued fraction method.

Chapter – V Sec – 5.1 to 5.4

Recommended Text:

Neal Koblitz, *A Course in Number Theory and Cryptography*, Springer-Verlag, New York, 2002, Second Edition.

Reference Books:

1. Niven and Zuckermann, *An Introduction to Theory of Numbers* (Edn. 3), Wiley Eastern Ltd., New Delhi, 1976.
2. David M.Burton, *Elementary Number Theory*, Wm C.Brown Publishers, Dubuque, Iowa, 1989.
3. K.Ireland and M.Rosen, *A Classical Introduction to Modern Number Theory*, Springer Verlag, 1972.

ELECTIVE: PAPER – 4
B. ALGEBRAIC NUMBER THEORY

Objectives : The course aims to provide a study on modules over rings, finite fields, algebraic extensions, number fields and cyclotomic fields, Noetherian rings and modules and Dedekind rings.

UNIT-I : ALGEBRAIC BACKGROUND

Rings and Fields- Factorization of Polynomials - Field Extensions - Symmetric Polynomials - Modules - Free Abelian Groups.

Chapter 1: Sec. 1.1 to 1.6

UNIT-II : ALGEBRAIC NUMBERS

Algebraic numbers - Conjugates and Discriminants - Algebraic Integers - Integral Bases - Norms and Traces - Rings of Integers.

Chapters 2: Sec. 2.1 to 2.6

UNIT-III : QUADRATIC AND CYCLOTOMIC FIELDS

Quadratic fields and cyclotomatic fields : Factorization into Irreducibles : Trivial factorization - Factroization into irreducibles - Examples of non-unique factorization into irreducibles.

Chapter 3: Sec. 3.1 and 3.2 ; Chapter 4: Sec. 4.2 to 4.4

UNIT-IV

Prime Factroization - Euclidean Domains - Euclidean Quadratic fields - Consequences of unique factorization - The Ramanujan -Nagell Theorem.

Chapter 4: Sec. 4.5 to 4.9

UNIT-V : IDEALS

Prime Factorization of Ideals - The norms of an Ideal - Non-unique Factorization in Cyclotomic Fields..

Chapter 5 : Sec. 5.2 to 5.4

Recommended Text

I. Steward and D.Tall. *Algebraic Number Theory and Fermat's Last Theorem* (3rd Edition) A.K.Peters Ltd., Natrick, Mass. 2002.

Reference Books

1. Z.I.Bosevic and I.R.Safarevic, *Number Theory*, Academic Press, New York, 1966.
2. J.W.S.Cassels and A.Frohlich, *Algebraic Number Theory*, Academic Press, New York, 1967.
3. P.Ribenboim, *Algebraic Numbers*, Wiley, New York, 1972.
4. P. Samuel, *Algebraic Theory of Numbers*, Houghton Mifflin Company, Boston, 1970.
5. A.Weil. *Basic Number Theory*, Springer, New York, 1967.

ELECTIVE: PAPER – 4
C. STOCHASTIC PROCESSES

Objectives : This course aims to introduce advanced topics in Markov process, Markov chains and Renewal theory.

UNIT - I : STOCHASTIC PROCESSES

Specification of stochastic processes – stationary processes – Markv Chains : Definitions and Examples – Higher transition probabilities – Generalization of independent Bernoulli trials.

Chapter 2 : 2.1 to 2.4; Chapter 3 : 3.1 to 3.3

UNIT - II : MARKOV CHAINS

Stability of Markov system – Graph theoretic approach – Markov chain with denumerable number of state – Reducible chains – Statistical inference for Markov chains.

Chapter 3 : 3.6 to 3.10

UNIT - III : MARKOV PROCESS WITH DISCRETE STATE SPACE

Poisson process: Poisson process and related distributions – Generalizations of Poisson process – Birth and death process – Markov process with discrete state space (Continuous time Markov chain).

Chapter 4 : 4.1 to 4.5

UNIT - IV : MARKOV PROCESS WITH CONTINUOUS STATE SPACE

Brownian motion – Weiner process – Differential equations for Weiner Process – Kolmogorov equations – First passage time distribution for Weiner process.

Chapter 5 : 5.1 to 5.5

UNIT - V : RENEWAL PROCESS AND THEORY

Renewal process and renewal equation – Stopping time – Wald's equation – Renewal theorem – Delayed and equilibrium renewal process.

Chapter 6 : 6.1 to 6.6

Recommended Text

J. Medhi, Stochastic Processes (2^{nd} Edition), New Age International, 1992.

Reference Books

1. S. Karlin, A first course in Stochastic Processes, (2nd Edition), Academic Press, 1958.
2. U.N. Bhat, Elements of Applied Stochastic Prcesses, John Wiley Sons, 1972.
3. E. Cinlar, Introduction to Stochastic Processes, PHI, 1975
4. S.K. Srinivasan and A. Vijayakumar, Stochastic Processes, Narosa, 2003.

ELECTIVE: PAPER – 4
D. MATHEMATICAL SOFTWARES PRACTICAL

Objectives : This course aims to practice the students in Mathematics document preparation and utilizing the software facility available for tedious computations.

- **CREATING A DOCUMENT USING LATEX**
  - Simple Typesetting
  - Page Layout (page size, margins, page style)
  - Formatting (Font size, Text Alignment)
  - Tables and Figures
  - Typesetting Mathematics
  - Bibliography Management.

- **MATLAB BASICS**
  - Algebra and Arithmetic
  - Calculus, Graphics and Linear Algebra
  - Curve Fitting and Interpolation
  - Ordinary Differential Equations

Reference Books

1. Latex Tutorials – A PRIMER Indian TEX Users Group, 2002, 2003 Indian TEX Users Group Floor III SJP Buildings, Cotton Hills Trivandrum 695014, India.
2. Brain R. Hunt, Ronald R. Lipsman and Jonathan M. Rosenberg, A Guide to MATLAB for Beginners and experienced users, Cambridge University Press, 2003.
3. Getting Started with MATLAB 7, Rudra Pratap, Oxford University Press, India, 2006.
4. Rose L. Spencer, Introduction to MATLAB.

COMPUTER LABORATORY PRACTICE EXERCISES

LATEX

1. Create a document file to prepare a Chapter in a Book.
2. Create a document file to prepare a research article.

MATLAB

1. Multiplication of matrices of order 4×4
2. Solution to linear non-homogeneous equations (4 unknowns)
3. Rank of a matrix of order atleast 4
4. Solving ordinary differential equations
5. Plotting of two and three dimensional graphs SPSS
6. Drawing Histograms, frequency curves and frequency polygons
7. Finding central measures and measures of dispersion
8. Finding correlation and rank correlation
9. Finding partial and multiple correlation
10. Calculation of ANOVA

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THIRUVALLUVAR UNIVERSITY

MASTER OF SCIENCE

DEGREE COURSE

M.Sc. PHYSICS

UNDER CBCS

(With effect from 2017-2018)

The Course of Study and the Scheme of Examinations

S.NO.	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
	Course Title							
SEMESTER I						CIA	Uni. Exam	Total
1	MAIN	Paper-1	6	5	Mathematical Physics -I	25	75	100
2	MAIN	Paper-2	6	5	Classical and Statistical Mechanics	25	75	100
3	MAIN	Paper-3	5	5	Quantum Mechanics - I	25	75	100
4	MAIN PRACTICAL	Paper-1	4	-	General Experiments	-	-	-
5	MAIN PRACTICAL	Paper-2	4	-	Electronics Experiments	-	-	-
6	ELECTIVE	Paper-1	5	3	**(to choose 1 out 3)** A. Electronic Devices and Applications B. Electronics Instrumentation C. Electronics communication systems	25	75	100
			30	**18**		**125**	**375**	**400**
SEMESTER II						CIA	Uni. Exam	Total
7	MAIN	Paper-4	5	4	Mathematical Physics -II	25	75	100
8	MAIN	Paper-5	5	4	Electromagnetic Theory and Plasma Physics	25	75	100
9	MAIN	Paper-6	5	5	Quantum Mechanics II	25	75	100
10	MAIN PRACTICAL	Paper-1	4	4	General Experiments	25	75	100
11	MAIN PRACTICAL	Paper-2	4	4	Electronics Experiments	25	75	100
12	**Compulsory Paper**		2	2	**Human Rights**	25	75	100
13	ELECTIVE	Paper-2	5	3	**(to choose 1 out 3)** A. Nano Science B. Fibre Optics C. Non linear Optics	25	75	100
			30	**26**		**150**	**450**	**700**

SEMESTER III						**CIA**	**Uni. Exam**	**Total**
14	MAIN	Paper-7	5	5	Spectroscopy	25	75	100
15	MAIN	Paper-8	5	5	Nuclear and Particle Physics	25	75	100
16	MAIN	Paper-9	5	5	Microprocessor and Microcontroller	25	75	100
17	MAIN PRACTICAL	Paper-3	5	-	Advanced General Experiments	-	-	-
18	MAIN PRACTICAL	Paper-4	5	-	Microprocessor, Microcontroller and C Programming	-	-	-
19	ELECTIVE	Paper-3	5	3	**(to choose 1 out 3)** A. Crystal Growth and Thin Films B. Advanced Spectroscopy C. Advanced Nuclear Physics	25	75	100
			30	**18**		**125**	**375**	**400**
SEMESTER IV						**CIA**	**Uni. Exam**	**Total**
20	MAIN	Paper-10	5	5	Material Science and Laser Physics	25	75	100
21	MAIN	Paper-11	5	5	Condensed matter Physics	25	75	100
22	MAIN	Paper-12	5	5	Project with *viva voce*	-	100 (75 Project +25 viva)	100
23	MAIN PRACTICAL	Paper-3	5	5	Advanced General Experiments	25	75	100
24	MAIN PRACTICAL	Paper-4	5	5	Microprocessor, Microcontroller and C Programming	25	75	100
25	ELECTIVE	Paper-4	5	3	**(to choose 1 out 3)** A. Advanced Microprocessor B. C Programming and MATLAB C. Numerical Methods and programming in C	25	75	100
			30	**28**		**255**	**345**	**600**

Subject	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total marks**
MAIN	12	4-5	58	100	1200
MAIN PRACTICAL	4	4-5	18	100	400
ELECTIVE	4	3	12	100	400
COMPULSORY PAPER	1	2	2	100	100
Total	**21**	**-**	**90**	**-**	**2100**

Project

There will be a Project work at the end of the Semester IV. The guidelines for the Project work with Viva-voce as follows.

a) The Project work carries 100 marks for which the Project report shall be evaluated for 75 marks and the Viva-voce carries 25 marks. The marks for Project report and Viva-voce are to be awarded jointly by the external examiners in consultation with project supervisor.
b) The Project report may consist of 40 to 50 pages.
c) The candidate has to submit the Project report 15 days before the commencement of the IV Semester examinations.
d) A candidate who fails in the Project/Dissertation may resubmit the report (on the same topic) with necessary modification/correction/ improvements in the subsequent even Semester examination for evaluation.
e) Each candidate shall be required to appear for Viva-voce examination (in defense of the Project only)

THIRUVALLUVAR UNIVERSITY

M.Sc. PHYSICS

SYLLABUS

UNDER CBCS

(With effect from 2017-2018)

SEMESTER I
PAPER-1

MATHEMATICAL PHYSICS I

UNIT-I: Linear Vector Spaces and Matrices

Linear Vector Spaces: Linear independence, basis and dimension - inner products. Orthonormality and completeness - Schwartz Inequality - Orthonormal basis - Gram-Schmidt orthogonalization process - Linear operators - Vectors in n dimensions - Matrix algebra, similarity transforms, matrix diagonalization - Orthogonal, Hermitian and Unitary matrices- Properties.

UNIT –II: Tensors

Coordinate transformation– summation convention - Contravariant, Covariant and mixed tensors – Rank of a tensor – symmetric and anti-symmetric tensors - Invariant tensors - Kronecker delta, Levi-civita tensor in three dimensions – contraction of tensors - product rule - Quotient rule - tensors of higher rank- Tensor forms of Operators.

UNIT-III: Ordinary Differential Equations

Second order linear differential equations: Wronskian, Ordinary and singular points- series solutions - Generating functions – Rodrigue's formula - Orthogonality relations - Important recurrence relations for Bessel, Legendre, Hermite and Laguerre functions - Spherical harmonics.

UNIT – IV: Green's functions

Dirac-delta function - Green's function - One dimensional Green function - boundary conditions – Eigen function - expansion of the Green's function- Reciprocity theorem – Sturm-Liouville type equations in one dimension and their Green's functions.

UNIT V: Probability theory and Random variables

Probability distributions and probability densities - Binomial, Poisson's and Normal - standard discrete and continuous probability distributions - moments and generating functions - Central limit theorem (statement and applications).

Books for Study:

1. P.K. Chattopadhyay, Mathematical Physics, Wiley Eastern, Madras, 1990.
2. G. Arfken and H.J. Weber, Mathematical Methods for Physicists, 5th Edition, Harcourt (India), New Delhi, 2001.
3. M.D. Greenberg, Advanced Engineering Mathematics, 2nd Edition, International Ed., Prentice - Hall International, New Jersey, 1998.
4. E. Kreyszig, Advanced Engineering Mathematics, 8th Edition Wiley, New York, 1999.
5. B.D. Gupta, Mathematical Physics, Vikas publishing house 3rd Edition, New Delhi, 2006.
6. Satyaprakash, Mathematical Physics, Sultan Chand & sons, New Delhi, 2004.

Books for Reference:

1. Schaum's outline series, McGraw Hill, (i) Vector and tensor analysis, (ii) Linear Algebra, (iii) Matrices, (iv) Differential Equations (v) Probability (vi) Statistics, 1964.
2. P.R Halmos, Finite dimensional Vector Spaces, 2nd Edition. Affiliated East - West, New Delhi, 1965.
3. C.R. Wylie and LC. Barrett, Advanced Engineering Mathematics, 6th Edition., International Edition. McGraw Hill, New York, 1995.
4. P.K. Chakrabarti and S.N. Kundu, A Text Book of Mathematical Physics, New Central Book Agency, Kolkata, 1996.
5. A.K. Ghatak, I.C. Goyal and S.H. Chua, Mathematical Physics Macmillan India, New Delhi, 2002.

PAPER-2

CLASSICAL AND STATISTICAL MECHANICS

PART A: CLASSICAL MECHANICS

UNIT-I: Lagrangian and Hamiltonian formulation

Hamilton's Variational Principle and Lagrange's equation - Lagrange Problems - Double Pendulum, Spherical pendulum, Cylinder rolling down an inclined plane - Hamilton's equations - cyclic variables – Principle of least action – Hamiltonian Problems - motion of a particle in a central force field, charged particle moving in an electromagnetic field – Equations of motion and first integrals –Scattering by central potential – Kepler's laws – Transformation from centre of mass to laboratory frame.

UNIT-II: Rigid body dynamics and Canonical transformations

Rigid body motion – Kinematics - Euler's angles - Angular momentum and kinetic Energy – Moment of inertia tensor - Euler's equations of motion – Torque-free motion of a rigid body - Motion of a symmetrical top under the action of gravity - Canonical transformation and their generators – simple examples – Poisson brackets – Equations of motion in Poisson bracket form - Noether's theorem.

UNIT-III: Hamilton - Jacobi Theory and Theory of Small Oscillations

Hamilton-Jacobi equations – Application to Linear harmonic oscillator problem - Action Angle variables - Application to Kepler's problem - Oscillatory motion - Theory of small oscillation –Two coupled pendulums - Linear triatomic molecule - Stability of Oscillatory motion - Forced Harmonic Oscillator - non- linear Oscillation in a symmetric potential.

PART B: STATISTICAL MACHANICS

UNIT-IV: Thermodynamics and Classical statistics

Thermodynamic parameters – thermodynamic potentials – Gibbs phase rule – First and second order phase transitions – Ehrenfest's equations - Random walk - Brownian motion - Langevin theory - Einstein theory.
Classical Statistics: Microstates and Macrostates - Phase space - Liouville theorem and it's significance - ensembles - Micro Canonical, Canonical and Grand Canonical ensembles - Partition function - Translational partition functions - Gibb's Paradox - Sackur- Tetrode equation.

UNIT-V: Quantum Statistics

Quantum Statistics of ideal gas - Ideas of Bose-Einstein and Fermi-Dirac Particles - Degeneracy of gases - Bose-Einstein condensation of gases - Photon gas - Planck's law of radiation and its limitation - Thermionic emission - Pauli's theory of Paramagnetism - Ising model.

Books for Study:

1. H. Goldstein, Classical Mechanics. 3rd Edition. Pearson Education, Asia, New Delhi, 2002.
2. S.N. Biswas, Classical Mechanics, Books and Allied Ltd., Kolkata, 1998.
3. Upadhyaya, Classical Mechanics, Himalaya Publishing Co., New Delhi, 1999.
4. Gupta Kumar Sharma, Classical Mechanics, Pragati Prakashan, Meerut, 2004.
5. K. Huang, Statistical Mechanics, Wiley Eastern Ltd., New Delhi, 1975.
6. B.K. Agarwal and M. Eisner, Statistical Mechanics, 2nd Edition, New Age International, New Delhi, 1998.
7. Sathya Prakash and J.P Agarwal, Statistical Mechanics, 7th Edition, Kedar Nath and Ram Nath & Co, Meerut, 1994.
8. J.K.Bhattacharjee, Statistical Mechanics: An Introductory Text, Allied Publication, New Delhi, 1996.

Books for Reference:

1. L.D. Landau and E.M. Lifshitz, Mechanics, Pergomon Press, Oxford, 1969.
2. K.R. Symon, Mechanics, Addison Wesley, London, 1971.
3. J.L. Synge and B.A Griffith, Principles of Classical Mechanics, Mc.Graw-Hill, NewYork, 1949.
4. C.R.Mondal, Classical Mechanics, Prentice - Hall of India, New Delhi.
5. L.P. Kadanoff, Statistical Physics - Statics, Dynamics and Renormalization, World Scientific, Singapore, 2001.
6. M. Glazer and J. Wark, Statistical Mechanics, Oxford University Press, Oxford, 2001.

PAPER-3

QUANTUM MECHANICS I

UNIT-I: Basic formalism

Wave functions for a free particle - Interpretation and conditions on the wave function - Postulates of quantum Mechanics and the Schrödinger equations – time dependent, independent - Expectation Value - Stationary States - Ehrenfest's theorem - Hermitian Operators for dynamical variables - Eigen values and Eigen functions - Uncertainty Principle.

UNIT-II: One Dimensional and Three Dimensional Problems

One Dimensional: Particle in a box – simple harmonic oscillator - Square well potential – Barrier penetration – Three Dimensional: Orbital angular momentum and spherical harmonics - Central forces and reduction of two body problem - Particle in a Spherical well - Hydrogen atom.

UNIT-III: General formalism

Hilbert's space - Dirac notation - Representation theory - Co-ordinate and momentum representations - Time evolution - Schrödinger, Heisenberg and Interaction pictures - Symmetries and conservation laws.

UNIT-IV: Approximation methods

Time-independent perturbation theory for non- degenerate and degenerate levels - Application to ground state of an harmonic oscillator and Stark effect in Hydrogen - Variation method -Application to ground state of Helium atom - WKB approximation - WKB quantization rule - Application to simple Harmonic Oscillator.

UNIT-V: Angular momentum and identical particles

Ladder Operators - Commutation rules for angular momentum operators - Eigen value spectrum from angular momentum algebra - Matrix representation - Spin angular momentum – Non-relativistic Hamiltonian including spin - Addition of two angular momenta - Clebsch- Gordan coefficients - Symmetry and anti symmetry of wave functions - Pauli's spin matrices.

Books for Study:

1. P.M. Mathews and K. Venkatesan, A Text book of Quantum Mechanics, Tata McGraw-Hill, New Delhi, 1976.
2. L.I. Schiff, Quantum Mechanics, 3rd Edition, International Student Edition,McGraw-Hill Kogakusha, Tokyo, 1968.
3. V. Devanathan, Quantum Mechanics, Narosa Publishing House, New Delhi, 2005.
4. V.K. Thankappan, Quantum Mechanics, 2nd Edition, Wiley Eastern Ltd, NewDelhi, 1985.
5. G. Aruldhas, Quantum Mechanics, Prentice-Hall of India, New Delhi, 2002.
6. Sathya Prakash Swati Saluja, Quantum Mechanics, Kedar Nath Ram Nath & Co Meerut, 2016.

Books for Reference:

1. E. Merzbacher, Quantum Mechanics 2nd Edition, John Wiley and Sons, NewYork, 1970.
2. P.A.M. Dirac, The Principles of Quantum Mechanics, Oxford University Press, London, 1973.
3. L.D. Landau and E.M. Lifshitz, Quantum Mechanics, Pergomon Press, Oxford, 1976.
4. Ajoy Ghatak, Loganathan, Quantum Mechanics theory and applications, Fourth edition, Macmillan, 1999.
5. Franz Schwabl, Quantum Mechanics, Narosa Publishing House, 1998.
6. B.S. Rajput, Advanced Quantum Mechanics, Seventh Edition, A Pragati Prakashan, 2007.
7. J.J.Sakurai, Modern Quantum Mechanics, Benjamin Cummings, 1985.
8. R.P. Feynman, R.B.Leighton and M.Sands, The Feynman Lectures on Physics, Vol.3, Narosa Publishing House, 1992.

ELECTIVE

PAPER - 1

(to choose 1 out of 3)

A. ELECTRONIC DEVICES AND APPLICATIONS

UNIT-I: Fabrication of IC and logic families

Fabrication of IC - Monolithic integrated circuit fabrication - pressure transducers - Monolithic RMS Voltage measuring device - Monolithic voltage regulators - Integrated circuit multipliers - Integrated circuit logic - Schottky TTL - P and N-MOS Logic - CMOS Logic - Tristate logic circuits.

UNIT-II: Opto electronic devices

Light sources and Displays - Light emitting diodes - Surface emitting LED - Edge Emitting LED - Seven segment display - LDR - Diode lasers - Photo detectors - Basic parameters - Photo diodes - p-i-n Photo diode - Solar cells - Photo transistors - IR and UV detectors.

UNIT-III: 555 Timer and applications

555 Timer - Description - Monostable operation - Frequency divider - Astable operation - Schmitt trigger - Phase Locked Loops - Basic principles - Analog phase detector - Voltage Controlled Oscillator - Voltage to Frequency conversion – temperature coefficient of resistance using IC 555 - PLL IC 565 - Description - Lock-in range - Capture range - Application - Frequency multiplication.

UNIT-IV: Op-amp applications

Instrumentation amplifier - V to I and I to V converter - Op-amp circuits using diodes - Sample and Hold circuits - Log and Antilog amplifiers - Multiplier and Divider - Electronic analog Computation solving simultaneous and differential equation- Schmitt Trigger - Astable, Monostable Multivibrator – Triangular wave generator - Sine wave generator - Active filters – Low, High and Band pass first and second order Butterworth filters – wide and narrow band reject filters.

UNIT-V: Pulse and digital Communication

Pulse communications - Introduction - Types - Pulse-Amplitude Modulation (PAM) - Pulse Time Modulation (PTM) : Pulse Width Modulation (PWM) - Pulse Position Modulation (PPM) - Pulse Code Modulation (PCM) - Principles of PCM - Quantizing noise - Generation and Demodulation of PCM - Effects of Noise - Advantages and applications of PCM - Pulse systems - Frequency-Shift keying - Digital communication - Modem classification - Modes of modem operation - Modem interconnection - Modem interfacing.

Books for Study:

1. S.M. Sze, Semiconductor Devices - Physics and Technology, Wiley, New York, 1985.
2. Millman and Halkias, Integrated Electronics, McGraw-Hill, New Delhi.
3. R.A. Gaekwad, Op-Amps and integrated circuits EEE, 1994.
4. Taub and Shilling, Digital Integrated Electronics, McGraw-Hill, New Delhi, 1983.
5. J. Millman, Digital and Analog Circuits and Systems, McGraw-Hill, London, 1979.
6. George Kennedy, Electronic communication systems 3rd Edition, McGraw-Hill, London, 1987.
7. G.S.N. Raju, Electronic Devices and Circuit , I.K. International Publishing House Pvt. Ltd., New Delhi, 2010.

Books for Reference:

1. R.F. Coughlin and F.F, Driscol, Op-Amp and linear integrated circuits, Prentice Hall of India, New Delhi, 1996.
2. M.S.Tyagi, Introduction to Semiconductor Devices, Wiley, New York.
3. P. Bhattacharya, Semiconductor Optoelectronic Devices, 2nd Edition, Prentice-Hall of India, New Delhi, 2002.
4. Deboo/ Burrous, Integrated circuits and semiconductor Devices – Theory and application, McGraw-Hill, New Delhi, 1985.
5. D. Roy Choudhury, Linear integrated circuits, Wiley Eastern, New Delhi, 1991.
6. Ramakant Gaekwad, Operational amplifiers, Wiley Eastern, New Delhi, 1981.
7. Louis E. Fresnel, Communication Electronics : principles and Applications, TMH Pub. Co., Ltd, 2002.

PAPER – 1

B. ELECTRONIC INSTRUMENTATION

UNIT-I : Transducers

Classification of Transducers - Principle, construction and working of Thermistor - LVDT, Electrical strain gauges and capacitive transducers, Photoelectric transducer, Piezoelectric transducer - Measurement of non-electrical quantities - Strain, Displacement, temperature, Pressure, Magnetic fields, vibration, optical and particle detectors.

UNIT-II: Digital Instrumentation

Principle, block diagram and working of Digital frequency counter, digital multimeter, digital pH meter, digital conductivity meter and digital storage oscilloscope.

UNIT-III: Analytical Instrumentation

Principle, block diagram, description, working and applications of UV-VIS spectrometer, IR spectrometer, Flame emission spectrometer and ICP - AES spectrometer - Basic concepts of Gas and Liquid Chromatography.

UNIT-IV: Bio-Medical Instrumentation

Physiological transducers to measure blood pressure, body temperature - Sources of Bio-electric potentials - resting potential, action potential, bio-potential electrodes - Principle, block diagram and operation of ECG and EEG - recorders.

UNIT-V: Computer Peripherals

Printers - Printer mechanism – Classification - Dot matrix, Ink jet and laser printers - Basic concepts of key board and mouse. Mass data storage - Hard Disk - Optical disk (CD) – DVD –Blueray disc – Universal Serial Bus (USB).

Books for Study:

1. Dr.Rajendra Prasad, Electronic Measurements and Instrumentation, Khanna Publications.
2. S.Ramabhadran, Electronic Measurements and Instrumentation Khanna Publications.
3. Leslie Cromwell fred J. Weibell, Erich A. Pfeiffer, Biomedical Instrumentation and Measurements 2nd Edition, Prentice –Hall of India Private Ltd, New Delhi, 2010.

Books for Reference:

1. S.M. Dhir, Electronics and Instrumentation, Khanna Publishers, Khandpur.
2. Albert D.Heltrick, William D. Cooper, Modern Electronics Instrumentation and measurement Techniques, PHI, New Delhi.

PAPER – 1

ELECTRONICS COMMUNICATION SYSTEMS

UNIT I- Signal Encoding Techniques

Antennas: types-Propagation modes – line of sight transmission- fading in the mobile environment – signal encoding techniques: criteria- ASK – FSK – BFSK – MFSK – PSK – BPSK – QPSK –multilevel PSK – AM modulation – Angle modulation – PCM – delta and adaptive delta modulation.

UNIT II – Coding and Error Control

Error detection – Parity check – cycle redundancy check – block error correction codes – hamming code – cyclic codes – BCH code – reed – Solomon codes – block interleaving – convolution codes – decoding – turbo coding – automatic repeat request – flow control – error control.

UNIT III – Satellite Communication

Satellite parameters and configurations – Satellite orbits – GEO – MEO – LEO – frequency bands – transmission impairments – Satellite foot print – atmospheric attenuation – satellite network – configuration – capacity allocation – multiplexing : FDM and TDM.

UNIT IV – Cellular wireless networks

Principles of cellular networks : Organization – frequency reuse – operation – mobile radio propagation effects – hand-off – power control – traffic engineering – first generation analog – AMPS – second generation – TDMA – mobile wireless TDMA design consideration – CDMA – mobile wireless CDMA design considerations – Soft handoff –IS 95 – Third generation systems – wireless local loop.

UNIT V – Wireless LANS

Overview: Wireless LAN applications, requirements and technology – Infrared LANS – spread spectrum LANS – narrow band microwave LANS – IEEE 802 architecture – IEEE 802.11 architecture.

Book for study:

1. William Schweber, Electronic Communication Systems, Complete Course Pearson Pub, 2011.
2. George Kennedy, Electronic Communication Systems, 3rd Edition, Tata McGraw-Hill Edition, New Delhi, 2008.

Book for References:

1. William Stallings, Wireless communications and Networks, Pearson education, Asia, 2002.
2. Robert J. Schoen beck, Electronic communications, modulation and transmission PHI, 1999.
3. P. Gnanasivam, Telecommunication switching and networks, PHI, 2004.

SEMESTER II

PAPER-4

MATHEMATICAL PHYSICS II

UNIT-I: Complex Variables

Functions of a complex variable – Single and multi valued functions - Analytic functions - Cauchy Riemann conditions – Singular points - Cauchy's integral theorem and formula - Taylor and Laurent expansions – Zeros and poles - Residue theorem - applications to evaluation of definite integrals.

UNIT –II: Partial differential equations

Laplace's equations – solutions of Laplace's Equations using cylindrical and spherical harmonics – Diffusion equation (Fourier equation of heat flow) – solutions of two and three dimensional heat flow - Wave equations – D' Alembert's solution - Interpretation - Vibrations of a rectangular membrane – Normal modes in three dimensions.

UNIT – III Laplace and Fourier Transforms

Laplace transforms: solution of linear differential equations with constant Coefficients – Fourier integral. Fourier transforms: Fourier sine and cosine transforms – Convolution theorems – Applications.

UNIT-IV: Group Theory

Definition of groups, subgroups and conjugate classes - Symmetry elements, Transformation, Matrix representation - Point groups - representation of a group - Reducible and irreducible representations - Orthogonality theorem - character of a representation - character Table C_{2v} and C_{3v} – Application to IR and Raman active vibrations of XY_3 molecules - Symmetry rotations SO(2) and SO(3) groups - Symmetry Unitary SU(2) and SU(3) groups.

UNIT –V Relativity

Relativistic mass-energy and momentum-energy relation – Relativistic Doppler effect – Velocity addition formula and its criticism - Relativistic Lagrangian and Hamiltonian for a particle – Minkowski's Space – four vectors – space-time and energy-momentum four vectors – centre of mass system for two relativistic particles – Invariance of Maxwell's field equations.

Books for Study:

1. P.K. Chattopadhyay, Mathematical Physics Wiley Eastern, Madras, 1990.
2. G. Arfken and H.J. Weber, Mathematical Methods for Physicists, 5th Edition, Harcourt, New Delhi, 2001.
3. M.D. Greenberg, Advanced Engineering Mathematics, 2nd Edition, International Ed., Prentice - Hall International, New Jersey, 1998.
4. E. Kreyszig, Advanced Engineering Mathematics, 8th Edition Wiley, New York, 1999.
5. B.D. Gupta, Mathematical Physics, Vikas publishing house 3rd Edition, New Delhi, 2006.
6. Satyaprakash, Mathematical Physics, Sultan Chand & sons, New Delhi, 2004.
7. F.A. Cotton, Chemical Application of Group Theory 3rd Edition, John Wiley and Sons, New York.
8. A.W. Joshi, Elements of group Theory for Physicists, 4th Edition, New Age International, New Delhi, 1997.
9. R.Resnick, Introduction to special theory of Relativity.
10. D.Rindler, Special Theory of Relativity, Oxford University Press, 1982.

Books for Reference:

1. Schaum's outline series, McGraw Hill, (i) Complex Variables, (ii) Laplace Transforms, (iii) Group Theory, (iv) Differential equations,1964.
2. P.R Halmos, Finite dimensional Vector Spaces, 2nd Edition. Affiliated East - West, New Delhi, 1965.
3. M. Hamermesh, Group Theory and Its application to Physical Problems Addison Wesley, London, 1962.
4. C.R. Wylie and LC. Barrett, Advanced Engineering Mathematics, 6th Edition., International Edition. McGraw Hill, New York, 1995.
5. P.K. Chakrabarti and S.N. Kundu, A Text Book of Mathematical Physics, New Central Book Agency, Kolkata, 1996.
6. A.K. Ghatak, I.C. Goyal and S.H. Chua, Mathematical Physics Macmillan India, New Delhi, 2002.

PAPER-5

ELECTROMAGNETIC THEORY AND PLASMA PHYSICS

UNIT I: Electrostatics

Laplace and Poisson equations – Boundary value problems - boundary conditions and uniqueness theorem – Laplace equation in three dimensions– Solution in Cartesian and spherical polar co ordinates – Examples of solutions for boundary value problems - Polarization and displacement vectors - Boundary conditions - Dielectric sphere in a uniform field – Molecular polarisability and electrical susceptibility –Langevin Theory of Polar molecules - Electrostatic energy in the presence of dielectric – Multipole expansion.

UNIT II: Magnetostatics

Biot-Savart Law - Ampere's circuital law - Magnetic vector potential and magnetic field of a localised current distribution - Magnetic moment, force and torque on a current distribution in an external field - Magnetostatic energy - Magnetic induction and magnetic field in macroscopic media - Boundary conditions - Uniformly magnetised sphere.

UNIT III: Maxwell Equations

Faraday's laws of Induction - Maxwell's displacement current - Maxwell's equations – free space and linear isotropic media - Vector and scalar potentials - Gauge invariance - Wave equation and plane wave solution- Coulomb and Lorentz gauges - Energy and momentum of the field - Poynting's theorem - Lorentz force - Conservation laws for a system of charges and electromagnetic fields.

UNIT IV: Electromagnetic Waves

Plane waves in non-conducting media - Linear and circular polarization, reflection and refraction at a plane interface- Fresnel’s law, interference, coherence and diffraction - Waves in a conducting medium - Propagation of waves in a rectangular wave guide - Inhomogeneous wave equation and retarded potentials - Radiation from a localized source - Oscillating electric dipole.

UNIT V: Elementary Plasma Physics

The Boltzmann Equation - Simplified magneto-hydrodynamic equations - Electron plasma oscillations - The Debye shielding problem - Plasma confinement in a magnetic field - Magneto-hydrodynamic waves - Alfven waves and magnetosonic waves.

Books for Study:

1. D.J. Griffiths, Introduction to Electrodynamics, 3rd Edition, Prentice-Hall of India, New Delhi, 2002.
2. J.R. Reitz, F. J. Milford and R. W. Christy, Foundations of Electromagnetic Theory, 3rd edition, Narosa Publication, New Delhi, 1986.
3. J. D. Jackson, Classical Electrodynamics, Wiley Eastern Ltd. New Delhi, 1975.
4. J. A. Bittencourt, Fundamentals of Plasma Physics, Pergamon Press, Oxford, 1988.
5. P.Lorrain, D.Corson, Electromagnetic fields and waves, CBS Publishers and distributors, 1986.

Books for Reference:

1. W. Panofsky and M. Phillips, Classical Electricity and Magnetism, Addison Wesley, Lodon, 1962.
2. J. D. Kraus and D. A. Fleisch, Electromagnetics with Applications, 5th Edition, WCB McGraw-Hill, New York, 1999.
3. B. Chakraborty, Principles of Electrodynamics, Books and Allied, Kolkata, 2002.
4. R. P. Feynman, R. B. Leighton and M. Sands, The Feynman Lectures on Physics, Vols. 2, Narosa, New Delhi, 1998.

PAPER-6

QUANTUM MECHANICS II

UNIT-I: Scattering Theory

The scattering problem - formulation –cross sections - Scattering amplitude – Greens function approach - Born approximation and its validity - Partial wave analysis - optical theorem - Phase shifts - Scattering length and effective range - Low energy scattering - Transformation from centre of mass to laboratory frame.

UNIT-II: Perturbation Theory

Time dependent perturbation theory - Constant and harmonic perturbations - Transition probabilities – Fermi-Golden rule - Selection rules for dipole radiation - Adiabatic approximation - Sudden approximation - The density matrix - spin density matrix and magnetic resonance - Semi classical treatment of an atom with electromagnetic radiation.

UNIT-III: Relativistic Quantum Mechanics

Klein-Gordon equation - Failures - Dirac equation - Plane - wave solutions - Interpretation of negative energy states - Antiparticles - Spin of electron - Magnetic moment of an electron due to spin - Energy values in a coulomb potential.

UNIT-IV: Dirac equation

Covariant form of Dirac equation - properties of gamma matrices - Traces -Separation of the equation and the Hydrogen atom problem - Invariance of Dirac equation under Lorentz transformation - T-Transformation for the Dirac equation in presence of electromagnetic field.

UNIT-V: Quantisation of Fields

Relativistic Lagrangian and Hamiltonian of a charged particle in an electromagnetic field - The Lagrangian and Hamiltonian formulations of field – Quantum equation for the field - Second quantization of Klein-Gordon field - creation and annihilation operators - Commutation relations - Quantization of electromagnetic field - Quantization of Schroedinger's field - Quantization of Dirac field.

Books for Study:

1. P.M. Mathews and K. Venkatesan, A Text book of Quantum Mechanics, Tata Mc Graw-Hill, New Delhi, 1976.
2. L.I. Schiff, Quantum Mechanics, 3rd Edition, International Student Edition, McGraw-Hill, Kogakusha, Tokyo, 1968.
3. E. Merzbacher, Quantum Mechanics, 2nd Edition, John Wiley and Sons, NewYork, 1970.
4. J.D. Bjorken and S.D. Drell, Relativistic Quantum Mechanics, McGraw-Hill, New York, 1964.
5. V. Devanathan, Quantum Mechanics, Narosa Publishing House, New Delhi, 2005.
6. P.A. M. Dirac, The Principles of Quantum Mechanics, Oxford University Press, London, 1973.
7. B.K. Agarwal, Quantum Mechanics and Field Theory, Lokbharti Publications, India, 1976.
8. Amitabha Lahiri and B.G. Pal, A First Book of Quantum Field Theory, Narosa Publications, New Delhi, 2005.

Books for Reference:

1. V.K. Thankappan Quantum Mechanics, 2nd Edition, Wiley Eastern Ltd, New Delhi, 1985,.
2. V. Devanathan, Angular Momentum Techniques in Quantum Mechanics, Kluwer Academic Publishers, Dordrecht, 1999.
3. L.D. Landau and E.M. Lifshitz, Quantum Mechanics, Pergomon Press, London, 1958.
4. J.S. Bell, Gottfried, M. Veltman, The Foundations of Quantum Mechanics, World Scientific, 2001.
5. G. Aruldhas, Quantum Mechanics, Prentice-Hall of India, New Delhi, 2002.
6. Claude Itzykson, Isau Bernard Zuber, Quantum Field Theory, McGraw-Hill International Edition, 1987.
7. Leslie E. Vallentine, Quantum Mechanics - A Modern Development, World Scientific Publications Pvt. Ltd, Singapore, 1998.

MAIN PRACTICAL
PAPER-1

GENERAL EXPERIMENTS

(Any 15 out of the given 25)

1. Cornu's method - Young's modulus by elliptical fringes.
2. Cornu's method - Young's modulus by hyperbolic fringes.
3. Determination of Stefan's constant.
4. Band gap energy - Thermistor.
5. Hydrogen spectrum - Rydberg's constant.
6. Co-efficient of linear expansion - Air wedge method.
7. Permittivity of a liquid using RFO.
8. Viscosity of liquid - Meyer's disc.
9. Solar spectrum - Hartmann's Interpolation formula
10. F.P. Etalon – spectrometer – determination of spacing between two plates
11. Iron / Copper arc spectrum.
12. Brass / Alloy arc spectrum.
13. B-H loop using Anchor ring.
14. Specific charge of an electron -Thomson's method / Magnetron method.
15. Electrical resistance of a metal / alloy as a function of temperature by four probe method
16. Edser and Butler fringes - Thickness of air film.
17. Spectrometer - Polarisability of liquids.
18. Spectrometer - Charge of an electron.
19. Determination of strain hardening co-efficient.
20. Thickness of the enamel coating on a wire - by diffraction.
21. Lasers: Study of laser beam parameters.
22. Measurement of Numerical aperture (NA) of a telecommunication graded index optic fiber.
23. Fiber attenuation of a given optical fiber.
24. Determination of solar constant.
25. Biprism - Wavelength of monochromatic source - Refractive Index of a liquid.

MAIN PRACTICAL

PAPER-2

ELECTRONICS EXPERIMENTS

(Any 20 out of the given 25)

1. FET as amplifier – frequency response, input impedance and output impedance.
2. Switching and power control using SCR and Triac.
3. Op-amp - Inverting, Non-inverting amplifier - Voltage follower - summing, difference, average amplifier - differentiator and integrator.
4. Op-amp - Study of the attenuation characteristics and design of the phase-shift Oscillator.
5. Op-amp - Study of the attenuation characteristics and design of the Wien Bridge Oscillator.
6. Op-amp - Solving simultaneous equations
7. Op-amp - Design of square wave, saw tooth wave, and Triangular wave generators.
8. Op-amp - Design of Schmitt Trigger and construction of Monostable multivibrator.
9. Op-amp - Design of active filters - second order - low pass, high pass, band pass and band reject.
10. Op-amp – 4 bit D/A converter - Binary weighted method and R-2R ladder method.
11. Arithmetic operations (Adder/ Subtractor) Using IC 7483.
12. Study of (i) Multiplexer using IC 74150 for the generation of Boolean functions and
    (ii) Demultiplexer using IC 74154
13. IC 7490 -as modulus counters and display using IC-7447
14. Up-down counters - Design of modulus counters.
15. IC 7476 - 4 bit Shift Register - Ring counter and Johnson counters.
16. IC 555 - Astable multivibrator and Voltage Controlled Oscillator.
17. IC 555 - Monostable multivibrator, Frequency Divider.
18. IC 555 - Schmitt Trigger and Hysteresis.
19. Temperature co-efficient of resistance using 555 timer.
20. Instrumentation Amplifier - using IC 741.
21. Pulse width modulator using IC 741.
22. A/D converter using comparator LM 339.
23. Phase Locked Loop.
24. Study of arithmetic and logical operations using IC74181
25. Study of A/D converters – 4 bit simultaneous A/D converter and successive approximation A/D converter using ADC IC 0801/IC 0804.

ELECTIVE
PAPER-2
(to choose 1 out of 3)

A. NANO SCIENCE

UNIT -I: NANOSCALE SYSTEMS

Introduction to Nanoscale – Size-Dependent properties - Size effect - surface tension, wettability - specific surface area and surface area to volume ratio – Reason for change in optical properties, electrical properties and mechanical properties – nanoscale catalysis - Principles of Top-Down and Bottom-Up approaches.

UNIT –II: SYNTHESIS OF NANOSTRUCTURE MATERIALS

Gas phase condensation – Vacuum deposition -Physical vapor deposition (PVD) - chemical vapor deposition (CVD) - Sol-Gel- Ball milling –spray pyrolysis – plasma based synthesis process (PSP) - hydrothermal synthesis - Etching technologies: wet and dry etching - photolithography – Drawbacks of optical lithography for nanofabrication - electron beam lithography – ion beam lithography - dip-pen nanolithography.

UNIT –III: QUANTUM DOTS

Quantum confinement - Excitons and excitonic Bohr radius – difference between nanoparticles and quantum dots - Preparation through colloidal methods - Epitaxial methods- MOCVD and MBE growth of quantum dots - current-voltage characteristics - magneto tunneling measurements - Absorption and emission spectra of quantum dots - photo luminescence spectrum.

UNIT IV: CHARACTERIZATION:

Nano SEM - Scanning Conducting microscopy (SCM) - High-resolution Transmission Electron Microscopy (HRTEM) - single nanoparticle characterization –Scanning capacitance microscopy. Principle and working of Atomic Force Microscopy (AFM) and Scanning tunneling microscopy (STM) – Principle of Transmission Electron Microscopy (TEM) – applications to nanostructures – nanomechanical characterization – nanoindentation.

UNIT V: APPLICATIONS OF NANOTECHNOLOGY:

Nanodiodes, Nanoswitches, molecular switches, Nano-logic elements - Single electron transistors - small metallic tunnel junctions - nanoparticles based solar cells and quantum dots based white LEDs – CNT based transistors –Surface acoustic wave (SAW) devices, microwave MEMS, field emission display devices, - Super hard nanocomposite coatings and applications in tooling - Biochemistry and medical applications: lab-on-a-chip systems. Nanoboat –nanosubmarines - DNA engineering.

Books for study:

1. S. Shanmugam,Nanotechnology TBH Edition.
2. T. Praddetp, Nano- the essential, Mc graw hill education, Chennai.
3. De Jongh J, Physics and Chemistry of Metal cluster components, Kulwer academic publishers, Dordrecht, 1994.
4. enneth J. Klabunde, Nanoscale Materials in Chemistry, KWiley & Sons, Publcn, 2001.
5. Dexler E, Nanosystems, John Wiley, CNY, 1992.
6. Sulabha K.Kulkarni, Nanotechnology: Principles and Practices, Capital Publishing company.
7. M.A.Shah, Principles of Nanoscience and Nanotechnology, Tokeer Ahmad.

Books for references:

1. Nanotechnology, AIP Press, Springer-Verlag, Gregory Timp editor, New York, , 1999.
2. N. JohnDinardo, Nanoscale characterization of surfaces & interfaces, 2nd Edition, Weinheim Cambridge: Wiley-VCH, 2000
3. Jan Korvink & Andreas Greiner, Semiconductors for micro and nanotechnology-An introduction for engineers, Weinheim Cambridge: Wiley-VCH, 2001.
4. W. Kamliu et. al Nanomaterials and mechanics, John Wiley.
5. Hand Book of Nanosciene, Engineering and Technology – The Electrical Engineering handbook series.

PAPER-2

B. FIBRE OPTICS

Unit I: Linear, nonlinear waves and Maxwell's equations

Simple pendulum – small and large oscillations – Duffing oscillator – Linear and nonlinear medium - Maxwell's equations – Electromagnetic waves phase and group velocity, modes in a planar and cylindrical wave guides – polarization - dielectric susceptibility – first and higher order susceptibilities.

Unit II: Optical fiber waveguides and sources

Ray theory transmission: Total internal reflection, acceptance angle, numerical aperture and skew rays –- evanescent field and Goos-Haechen shift – step index and graded index fibers – single and multi-mode fibers.

Sources: LED - Lasers – mode locked Lasers - modulation capability- transient response -semiconductor losses - diode structure and threshold conditions – modulation – temperature effects – source linearity and reliability – Photo detectors – PIN Photo detector – avalanche photodiode.

Unit III: Transmission characteristics of optical fibers

Attenuation – material absorption losses in silica fibers – linear and nonlinear scattering losses – fiber bend loss – mid-infrared and far-infrared transmission – intramodal and intermodal dispersion – overall fiber dispersion in multimode and single-mode fibers – modal birefringence.

Unit IV: Fabrication and connection of optical fibers

Glass fibers - Preparation of optical fibers – Liquid-phase (melting) and Vapour-phase deposition techniques – characteristics of single-mode, multimode, plastic-clad and all-plastic fibers - Stability of the Fiber Transmission Characteristics: Micro bending and hydrogen absorption – fiber alignment and joint loss – fiber splices – Fiber connectors: cylindrical ferrule expanded beam connectors - Fiber couplers: Three and four port couplers - star couplers.

Unit V: Nonlinear effects in fiber and solitons in optical fiber communication

Refractive index – frequency and intensity dependent refractive index – group velocity dispersion – self-phase modulation - Kerr effect – chirping - stimulated Raman scattering – stimulated Brillouin scattering – self-steepening – self-focusing – self-defocusing –

concept of solitons – formation of solitons – kdV equation - Nonlinear Schrödinger equation for solitons – soliton switching – soliton laser- advantages of soliton based communication.

Books for study:

1. Ajoy Ghatak and K. Thyagarajan, Introduction to fiber optics, 6th Edition, Cambridge University press, 2006.
2. John M. Senior, Optical fiber communications: Principles and practice, 2nd edition , PHI.
3. Govind P. Agrawal, Fiber-Optic communication systems, John Wiley, 2003.
4. Waves called solitons: concepts and experiments, Springer Verlag, 1992.
5. Gerd Keiser, Optical fiber communications,5th edition, McGra-Hill Education Pvt. Ltd., New Delhi, 2013.

Books for reference:

1. B.B. Laud,Lasers and Non-Linear optics, New Age International, New Delhi.
2. Akira Hasegawa and Yujiodama, Solitons in optical communications, oxford Press, 1995.
3. Robert W Boyd, Nonlinear fiber optics, 2nd Edition, Elsevier, 2006.

PAPER-2

C. NON LINEAR OPTICS

Unit I: Lasers

Gas lasers – He-Ne, Az + ion lasers – Solid state lasers – Ruby – Nd: YAG, Ti Sapphire – Organic dye laser – Rhodamine – Semiconductor lasers – Diode laser, p-n-junction laser, GaAs Laser.

Unit II: Introduction to Nonlinear Optics

Refractive index – frequency dependent and intensity dependent refractive index - Wave propagation in an anisotropic crystal – Polarization response of materials to light – Second harmonic generation – Sum and difference frequency generation – Phase matching –four wave mixing - Third harmonic generation – self focusing – Parametric amplification – bistability.

Unit III: Multiphoton Processes

Two photon process – Theory and experiment – Three photon process parametric generation of light – Oscillator – Amplifier – Stimulated Raman scattering – Intensity dependent refractive index optical Kerr effect – photorefractive, electron optic effects.

Unit IV: Nonlinear Optical Materials

Basic requirements – Inorganics – Borates – Organics – Urea, Nitro aniline – Semi organics –Thiourea complex – X-ray diffraction, FTIR and FT-NMR qualitative study – Kurtz test – Laser induced surface damage threshold.

Unit V: Fiber Optics

Step – Graded index fibers – wave propagation – Fiber modes – Single and multimode fibres – Numerical aperture – Dispersion – Fiber bandwidth – Fiber loss – Attenuation coefficient – Material absorption-Bending Losses, inverse square law losses-core and cladding losses.

Books for study:

1. Subir kumar Sarkar, Optical fibers and fiber Optic communication system, S. Chand & company Ltd, New Delhi.
2. D.L. Mills, Nonlinear Optics – Basic Concepts Springer, Berlin, 1998.

Books for Reference

1. B.B. Laud, Lasers and Nonlinear Optics, 2nd Edition, New Age International (P) Ltd., New Delhi, 1991.
2. Robert W. Boyd, Nonlinear Optics, 2nd Edition, Academic Press, New York, 2003
3. Govind P. Agarwal, Fiber-Optics Communication Systems, 3rd Edition, John Wiley & Sons, Singapore, 2003.
4. William T. Silvast, Laser Fundamentals, Cambridge University Press, Cambridge 2003.

SEMESTER III

PAPER-7

SPECTROSCOPY

UNIT-I: Microwave spectroscopy

Pure rotational spectra of diatomic molecules - Polyatomic molecules - Study of linear molecules and symmetric top molecules - Hyperfine structure and quadruple moment of linear molecules - Experimental techniques - Molecular structure determination - Stark effect - inversion spectrum of ammonia - Applications to chemical analysis.

UNIT-II: Infrared spectroscopy

Vibrational spectroscopy of diatomic and simple polyatomic molecules - Harmonic Oscillator - Anharmonic Oscillator - Rotational vibrators - Normal modes of vibration of Polyatomic molecules - Experimental techniques - Applications of infrared spectroscopy - H_2O and N_2O molecules - Reflectance spectroscopy.

UNIT-III: Raman Spectroscopy

Classical theory of Raman Scattering - Raman effect and molecular structure - Raman effect and crystal structure - Raman effect in relation to inorganic, organic and physical chemistry - Experimental techniques - Coherent anti-Stokes Raman Spectroscopy - Applications of infrared and Raman spectroscopy in molecular structural confirmation of water and CO_2 molecules - Laser Raman Spectroscopy.

UNIT-IV: NMR and NQR Spectroscopy

Theory of NMR - Bloch equations - Steady state solution of Bloch equations - Theory of chemical shifts - Experimental methods - Single Coil and double coil methods - Pulse Method - High resolution method - Applications of NMR to quantitative measurements. Quadruple Hamiltonian of NQR - Nuclear quadruple energy levels for axial and non-axial symmetry - Experimental techniques and applications.

UNIT-V: ESR and Mossbauer Spectroscopy

Quantum mechanical treatment of ESR - Nuclear interaction and hyperfine structure - Relaxation effects - Basic principles of spectrographs - Applications of ESR method - Mossbauer Effect - Recoillness emission and absorption - Mossbauer spectrum – Experimental methods - Mossbauer spectrometer - Hyperfine interactions - Isomer shift - Magnetic hyperfine interactions - Electric quadruple interactions - Simple biological applications.

Books for Study:

1. C.N. Banwell, E.M. Mc Cash, Fundamentals of Molecular Spectroscopy, 4th Edition, Tata McGraw-Hill Publications, New Delhi, 1994.
2. G. Aruldas, Molecular Structure and Spectroscopy, Prentice - Hall of India Pvt.Ltd., New Delhi, 2001.
3. D.N. Satyanarayana, Vibrational Spectroscopy and Applications, New Age International Publications, New Delhi, 2004.
4. Raymond Chang, Basic Principles of Spectroscopy, Mc Graw-Hill Kogakusha, 1980.

Books for Reference:

1. Straughn and Walker, Spectroscopy, Vol I &II Chapman and Hall, 1967.
2. Atta Ur Rahman, Nuclear Magnetic Resonance, Spinger Verlag, New York, 1986.
3. Towne and Schawlow, Microwave Spectroscopy, McGraw-Hill, New York, 1995.
4. Raymond Chang, Basic Principles of Spectroscopy, Mc Graw-Hill, Kogakusha, Tokyo, 1980.
5. D.A. Lang, Raman Spectroscopy, Mc Graw-Hill International, New York.
6. John Ferraro, Introductory Raman Spectroscopy, Academic Press, New York, 2008.
7. Raj kumar, Atomic and Molecular Spectra: Laser, Kedar Nath Ram Nath, Meerut, New Delhi, 2015.

PAPER-8

NUCLEAR AND PARTICLE PHYSICS

UNIT I: Nuclear Interactions

Nuclear forces – Exchange forces - Two body problem – Ground state of deutron - Magnetic moment – Quardrupole moment - Tensor forces – Nucleon – Nucleon interaction –Meson theory of nuclear forces – Nucleon-Nucleon scattering – Effective range theory – Spin dependence of nuclear forces – Charge independence and charge symmetry of nuclear forces – Isospin formalism.

UNIT II: Nuclear Reactions

Types of reactions and conservation laws – Energetics of nuclear reactions –Dynamics of nuclear reactions – Q-value equation – Scattering and reaction cross sections – Compound nucleus reactions – Direct reactions – Resonance scattering – Breit-Wigner one level formula.

UNIT III: Nuclear Models

Liquid drop model – Bohr-Wheeler theory of fission – Experimental evidence for shell effects – Shell model – Spin-orbit coupling - Magic numbers – Angular momenta and parities of nuclear ground states – Qualitative discussion and estimate of transition rates – Magnetic moments and Schmidt lines – Collective model of Bohr and Mottelson.

UNIT IV: Nuclear Decay

Beta decay – Fermi theory of beta decay – Shape of the beta spectrum – Total decay rate - Mass of the neutrino – Angular momentum and parity selection rules – Allowed and forbidden decays – Comparative half-lives – Neutrino physics – Non-conservation of parity – Gamma decay – Multipole transitions in nuclei – Angular momentum and parity selection rules – Internal conversion – Nuclear isomerism.

UNIT V: Elementary Particle Physics

Types of interaction between elementary particles – Hadrons and leptons – Symmetries and conservation laws – Elementary ideas of CP and CPT invariance – Classification of hadrons – SU(2) and SU(3) multiplets –- Gell-Mann-Okubo mass formula for octet and decuplet hadrons – Quark model- Types of quarks.

Books for study:

1. K. S. Krane, Introductory Nuclear Physics, Wiley, New York, 1987.
2. D. Griffiths, Introduction to Elementary Particle Physics, Harper & Row, New York, 1987.
3. R. R. Roy and B.P. Nigam, Nuclear Physics, New age Intl. New Delhi, 1983.
4. M.L. Pandya and R.P.S. Yadav, Elements of Nuclear Physics 7th Edition, Kedar Nath Ram Nath, Delhi, 1995.
5. D.C. Tayal, Nuclear Physics, 5th Edition, Himalaya Publishing House, Bombay, 1997.
6. R. C. Sharma, Nuclear physics, Kedar Nath & Co, Meerut.

Books for reference:

1. H. A. Enge, Introduction to Nuclear Physics, Addison-Wesley, Tokyo, 1983.
2. Y. R. Waghmare, Introductory Nuclear, Physics, Oxford-IBH, New Delhi, 1981.
3. Ghoshal, Atomic and Nuclear Physics, Vol. 2
4. J. M. Longo, Elementary particles, McGraw-Hill, New York, 1971.
5. R. D. Evans, Atomic Nucleus, McGraw-Hill, New York, 1955.
6. I. Kaplan, Nuclear Physics, Narosa, New Delhi, 1989.
7. B. L. Cohen, Concepts of Nuclear Physics, TMH, New Delhi, 1971.
8. M. K. Pal, Theory of Nuclear Structure, Affl. East-West, Chennai, 1982.
9. W. E. Burcham, M. Jobes, Nuclear and Particle Physics, Addison-Wesley, Tokyo, 1995.

PAPER-9

MICROPROCESSOR AND MICROCONTROLLER

UNIT-I: 8085 Architecture and Programming

8085 Architecture - Programmer's model - ALU - Registers and Flags - Stacks - Complete instruction set of Intel 8085 - State transition and timing diagrams - T States - Machine cycles - Instruction cycles - Timing diagram for memory read and memory write cycles - Addressing modes - Maskable and Non-maskable Interrupts - Assembly language programs – time delay subroutines and delay calculations.

UNIT-II: Interfacing Memory and I/O devices

Interfacing memory and devices – I/O and Memory mapped I/O – Simple polled I/O and Handshaking operations - Programmable keyboard / display interface 8279 - Programmable peripheral device 8255A - 8253 Timer Interface – DAC and ADC interface - Wave form generation (Sine, square, triangular and ramp wave) - Programmable communication interface 8251 (USART).

UNIT-III: Microcontroller 8051

Introduction – 8 and 16 bit Microcontroller families –Flash series – Embedded RISC Processor – 8051 Microcontroller Hardware – Internal registers – Addressing modes – Assembly Language Programming – Arithmetic, Logic, Sorting operations and BCD to binary and binary to BCD conversion.

UNIT IV: Interfacing I/O and Memory With 8051

Interfacing I/O Ports, External memory, counters and Timers - Serial data input/output, Interrupts – Interfacing 8051 with ADC, DAC, LED display, Keyboard, Sensors and Stepper motor.

UNIT V: Embedded Microcontroller

Embedded microcontroller system – types of embedded operating system – Micro chip PIC 16C6X /7X family – features – Architecture – Memory Organization – Register file map – I/O ports – Data and flash program memory – asynchronous serial port – Applications in communication and industrial controls.

Books for Study

1. R.S. Gaonkar, Microprocessor Architecture, programming and Application with the 8085, 3rd Edition, Penram International Publishing, Mumbai, 1997.
2. V.Vijayendran, Fundamentals of Microprocessor 8085 - Architecture, programming and interfacing, Viswanathan Publication, Chennai, 2002.
3. Kenneth J. Ayala – The 8051 Micro Controller Architecture, Programming and Applications. 3rd Edition , Penram International
4. John B. Peatman, Design with PIC Microcontrollers, 7th Indian reprint, Pearson Education, 2004.
5. K. V. Shibu, Introduction to Embedded System, Tata Mc Graw-Hill Education Private Limited , New Delhi.
6. Raj Kumar, Embedded System, Tata Mc Graw-Hill Education Private Limited, New Delhi.

Books for Reference

1. B. Ram, Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai publications, New Delhi.
2. R. Thiagarajan, S. Dhanasekaran, S.Dhanapal, Microprocessor and its applications, New Age International, New Delhi.
3. Muhammed Ali Mazidi, Janice Gillespie Mazidi, The 8051 Microcontroller and Embedded Systems, Fourth Indian Reprint, Pearson Education , 2004.
4. Raj Kamal, Introduction to Embedded Systems, TMS, 2002.

ELECTIVE

PAPER-3

(to choose 1 out of 3)

A. CRYSTAL GROWTH AND THIN FILMS

UNIT I: Nucleation and Growth

Nucleation – Different kinds of nucleation - Concept of formation of critical nucleus – Classical theory of nucleation - Spherical and cylindrical nucleus - Growth Kinetics of Thin Films – Thin Film Structure.

UNIT II: Growth Techniques

Solution Growth Technique: Low temperature solution growth: Solution - Solubility and super solubility – Expression of super saturation – Miers T-C diagram - Slow cooling and solvent evaporation methods - Constant temperature bath and crystallizer – Seed preparation and mounting.
Gel Growth Technique: Principle – Various types – Structure of gel – Liesegang rings - Importance of gel – Experimental procedure –Chemical reaction method – Single and double diffusion method — Advantages and disadvantages of gel method.

UNIT III: Melt Growth Techniques

Melt technique: Bridgman technique - Basic process – Various crucibles design - Thermal consideration –Vertical Bridgman technique –Crystal Pulling technique - Czochralski technique – Experimental arrangement – Growth process –Zone melting technique –Skull melting process –Verneuil Process.

UNIT IV: Thin Film Deposition Techniques

Thin Films – Introduction to Vacuum Technology - Deposition Techniques - Physical Vapour Deposition: Resistive Heating, Electron gun, Laser gun Evaporation and Flash Evaporations, Sputtering – D.C. Reactive Sputtering, RF Sputtering - Chemical vapour deposition (CVD): Spray Pyrolysis -– Preparation of Transparent Conducting Oxides.

UNIT V: Characterization Technique

X – Ray Diffraction (XRD) – Powder and single crystal - Fourier transform Infrared analysis (FT-IR) – Elemental analysis:Energy dispersive X-ray analysis (EDAX) – Scanning Electron Microscopy (SEM) – UV-Vis-NIR Spectroscopy – Etching (Chemical) – Vicker's Micro hardness –Dielectric studies – Second harmonic generation test.

Books for Study and Reference:

1. J.C. Brice, Crystal Growth Processes, John Wiley and Sons, New York, 1986.
2. P. SanthanaRagavan and P. Ramasamy, Crystal Growth Processes and Methods, KRU Publications, Kumbakonam, 2001.
3. A. Goswami, Thin Film Fundamentals, New Age International (P) Limited, New Delhi, 1996.
4. H.H. Willard, L.L. Merritt, J.A. Dean, F.A. Settle, CBS, Publishers and Distributors, New Delhi.
5. Douglas A. Skoog, James J. Leary, Principles of Instrumental Analysis, 4th Edition, Harcourt Brace College Publishers, New York, 1992.
6. B.D.Cullity, Elements of X-Ray Diffraction, 2nd Edition, Addison-Wesley Publishing Company, California, 1978.
7. Heniz K.Henisch, Crysals in Gels and Liesegang Rings, Cambridge University Press, Cambridge, 1988.
8. Anthony R.West, Solid State Chemistry and its Applications, John Wiley & Sons, NewYork, 2003.

PAPER 3

B. ADVANCED SPECTROSCOPY

UNIT I: UV Spectroscopy

Energy levels, Molecular orbitals – Theory of UV spectra – Franck Condon Principle – transition Probability, measurement of spectrum – Types of transition in Organic molecules – Types of absorption bands – transition in metal complexes – Selection rules – Electronic spectra in poly atomic molecules – Chromophore concept – Application of UV Spectroscopy.

UNIT II: Atomic absorption and Emission Spectroscopy

Atomic Absorption Spectroscopy (AAS): Principle of AAS– single beam Spectrophotometer –Applications of AAS - Atomic emission Spectroscopy – Principle of AES, Advantages - Instrumentation– Applications of AES –Difference between AAS and AES.

UNIT III: Surface Enhanced Raman Scattering (SERS) and FT Raman Spectroscopy

Surfaces for SERS study – Enhancement mechanism – Instrumentation and sampling techniques - Surface selection rules – SERS microprobe – SERS study of bio molecules – SERS in medicine –Use of Laser FT Raman Spectroscopy: Principle, Instrument, sample handling methods and applications.

UNIT IV: Surface Spectroscopy

Electron energy loss spectroscopy (EELS) – Reflectance Absorbance – IR spectroscopy (RAIRS) – Inelastic helium scattering – Photo electron spectroscopy (PES) – X ray photo electron spectroscopy (XPES).

UNIT V: Nonlinear Spectroscopic Phenomena

Nonlinear Raman phenomena – Hyper Raman effect – Experimental Technique – Stimulated Raman scattering – Inverse Raman effect – Photo acoustic Raman scattering – Multiphoton spectroscopy.

Books for study

1. N. Banwell and E. M. McCash, Fundamentals of Molecular Spectroscopy, 4th Edition, Tata Mc Graw-Hill, New Delhi, 1994.
2. G. Aruldhas, Molecular structure and spectroscopy, Prentice Hall of India Pvt. Ltd., New Delhi, 2001.
3. H.Kaur, Spectroscopy, 5th Edition, A Pragati Prakashan, 2009.
4. P. S. Sindhu, Molecular Spectroscopy, Tata Mc Graw-Hill, New Delhi, 1990.
5. D.N. Sathyanarayana, Vibrational Spectroscopy, New age International Publishers.

Books for Reference:

1. G. W. King, Spectroscopy and molecular structure, Hoit Rinchart and Winsten Inc, London, 1964.
2. T. A. Carlson, Photo electron and Auger spectroscopy, Plenum Press, 1975.
3. J . Loder, Basic Laser Raman spectroscopy, Hezdan and Son Ltd. , 1970.
4. T. P. Das, E. L. Hehn, NQR Spectroscopy, Academic Press, 1958.
5. Raymond Chang, Basic Principles of Spectroscopy Mc Graw-Hill Kogakusha, 1980.
6. Douglas A. Skoog, James J.Leary, Principles of Instrumental Analysis, 4th Edition, Harcourt Brace College Publishers, New York,1992.
7. Anthony R.West, Solid State Chemistry and its Applications, John Wiley & Sons, New York, 2003.
8. K.P. Rajappan Nair, Atomic spectroscopy MJP publication, Chennai.

PAPER-3

B. ADVANCED NUCLEAR PHYSICS

UNIT-I: Methods of investigating nuclear size

Classification of nuclei, nuclear size - methods to investigate nuclear size - Mesonic X-rays, Electron scattering, Coulomb energies of mirror nuclei, neutron scattering methods

UNIT-II: Discovery and Properties of neutron

Discovery of neutron, fundamental properties of neutron, neutron sources, - radioactive sources, Photo-neutron sources, accelerated particle sources – Detection of neutrons – General principles, slow neutron detectors by foil activation method, detection of fast neutrons by scintillation counter.

UNIT-III: Classification and interaction of neutron

Classification of neutrons according to energy, Neutron –electron interactions, slowing down of fast neutrons, slowing down time, slowing down density, resonance escape probability, neutron diffusion-solution to diffusion equation, diffusion of fast neutrons-Fermi-age equation

UNIT-IV: Reactor Physics

Condition of criticality of nuclear reactor, the critical equation and buckling, critical reactor dimensions, criticality of large thermal reactors- migration length, the reflector reactor, continuum theory of nuclear reactions, optical model theory of nuclear reactions, photo-nuclear reactions.

UNIT-V: Nuclear fusion: Thermonuclear energy

Nuclear fusion, the fusion reaction, thermonuclear reactions, sources of stellar energy, controlled thermonuclear reactions, the possibility of fusion reactor, cold fusion and transuranic elements.

Books for Study and Reference:

1. Robley D. Evans, The atomic nucleus, TMH, New Delhi, 1982.
2. M.L.Pandya, R.P.S Yadhav, Kedharnath, Ramnath, Elements of nuclear Physics, Meerut, 1995.
3. Irving Kaplan, Nuclear Physics, Narosha Publshers,New Delhi, 1989.
4. V. Devanathan, Nuclear Physics, Narosa Publishing House , New Delhi.
5. A.B Gupta, Modern Atomic and Nuclear Physics, Books and Allied Limited, Kolkata.

SEMESTER IV

PAPER-10

MATERIALS SCIENCE AND LASER PHYSICS

UNIT-I: Defects and dislocations

Point defects - Schottky and Frenkel defects - number of defects as a function of temperature - Diffusion in metals - Diffusion and ionic conductivity in ionic crystals - Dislocations - Edge and screw dislocations - Burgers vector - Plastic deformation - Slip - Motion of dislocations under uniform shear stress - Stress fields around dislocations - Density - Work hardening function- Effect of grain size on dislocation motion - Effect of solute atoms on dislocation motion.

UNIT-II: Optical Properties, Dielectric Properties and Ferro Electrics

Color centers - Photo conductivity - electronic transitions in photo conductors - Trap, Capture, recombination centers - General mechanism - Luminescence - Excitation and emission - Internal electric field in a dielectric - Clausius-Mossotti and Lorentz - Lorenz equations - Dielectric dispersion and loss - Ferroelectrics - Ferro electricity - General properties - Dipole theory - Ionic displacements and the behaviors of $BaTiO_3$.

UNIT-III: Elastic Behaviour, Polymer and Ceramics

Anelastic and visco elastic behaviour - Atomic model of elastic behaviour - rubber like elasticity - Anelastic deformation - Relaxation process - Model for visco elastic behaviour - Polymers - Polymerization mechanism - Polymer structures - Deformation of polymers - Behaviour of polymers. Ceramics:Ceramic phases - Structure - classes - Effect of structure on the behaviour of ceramic phases - composites.

UNIT-IV: Nano Material and Its Applications

Classification of Nanomaterials – Synthesis – Ball milling, Solgel and CVD methods – metal and semiconductor nanoparticles by colloidal route – microorganism method – Analytical methods: STM- TEM – Electrical, Magnetic and optical properties of nanoparticles – Applications Optoelectronic device– LED – Colourants and pigments – Nano biotechnology – DNA chips – DNA array devices – Drug delivery systems.

UNIT-V: Laser Physics

Introduction - Interaction of radiation - with matter - Spontaneous and stimulated emission - Conditions for oscillation - Frequency of oscillation of the system - Einstein co-efficient - Possibility of amplification - Population inversion - Laser pumping Rate equations - Three level and four level system - Optical resonator - Types and modes of resonator - Oscillation - Threshold condition. The confocal resonant cavity - theory - Spot size and beam divergence - quality factor (Q) of an optical cavity.

Books for Study:

1. G.K. Narula, K.S. Narula, and V.K. Gupta, Material Science, TMH, New Delhi, 1995.
2. A.J. Dekker, Solid State Physics, McMillan Co., 1981.
3. V.Ragavan, Material Science and Engineering, 4th Edition, Prentice Hall of India,New Delhi, 2003.
4. M. Arumugam, Materials Science, 3rd Edition, Anuradha Agencies, 2002.
5. Allen, Jones, Principles of Gas lasers, Butterworths, London, 1967.
6. K.R. Nambiar, Laser Principles, types and Application, New Age International, 2004.
7. K. Thyagarajan, A.K. Ghatak, Laser Theory and Applications, Macmillan India Ltd., 1997.

Books for Reference:

1. Lawrence H. Vlack, Elements of Materials Science and Engineering, 6th Edition, Second ISE reprint, Addison-Wesley, 1998.
2. H. Iabch, H. Luth, Solid State Physics, An introduction to principles of Material Science, 2nd Edition, Springer, 2001.
3. B.B. Laud, Lasers and Non linear optics, Wiley Eastern Ltd., 1991.
4. J.J. Verdayan, Laser Electronics, Prentice-Hall India, New Delhi, 1993.

PAPER-11

CONDENSED MATTER PHYSICS

UNIT-1 Crystal Physics

Types of lattices - Miller indices – symmetry elements and allowed rotations - simple crystal structures – Atomic packing factor - Crystal diffraction - Bragg's law –Scattered wave amplitude - Reciprocal lattice (sc, bcc, fcc) – Diffraction conditions - Laue equations – Brillouin Zone - Structure factor - Atomic form factor - Inert gas crystals - Cohesive energy of ionic crystals - Madelung constant - Types of crystal binding(general ideas).

UNIT-II: Lattice dynamics

Monoatomic lattices - Lattice with two atoms per primitive cell - First Brillouin zone - Group and phase velocities - Quantization of lattice vibrations - Phonon momentum - Inelastic scattering by phonons - Einstein's model and Debye's model of specific heat - thermal expansion - Thermal conductivity - Umklapp processes.

UNIT-III: Theory of metals and semiconductors

Free electron gas in three dimensions - Electronic heat capacity - Wiedmann-Franz law - Band theory of metals and semiconductors - Bloch theorem - Kronig-Penny model - Semiconductors - Intrinsic carrier concentration – Temperature dependence - Mobility - Impurity conductivity – Impurity states - Hall effect -Fermi surfaces and construction - Experimental methods in Fermi surface studies - de Haas Van Alphen effect.

UNIT-IV: Magnetism

Diamagnetism - quantum theory of Paramagnetism - Rare earth ion - Hund's rule - Quenching of orbital angular momentum - Adiabatic demagnetization - Quantum theory of ferromagnetism - Curie point - Exchange integral - Heisenberg's interpretation of Weiss field - ferromagnetic domains - Bloch Wall - Spin waves - Quantization - Magnons - thermal excitation of magnons - Curie temperature and susceptibility of ferrimagnets - Theory of anti ferromagnetism - Neel temperature.

UNIT-V: Super conductivity

Experimental facts: Occurrence - Effect of magnetic fields - Meissner effect – Critical field – Critical current - Entropy and heat capacity - Isotope effect - Energy gap - Type I and Type II superconductors. Theoretical explanation: Thermodynamics of super conducting transition - London equation - BCS Theory - Coherence length –- Cooper pairs - Single particle Tunneling - Josephson tunneling - DC and AC Josephson effects - High temperature super conductors - SQUIDS.

Books for Study:

1. C. Kittel, Introduction to Solid State Physics, 7th Edition, Wiley, New York, 1996.
2. M. Ali Omar, Elementary Solid State Physics-Principles and Applications, Addison-Wesley, London, 1974.
3. H.P. Myers, Introductory Solid State Physics, 2nd Edition, Viva Book, New Delhi, 1998.
4. S.O. Pillai, Solid State Physics, New Age International, New Delhi, 1997.

Books for Reference:

1. N.W. Aschroft, N.D. Mermin, Solid State Physics, Rhinehart and Winton, New York.
2. J.S. Blakemore, Solid State Physics, 2nd Edition, W.B. Saunder, Philadelphia, 1974.
3. A.J. Dekker, Solid State Physics, Macmillan India, New Delhi.
4. H.M. Rosenburg, The Solid State, 3rd Edition, Oxford University Press, Oxford, 1993.
5. S.O. Pillai, Problems and Solutions in Solid State Physics, New Age International, New Delhi, 1994.
6. S.L. Altmann, Band Theory of Metals, Pergamon, Oxford.
7. M.A. Wahab, Solid State Physics, Structure and Properties of Materials, Narosa, New Delhi, 1999.
8. J.M. Ziman, Principles of the Theory of Solids, Cambridge University Press, London, 1971.

PAPER-12

PROJECT WITH VIVA VOCE

Preamble

The concept of introducing the project will help the student community to learn and apply the principles of Physics and explore the new research avenues.

In the course of the project the student will refer books, Journals or collect literature / data by the way of visiting research institutes/ industries. He/she may even do experimental /theoretical work in his/her college and submit a dissertation report with a minimum of 40 pages not exceeding 50 pages.

Format for Preparation of Dissertation

The sequence in which the dissertation should be arranged and bound should be as follows

1. Cover Page and title Page
2. Declaration
3. Certificate
4. Abstract (not exceeding one page)
5. Acknowledgement (not exceeding one page)
6. Contents (12 Font size, Times new Roman with double line spacing)
7. List of Figures/ Exhibits/Charts
8. List of tables
9. Symbols and notations
10. Chapters
11. References

Distribution of marks for Dissertation (100 Marks)

(a) For Organization and presentation of Thesis - 60 marks
(b) For the novelty /Social relevance -10 marks
(c) Presentation of work /Participation in state/
(d) national level Seminar/publication - 5 marks
(e) Viva voce (Preparation, Presentation of work and Response to questions) - 25 marks

MAIN PRACTICAL

PAPER-3

ADVANCED GENERAL EXPERIMENTS

(Any 15 out of the given 20)

1. G.M. Counter - characteristics, Inverse square law.
2. G.M. Counter - Absorption co-efficient.
3. Michelson Interferometer -Wavelength and separation of wavelengths.
4. Michelson Interferometer - Thickness of mica sheet.
5. F.P. Etalon - using Michelson set up.
6. Hall Effect.
7. Molecular Spectra - AlO Band.
8. Molecular Spectra - CN Band.
9. Susceptibility of a liquid by Quincke's method.
10. Susceptibility of a liquid by Guoy's method.
11. Ultrasonic Diffraction - Velocity and Compressibility of a liquid.
12. Ultrasonic Interferometer - Velocity and Compressibility of a liquid.
13. B-H curve using CRO.
14. Spectral analysis of a salt.
15. Absorption Spectra.
16. Laser beam - Interference Experiments
    (a) Using an optically plane glass plate.
    (b) Using Lloyd's single mirror method.
17. Laser beam – Diffraction Experiments.
    (a) Diffraction at straight edge.
    (b) Diffraction at a straight wire.
    (c) Diffraction at a circular aperture.
18. Microwave experiment.
19. Determination of Planck's constant.
20. Spectrophotometer - Beer's law verification and absorption co-efficient.

MAIN PRACTICAL

PAPER-4

Microprocessor, Microcontroller and C Programming

(Any 20 out of the given 30)

Microprocessor 8085 programs

1. Number conversion - 8 bit and 16 bit: BCD to Binary, Binary to BCD, Hex to ASCII.
2. Square and square root of BCD and HEX numbers (both 8 and 16 bit).
3. Time delay subroutine and a clock programme.
4. Sum of simple series and arithmetic progression.
5. Interfacing (i) Op-amp 8 bit DAC R-2R network (ii) Switching an array of LEDs.
6. ADC and interfacing IC 0809 with MPU
7. Interfacing and programming IC 0800 with MPU – Unipolar and Bipolar.
8. Wave form generation – sine wave, square wave, triangular and ramp wave.
9. Analog to digital conversion using a DAC Comparator and MPU system.
10. Interfacing a DC stepper motor to the MPU system - clockwise and anticlockwise – full Stepping and half stepping
11. Parallel and Serial communication between two microprocessor systems.
12. Interfacing a HEX keyboard to the MPU system through I/O ports.

Microprocessor 8086 programs using MASM

13. Addition, subtraction
14. Multiplication and division.
15. Multibyte addition/ Subtraction
16. Computation of LCM
17. Sorting in ascending/ descending order.
18. Factorial of a number

Microcontroller 8051 experiments

19. Addition, Subtraction
20. Multiplication and Division.
21. Block transfer
22. BCD to Binary conversion and binary to BCD
23. Sorting in ascending and descending order.
24. LED interface and Stepper motor interface.

Computation methods – C programming

25. Lagrange interpolation with algorithm, flow chart, program and its output
26. Numerical integration by Simpson's rule with algorithm and flowchart, program and its output.
27. Numerical solution of ordinary first order differential equation -Euler's method with algorithm, flowchart, program and its output.
28. Numerical solution of ordinary first order differential equations by the Runge-Kutta IV method, with algorithm, flow chart, program and its output.
29. Curve fitting - Least square fitting with algorithm, flowchart, program and its output.
30. Matrix manipulation - Multiplication Transpose and Inverse with algorithm, Flow chart, program and its output.

ELECTIVE

PAPER-4

A. ADVANCED MICROPROCESSOR

UNIT-I 8086 Architecture and programming

Internal architecture of 8086 - Software model - Internal registers - Minimum mode and Maximum mode system - Instruction set - Addressing modes – Data transfer, Arithmetic, Logical, Shift and rotate instruction – Compare, Jump, Loop, String, Processor control, CALL - RET and stack instructions - Procedures - Assembler Macros - Assembler directives.

UNIT-II Software Programs of 8086

Assembly language Programming – Addition, subtraction and multiplication and division of two 16 bit numbers - Multibyte addition/subtraction – Ascending order – Sum of a series - Computation of LCM - Block transfer – Factorial of a number.

UNIT-III: Memory and Interrupt interface of 8086 Microprocessor

Memory interface - block diagram - Hardware organization of the memory address space - Memory control signals - The stack - Stack segment register and stack pointer - RAM interface - Dynamic RAM interfacing and refreshing - Types of interrupts - Interrupt and address pointer table - Interrupt instructions - Masking of interrupts - External hardware interrupt interface - Interrupt sequence - 8259 Programmable interrupt controller (PIC).

UNIT-IV: 80286, 386 and 486 Microprocessor

Introduction to Intel Processor and its architecture 80286/ 80386 and 80486 microprocessors – block diagram of 386 and 486 - comparison - Pentium Processor –block diagram (Pentium II, III and IV) and its salient features – Multitasking concepts - Operating system concepts and terms - DISK operating system (DOS) - Multitasking and multiprogramming operating system (UNIX).

UNIT-V: Data communication and applications

Centronix parallel interface of printers - Printer concepts - Interfacing ASCII keyboard - Concepts of secondary storage device like floppy disk and Hard disk – PCI bus architecture – AGP - USB - Data Communication methods and standard GPIB – IEEE-488, RS-232C, RS-422 and RS-423A - Temperature controller.

Books for Study:

1. Douglas V. Hall : - Microprocessors and Interfacing programming and Hardware (Tata Mc Graw Hill)
2. W.A. Triebel and Avatar Singh, The 8086 /8088 Microprocessors- Programming, Software, Hardware and application, Prentice Hall of India, New Delhi.
3. Badri Ram, Advanced Microprocessors and interfacing, Tata McGraw Hill, 2006.

Books for Reference:

1. B. Brey, Intel Microprocessors 8086/8088, 80186,80286,80486,80486, Architecture, Programming and Interfacing, 1995.
2. V. Vijayendran, Fundamentals of Microprocessor –8086- Architecture, Programming (MASM) and interfacing, Viswanathan, Chennai, 2002.
3. Yu – Cheng and Glenn A. Gibson, The 8086 / 8088 family Architecture, Programming and Design, Prentice-Hall of India.

PAPER-4

B. PROGRAMMING IN C AND MATLAB

UNIT-I: Data types, managing input and output operations

Basic structure of C programs – Character set – C tokens- Constants– keywords and identifiers – variables – data types - declaration of variables – Assigning values to variables – defining symbolic constants – Reading and writing a character – formatted inputs and outputs.

UNIT-II: Operators, Expressions and Arrays

Arithmetic, relational, logical, assignment, increment, decrement, conditional, bitwise special operators –Arithmetic expressions- evaluation of expressions, precedence of arithmetic operators-one dimensional arrays, two dimensional arrays, multi dimensional arrays- declaration and initialization of arrays.

UNIT-III Decision making, Branching and Looping

Simple if, If-else, If-else ladder, switch, go-to statements, While, DO, FOR statements, simple programs using these statements.

UNIT-IV: Functions and Application programs

Programs for finding square root of second degree algebraic equations-matrix addition, multiplication, diagonalisation and inversion-Solution of simultaneous equations- Gauss elimination method, Solution of first order differential equations- Euler's method, runge Kutta IV order method, numerical integration-Simpson's 1/3 rule.

UNIT-V: MATLAB

Basic Computations, Array operations, Solving Algebraic equations in MATLAB-Differentiation, Integration, Limits, sums and products, Taylor's series – Simple x-y plots – Matrices – Determinant, multiplication, transpose – Loops – Branching – Script M-file – Function M-files.

Books for study:

1. E. Balagurusamy, Programming in ANSI C, 4th Edition TMH, New Delhi, 2009.
2. S.S. Sastry, Introductory methods of Numerical analysis, 3rd Edition Prentice, Hall of India, New Delhi, 2003.
3. E. Balagurusamy, Numerical methods, Tata Mc-Graw Hill, New Delhi.
4. Gilat, MATLAB: An introduction with Applications, John Wiley & Sons, Inc 2004.

Books for Reference:

1. MATLAB 7.0 Basics, P. Howard, spring, 2005.
2. http://www.maths.tamu.edu/~phoward/308/matbasics.pdf
3. S.S. Kuo, Numerical Methods, and Computer, Addison-Wesley, 1996.
4. W.H. Press, Numerical Recipes in C, 2nd Edition, Cambridge University Press, 1992.

PAPER-4

C. NUMERICAL METHODS AND PROGRAMMING in C

UNIT-I: Errors and the measurements

General formula for errors – Errors of observation and measurement – Empirical formula –Graphical method – Method of averages – Least square fitting – curve fitting –parabola, exponential.

UNIT-II: Numerical solution of algebraic and transcendental equations

The iteration method – The method of false position – Newton-Raphson method – Convergence and rate of convergence – C program for finding roots using Newton – Raphson method - Simultaneous linear algebraic equations - Gauss elimination method – Jordon's modification – Gauss–Seidel method of iteration – C program for solution of linear equations.

UNIT-III: Interpolation

Linear interpolation – Lagrange interpolation Gregory – Newton forward and backward Interpolation formula – Central difference interpolation formula – Gauss forward and backward interpolation formula – Divided differences – Properties – Newton's interpolation formula for unequal intervals – C programming for Lagrange's interpolation.

UNIT-IV: Numerical differentiation and integration

Newton's forward and backward difference formula to compute derivatives – Numerical Integration: the trapezoidal rule, Simpson's rule – Extended Simpson's rule – C program to evaluate integrals using Simpson's and trapezoidal rules.

UNIT-V: Numerical Solutions of ordinary differential equations

Nth order ordinary differential equations – Power series approximation – Pointwise method – Solutions of Taylor series – Euler's method – Improved Euler's method – Runge-Kutta method – second and fourth order – Runge-Kutta IV method for solving first order differential equations – C program for solving ordinary differential equations using Runge-Kutta IV method.

Books for study and Reference:

1. S.S. Sastry, Introductory Methods of Numerical analysis, Prentice, 3rd Edition, Hall of India, New Delhi, 2003.
2. M.K. Venkataraman, Numerical Methods in Science and Engineering, The National Publishing Co. Madras, 2001.
3. E. Balagurusamy, Numerical methods ,Tata Mc Graw Hill, New Delhi, 2008.
4. A. Singaravelu, Numerical Methods, Meenakshi Agency, Chennai.
5. B.P.Flannery, S.A.Teukolsky, W.T. Vetterling, Numerical Recipes in C, W.H. Press, Cambridge University, 1996.
6. K.P.N. Murthy, Monte Carlo : Basics, ISRP, Kalpakkam, 2000.
7. Veerarajan,Numerical Methods in C and C++, S.Chand, New Delhi, 2006.

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THIRUVALLUVAR UNIVERSITY

PART-IV

SOFT SKILL

SYLLABUS
(For all UG Degree Courses)

(with effect from 2017-2018)

UNIT I

1.1. Skills in Listening and Writing

1.2. Skills in Reading and Understanding

UNIT II

2.1. Skills to Read and Respond to Instructions

2.2. Skills of Interpretation and Transcoding Information

UNIT III

3.1. Skills in Seeking and Responding to Information

3.2. Skills of Day-to-Day communication

UNIT IV

4.1. Grammatical skills and Spelling rules

4.2. Career skills

UNIT V

5.1. Skills of formal and in-formal expressions

5.2. Skills of non-verbal communication

Note: The contents of the previous book for 'Soft Skills' by Trinity Publication for I year UG students have not been changed. However, the titles of the contents have been modified.

THIRUVALLUVAR UNIVERSITY

PART-IV

VALUE EDUCATION

SYLLABUS
(For all UG Degree Courses)

(with effect from 2017-2018)

SEMESTER II

UNIT-I

Value Education - Definition - relevance to present day - Concept of Human Values - self introspection - Self esteem.

UNIT-II

Family values - Components, structure and responsibilities of family - Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-III

Ethical values - Professional ethics - Mass media ethics - Advertising ethics - Influence of ethics on family life - psychology of children and youth - Leadership qualities - Personality development.

UNIT-IV

Social values - Faith, service and secularism - Social sense and commitment - Students and Politics - Social awareness, Consumer awareness, Consumer rights and responsibilities - Redressal mechanisms.

UNIT-V

Effect of international affairs on values of life/ Issue of Globalization - Modern warfare - Terrorism. Environmental issues - mutual respect of different cultures, religions and their beliefs.

Reference Books

1. T. Anchukandam and J. Kuttainimathathil (Ed) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995)
2. Mani Jacob (Ed) Resource Book for Value Education, Institute for Value Education, New Delhi 2002.
3. DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value Education, Secunderabad, 2002.
4. Daniel and Selvamony - Value Education Today, (Madras Christian College, Tambaram and ALACHE, New Delhi, 1990)
5. S. Ignacimuthu - Values for Life - Better Yourself Books, Mumbai, 1991.
6. M.M.M.Mascaronhas Centre for Research Education Science and Training for Family Life Promotion - Family Life Education, Bangalore, 1993.

WEBSITES AND e-LEARNING SOURCES:

www.rkmissiondhe/.org/education.html/

www.clallam:;org/lifestyle/education.html/

www.sun.com/../edu/progrmws/star.html/

www.infoscouts.com

www.secretofsuccess.com

www.1millionpapers.com

http://militarlyfinance.umuc.edu/education/edu-network.html/

THIRUVALLUVAR UNIVERSITY

BACHELOR OF ARTS

B.A. ENGLISH

DEGREE COURSE

CBCS PATTERN

(With effect from 2017-2018)

Sl.No.	Part	Study Components / Course Title		Ins.hrs/ Week	Credit	Title of the paper	Maximum Marks		
SEMESTER-I							CIA	Uni. Exam	Total
1.	I	Language	Paper-1	6	4	Tamil /other Languages	25	75	100
2.	II	English	Paper-1	6	4	English	25	75	100
3.	III	Core Theory	Paper-1	5	4	Indian Writing in English	25	75	100
4.	IV	Core Theory	Paper-2	5	4	Advanced English Grammar	25	75	100
5.	V	Allied - 1	Paper-1	6	4	Literary Forms and Terms	25	75	100
6.	VI	Environmental Studies		2	2	Environmental Studies	25	75	100
				30	**22**		**150**	**450**	**600**

Sl.No.	Part	Study Components / Course Title		Ins.hrs/ Week	Credit	Title of the paper	Maximum Marks		
SEMESTER-II							CIA	Uni. Exam	Total
7.	I	Language	Paper-2	6	4	Tamil /other Languages	25	75	100
8.	II	English	Paper-2	4	4	English	25	75	100
9.	III	Core Theory	Paper-3	5	4	British Literature-I	25	75	100
10.	III	Core Theory	Paper-4	5	4	American Literature -I	25	75	100
11.	IV	Allied-1	Paper-2	6	4	The Social History of England	25	75	100
12.	IV	Value Education		2	2	Value Education	25	75	100
13.	IV	Soft skill		2	1	Soft Skill	25	75	100
				30	**23**		**175**	**525**	**700**

Sl.No.	Part	Study Components Course Title		Ins.hrs/ Week	Credit	Title of the paper	Maximum Marks		
SEMESTER-III							CIA	Uni. Exam	Total
14.	I	Language	Paper-3	6	4	Tamil /other Languages	25	75	100
15.	II	English	Paper-3	6	4	English	25	75	100
16.	III	Core Theory	Paper-5	5	4	British Literature-II	25	75	100
17.	IV	Core Theory	Paper-6	5	4	American Literature-II	25	75	100
18.	V	Allied-2	Paper-3	5	4	History of English Literature -I	25	75	100
19.	VI	Skill based subject	Paper-1	3	3	Skill for Employment - I	25	75	100
20.	IV	Non-Major Elective	Paper-1	2	2	Language skills and Communication I	25	75	100
				30	**25**		**175**	**525**	**700**

Sl.No.	Part	Study Components Course Title		Ins.hrs/ Week	Credit	Title of the paper	Maximum Marks		
SEMESTER-IV							CIA	Uni. Exam	Total
21.	I	Language	Paper-4	6	4	Tamil /other Languages	25	75	100
22.	II	English	Paper-4	6	4	English	25	75	100
23.	III	Core Theory	Paper-7	5	4	British Literature-III	25	75	100
24.	III	Core Theory	Paper-8	5	4	History of English Language	25	75	100
25.	III	Allied-2	Paper-4	5	4	History of English Literature-II	25	75	100
26.	IV	Skill based Subject	Paper-2	3	3	Skill for Employment-II	25	75	100
27.	IV	Non-Major Elective	Paper-2	2	2	Language skills and communication II	25	75	100
				30	**25**		**175**	**525**	**700**

Sl.No.	Part	Study Components / Course Title		Ins.hrs/ Week	Credit	Title of the paper	Maximum Marks		
SEMESTER-V							CIA	Uni. Exam	Total
28.	III	Core Theory	Paper-9	5	4	British Literature - IV	25	75	100
29.	III	Core Theory	Paper-10	5	4	Language and Linguistics	25	75	100
30.	III	Core Theory	Paper-11	5	4	Introduction to Literary Criticism	25	75	100
31.	III	Core Theory	Paper-12	6	4	Indian literature in Translation	25	75	100
32.	III	Elective	Paper-1	4	3	Journalism and Mass communication **(or)**Techniques of Translation	25	75	100
33.	IV	Skill based subject	Paper-3	3	3	Conversational English	25	75	100
				30	**22**		**150**	**450**	**600**

Sl.No.	Part	Study Components / Course Title		Ins.hrs/ Week	Credit	Title of the paper	Maximum Marks		
SEMESTER-VI							CIA	Uni. Exam	Total
34.	III	Core Theory	Paper-13	6	5	Shakespeare	25	75	100
35.	III	Core Theory	Paper-14	6	4	British Literature-V	25	75	100
36.	III	Core Theory	Paper-15	6	4	New Literatures in English	25	75	100
37.	III	Elective	Paper-2	4	3	Technology Mediated English **(or)** Business English	25	75	100
38.	V	Elective	Paper-3	4	3	Copy –editing and proof Reading **(or)** Effective Communication	25	75	100
39.	VI	Skill based subject	Paper-4	4	3	English Language Teaching	25	75	100
40.	V	Extension Activities			1		100		100
				30	**23**		**250**	**450**	**700**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	4	8	100	200
	Allied (Even Semester)	2	4	8	100	200
	Electives	3	3	9	100	300
	Core	15	(3-5)	61	100	1500
Part IV	Environmental Science	1		2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang.&others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension Activity	1	1	1	100	100
	Total	**40**		**140**		**4000**

SEMESTER-I
Paper -1 - INDIAN WRITING IN ENGLISH

UNIT I: POETRY

1. Sarojini Naidu: Love and Death
2. Jayanta Mahapatra: Evening Landscape by the River
3. Rabindranath Tagore: Lyric No. LXXIII (from Gitanjali)
4. Toru Dutt: Our Casuarina Tree

References:

1. Indian Yarns: An Anthology of Indian English Writing. Cambridge University Press, 2013.
2. Tagore, Rabindranath. Gitanjali. Wellesley: branden Books, 2000
3. Ramaswamy,S. Commentaries on Commonwealth Poetry and Drama. New Delhi: Prestige Books, 1994.

UNIT II: PROSE

1.Jawaharlal Nehru: A Tryst with Destiny
2.. Rabindranath Tagore Realization of the Infinite
3. Shashi Tharoor: Ajanta and Ellora in the Monsoon

References:

1. Indian Yarns: An Anthology of Indian English Writing. Cambridge University Press, 2013.
2. Dutta, Krishna. Ed. Rabindranath Tagore: An Anthology. New Delhi: Oxford University Press, 1998.

UNIT III: SHORT STORIES

1. Ruskin Bond The Eyes Have it
2. Anita Desai A Devoted Son

UNIT IV: DRAMA

1. Girish Karnad The Fire and the Rain

References:

Karnad, Girish, The Fire and the Rain New Delhi: Oxford University Press, 1999.

UNIT V: FICTION

1. R.K. Narayan The Bachelor of Arts

SEMESTER I

PAPER – 2 - ADVANCED ENGLISH GRAMMAR

UNIT I

Introduction to Modern English grammar

Sentences – various types of sentence – simple – compound – complex – declaratives – interrogatives – imperatives – exclamatives.

Basic sentence patterns in English - constituents of sentences – subject – verb - object - complement - adverbials.

UNIT II

Clauses - main and subordinate clauses - noun clauses - relative clauses - adverbial clauses - finite and non-finite clauses - analysis and conversion of sentences – Active to Passive and vice versa – Direct to Indirect and vice versa – Degrees of Comparison, one form to the other.

UNIT III

Phrases - various types of phrases - noun, verb, adjectival and prepositional phrases.

Words - parts of speech – nouns – pronouns – adjectives - verbs - adverbs – prepositions – conjunctions - determinatives.

UNIT IV

Nouns - different types - count and uncount – collective - mass - case - number – gender.

Pronoun - different types - personal, reflexive - infinite-emphatic – reciprocal.

Adjectives - predicative - attributive - pre- and post-modification of nouns.

Verbs - tense-aspect - voice -mood - Concord - types of verbs – transitive – intransitive finite – non-infinite.

Helping verbs and modal auxiliaries - function and use.

UNIT V

Adverbs - different types - various functions - modifying and connective.

Prepositions - different types - syntactic occurrences - prepositional phrases - adverbial function.

Conjunctions - subordinating and coordinating Determinatives articles - possessives – quantifiers

Same words used as different parts of speech – Words followed by appropriate prepositions.

Books for Study and Reference:

A Remedial English Grammar for Foreign Students. Publisher: Macmillan. Author: F T Wood

Carter, Ronald and Michael McCarthy.Cambridge Grammar of English.CUP, 2006.

Greenbaum, Sidney. Oxford English Grammar.Indian Edition.Oxford University Press, 2005.

SEMESTER I

ALLIED - 1 - PAPER - 1 - LITERARY FORMS AND TERMS

UNIT I : PROSE

1. The Essay
2. The Short Story
3. Biography
4. Autobiography

UNIT II : POETRY

1. The Lyric
2. The Sonnet
3. The Elegy
4. The Epic
5. The Ode
6. The Ballad

UNIT III : DRAMA

1. Comedy
2. Tragedy & Tragic Comedy
3. One-act play
4. Mystery and Miracle Play
5. The Absurd Drama
6. Monologue

UNIT IV: NOVEL

1. Historical Novel
2. Psychological Novel
3. Stream of consciousness Novel
4. Realistic Novel
5. Science Fiction

UNIT V: LITERARY TERMS

Poetry: Simile, Metaphor, Allusion, Rhyme, Oxymoron, Blank-Verse, Symbolism
Drama: Soliloquy, Climax and Anti-climax, Unity of Time, Place and Action
Prose: Allegory, Didacticism, Fable, Satire, Irony

Books for Study and Reference:

Prescribed text – A Glossary of Literary Terms. M.H. Abrams – Macmillan Publishers India Ltd. (Trinity -Laxmi Publications, Chennai)
Prasad, Birjadish. A Background to the Study of English Literature. Chennai: Macmillan India Press, 2007.Print.
Baldick, Chris. The Concise Oxford Dictionary of Literary Terms, Delhi: OUP, 1990

SEMESTER II

PAPER – 3 – BRITISH LITERATURE I

Objectives:

- To enable the learners to appreciate the versatility and knowledge of the Elizabethan age.

- To enable the students to understand the history and the growth of English Literature.

UNIT I: POETRY (Detailed Study)

Geoffrey Chaucer : The Prologue to Canterbury Tales:

Whan that april with his shoures soote….And eek in what array that they were inne; (1-41lines)

Edmund Spenser : Sonnet 75: One Day I Wrote Her Name upon the Strand

UNIT II : PROSE (Detailed Study)

Francis Bacon : of Adversity, of Beauty, of Honour and Reputation

UNIT III : DRAMA (Detailed Study)

Christopher Marlowe : Dr. Faustus

UNIT IV : POETRY (Non-Detailed Study)

John Donne : The Good Morrow

George Herbert : The Pulley

UNIT V : DRAMA (Non-Detailed Study)

Ben Jonson : Every Man in His Humour

Books for Study and Reference:

Greenblat, Stephen Ed.*The Norton Anthology of English Literature,* Vol B,16th and early 16th century, W.W Norton &Company, Inc., 9th Edition.2012

Marlowe, Christopher. *The Tragical History of Doctor Faustus.*Ed Roma Gill, New Delhi, Bloomsbury Methuen Drama. 2015

Dave, Smita., *Christopher Marlowe.* New Delhi, Arnold Heinemann publishers (India) Private Limited.1974.

Jump, John., *Marlowe: Doctor Faustus.* New York , Palgrave Macmillian. 2007

Ellis-Fermor, Una., *The Jacobean Drama,* London, University Paperbacks.1969

Web Resources

Literary Texts – Prose, Poetry and Fiction:
http://www.library.utoronto.ca/utel/works.html

SEMESTER II

PAPER– 4 - AMERICAN LITERATURE-I

UNIT I- POETRY (Detailed)

Whitman : One's Self I Sing

E.A. Poe : To Helen

Emily Dickinson : I taste a liquor never Brewed

UNIT II- POETRY (Non- Detailed)

Carl Sandburg : Happiness

Robert Frost : Mending Wall

Ezra Pound : The Rest

UNIT III- PROSE (Detailed)

Emerson : The American Scholar

UNIT IV- DRAMA (Detailed)

Eugene O'Neil : The Hairy Ape

UNIT V- FICTION (Non- Detailed)

Herman Melville : Moby Dick (The Whale)

Books for Study and Reference:

Fisher, William J., H. Willard Reninger, Ralph Samuelson, and K. B. Vaid. *An Anthology American Literature of the Nineteenth Century*. S. Chand & Company Ltd. New Delhi, 1955. Print.

Oliver, Egbert S. *An Anthology of American Literature* 1890-1965.S.Chand & Company Ltd. New Delhi, 1967. Print.

Melville, Herman. *Moby- Dick*. Harper & Brothers Publishers. London, 1851. Print.

SEMESTER II

ALLIED - 1 - PAPER - 2 – THE SOCIAL HISTORY OF ENGLAND

UNIT I

1. Tudor England (1485 to 1603)
2. The Renaissance
3. The Reformation and the Counter Reformation

UNIT II

1. Puritanism
2. Restoration England (1660 to 1688): Social Life
3. The Age of Queen Anne (1702 to 1714)
4. The Industrial Revolution and the Agrarian Revolution

UNIT III

1. The effects of the French Revolution on British Life.
2. The Victorian Age (1837 to 1901)
3. The Reform Bills

UNIT IV

1. The Dawn of Twentieth Century
2. Life Between the Two World wars (1919 to 1939)
3. The effects of World War II and the Cold War
4. Life in the Sixties.

UNIT V

1. Life in the Seventies
2. Life in the Eighties
3. The Origin and Growth of Political Parties in England
4. Contemporary Life in England.

Prescribed text

Padmaja Ashok. The Social History of England . Orient Black swan Pvt. Ltd.

SEMESTER III

PAPER –5– BRITISH LITERATURE II

Objectives:

- To expose the students to the Neo-classical tradition in literature
- To enable them to explore the remarkable changes in literary forms
- To train them to comprehend the trends in the literary expression of the period

UNIT I : POETRY (Detailed Study)

John Milton : Paradise Lost Book IV: (Lines 131-287)

So on he fares, and to the border comes…Of living creatures, new to sight and strange

Thomas Gray : Elegy Written in a Country Churchyard

William Blake : The Tyger

UNIT II :

Prose (Detailed Study)

Samuel Johnson : Preface to Shakespeare: His histories, being neither tragedies nor comedies… are to copy nature and instruct life (extract)

Drama (Detailed Study)

Oliver Goldsmith : She Stoops to Conquer

UNIT III : POETRY (Non-Detailed Study)

Andrew Marwell : On a Drop of Dew

John Dryden : A Song for St. Cecilia's Day

UNIT IV: PROSE (Non-Detailed Study)

Joseph Addison : 1. Popular Superstitions
2. Will wimble Selections from 'The Spectator'

UNIT V: FICTION (Non-Detailed Study)

Jonathan Swift : Gulliver's Travels

Books for Study and Reference:

Lynn, Mary Johnson Ed., John E. Grant. *Blake's Poetry and Designs*. Norton Critical Edition. 2004.

Defoe, Daniel. *Robinson Crusoe*. Ed.Pramod K.Nayar.Hyderbad,Orient BlackSwan.2011

Ellis, Frank H. *Twentieth Century Interpretations of Robinson Crusoe*. Spectrum Book. 1969.

Grierson, HJC. *Metaphysical Lyrics and Poems of the Seventeenth Century*. Oxford University. 1972.

The Norton Anthology of English Literature: The Restoration and the Eighteenth Century. Norton. 1962.

Web Resources

Literary Texts – Prose, Poetry and Fiction:
<http://www.library.utoronto.ca/utel/works.html>

SEMESTER III

PAPER –6 – AMERICAN LITERATURE-II

UNIT I-POETRY (Detailed)

E.E.Cummings : Among Crumbling People

Wallace Stevens : Anecdote of a Jar

Sylvia Plath : Mirror

UNIT II- POETRY (Non-Detailed)

William Carlos William : The Yachts

Hart Crane *: from* The Bridge: To Brooklyn Bridge

John Crowe Ransom : Bells For John Whiteside's Daughter

UNIT III- PROSE

Robert Frost : The Figure a Poem Makes

UNIT IV- DRAMA (Detailed)

Tennessee Williams : The Glass Menagerie

UNIT V- FICTION (Non -Detailed)

Ernest Hemingway : The Snows of Kilimanjaro

Books for Study and Reference:

1. Oliver, Egbert S. *An Anthology of American Literature 1890-1965*.S.Chand & Company Ltd. New Delhi, 1967. Print.

2. Thomas, C.T, Ed.*Twentieth Century Verse An Anglo-American Anthology*.Macmillan Publisher India Ltd. Reprinted 2009.

SEMESTER III

ALLIED 2 – PAPER 3 -HISTORY OF ENGLISH LITERATURE I

UNIT I:

The Age of Chaucer - Chapters II & III

UNIT II:

The Development of Drama - Chapters IV & V

UNIT III:

The Age of Shakespeare- Chapters VI, VII & VIII

UNIT IV:

The Age of Milton - Chapters IX & X

UNIT V:

The Age of Dryden -Chapters XI & XII

Prescribed Book: W.H. Hudson: An Outline History of English Literature

Reference: History of English Literature Author: Edward Albert

SEMESTER III

SKILL BASED SUBJECT - PAPER 1 - SKILL FOR EMPLOYMENT I

UNIT - I

Oral Communication Skills Listening & Hearing, Barriers to Everyday Listening

UNIT - II

Workplace Listening, Documentation

UNIT - III

Written Communication skills

UNIT - IV

Reading, Barriers, Reading Strategies

UNIT - V

Ability to Read & follow instructions, giving and Receiving Instructions, Directions, Language of Instructions Transcoding Information graphic Communication, Charts, Tables & Transcoding

Books for Study and Reference:

Communication and soft skills: SP Dhanavel. Orient Blackswan

English & Soft skills: SP Dhanavel. Orient black swan.2010

Essential English : E. Suresh kumar P.Sreehari J. Savithri.2010

G M Sundaravalli, A S Kamalakar, P Kusuma Harinath. Communication and Softskills Vol 1: Orient Blackswan, 2015

English for Competitive examinations: Manamohan Bhatnagar.

SEMESTER III

NON-MAJOR ELECTIVE - PAPER 1 -

LANGUAGE SKILLS AND COMMUNICATION I

(for other departments)

UNIT - I

1. Meeting people

2. Exchanging greetings

3. Introducing, others, giving personal information, taking about people animals and places

UNIT - II

1. Answering telephone, asking for someone
2. Making enquiries on the phone
3. Dealing with wrong number
4. Taking and leaving messages

Books for Study and Reference:

Mastering communication skills and soft skills

N.Krishnaswamy, Manju Dariwal, Lalitha Krishnaswamy(Bloomsbury)

SEMESTER IV

PAPER - 7 - BRITISH LITERATURE III

Objectives:

- To understand the roots of Romantic Literature.
- To familiarize the students with the outstanding writers of the period.

UNIT I: POETRY (Detailed Study)

William Wordsworth : I Wander Lonely as a Cloud

S. T. Coleridge : Time, Real and Imaginary

John Keats : Ode to Autumn

Percy Bysshe Shelly : Ode to a Skylark

UNIT II: PROSE

Charles Lamb : Poor Relations

William Hazlitt : On going a Journey

UNIT III: POETRY (Non-Detailed)

Lord Byron : She Walks in Beauty

Robert Burns : A Red Red Rose

UNIT IV: FICTION

Jane Austen : Pride and Prejudice

UNIT V: FICTION

Walter Scott : Ivanhoe

Books for Study and Reference:

Nayar, k Pramod. *The English Romantic Poets: An Anthology*. Orient Blackswa. 2013

Ed. Hollingworth. *Essays: Hazlitt*. University Tutorial Press Limited.

Scott, Sir Walter. *Ivanhoe*. J.M. Dent and Sons Limited. 1977.

Plowman, Max. *An Introduction to the Study of William Blake*. Atlantic Publishers and Distributors. New Delhi. 1994.

Gill, Stephen. Ed., WU, Duncan. *William Wordsworth Selected Poetry*. Oxford University Press. New York. 2008.

Blunden, Edmund. Ed., *Selected Poems John Keats*. Rupa Publications India Private Limited. New Delhi. 2011.

Jump. D. John, *Byron*. Routledge & Kegan Paul Ltd. U.S.A. 1972.

Bloom, Harold. Ed., *Jane Austen's Pride and Prejudice*. Viva Books Private Limited. New Delhi. 2010.

Web Resources

Literary Texts – Prose, Poetry and Fiction:
<http://www.library.utoronto.ca/utel/works.html>

SEMESTER IV

PAPER 8 - THE HISTORY OF ENGLISH LANGUAGE

UNIT I

Origin of English Language

General Characteristics of the Origin of English language

Indo European family

UNIT II

Shakespeare's Contribution to the Growth of English Language.

Milton's Contribution to the Growth of English Language

UNIT III

The Pronunciation, Spelling & Vocabulary Development

Role of Dictionary in the Marking of English language

Change of Meaning

UNIT IV

Growth of English Vocabulary loan words in Latin, French, Greece and Indian

The Contribution of foreign Languages to English

UNIT V

Differences between British English and American English

The Evolution of Standard English

Prescribed Text:

Outline History of English Language C.L.Wren. Macmillian J.D.O' Connor.

Better English in pronunciation (second edition) .Cambridge

Reference:

F.T. Wood: An Outline History of English Language. Delhi, Macmillan India Limited, 1969.

Krishnaswamy. N. Verma, S.K. Nagarajan. M. Modern Applied Linguistics. Chennai, Macmillan Limited, 2000.

Cruttenden, Alan. Gimson's Pronunciation of English. London, Oxford University Press, 2001.

AC.Baugh. History of English Language

Lalitha Ramamoorthy : A History of English Language & Elements of Phonetics, Macmillan.

Baugh, Albert. C. Cable, Thomas. A History of The English Language. Delhi, Routledge,2000.

Crystal, David. Linguistics. Great Britain, Richard Clay Ltd, 1985

SEMESTER IV

ALLIED 2- PAPER 4 – HISTORY OF ENGLISH LITERATURE II

UNIT 1:

The Age of Pope - Chapters XIII & XIV

UNIT II:

The Age of Johnson - Chapters XV - XVII

UNIT III:

The Age of Wordsworth - Chapters XVIII - XXI

UNIT IV:

The Age of Tennyson - Chapters XXII & XXIV

UNIT V:

The Age of Hardy & the Present Age -Chapters XXV & XXVII

Prescribed Book: W.H. Hudson: An Outline History of English Literature

Reference: Edward Albert: History of English Literature

SEMESTER IV

SKILL BASED SUBJECT - PAPER 2

SKILL FOR EMPLOYMENT II

UNIT -I

Interpersonal Communication

UNIT -II

Information collection - telephone conversation

Encoding & Decoding strategies

UNIT -III

Communication with Employees - Supervisors and customers

Employment Communication goal setting, Written, Spelling & Grammar

UNIT -IV

Job Application and Interview, covering letter, Resume, Interview, Frequently asked Questions

Model Interview

UNIT -V

Polite Behavior in Communication

The Importance of being courteous – Politeness - Body Language - facial language - Eye contact

Books for Study and Reference:

S.P. Dhanavel. Communication and Soft skills. Mainspring Publishers

SEMESTER IV

NON-MAJOR ELECTIVE - PAPER 2 –

LANGUAGE SKILLS AND COMMUNICATION II

(for other departments)

UNIT I

1. Getting people's attention and interrupting
2. Giving instructions and seeking clarification
3. Making requests, Asking for direction and giving directions

UNIT II

1. Inviting, Accepting and refusing invitation
2. Apologising and responding to an apology
3. Congratulating and responding to congratulations
4. Asking for, Giving and refusing permission

Prescribed Text: Kamlesh Sadan and and Susheela Punitha. Spoken English: A Foundation Course (Part I). Orient black swan.2014

SEMESTER V

PAPER 9 -- BRITISH LITERATURE IV

Objectives

- To enable students to analyse literary works through careful study of the Victorian Age.
- To integrate critical sources effectively into their analysis of literature.

Unit I : Poetry (Detailed Study)

Alfred Lord Tennyson : The Lady of Shalott – Part I

Robert Browning : Memorabilia

Dante Gabriel Rossetti : The Blessed Damozel

Unit II : Poetry (Non-Detailed study)

Alfred Lord Tennyson : Ulysses

Gerard Manley Hopkins : God's Grandeur

Christina Rossetti : Remember

Unit III : Prose (Detailed study)

John Henry Newman : The Idea of a University -

If I were asked to describe as briefly and popularly as I could,… how the "gentlemanlike" can otherwise be maintained; and maintained in this way it is.(extract)

Unit IV : Drama

(Detailed study)

Oscar Wilde : Lady Windermere's Fan

(Non-Detailed study)

George Bernard Shaw : Arms and the Man

Unit V : Fiction (Non-Detailed study)

Thomas Hardy : Far from the Madding Crowd

Charles Dickens : Oliver Twist

Books for Study and Reference

Gilbert, J. Garraghan S. J. Prose Types in Newman. New York: Schwartz, Kirwin & Faussi.

Hill, Robert W. Jr. Tennyson's Poetry. New York: W. W. Norton & Co, 2010. Print.

Sen, S. G. M. Hopkins: Selected poems. New Delhi: Unique Publishers, 2008. Print.

Wilde, Oscar. The Importance of being Earnest and Other Plays. United States: OPU, 2008. Print

Steane, J. B. Literature in Perspective: Tennyson. London: Evans Brothers Limited.

Web Resources

Literary Texts – Prose, Poetry and Fiction:
<http://www.library.utoronto.ca/utel/works.html>

SEMESTER V

PAPER 10 - LANGUAGE AND LINGUISTICS

UNIT I

The Origins of Language

The Development of Writing

Introduction to sounds

Words Stress, Strong & weak forms

Sentences stress & intonation, Voice Modulation

UNIT II

The properties of Language

Morphology

Communication process barriers to Communication

Group talk

UNIT III

Phrases and sentence: grammar syntax

Grammar

UNIT IV

Semantics: Language & Mechanics

Non- Verbal Presentation skills public speaking & presentation skills

UNIT V

Language Varieties

Language, Society and Culture

Preparing for Interview

Books for Study and Reference:

George Yule: The Study of Language . Cambridge University Press. 1996
John Lyons: Language and linguistics: An Introduction. (Cambridge)
Spring Board to success: Sharada Kaushik Bindu Bajwa. Orient black swan.2011

SEMESTER V

PAPER 11 - INTRODUCTION TO LITERARY CRITICISM

UNIT I

1. PLATO

Age and Works – View of Art – Attack on Poetry – The Function of Poetry – Comments on Drama – Observations on Style

2. ARISTOTLE

Critical Works and their Nature – The Plan of Poetics – Observations on Poetry – Observations on Tragedy

UNIT II

1. SIR PHILIP SIDNEY

The Writer and his Work - The 'Argument' of his Book – Respect for Rules

2. BEN JONSON

The Critic and his Work – Classicism – The Qualifications of a Poet – Observations on Style

UNIT III

1. JOHN DRYDEN

Critical Works – The Nature of Poetry – The Function of Poetry – Dramatic Poetry

2. ALEXANDER POPE

Critical Work – Classicism – On the Function of Criticism – Remarks on Literature

UNIT IV

1. W. WORDSWORTH

The occasion and Limitations of his Critical Work – concept of poetic diction - Concept of Poetry

2. S. T. COLERIDGE

The Nature of his Critical Work – Theory of Imagination

UNIT V:

1. MATTHEW ARNOLD

Critical Works – Criticism on Poetry – On Criticism

2. T. S. ELIOT

Classicism – True Criticism – Impersonality of Poetry – Other Concepts

Prescribed Book:

B. Prasad. An Introduction to English Criticism. Macmillan. (Trinity:Laxmi Publications).2014

Books for study and Reference

S.Ramaswami V.S.Sethuraman .The English Critical Tradition. An Anthology of English Literary Criticism (Volume I&II)

SEMESTER V

PAPER -12- INDIAN LITERATURE IN TRANSLATION

UNIT I: INTRODUCTION TO TRANSLATION

1. Survey of the History, Growth and role of Translation in India

2. Key concepts in Translation

From Wordworlds: Translation and Communication

UNIT II: POETRY

1. Subramania Bharati	: Wind,9 (113)
2. Chemmanam Chacko	: Rice (148-149)
3. Jyoti Lanjewar	: I Never Saw You (171-175
4. Gaddar	: It Will Not Stop
5. Sahir Ludhianvi	: Let's Weave a Dream

UNIT III: PROSE

1. Rassundari Devi	: Amar Jiban (My Life)The sixth composition (199-202)
2. A.K.Ramanujan	: Telling Tales: Tales have Relatives all over the word Pg 456-462
3. P.Sivakami	: Land: Woman's Breath and Speech
4. Durga Khote	: Memories of the Marathi Stage (1910 -26)
	I had inherited…taking its course Pg 42 - 47

UNIT IV: DRAMA

Girish Karnad	: Tughlaq

UNIT V: FICTION

Shanmugasundaram	:Nagammal

SHORT STORIES

1. R.Chudamani : Does Anyone Care?
2. Prabanchan : Brahma Vriksha
3. Satyam Sankarmanchi : The Flood
4. B.M. Zuhara : Literacy
5. Afrose Sayeeda : Destination Spring

Prescribed Text:

Wordscapes: Indian Literature in Translation, Oxford University Press

SEMESTER V

ELECTIVE PAPER 1 –
JOURNALISM & MASS COMMUNICATION

UNIT-I MASS COMMUNICATION-ORIGIN AND DEVELOPMENT

1. Need for Communication.
2. Types of Communication.
3. Elements of Communication.
4. Barriers of Communication.
5. 7-C's of Communication.
6. Functions and uses of Mass Communication.

UNIT-II JOURNALISM

1. What is Journalism?
2. History of Journalism
3. The Role of the Press
4. Functions of the Press
5. Journalism as a Career
6. Qualification of a Successful Journalist

UNIT-III PRINT MEDIA

1. What is News?
2. Collecting the Fact
3. Reporting the News
4. Editing the News
5. How to write Headlines
6. The News Editor
7. The Sub-Editor

UNIT-IV REPORT WRITING

1. The Reporter
2. The Chief Reporter and other Correspondents
3. The News Editor
4. Feature Writing
5. Writing for the Magazines
6. The Freelance Journalist

UNIT-V ELECTRONIC MEDIA

1. Radio
2. Television
3. The Internet
4. Writing for Radio and Television

Prescribed Texts

1. Vir Aggarwal & V.S.Gupta., **Handbook of Journalism and Mass Communication**, Concept Publishing Company, New Delhi.
2. Puri. G.K. **Competition Success: Review Communication .** New Delhi: Sudha Publication,
3. Roy, Baron, **Beginner's Guide to Journalism**, New Delhi: Pushtak Mahal, 2003.
4. Parthasarathy,Rangaswami, **Basic Jounalism**,Macmillan Publications,New Delhi,1984 Print.

SEMESTER V

ELECTIVE PAPER 1
TECHNIQUES OF TRANSLATION

Unit I
PERSPECTIVES ON TRANSLATION:

Definition of Translation
Equivalence: semantic and stylistic
Rules: description and prescription

Unit II
DEFINITION OF A TRANSLATOR:
Memory,meaning and language
The communication process
The translation process

Unit III
TRANSLATION THEORY:
Theories ,models and analogies
Requirements for a theory of Translation
Methodology;Investigating translation

Unit IV
TRANSLATING:MODELLING THE PROCESS
TheTranslator: Knowledge and Skills
Ideal:Bilingual competence – Expertise - Communicative competence

Unit V
TRANSLATING: THE MODEL
components and processes –Analysis – synthesis
Using the process to translate
Analysis: reading the source language text
Preparation to Translate
Synthesis: writing the target translation text

Prescribed text:
Bell, Roger T.Translation and Translating: Theory and Practice.UK: Longman Group.1991
https://pandoraenglish.files.wordpress.com/2012/11/ebooksclub-org__translation_and_translating__theory_and_practice__applied_linguistics_and_language_study_.pdf

SEMESTER V

SKILL BASED SUBJECT - PAPER 3
CONVERSATIONAL ENGLISH

Unit I

Greeting
Introducing
Inviting someone
Making requests
Seeking permission
Persuading

Unit II

Compliments/Congratulating
Expressing sympathy
Complaining
Apologising
Starting a conversation with a stranger
Ending a conversation

Unit III

Asking for Information
Asking someone to say something again
Checking that you have understood
Asking if someone is able to do something

Unit IV

At the Doctor's
At the bank
Railway enquiry
Looking for Accommodation
In a Government office
At the Greengrocer's

Unit V

Invitation to a party
Talking about a vacation
Seeking admission in a school
Asking about a course
Selling a Product
Getting a book published
An Interview

Prescribed Texts:

Spoken English For You Level 1, RadhakrishnaPillai G,KRajeevan. Emerald Publishers, Chennai

Spoken English For You Level 2, RadhakrishnaPillai G,Emerald Publishers, Chennai

SEMESTER VI

PAPER - 13 - SHAKESPEARE

Objectives:

- To enable the students to read the plays in the light of the critical approaches that has emerged prominent.
- The students will be enabled to review the traditional concepts of genre such as the Tragedy and the Romantic comedy etc.

UNIT I (Detailed Study)

: Macbeth

UNIT II (Detailed Study)

: As You Like It

UNIT III (Non-detailed Study)

The Tempest

UNIT IV SHAKESPEARE CRITICISM I (Non-detailed Study)

Thomas Dequincey : On the Knocking at the gate in Macbeth

(A Book of English Essays. Penguin Books, New Delhi 1992)

William Hazlitt : Character of Shakespeare's Plays

1. Macbeth
2. As You Like It
3. The Tempest

UNIT V SHAKESPEARE CRITICISM II (Non-detailed Study)

Nevill Coghill : The Basis Of Shakespearian Comedy
Part-III: As Shakespeare matured in comedy… the first modification of Vincent's formula for comedy

W.H. Auden : Music in Shakespeare Part VII: Ariel's songs in The Tempest…a place where silence shall be all.

From Ridler,Anne.*Shakespeare Criticism:1935-60*.OUP , London.1965

Books for Study and Reference

Hazlitt, William .*Characters of Shakespeare's Plays*. Oxford University Press, London.1966

Ridler,Anne. *Shakespeare Criticism: 1935-60*. Oxford University Press, London.1965

Charlton H.B. *Shakespearian Comedy*.Methuen & Co.Ltd. London 1969.

Wells, Stanley and Lena Cowen Orlin, *Shakespeare: An Oxford Guide*. Oxford University Press 2003 Newyork.

Edwards, Philip. *Shakespeare and the confines of Art* Methuen & CO.LTD London 1972.

Clemen,Wolfgang. *Shakespeare's Dramatic Art* –Methuen & CO.LTD London 1972.

Dover, John Wilson The Essential Shakespeare –Cambridge University Press 1967 Bennett H.S. Studies in Shakespeare - Oxford University Press 1964 London.

Smith,Emma..The Cambridge Shakespeare Guide, plots, characters and Interpretations. Cambridge University Press.

Rosen,Joseph Blum Ed The Greenwood Companion to Shakespeare. Volume I,II,III,IV Atlantic Publishers – New Delhi 2007.

Kurian,Anna.ed., *Shakespeare.* Orient BlackSwan, 2016

Shakespeare,William. *Macbeth*.The Arden Shakespeare ed., Sandra Clerk and Pamela Mason Bloomsbury,New Delhi. 2015

Shakespeare,William. *A Midsummer Night's Dream*.The Arden Shakespeare ed., Harold F.Brooks Bloomsbury,New Delhi. 2013

SEMESTER VI

PAPER - 14 - BRITISH LITERATURE V

Objectives:

- To give the students knowledge of the literary accomplishments and an exposure to twentieth century writers.
- To familiarize them with the writers of the modern era.

UNIT I: POETRY (Detailed Study)

W. B. Yeats : The Lake Isle of Innisfree

Philip Larkin : Church Going

Wilfred Owen : Insensibility

UNIT II: PROSE (Detailed Study)

George Orwell : Why I Write

D.H. Lawrence : Why the Novel Matters

UNIT III: DRAMA (Detailed Study)

T.S.Eliot : Murder in the Cathedral

UNIT IV: POETRY (Non-Detailed Study)

Dylan Thomas : Fern Hill

W. H. Davis : Leisure

UNIT V

DRAMA

J.M. Synge : Riders to the Sea

FICTION

E. M. Foster : A Passage to India

Virginia Woolf : To the Lighthouse

Books for Study and Reference

David,Green. *The Winged Word*. London: Macmillan, 1974

Viswanathan,Gauri. *Masks of conquest: Literary Study and British Rule in India*.OUP,1998

Sherry,Vincent,ed. *The CambridgeCompanion to the Literature of the First World War*. CUP,2005

Mukherjee, Sipra. *Literary Contexts: Modern English Literature 1890-1960*.Orient BlackSwan,2016

Web Resources

Literary Texts – Prose, Poetry and Fiction:
<http://www.library.utoronto.ca/utel/works.html>

George Orwell – Why I write –Text:
<http://orwell.ru/library/essays/wiw/english/e_wiw>

SEMESTER VI

PAPER -15 -NEW LITERATURES IN ENGLISH

UNIT I: POETRY

Derek Walcott	: A far Cry from Africa
Pablo Neruda	: Tonight I can write…
Margaret Atwood	: Journey to the Interior

UNIT II: DRAMA

Wole Soyinka **:** The Lion and the Jewel

UNIT III: SHORT STORIES

Gabriel Garcia Marquez	: The Handsomest Drowned Man in the World
Nadine Gordimer	: Once Upon a Time
Katherine Mansfield	: Miss Brill
Isabel Allende	: And of Clay re We Created

UNIT IV: PROSE

Ngugi Wa Thiong'o	: On the Abolition of the English Department
Thomas B. Macaulay	: Minute on Indian Education

UNIT V: FICTION

Chinua Achebe	: Things Fall Apart

Books for Study and Reference

Texts and their worlds II.ed., K Naryan chandran. Foundation Books.,Chennai,2005

Ed. Nasta, Susheila. *Writing Across Worlds*. London: Routledge.2004

Punter, David. *Postcolonial Imaginings*: *Fictions of a New World Order*. Atlantic: New Delhi. 2005.

SEMESTER VI

ELECTIVE PAPER 2 -

TECHNOLOGY MEDIATED ENGLISH

Unit 1:

1. World Wide Web & Email: WWW FAQ'S : Email, Internet
2. Searching the Internet & Search FAQ's
3. The Internet as Resource Bank and classroom tool
4. E.Mail Projects and Discussion Lists

Unit 2:

1. Introduction to NET (I)
2. Introduction to NET (II)

Unit 3:

1. Strange news
2. Making news
3. Eco-tourism

Unit 4:

1. Writing Projects
2. Online groups
3. Blogs and Wikis
4. Email projects and discussion lists

Unit 5:

1. A good book
2. Puzzle maker
3. web quest
4. Professional development online

Prescribed Text

The Internet and the Language Classroom – A Practical Guide for Teachers – II Edition – Gavin Dudency , Cambridge University Press, 2007.

SEMESTER VI

ELECTIVE - PAPER 2

BUSINESS ENGLISH

UNIT I

1. Introduction to Business Communication
2. Communication in Organizations

UNIT II

1. Non- Verbal Communication
2. Effective Listening

UNIT III

1. Making presentations
2. Audio - Visual Aids
3. E-Mail Communication

UNIT IV

1. Resumes and cover letters
2. Preparing an Effective cv
3. Group Discussions
4. Interview Techniques

UNIT V

1. Memos, Reports, Proposals
2. Note taking, Note making
3. Inter cultural communication

Books for Study and Reference

N. Krishnaswamy, Manju Dariwal, Lalitha Krishnaswamy.

Mastering communication and soft skills: A Learner's Guide to Life Skills. Bloomsbury. 2015

Om P. Juneja and Aarti Mujumdar Business Communication: Techniques and Methods (Hyderabad: Orient Blackswan Private Limited, 2010.

Sanghita Sen , Alankrita Mahendra , Priyadarshi Patnaik.
Communication & language skills. Cambridge University Press India.2015

SEMESTER VI

ELECTIVE PAPER - 3 COPY EDITING AND PROOF READING

UNIT I: INTRODUCTION TO COPY EDITING

1. What is copy editing?
2. Type Scripts: Hard copy, Electronic and Camera ready
3. Type Scripts corrected by the author
4. Copy editing on Screen

UNIT II: PREPARING THE TEXT FOR THE TYPE SETTER

1. Various legal aspects
2. A well organized and consistent book
3. Copy right permissions and acknowledgements

UNIT III: ILLUSTRATIONS AND PROOFS

1. How to read proofs
2. How to make corrections
3. Colour coding corrections
4. The author's corrected proof
5. After passing proofs for Press

UNIT IV: HOUSE STYLE

1. House Style and Preliminary Pages
2. Cross – references
2. Date and Time
3. Spelling and Punctuation
4. Title page
5. Contents List
6. List of Illustrations

UNIT V: OTHER PARTS OF A BOOK AND LITERARY MATERIAL

1. Running Heads
2. Page numbers
3. Headings
4. Footnotes and Endnotes
5. Tables
6. Appendixes
7. Glossaries

Prescribed Text:

"Butcher's copy Editing" – Fourth Edition – Judith Butcher, Caroline Drake and Marseen Leach – CUP.

SEMESTER VI

ELECTIVE PAPER -3

EFFECTIVE COMMUNICATION

UNIT I- JUST A MINUTE

Planning a speech- Beginning a speech-Transitions-Closing statements- Body language- Voice modulation- Practising a speech- Effective Communication

UNIT II- WRITING SKILLS

Features of good writing – Gathering ideas – Purposes of writing – Writing for a specific audience – Organising ideas – Writing an introduction

UNIT III- CRITICAL THINKING SKILLS

Developing support ideas- Writing a conclusion – Using linkers – Choosing the right words – Common errors in writing – Editing and proofreading

UNIT IV- GROUP DISCUSSION

Group discussion as a tool for selection- Skills for group discussion- Leadership and problem solving skills- Types of group discussions- Group dynamics- Roles and functions: beginning, presenting, elaborating- Roles and functions: agreeing/disagreeing and summarising- Etiquette, body language and time management- group discussion activities

UNIT V- CRITICAL THINKING SKILLS

Reasoning- Analysis- Making an argument- Evaluating an argument- Evaluating alternative points of view- Synthesising and making connection- Interpreting information- Thinking about experiences- Problem solving- Thinking out of the box.

Prescribed Book

Mukhopadhyay, Lina *et* al. Polyskills*: A course in communication skills and life skills.* New Delhi: Cambridge University Press India Pvt. Ltd., 2012.

SEMESTER VI

SKILL BASED SUBJECT - PAPER 4
ENGLISH LANGUAGE TEACHING

UNIT I

Problems & prospects for the teacher of English.

What is involved in teaching English?

UNIT II

The content of the teaching of English

Strategies of techniques for the teacher

Planning the lesson

Methods & Techniques for Teaching

English in large classes- prose

UNIT III

Teaching reading skills: poetry

UNIT IV

Teaching of grammar & Composition

Examinations in English

UNIT V

Non- Verbal Presentation skills

Public speaking & presentation skills

Preparing for Interview

Books for Study and Reference

1. Bright . Mc. Gregor : Teaching English as a second language (Longman)
2. Spring Board to success: Sharada Kaushik Bindu Bajwa
3. Gosh, Sastrie, Dass : Introductions to English Language Teaching vol:3 CIEFL(oup)
4. Nagaraj, Geetha. English Language Teaching. Delhi, Orient Blackswan Private Limited, 2010.
5. Saraswathi. V. English Language Teaching, Principles and Practice. Chennai, Orient Longman, 2004.
6. Willis, Jane. Teaching English Through English. Hong Kong, Sing Cheong Printing co. Ltd, 1984.

THIRUVALLUVAR UNIVERSITY

B. COM., (GENERAL)

Degree Course

CBCS Pattern

(With effect from 2017-18)

The course of study and the scheme of Examination

Semester – I

S. No.	Part	Study Components Course Title	Ins. Hrs. / Week	Credit	Title of the paper	CIA	Uni. Exam	Total
SEMESTER – I								
1	I	Language – I	6	4	Tamil – I / Other Language	25	75	100
2	II	English – I	6	4	English – I	25	75	100
3	III	Core Paper – I	6	4	Financial Accounting – I	25	75	100
4	III	Core Paper – II	4	3	Business Organisation	25	75	100
5	III	Allied – I	6	4	**(To choose one out of 3)** a. Indian Economy – I b. Business Mathematics c. Consumer Protection and Consumer Rights	25	75	100
6	IV	EVS	2	2	EVS	25	75	100
			30	**21**		**150**	**450**	**600**
SEMESTER – II						**CIA**	**Uni. Exam**	**Total**
1	I	Language – II	6	4	Tamil – II / Other Language	25	75	100
2	II	English – II	4	4	English – II	25	75	100
3	III	Core Paper – III	6	4	Financial Accounting – II	25	75	100
4	III	Core Paper – IV	4	3	Elements of Insurance	25	75	100
5	III	Allied – II	6	6	**(To choose one out of 3)** a. Indian Economy – II b. Logistic Management c. Merchant Banking	25	75	100
6	IV	Value Education	2	2	Value Education	25	75	100
7	IV	Soft Skill	2	1	Soft Skill	25	75	100
			30	**21**		**175**	**525**	**700**
SEMESTER – III						**CIA**	**Uni. Exam**	**Total**
1	I	Core Paper – V	6	4	Corporate Accounting – I	25	75	100
2	II	Core Paper – VI	5	4	Business Law	25	75	100
3	III	Core Paper – VII	4	3	Banking Theory, Law & Practice	25	75	100

4	III	Core Paper – VIII	4	3	Business Statistics – I	25	75	100
5	III	Allied – III	6	4	Business Economy – I	25	75	100
6	IV	Skill based Subject - I	3	3	E-Commerce & Its Applications	25	75	100
7	IV	Non-Major - I	2	2	Elements of Accountancy	25	75	100
			30	**23**		**175**	**525**	**700**
SEMESTER – IV						**CIA**	**Uni. Exam**	**Total**
1	III	Core Paper – IX	6	4	Corporate Accounting – II	25	75	100
2	III	Core Paper – X	5	4	Company Law	25	75	100
3	III	Core Paper – XI	4	3	Business Communication	25	75	100
4	III	Core Paper – XII	4	3	Business Statistics – II	25	75	100
5	III	Allied – IV	6	6	Business Economy – II	25	75	100
6	IV	Skill based Subject - II	3	3	Industrial Organisation	25	75	100
7	IV	Non-Major - II	2	2	Advertising and Salesmanship	25	75	100
			30	**25**		**175**	**525**	**700**
SEMESTER – V						**CIA**	**Uni. Exam**	**Total**
1	III	Core Paper – XIII	6	4	Cost Accounting – I	25	75	100
2	III	Core Paper – XIV	5	4	Practical Auditing	25	75	100
3	III	Core Paper – XV	6	4	Business Management	25	75	100
4	III	Core Paper – XVI	6	4	Income Tax Law & Practice – I	25	75	100
5	III	Elective – I	4	3	**(To choose one out of 3)** a. Entrepreneurial Development b. Industrial Relations c. Management Information System	25	75	100
6	IV	Skill based Subject - III	3	3	Principles of Marketing	25	75	100
			30	**22**		**150**	**450**	**600**
SEMESTER – VI						**CIA**	**Uni. Exam**	**Total**
1	III	Core Paper – XVII	6	5	Cost Accounting – II	25	75	100
2	III	Core Paper – XVIII	6	5	Management Accounting	25	75	100
3	III	Core Paper – XIX	6	5	Income Tax Law & Practice – II	25	75	100
4	III	Elective – II	5	3	**(To choose one out of 3)** a. Financial Management b. Business Environment c. Office Management	25	75	100
5	III	Elective – III	4	3	**(To choose one out of 3)**	25	75	100

					a. Human Resource Management b. Financial Services c. Portfolio Management			
6	IV	Skill based Subject – IV	3	3	Computer Application in Business	25	75	100
7		Extension Activities	-	1		100	0	100
			30	**25**		**250**	**450**	**700**

Consolidated statement

Part	subject	Papers	credit	Total credits	Marks	Total Marks
Part - I	Languages	2	4	8	100	200
Part - II	English	2	4	8	100	200
Part - III	Allied (Odd Semester)	2	4	8	100	200
	Allied (Even Semester)	2	6	12	100	200
	Electives	3	3	9	100	300
	Core	19	(3-7)	73	100	1900
Part - IV	Environmental Science	1	2	2	100	100
	Soft Skills	1	1	1	100	100
	Value Education	1	2	2	100	100
	Language & Others / NME	2	2	4	100	200
	Skill based	4	3	12	100	400
Part - V	Extension Activities	1	1	1	100	100
	Total	**40**		**140**		**4000**

THRUVALLUVAR UNVERSITY
B.COM (GENERAL)
SYLLABUS

UNDER CBCS

(With effect from 2017-2018)

SEMESTER – I

CORE PAPER - 1

FINANCIAL ACCOUNTING - I

Objective:

To gain knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Introduction

Meaning of accounting – objectives of accounting – advantages and limitations of accounting- Accounting concepts and conventions - Methods of accounting -Rules of debit and credit- Journal - Ledger accounts– Trial Balance - Errors and their rectification - Rectification of Errors without suspense a/c - Rectification errors with suspense a/c (effect of rectification on profit and rectification during subsequent accounting year are excluded) - Bank Reconciliation Statement.

Unit - II: Depreciation, Provisions and Reserve

Meaning of depreciation – causes for depreciation – need for charging depreciation – Methods of calculating depreciation: straight line method and written down value method (change in method of depreciation is excluded) – Methods of recording depreciation: by charging depreciation to assets account or by creating provision for depreciation account.

Unit - III: Bills of exchange

Meaning of bill of exchange - features and advantages of bill of exchange- types of bill of exchange: Trade bills and accommodation bills - Accounting treatment of trade bills (accommodation bills are excluded).

Unit - IV: Final accounts

Meaning of final accounts – adjustments in preparation of final accounts – preparation of trading, profit & loss account and balance sheet of sole proprietorship concern.

Unit V: Accounts from incomplete records

Meaning of single entry system – features and limitations of single entry system – Distinction between single entry system and double entry system - Methods of calculation of profit: Statement of affairs method and Conversion method – Distinction between statement of affairs and balance sheet.

Note: Questions in section A,B and C shall be in the proportion of 20: 80 between theory and problems

Text books

1. Jain &Narang,Financial Accounting, KalyaniPublishers, New Delhi.
2. T.S. Reddy & Dr. A.Murthy, Financial Accounting, MarghamPublications, Chennai.

Reference books

1. Gupta,R.L&Gupta,V.K,AdvancedAccounting,Sulthan Chand&Sons,NewDelhi.
2. Shukla&Grewal,AdvancedAccounting,S.Chand&Co.NewDelhi.
3. Parthasarathy,S.&Jaffarulla,A.FinancialAccounting,KalyaniPublishers, NewDelhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER- 2

BUSINESS ORGANISATION

Objective:

To gain a knowledge of Business Organization and its importance.

UNIT - I

Business - meaning and types - Profession - meaning and importance of business Organization - Social Responsibilities of Business - Business Ethics.

UNIT - II

Forms of Business organization - sole trader - partnership - joint Hindu family - joint stock companies - co-operative societies - public utilities and public enterprises - Public Sector vs. Private Sector

UNIT - III

Location of industry - factors influencing location - size of industry - optimum firm - advantages of large - scale operation - limitation of small scale operation - industrial estates - district industries centres.

UNIT - IV

Stock Exchange - Function - Types - Working - Regulation of Stock Exchanges in India - Business Combination - Causes - Types - Effects of Combination in India.

UNIT-V

Trade association - Chamber of commerce - Functions - Objectives - Working in India.

Text Books:

1. Y.K.Bhushan, Business organization, Sultan Chand, New Delhi.
2. Business organization & Management, R.N. Gupta, S. Chand & Co. New Delhi.
3. Dr. K. Sundar, Business Organisaion, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books:

1. Prakash&Jagedesh, Business organization & Management.
2. Reddy &Gulshar, Principles of Business Organization & Management
3. Vasudevan&Radhasivam, Business Organization.

ALLIED - 1

(to choose any 1 out of 3)

PAPER - 1

A. INDIAN ECONOMY - I

Objective

To acquire sufficient knowledge about India's Economic features; occupational structure and the relative shares of the different Sectors. Students should know that India is an emerging economic power in the World market.

UNIT-I

Features of less developed and developing Economies. - Economic and Non-Economic factors impeding Economic development - Concept of growth and development - Indicators - Factors in Economic Development.

UNIT-II

Capital Formation - Human and Physical, Savings and Investment pattern since 1991 - National Income - Methods, trends, limitation - Distribution - Recent trends in National Income - Black Money - Corruption.

UNIT-III

Human Resources - Human Resource Development Size and growth of population- Causes,impact-mesaures to controlpopulation-Recent Population Policy.

UNIT-IV

Agriculture - It's Contribution to Economic Development - Food Problems - Methods of solving it - Agricultural productivity - Land Reforms - Green Revolution

UNIT-V

Agricultural labour – Definition – Features- Problems – Remedies Agricultural Credit - Grameen Bank.

BOOKS FOR REFERENCE:

1.	Agrawal, A.N.	:	Indian Economy, Vikas Publishing House, New Delhi.
2.	Alak Ghosh	:	Indian Economy, The World Press, Kolkatta.
3.	Arora, R.C.	:	Integrated Rural Development, S.Chand & Co.,
4.	Arthur Lewis	:	The Theory of Economic Growth.
5.	Arun Ghosh	:	India in Transition, Economic Policy Options, S.Chand & co.,
6.	Bimal Jalan	:	Indian Economic Crisis, Oxford University Press, Chennai.
7.	Bright Singh	:	Economics of Development.
8.	Dewett, Verma & sharma	:	Indian Economics, S.Chand & Co.,
9.	Dhingra, I.C.	:	Indian Economy, Sultan Chand & Co.,
10.	Hajela & Goswami (E.D.)	:	Economic Reforms and Employment, Indian Economic Association, New Delhi.
11.	Jhingan, M.L.	:	Economics of Development & Planning, Konark Publishers , New Delhi.
12.	Kanka, S.S.	:	Human Resource Management, S.Chand & Co.,
13.	Kindle berger	:	Economic Development.
14.	Minhas	:	Planning for the Poor.
15.	Mongia, J.N. (Editor)	:	India's Economic Policies, Allied Publishers
16.	Pndey, B.N.	:	Role of Science & Technology in Rural and Economic Development of India, S.Chand & Co.,
17.	Pramit Chaudhury	:	The Indian Economy, Poverty and Development, Vikas Publishing House, New Delhi.
18.	Pramod Verma	:	Labour Economics and Industrial Relations, Tata McGraw Hill
19.	Ray, S.K.	:	Economics of Development - Prentice Hall of India.

ALLIED - 1

PAPER - 1

B. BUSINESS MATHEMATICS

Objective:

To understand the fundamentals of Business Mathematics.

UNIT-I

Sets: Finite and infinite sets - equality of sets - Disjoint sets - universal set - set operation Union of sets, intersection of sets - difference of sets - complement of sets - venn diagram - De-Morgan's law - Cartesian product.

UNIT-II

Matrices - type of matrices - matrix operation - Determinant of matrix - Singular and Non Singular matrices - adjoint, inverse of matrix - solving simultaneous linear equations - matrix inversion method and method of reduction.

UNIT-III

Co-ordinate geometry - Co-ordinates - distance between two points - straight line - Concurrent lines - slope - intercept from, slope - point from, two points form - angle between straight lines, parallel and perpendicular conditions - simple problems.

UNIT-IV

Simple interest - compound interest - annuities - discount on bills.

UNIT-V

Differentiations - limits - derivatives of standard function x^n, e^x, $\log_x^e$, trigonometric functions - rules of Differentiation - Differentiation on different types of functions - successive Differentiation - maxima and minima - applications in business problems.

Reference Books:

1. S.P.Gupta, Statistical Methods, S.Chand& Co.,
2. P.R. Vittal, Business Mathematics & Statistics, Margham Publishers, Chennai.
3. Chandran&Agarwal, Business Mathematics.
4. Raghavachari, Mathematics for Management,
5. Raja Gopalan and Sattinathan, Business Mathematics, Vijay Nicole Publications, Chennai.

ALLIED - 1

PAPER - 1

C. CONSUMER PROTECTION AND CONSUMER RIGHTS

Objective:

To make students to acquire basic knowledge of consumer laws, consumer rights and consumer welfare and protection.

Unit - I

Introduction of Consumer Protection Act 1986 – Objectives - Consumer Protection Act 2006 (Amendments) – Salient features.

Unit - II

Definitions of the term: - Consumer – Types of Consumer Appropriate authority – Complainant – Consumer dispute – Restrictive Trade Practice.

Unit - III

The various Consumer Rights: - Right to Safety, Right to Information, Right to Choose, Right to be heard – Right against exploitation – Right to Consumer Education.

Unit - IV

Consumer Production Council: - Composition and Powers of National Commission, State Commission and District Consumer Forum.

Unit - V

Redressal of consumer grievances-Goods & Services covered under Consumer Protection Act-Procedure for filing of complaints with District Forum, State Commission , National Commission.

Books for reference

1. Lecture on Torts and Consumer Protection Laws by Dr. Rega Surya Rao – Asia Law House, Hyderabad.
2. Consumer Protection Laws – By Prof. RakeshKhanna – Central – Law Agency.
3. Consumer Protection (Amendment) Act, 2002. S. Chand & Sons.2012.

SEMESTER – II

CORE PAPER- 3

FINANCIAL ACCOUNTING - II

Objective:

To gain a knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Branch accounts

Meaning – objects of branch accounts – accounting in respect of dependent branches: debtors system; stock and debtors system; wholesale branch system and final accounts system - Independent branches – incorporation of branch trial balance in head office books.

Unit - II: Departmental Accounting

Meaning of departments and departmental accounting – Distinction between departments and branches- need for departmental accounting – advantages of departmental accounting - Apportionment of indirect expenses – Inter departmental transfers at cost and selling price - preparation of departmental trading, profit & loss account and balance sheet.

Unit - III: Hire purchase and Instalment purchase systems

Meaning and features of hire purchase system - calculation of interest – books of hire purchaser and books of hire vendor - default and repossession (Hire purchase trading account excluded)

Meaning of instalment system -distinction between hire purchase system and instalment system - calculation of interest – books of buyer and books of seller.

Unit - IV: Partnership accounts (fundamentals and reconstitution of partnership)

Meaning and features of partnership – Partnership deed - calculation of Interest on capital and interest on drawings – preparation of profit & loss appropriation account – preparation of capital accounts (fixed and fluctuating) – admission of a partner – retirement of a partner – death of a partner – treatment of goodwill as per AS 10.

Unit - V: Partnership Accounts (Dissolution of partnership firms)

Dissolution of a firm – insolvency of a partner (Garner Vs Murray rule) – Insolvency of all the partners – Piecemeal distribution: proportionate capital method and maximum loss method.

Note: Questions in section A, B and C shall be in the proportion of 20: 80 between theory and problems.

Text books

1. Jain &Narang ,Financial accounting, Kalyani publishers, New Delhi
2. T.S. Reddy & Dr. A.Murthy, Financial accounting, Margham publications, Chennai

Reference books

1. Gupta,R.L&Gupta,V.K,AdvancedAccounting,Sultan Chand&Sons,NewDelhi.
2. Shukla&Grewal,AdvancedAccounting,S.Chand&Co.NewDelhi.
3. Parthasarathy,S.&Jaffarulla,A.FinancialAccounting,KalyaniPublishers,NewDelhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER- 4

ELEMENTS OF INSURANCE

Objective:

To gain a knowledge of insurance and its importance.

UNIT-I

Definition of insurance - classification of Contracts of insurance - marine and non-marine - general principles of law as applied to non-marine insurance.

UNIT-II

Life Assurance - objects of life Assurance - principles of life Assurance - different plans of life Assurance and annuities - policy condition and privilege - assignment and nomination - lapses and revivals - surrender values and loans - claims - double insurance.

UNIT-III

Marine insurance - principles of marine insurance - functions of marine insurance - proximate clause - subrogation and contribution

UNIT-IV

Types of marine policy - clauses in general use - warranties - kinds of marine losses - reinsurance and double insurance.

UNIT-V

Fire insurance - principles of law as applied to fire insurance - the subject matter of fire insurance - fire waste - hazard types of fire policy - cover notes - surveys and inspection average - re-insurance - renewals.

Text and Reference Books:

1. Dr. B. Vardharajan - Insurance Vol 1 and 2. - Tamil Text Book.
2. R.S. Sharma - Insurance Principle & Practice - Vara Bombay, 2006.
3. A. Murthy - Elements of Insurance Risk management & Insurance - Harrington, 2006 - Tata McGraw Hill pub.

ALLIED - 1

(To choose any 1 out of 3)

PAPER – 2

A. INDIAN ECONOMY - II

UNIT-I

Role of Technology - Information Technology BPO in India - their impact on Economic Development – Cyber Crime.

UNIT-II

Role of industries - Cottage & Small Scale industries - Some Large Scale industries (Cotton, Sugar, Iron & Steel, Tea & Petro Chemical) Industrial Policy - 1991 and after - Public sector Enterprises - Dis-investment and Privatisation.

UNIT-III

Transport - Importance of Transport (Roadways, Railways, Shipping and Civil Aviations) to Economic growth - Evaluation of Government in Policy in relation to privatisation policy - Transport Coordination.

UNIT-IV

Planning in India - Strategy of Indian Planning - Resources for Financing Plan - Agriculture and Industrial Development - Planning techniques - Investment Priorities – General Objectives – Targets, Achievements and Failures – 11^{th} and 12^{th} five year plans- NITIAYOG

UNIT-V

Poverty in India - Poverty Eradication Programmes - Recent Employment scheme-Swaraj Bharat Mission - Role of Micro finance - (SHG, Cottage and Household Sector etc.,) - Regional Development Disparities -India's Foreign Trade and Balance of Payments.

ALLIED - 1

PAPER - 2

B. LOGISTIC MANAGEMENT

Objective:

To understand the comprehensive nature of Logistics Management.

UNIT-I

Logistics - definition - scope - functions - objectives of Logistics Management - customer service and logistics.

UNIT-II

Supply Chain - components - role of logistics in supply chain - Warehousing - functions - types - warehouse layout - material handling and logistics - Inventory Management.

UNIT-III

Transportation - infrastructure - freight management - transportation network - route planning - containerization.

UNIT-IV

Logistical packaging - logistics information needs - logistics design for distribution channels - logistics outsourcing.

UNIT-V

Government policies and regulations - Motor Vehicles Act, carriage by air, sea, multi-modal transportation etc., Documentation - Airway Bill, Railway Receipt, Lorry Receipt, Bill of Lading etc.

Reference Books:

1. Vinod V. Sople, Logistics Management, Pearson Education (Singapore) P. Ltd.,
2. Satis C. Ailawadi, Rakesh Singh, Logistics Management, Prentice Hall of India, New Delhi - 110 001.
3. Ronal H. Ballou, Business Logistics / Supply Chain Management, Pearson Education, Prentice Hall, New Delhi - 2001.

Text Books:

1. Sunil Chopra & Peter Meindi, Supply Chain Management / Strategy, Planning and Operation - Pearson Education Asia, New Delhi.
2. B. S. Sahay, Supply Chain Management for Global Competitiveness, Macmillan India Ltd., Delhi.
3. B. Nanthakumar, Logistic and Supply Chain Management, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

ALLIED - 1

PAPER - 3

C. MERCHANT BANKING

Objective:

To enable the students to understand Merchant banking and its services to corporate sector.

UNIT-I

Merchant Banking – Definitions and Functions – Regulatory Framework – Registration of Merchant Bankers – Procedure Capital Adequacy Requirement – Lead Merchant Banker Appointment, Restrictions and Responsibilities

UNIT-II

Public Issue Management – Functions and Mechanism – Categories of Issue – Issue Manager – Category and Restrictions Activities Involved in Public issue Management – Marketing of New Issues – Methods – Pricing of Rights and Other Public Issues

UNIT-III

Post Issue Management – Allotment / Dispatch of Shares / Refunds – Basis of Allotment – Procedure – Listing Requirements of Stock Exchanges – Advantages – Listing Requirements of OTCEI

UNIT-IV

Capital Market Instruments – Meaning and Types – Commercial Paper – Issue of Commercial Paper – Usance – E-nomiation – Ceiling – Mode of Issue – Credit Syndication – For Long Term and Working Capital

UNIT-V

Port Folio Management – Functions – Registration of Port-folio Managers – Obligation – Investment of Client Funds – Maintenance of Book and Accounts – Reports to be Furnished – Code of Conduct

Text Books:

1. Dr.S.Guruswamy, Merchant Banking and Financial Services, Vijay Nicholes Imprint Pvt. Ltd., Chennai.
2. Dr.V.Balu, Merchant Banking and Financial Services, Sri Venkateswara Publications, Chennai

Reference Books:

1. H.R. Machiraju, Merchant Banking, New Age International, New Delhi.
2. A Treatise on Merchant Banking, Skylark Publications, New Delhi
3. Dr. J.C.Verma, A Manual of Merchant Banking, Bharath Law House, New Delhi.

SEMESTER - III

CORE PAPER- 5

CORPORATE ACCOUNTING – I

Objective:

To gain comprehensive understanding of all aspects relating to corporate accounting.

Unit - I: Share capital

Meaning and types of shares - Issue and allotment of equity and preference shares- issue at par, premium and at discount – calls in advance – calls in arrears – forfeiture of shares – reissue of forfeited shares – redemption of preference shares – underwriting of shares (Determining the liability of underwriters – firm underwriting)

Unit - II: Debentures

Meaning and types of debentures - Issue of debentures at par, premium and at discount – writing off discount on issue of debentures – issue of debentures as collateral security – issue of debentures for consideration other than cash - redemption of debentures – methods – open market buying – conversion of debentures into shares – sinking fund method – insurance policy method.

Unit - III: Acquisition of Business

Meaning of Acquisition of business – accounting treatment – new set of books to be opened - same set of books to be continued – profit prior to incorporation

Unit - IV: Final accounts

Preparation of Statement of profit & loss and Balance sheet (as per revised schedule VI)

Unit - V: Amalgamation, Absorption, External and Internal reconstruction

Purchase consideration – methods - Amalgamation in the nature of merger or purchase – absorption (AS 14). Alteration of share capital – reduction of share capital (scheme of capital reduction is excluded).

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text Books

1. Jain,S.P & Narang,N.L., Advanced Accounting, Kalyani Publications.
2. Reddy T.S.& Murthy,A,Corporate Accounting, Margham Publications, Chennai.

Reference Books

1. Gupta,R.L & Radhaswamy, M, Advanced Accounts, Sulthan Chand, New Delhi.
2. Shukla & Grewal & Gupta, Advanced Accounting, S. Chand & Co., New Delhi.
3. Palaniyappan, Corporate Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER - 6

BUSINESS LAW

Objective:

To gain a comprehensive knowledge on all aspects of law as applied to business.

UNIT-I

Contract - Formation and Essential Elements of Contract – Types of Contract and Agreements – Rules as to offer, Acceptance and Consideration – Capacity to Contract – Lawful Object and Free Consent – Quasi Contract.

UNIT-II

Performance of Contract – Devolution of Joint Rights and Liabilities – Discharge of Contract – Breach of Contract and Remedies.

UNIT-III

Indemnity and Guarantee – Features and Distinctions – Extent of Surety's Liability – Rights and Discharge of Surety – Bailment and Pledge – Features – Difference – Rights and Duties of Bailor and Bailee – Law Relating to Lien and Finder of Lost Goods – Rights and Duties of Pawnor and Pawnee – Pledge by Non-Owner.

UNIT-IV

Contract of Agency – Definition and Meaning – Creation – Ratification and Requisites – Rights of Principal and Agent – Relation of Principal with Third Parties – Personal Liability of Agent – Termination of Agency – Irrevocable Agency.

UNIT-V

Sale of Goods Act 1930 – Definition of Sale – Sale Vs Agreement to Sell – Subject Matter – Express and Implied Conditions and Warranties – Caveat Emptor and Exceptions – Performance of Contract – Transfer of Property – Rights of an Unpaid Seller – Sale by Non-owner – Auction Sale.

Text Books:

1. N.D.Kapoor, Business Laws, Sultan Chand & Sons, New Delhi.
2. R.S.N.Pillai&Bagavathi, Business Laws, S.Chand& Co., New Delhi.

Reference Books:

1. M.C.Dhandapani, Business Laws, Sultan Chand & Sons, New Delhi.
2. M.C.Shukla, Mercantile Law, S.Chand& Co., New Delhi.
3. P.C. Tulsian, Business Laws, Tata McGraw Hill, New Delhi.
4. Dr.N.Premavathy, Business Law, Sri Vishnu Publications, Chennai.
5. Dr.N.Premavathy, Business Law (in Tamil), Sri Vishnu Publications, Chennai.
6. Balachandran. V and Thothadri. R, Business Law, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER - 7

BANKING THEORY, LAW AND PRACTICE

Objective:

To study in detail about the Central Bank and Commercial Banking System including the latest directives and decisions of Reserve Bank of India. To study the recent developments in Indian banking system. To acquire the basic knowledge about the banking transactions.

Unit - I

Origin of banks – Banking Regulation Act, 1949 – Roll of Banks and Economic Development – Central Banking and Role of RBI and their functions - Credit Control Measures of Central Bank.

Unit - II

Commercial Banks – Functions – E-Banking – ATM Cards, Debit cards, Personal Identification Number – Online enquiry and update facility – Electronic Fund Transfer – Electronic Clearing System – Credit Creation and Credit Control – Role of SBI in the Economic Development of India.

Unit - III

Types of Bank Accounts - Savings Account, Current Account - Types of Deposit Account – Fixed and Recurring Deposits Account – Procedure for opening of an Account – Types of customers (Individuals, firms and Companies) – Importance of CRM – Customer grievances and redressal – Ombudsman.

Unit - IV

Negotiable instruments – Promissory Note – Bills of Exchange, Cheque, Draft – Definitions, Features – Crossing – Endorsement – Material Alteration – Dishonour of Cheques – Paying Banker – Rights, Duties and Statutory Protection to Paying Banker – Collecting banker – Rights and Duties.

Unit - V

Principles of lending – Types of Loans – Precautions to be taken by a banker while lending against LIC Policies, Shares, Gold, Silver Ornament and Jewellery.

Text Books:

1. Banking Law Theory and Practice – Sundaram and Varshney – Sultan Chand Co.
2. Banking and Financial Systems – B. Santhanam, Margham Publishers.
3. Banking Law Theory and Practice – S.N. Maheswari – Kalyani Publications.
4. Banking Theory Law and Practice, Dr. S. Guruswamy, 3rd Edition, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books:

1. Indian Banking – Parameswaran – S. Chand and Co.
2. Financial Services – Dr. S. Gurusamy, Tata McGraw-Hill Education India.
3. Banking Theory Law Theory and Practice – Dr. S. Gurusamy, Tata McGraw-Hill Education India.

CORE PAPER - 8

BUSINESS STATISTICS – I

Objective

To understand and apply statistical tools in business.

UNIT-I

Statistics - Definitions - Scope and Limitations - Collection of Data - Primary and Secondary Data - Questionnaire - Classification and Tabulation - Diagrammatic and graphical representation of data.

UNIT-II

Measures of Central tendency - Mean - Median - Mode - Harmonic Mean and Geometric Mean,

UNIT-III

Measures of Dispersion - Range - Quartile deviation - Mean Deviation - Standard Deviation - Coefficient of Variation - Lorenz Curve.

UNIT-IV

Measures of Skewness - Karl Pearson's and Bowlay's Coefficient of Skewness - Kurtosis - Characteristics of Kurtosis - Measures - Calculation.

UNIT-V

Statistical Quality Control - Control Charts - X, P, C, R - Charts - Acceptance sampling only.

(Weightage of Marks = Problems - 80%, Theory - 20%)

Text Books:

1. Dr. S.P. Gupta, Business Statistics & Operation Research - Sultan Chand.
2. PA. Navanitham, Business Statistics & Operation Research, Jai Publications, Trichy.
3. S.P. Rajagopalan& R. Sattanathan, Business Statistics & Operation Research 3rd Edition, Vijay Nicole Publications, Chennai.

Reference Books:

1. Dr. S.P. Gupta, Statistical Methods - Sultan Chand.
2. R.S.N. Pillai&Bhagavathi, Statistics.
3. J.K. Sharma, Business Statistics - Pearson Education.
4. B. Agarwal, Basic Statistics - Wiley Eastern.

ALLIED - 2

PAPER - 3

BUSINESS ECONOMICS – I

UNIT-I

Introduction to Business Economics - Objectives of Business Profit maximization - Social responsibility of Business.

UNIT-II

Demand analysis - Demand schedule - Demand curve - Different types of Elasticity of demand - Measurement - Importance of elasticity of demand.

UNIT-III

Utility analysis - Cardinal - Ordinal - The law of diminishing marginal utility - Equi-Marginal utility - Indifference curve - Break-even analysis - Profit theories and concepts.

UNIT-IV

Demand Forecasting - Different types of Demand Forecasting.

UNIT-V

Production - Production function - The law of variable proportions - Economies of scale, Law of returns to scale.

Reference Books:

Business Economics, K.P.M Sundaram and E.N. Sundaram, Sultan & Chand, New Delhi.

Business Economics, S. Sankaran, Margham Publications, Chennai

Managerial Economics, R.L. Varsheny and K.L. Maheshwari, Sultan & Chand. New Delhi.

Business Economics, H.L. Ahuja, S.Chan

SKILL BASED SUBJECT

PAPER – 1

E-COMMERCE AND ITS APPLICATIONS

Unit - I:

Introduction to E-Commerce – Meaning – Working of E-Commerce – Electronic Business – Categories of E-Commerce Application – Global Trading Environment and Adoption of E-Commerce – Product suitability – Comparison between Traditional and Electronic Commerce – Advantages and Disadvantages of E-Commerce.

Unit - II:

Business Models of E-Commerce – Introduction – Major challenges of B2C E-Commerce – Meaning of B2B Exchange – Development of B2B E-Commerce – Types of B2B Markets – Difference between B2C and B2B Commerce.

Unit - III:

Introduction to E-Hub Concept – Introduction to B2G Concept – E-filing.

Unit - IV:

Internet – Internet Operation – Internet Explorer – Creation of E-mail ID, E-mail etiquettes.

Unit - V:

Web Browsing – Role of Website in B2C E-Commerce, Website strategies and goals. Websites Design Principles for E-Commerce websites.

Text Books:

1. E-Commerce – SrinivasaVallabhan. S.V – Vijay Nicole Imprints Private Ltd., Chennai.

NON-MAJOR ELECTIVE
PAPER – 1
ELEMENTS OF ACCOUNTANCY

Objectives:

To facilitate the non- commerce students to have a basic knowledge in Book-Keeping and Accounting.

Unit - I:

Need for Accounting – Definition (AICPA) – Steps – Objectives — Double Entry System - Meaning of Debit and Credit - Advantages – Limitations – Types of Accounts – Accounting Rules – Accounting Terminology – Accounting Concepts and Conventions – Meaning and Types – Accounting Equation.

Unit - II:

Journal – Ledger Accounts – Trial Balance.

Unit - III:

Subsidiary Books – Meaning – Types (no problems from Bills Receivable Book and Bills Payable Book but only theory) – Advantages over Journal – Ledger Accounts – Trial Balance.

Unit - IV:

Errors – Classification – Rectification (Rectification after the preparation of final account is excluded) – Suspense Account – Meaning and Need.

Unit - V:

Closing and Adjustment Entries – Final Accounts with simple Adjustments.

(Weightage: Theory: 25%, Problems: 75%)

Text Books

1. Jain,S.P & Narang,N.L., Advanced Accounting, Kalyani Publications.
2. Jaya Charulatha and Baskar, Introduction to Accountancy, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books

1. Gupta,R.L&Radhaswamy,M,AdvancedAccounts,SulthanChand,NewDelhi.
2. Shukla&Grewal&Gupta,AdvancedAccounting,S.Chand&Co.,NewDelhi.

SEMESTER – IV

CORE PAPER – 9

CORPORATE ACCOUNTING – II

Objective:

To gain accounting knowledge in advanced corporate accounting.

Unit - I: Valuation of goodwill and shares

Methods of Valuation of Goodwill – Average Profit Method – Super Profit Method – Capitalisation Method.

Methods of Valuation of Shares- Net Assets Method – Yield Method – Fair Value Method.

Unit - II: Liquidation of companies

Order of Payments – Preferential Creditors – Liquidator's Remuneration - Liquidator's Final Statement of Account - Statement of Affairs and Deficiency Account.

Unit - III: Bank and Insurance Company accounts

NPA – Interest on Doubtful Debts – Rebate on Bills Discounted – Preparation of Bank Profit &Loss Account and Balance Sheet.

Life insurance – Ascertaining Correct Assurance Fund –Revenue Account – Valuation Balance Sheet - Profit & Loss account – Balance Sheet (new format).

General Insurance – Revenue Account – Profit & Loss Account – Balance Sheet (new format).

Unit - IV: Holding company accounts

Capital Profit - Revenue Profit - Cost Of Control - Minority Interest– Elimination Of Common Transactions – UnrealisedProfit – Revaluation of Assets and Liabilities – Bonus Shares - Consolidated Balance Sheet (IntercompanyInvestment is Excluded).

Unit - V: Inflation accounting (Accounting for price level changes)

Limitations of Historical Accounting – Meaning of Inflation Accounting – Methods of Inflation Accounting – CPP Method; Gain or Loss on Monetary Items; Valuation of Cost of Sales and Closing Inventory – CCA Method: COSA; MWCA; Depreciation Adjustment; Gearing Adjustment.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text Books

1. Jain,S.P & Narang, N.L., Advanced Accounting, Kalyani Publications.
2. Reddy T.S. & Murthy, A, Corporate Accounting, Margham Publications, Chennai.

Reference Books

1. Gupta,R.L & Radhaswamy, M, Advanced Accounts, Sulthan Chand, New Delhi.
2. Shukla & Grewal & Gupta, Advanced Accounting ,S.Chand & Co., New Delhi.

CORE PAPER - 10

COMPANY LAW

Objective:

To gain knowledge about the company law.

UNIT-I

Introduction – Meaning and Definition of a Company – Characteristics of a Company – Advantages – Limitations – Types of Companies – Distinction between a Private Ltd. Company and a Public Ltd. Company.

UNIT-II

Formation of a Company – Promotion – Functions of a Promoter – Memorandum of Association – Meaning – Contents – Purpose – Articles of Association – Meaning – Contents – Distinction between Memorandum and Articles.

UNIT-III

Prospectus – Meaning – Requirements of a Prospectus – Conditions for a Prospectus – Objects of Issuing a Prospectus – Contents – Statement in Lieu of Prospectus.

UNIT-IV

Members of a Company – Meaning and Definition – Who can become a Member? – Rights of the Members – Liabilities of the Members – Termination of Membership.

UNIT-V

Directors of a Company – Definition – Eligibility to become a Director – Number of Directorships – Appointment of Directors – First Directors – Subsequent Directors – Removal of Directors – Powers, Duties and Liabilities of Directors – Winding up of a Company – Meaning – Methods of Winding up.

Text Book:

1. N.D.Kapoor, Company Law – Sultan & Chand.

Reference Books:

1. Dr.N.Premavathy, Company Law, Sri Vishnu Publications, Chennai.
2. Gaffoor and Thothadri, Company Law, 2nd Edition, Vijay Nicholes Imprint Pvt. Ltd., Chennai.
3. Kathiresan and Radha, Company law – Prasanna Publishers, Chennai.

CORE PAPER - 11

BUSINESS COMMUNICATION

Objective:

To enable the students to know importance of communication in commerce and trade and to draft business letters.

UNIT-I

Business Communication – Meaning – Definition - Features of Business Communication – Importance of effective Communication in Business – Classification of Communication – Characteristics (7cs) and Guidelines of Effective Business Communication.

UNIT-II

Analysis of Business Letters – Basic Principles in Drafting – Appearance, Structure and Layout – Letter Styles.

UNIT-III

Various types of Business Letters – Letters of Enquiry – Offers, Quotations, Orders, Complaints and Settlement, Circular Letters, Status Enquiry – Collection Letters.

UNIT-IV

Letters of Application – Essential Qualities – Letters of Application with CV, Resumes – Application with reference to an Advertisement – Solicited and Unsolicited Letters – Reference Letters.

UNIT-V

Business Report – Importance – Characteristics – Types – Reports by Individuals and Committees.

Text Books:

1. Dr.K.Sundar, Business Communication, Vijay Nicole Publications, Chennai.
2. Rajendra Pal & J S Korlahali, Essentials of Business Communication.

Reference Books:

1. Ramesh and Pattanchetti, Business Communication, R Chand & Co.
2. Dr.N.Premavathy, Business Communication, Sri Vishnu Publications, Chennai.
3. Dr.N.Premavathy, Business Communication (in Tamil), Sri Vishnu Publications, Chennai.

CORE PAPER - 12

BUSINESS STATISTICS – II

Objective

To understand and apply statistical tools in Business.

UNIT-I

Correlation - Definition - Karl Pearson's Coefficient of Correlation - Rank Correlation.

UNIT-II

Regression Equations – Properties of Regression Lines and Coefficients – Standard Error of Estimate.

UNIT-III

Index Number - Definition - Uses - Unweighted Index Number - Simple Aggregate Price Index, Simple Average of Price Relatives Index - Weighted Index - Laspeyre's Paasche, Dorbish Bowley's - Marshall Edge worth, Fisher Ideal Index - Time and Factor Reversal Test - Cost of Living Index.

UNIT-IV

Time Series - Definition and Uses - Components - Semi Average, Moving Average - Method of Least Square - Seasonal Variation - Simple Average Method.

UNIT-V

Probability - Addition and Multiplication Theorem - Permutation and Combination - Baye's Theorem.

(Weightage of Marks = Problems - 80%, Theory - 20%)

Text Books:

1. Dr. S.P. Gupta, Business Statistics & Operation Research - Sultan Chand.
2. PA. Navanitham, Business Statistics & Operation Research, Jai Publications, Trichy.
3. S.P. Rajagopalan& R. Sattanathan, Business Statistics & Operation Research 3rd Edition, Vijay Nicole Publications, Chennai.

Reference Books:

1. Dr. S.P. Gupta, Statistical Methods - Sultan Chand.
2. R.S.N. Pillai&Bhagavathi, Statistics.
3. J.K. Sharma, Business Statistics - Pearson Education.
4. B. Agarwal, Basic Statistics - Wiley Eastern.

ALLIED - 2

PAPER - 4

BUSINESS ECONOMICS - II

UNIT-I

Cost and Revenue analysis - Different types of cost and their relations to each other - Average cost - Marginal cost - Various types of revenue curves short term and long term - Diagrammatic representation.

UNIT-II

Market structure and pricing - Pricing under perfect computation - Pricing under monopoly - Pricing under monopolistic competition.

UNIT-III

Distribution theories - Theories of profits.

UNIT-IV

Government and Business - Industrial Policy - National Income Computation – Concepts of National Income – Methods of Measuring National Income - National Income in India - Contribution.

UNIT-V

Fiscal Economics - Revenues and Public expenditure - Canons of Taxation - Fiscal policy of India.

Reference Books:

Business Economics, K.P.M Sundaram and E.N. Sundaram, Sultan & Chand, New Delhi.

Business Economics, S. Sankaran, Margham Publications, Chennai

Managerial Economics, R.L. Varsheny and K.L. Maheshwari, Sultan & Chand. New Delhi.

Business Economics, H.L. Ahuja, S.Chand.

SKILL BASED SUBJECT - II

PAPER - 2

INDUSTRIAL ORGANIZATION

Objective:

To gain knowledge of the basic industrial structure and its working.

UNIT-I

Meaning of Industrial Organisation – Industrial Revolution – Industrial Growth – Aggregation, Consolidation, Integration - Mass Production – Importance, Advantages, Limitations – Specialisation – division of labour – its advantages and disadvantages – Industrial growth in India – major industries in India – current scenario.

UNIT-II

Industrial ownership – Sole Proprietorship - Features, merits and demerits – partnership - Features, merits and demerits - Joint Stock Company - Features, merits and demerits - Types – Public Ltd and Private Ltd companies.

UNIT-III

Physical facilities – plant location – need for selection of location – stages in selection of location – plant layout – definition, objectives, advantages, types – factors influencing plant layout – tools used for design of plant layout – principles of a good plant layout.

UNIT-IV

Production management – product design – characteristics of a good product design – design of production system – its types – design of work study – motion study – time study - production planning – objectives, levels – production control – factors determining production control operation – functions of production planning and control.

UNIT-V

Materials management – its meaning, objectives, advantages, functions – purchasing-types of purchasing policy – store keeping – organisation of stores department – inventory control – its objectives, functions, benefits.

Text Book:

1. Dr. A. Murthy, Industrial Organisation, Margham Publications, Chennai.

Reference Books:

1. L Bethel, Atwater, Smith and Stackman, Industrial Organisational Management, McGraw Hill.
2. Kimball & Kimball, Principles of Industrial Organisation, McGraw Hill.
3. Lundy, Effective Industrial Management Eurasia Publishing House (Pvt.) Ltd., New Delhi.

NON-MAJOR ELECTIVE

PAPER - 2

ADVERTISING AND SALESMANSHIP

UNIT-I

Origin and Development of Advertising – Objectives – Nature – Functions – Types – Benefits – Difference between Advertising and Publicity – Scope of Advertising – DAGMAR approach.

UNIT-II

Various media of Advertising – Print Media – Newspapers – Magazines – Advantages – Limitations – Radio and TV advertising - Advantages – Limitations.

UNIT-III

Advertisement copy – Characteristics – Clarification – Components – Salesmen Recruitment – Salesmen report – Types – Salesmanship and Psychology.

UNIT-IV

Salesmanship – Characteristics of Salesmanship – Objectives of Personal selling – Advantages – Limitations – Essentials of Effective selling – Advertising and Salesmanship.

UNIT-V

Qualities of Good Salesman – Sales Promotion – Kinds of Sales promotion – Importance of Salesmanship – Types of Salesmen – Methods of Remuneration – Qualities of successful Salesman.

Text Books:

1. Modern Marketing (Principles and Practises) R.S.N. Pillai&Bagavathi, S. Chand & Co. New Delhi
2. Sales and Advertisement Management S Rajkumar, V Rajagopalan, S. Chand & Company Pvt. Ltd.

Reference Books:

1. Advertising (Principles and Practise) Chunawalla K.C. Sethia, Himalaya Publishing House, Delhi.
2. Advertising Management Dr. M.M. Varma, R. K. Agarwal, Forward 300K Depot, New Delhi.
3. Advertising Management Mahendra Mohan, Tata Mcgraw-hill Publishing Company Limited,New Delhi,India.
4. Advertising Marketing and Sales Management G.R. Basotia N. K Sharama, Mangal Deep Jaipur.
5. Essentials of Marketing, Dr. K. Sundar, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

SEMESTER – V

CORE PAPER - 13

COST ACCOUNTING – I

Objective:

To understand the basic concepts and methods of Cost Accounting.

UNIT-I: Nature and Scope of Cost Accounting

Cost Accounting : Nature and Scope – Objectives, Advantages and Limitations – Financial Vs. Cost Accounting - Costing System - Types of Costing and Cost Classification – Cost Sheet and Tenders – Cost Unit – Cost Centre and Profit Centre.

UNIT-II: Material Purchase and Control

Purchase Department and its Objectives – Purchase Procedure – Classification and Codification of Materials, Material Control: Levels of Stock and EOQ – Perpetual Inventory System, ABC and VED Analysis – Accounting of Material Losses.

UNIT-III: Methods of pricing of Material Issues

Cost Price Methods: FIFO, LIFO, Average Price Methods: Simple and Weighted Average Price Methods, Notional Price Methods: Standards Price, and Market Price Methods

UNIT-IV: Labour Cost Control

Labour Turnover: Causes, Methods of Measurement and Reduction of Labour Turnover – Idle and Over Time – Remuneration and Inventive: Time and Piece Rate – Taylor's, Merricks and Gantt's Task – Premium Bonus System – Halsey, Rowan and Emerson's Plans – Calculation of Earnings of Workers.

UNIT-V: Overheads

Classification of Overhead Costs – Departmentalization of Overheads – Allocation Absorption and Appointment of Overhead Costs – Primary and Secondary Distribution of Overheads – Computation of Machine Hour Rate and Labour Hour Rate.

(Weightage of Marks = Problems 80%, Theory 20%)

TEXT BOOKS:

1. T.S. Reddy &Hari Prasad Reddy – Cost Accounting – Margham Publications, Chennai
2. A.Murthy and S. Gurusamy, Cost Accounting 2nd Edition, Vijay Nicole Imprints Private Ltd., Chennai.
3. A.Murthy and S. Gurusamy, Cost Accounting, Tata McGraw-Hill Publishing Company Ltd. New Delhi.
4. Tulsian P.C. – Cost Accounting – Tata McGraw Hills.

REFERENCE BOOKS:

1. S.P.Jain and Narang – Cost Accounting – Kalyani Publishers, New Delhi
2. S.N.Maheswari – Principles of Cost Accounting – Sultan Chand & sons, New Delhi
3. A.Murthy and S. Gurusamy, Essentials of Cost Accounting, Vijay Nicole Imprints Private Ltd., Chennai.
4. S.P.Iyangar – Cost Accounting – Sultan Chand & Sons, New Delhi.

CORE PAPER - 14

PRACTICAL AUDITING

Objective:

To gain knowledge of the principles and practice of auditing.

UNIT-I

Meaning and Definition of Auditing – Nature and Scope of Auditing – Accountancy and Auditing, Auditing and Investigation – Objectives of Auditing – Limitations of Audit – Advantages of Audit – Classification of Audit

UNIT-II

Meaning and Definition of Audit Programme – Advantages and Disadvantages – Audit File, Audit Note Book, Audit Working Papers – Purposes and Importance of Working Papers – Internal Check – Meaning, Object of Internal Check – Features of Good Internal Check System – Auditors duty with regards to Internal Check System – Internal Check and Internal Audit.

UNIT-III

Vouching – Meaning – Objects – Importance of Vouching – Meaning of Voucher – Vouching of Cash Receipts and Vouching of Cash Payments – Vouching of Trading Transactions.

UNIT-IV

Verification and Valuation of assets and liabilities – Meaning and objects of verification – Vouching and verification – Verification and Valuation of different kinds of Assets and Liabilities.

UNIT-V

The Audit of Limited Companies – Necessity of Company Audit – Qualification and Disqualification of Auditors – Appointment – Removal – Remuneration – Status of Auditors – Rights – Powers – Duties and Liability of Auditors – Auditor's Report – Importance and Contents.

Text Books:

1. B.N. Tandon, Sultan Chand – A handbook of practical auditing
2. B.N. Tandon, Sudharsanam, Sundharabahu – S Chand – Practical auditing.
3. Sundar. K and Pari. K, Vijay Nicole Imprints Private Ltd., Chennai.

Reference Books:

1. Sharma, SahityaBhavan, Agra – Auditing
2. Dr.N.Premavathy, Practical Auditing, Sri Vishnu Publications, Chennai.
3. Dr.N.Premavathy, Practical Auditing (in Tamil), Sri Vishnu Publications, Chennai.

CORE PAPER - 15

BUSINESS MANAGEMENT

Objective:

To understand the basic principles of Business Management.

UNIT-I

Management – Meaning – Definition – Nature – Importance – Distinction between Administration and Management – Scope – Principles and Functions of Management.

UNIT-II

Planning – Meaning – Nature – Importance – Advantages and Limitations – Process of Planning – Types of Plans – MBO – Forecasting – Decision Making.

UNIT-III

Organising – Meaning – Definition – characteristics – Importance – Types – Authority and Responsibility – Centralisation and Decentralisation and Departmentation.

UNIT-IV

Directing – Meaning – Definition – Characteristics – Directing Process – Span of Supervision – Motivation – Leadership - Communication.

UNIT-V

Controlling – Definition – Principles – Controlling process – Types of Controls – Control Techniques - Coordination.

REFERENCE BOOKS:

1. Dr. C.B. Gupta, Business Management –Sultan Chand & Sons
2. Jayashankar, Business Management –Margham Publications, Chennai.

REFERENCE BOOKS:

1. Koontz, Weihrich and Aryasri, Principles of Management, Tata McGraw hill
2. Dr.H.C. Das Gupta, Principles & Practice of Management & Sahitya Bhawan. Agra
3. Lallan Prasad & S.S.Gulshan, Management principles and Practices & S.Chand & Co.
4. Dr.N.Premavathy, Principles of Management, Sri Vishnu Publications, Chennai.

CORE PAPER - 16

INCOME TAX LAW AND PRACTICE - I

Objective:

To enable the students to have a knowledge of law of practice of Income tax.

Unit - I: Introduction

Income Tax Act 1961- Basic Concepts – Assessment Year – Previous Year – Person – Assessee – Income – Gross Total Income – Total Income - Agricultural Income – Casual Income – Capital and Revenue Receipts – Capital and Revenue Expenditures – Exempted Incomes u/s 10.

Residential status of an individual- Residential status of a HUF – Residential status of a firm and association of persons – Residential status of a company – incidence of tax liability.

Unit - II: Salaries

Meaning and features of Salary – Allowances – Perquisites – Profits in lieu of Salary – Provident Fund and its types – payments exempted u/s 10: Leave travel concession; gratuity; pension; leave encashment; retrenchment compensation; VRS – Deductions from salary: EA and professional tax- deduction u/s 80C- taxable salary

Unit - III: Income from House Property

Annual value – Determination of annual value- Income from let out house property – Income from self-occupied house property – Deductions allowed from Income from house property u/s 24.

Unit - IV: Profit and Gains of Business or profession and depreciation

Meaning of business and profession – deductions expressly allowed – expenses expressly disallowed – treatment/ admissibility of certain expenses and incomes – income from business- income from profession.

Meaning of depreciation – conditions for depreciation – actual cost – written down value – computation of allowable depreciation.

Unit - V: Income tax authorities

CBDT – powers – Director General of income tax – Chief commissioner of income tax – Assessing officer – appointment – Jurisdiction – powers relating to search and seizure.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text books

1. Gaur & Narang, Income Tax Law & Practice, Kalyani Publishers.
2. Dr. A. Murthy, Income Tax Law & Practice, Vijay Nicole Imprints Pvt.Ltd. Chennai
3. Reddy,T.S. & Hariprasad Reddy,Y, Income Tax Theory, Law&Practice, Margham Publications, Chennai.

Reference books

1. Mehrotra -Income Tax Law & Accounts, Sahithiya Bhavan Publications.
2. Vinod,K.Singhania, Students Guide to Income Tax,Taxman Publications Pvt. Ltd.

ELECTIVE

(To choose any 1 out of 3)

PAPER - 1

A. ENTREPRENEURIAL DEVELOPMENT

Objective:

To encourage students to become entrepreneurs.

UNIT-I

Meaning of Entrepreneur – Entrepreneur and Enterprise – Entrepreneur and Manager – Entrepreneur and Intrapreneur – Qualities (Traits) of True Entrepreneur – Characteristics of Entrepreneur – Types of Entrepreneurs – Functions of an Entrepreneur – Roles of Entrepreneurs in the Economic Development.

UNIT-II

Establishing an Enterprise – Project Identification – Selection of the Product – Project Formulation – Assessment of Project Feasibility – Preparation of Project Report – Selection of Site (Location).

UNIT-III

Selection of Types of Organization – Sole Proprietorship – Partnership Joint Stock Company – Factors Influencing the Choice of Organization – Sources of Project Finance – Sources of Long Term Finance – Sources of Short Term Finance.

UNIT-IV

Incentives and Subsidies – Meaning of Incentives and Subsidies – Need and Problems – Incentives for Development of Backward Area – Incentives for SSI Units in Backward Areas – Taxation Benefits to SSI Units – Subsidies and Incentives in Tamil Nadu.

UNIT-V

Women Entrepreneurs – Concept – Functions and Role – Problems of Women Entrepreneurs – Suggestions for Development of Women Entrepreneurs – Rural Entrepreneurship – Need – Problems – How to Develop Rural Entrepreneurship.

Text Books:

1. C.B. Gupta, Entrepreneurship development in India – Sultan Chand.
2. Gupta C.B and Srinivasan N.P. Entrepreneurial Development, Sultan Chand & Sons, New Delhi.

Reference Books:

1. P Sarvanavel, Entrepreneurial development – Ess Pee kay Publishing House.
2. S.S. Khanka, Entrepreneurial Development, S. Chand & Co., New Delhi.

ELECTIVE

PAPER - 1

B. INDUSTRIAL RELATIONS

Objective: To enable the students to learn the concepts of Industrial Relations including trade unions, collective bargaining and various labour enactments.

Unit - I: Industrial Relations (IR)

Concept of Industrial Relations; Nature of Industrial Relations; Objectives of IR; Factors affecting IR in changing Environment, Evolution of IR in India; Role of State; International Dimensions of IR.

Unit - II: Trade Union

Trade Union: Origin and growth, unions after Independence, unions in the era of liberalization; Factors affecting growth of Trade Unions in India, Major Provisions of Trade Union Act 1926.

Unit - III: Collective Bargaining and Worker's Participation in Management

Collective Bargaining: Meaning, Nature, Types, Process and Importance of Collective Bargaining Status of Collective Bargaining in India, Functions and role of Trade Unions in Collective bargaining.

Workers' Participation in Management: Consent, practices in India, Works Committees, Joint management councils; Participative Management and co-ownership; Productive Bargaining and Gain Sharing.

Unit - IV: The Industrial Disputes Act, 1947:

Definitions of Industry, workman, and Industrial Dispute; Authorities under the Act; Procedure, Powers and Duties of Authorities; Strikes and Lock outs; Lay-off and Retrenchment; Provisions relating to Layoff, Retrenchment, and closure.

Unit - V: The Factories Act, 1948:

Provisions relating to Health, Safety, Welfare facilities, working hours, Employment of young persons, Annual Leave with wages.

Text Books:

1. B. Nandhakumar, *Industrial Relations and Labour Welfare and Labour Laws* - Vijay Nicole Imprints Private Ltd., Chennai.
2. JP Sharma, *Simplified Approach to Labour Laws*, Bharat Law House (P) Ltd.

Reference Books:

1. PK Padhi, *Industrial Relations and Labour Law*, PHI Learning.
2. ArunMonalppa, *Industrial Relations and Labour Law*, McGraw Hill Education.
3. SC Srivastav, *Industrial Relations and Labour Law*, Vikas Publishing House.
4. C.S. VenkataRatnam, *Industrial Relations*, Oxford University Press.
5. P.L. Malik's *Handbook of Labour and Industrial Law*, Vol 1 and Vol 2, Eastern Book Company.

ELECTIVE

PAPER – 1

C. MANAGEMENT INFORMATION SYSTEM

Unit-I:

Management Information – Meaning of Information – Information needs of Managers – Web Data basis – Data warehousing – Knowledge management – Information system for decision making.

Unit-II:

Types of Information System – Transaction Processing System – Office Automation System – Decision Support System – Executive Support System – MIS – Evolution of MIS – Computer and MIS.

Unit-III:

System Analysis – System Planning and Mutual Investigation – System Design - The Process and Stages of System Design – Input / Output forms Design – File Organisation – System Implementation.

Unit-IV:

Management Information Needs and Communication links for Marketing system, Production System, Accounting System, Manufacturing System, Inventory Control System and Budget Control System - IS Organisation – Top Management Responsibility – Processing Group Responsibility.

Unit-V:

Development – Maintenance of MIS – Operation of manual Information System –Role of Computer in MIS – Data base Concept – Expert Systems – System Audit.

Text Book:

1. M. Assam – Fundamentals of Management Information System – Vijay Nicole Imprints Private Ltd., Chennai.
2. Effy Oz, "Management Information Systems", Second edition, Thomson Learning Course Technology, 2002.
3. Jawadekar W.S, "Management Information Systems", Tata McGraw Hill Publishing Company Ltd, 2002.
4. Kenneth.CLaudon and Jane P. Laudon, "Management Information Systems", Prentice Hall of India Ltd, 2002.

Reference Books:

1. David Knoenke (1989), "Management Information Systems", Tata McGraw Hill, New Delhi.
2. Iandon K.C and Landon J.P (2001), "Management Information Systems', Maxwell Macmillan Publishing Company.
3. Murdic Rose and Elaggett, "Information System for Modern Management, Prentice Hall.
4. Robert Schultheis, Mary Sumner, "Management Information Systems" – The Manager's View, Fourth edition, Tata McGraw Hill Edition, 1999

SKILL BASED SUBJECT

PAPER - 3

PRINCIPLES OF MARKETING

Objective:

To enable the students to understand the concept and importance of marketing and the developments that have taken place in the field of marketing in the global scenario.

Unit - I Introduction

Meaning of market – classification of markets- meaning and definition of marketing- features of marketing – importance of marketing – difference between marketing and selling – Evolution of marketing concepts - functions of marketing.

Unit - II Market Segmentation and Consumer Behaviour

Meaning and definition of market segmentation – different patterns of market segmentation – Bases for segmenting consumer markets – benefits and limitations of market segmentation

Definition of consumer behaviour - consumer behaviour theories - factors determining consumer behaviour.

Unit - III Marketing Mix and Product policy

Definition and components of marketing mix - four P's of marketing mix - definition of product - features of a product - classification of products - stages in new product development - product life cycle – Branding – advantages of branding a product - packaging – functions of package – labelling – functions of labelling – kinds of labels.

Unit - IV Pricing policy, Channel of distribution and Promotion Mix

Meaning of price – factors affecting price decision – Types of pricing strategies - definition of channel of distribution – features of marketing channels – types of Channel of distribution - factors determining Channel of distribution - functions of wholesalers – types of retailers – promotion mix – Advertising – types of advertising – personal selling – qualities of a good salesman – sales promotion – kinds of sales promotion.

Unit - V Recent trends in Marketing

Social marketing – De-marketing – Re – marketing – Over marketing – Meta marketing – E- Marketing – online retailing – shopping malls.

Text Books:

1. Rajan Nair, Marketing, Sultan Chand & Sons , New Delhi
2. Varshney, Marketing Management, Sultan Chand & Sons , New Delhi.

Reference Books:

1. Jaisankar, Marketing, Margham Publications, Chennai
2. L. Natarajan, Marketing, Margham Publications, Chennai
3. Dr. K. Sundar, Essentials of Marketing, Vijay Nicole Imprints Private Ltd., Chennai.

SEMESTER – VI

CORE PAPER - 17

COST ACCOUNTING II

Objective:

To understand the basic concepts and methods of Cost Accounting.

UNIT-I

Job, Batch, Contract Costing: Job Costing – definition – Features – Procedure – WIP – Cost Accumulation, Batch Costing – EBQ, Contract Costing – Definition, Features, Work Certified and Uncertified – Incomplete Contact – Escalation Clause – Cost Plus Contract – Contract Account

UNIT-II

Process Costing : Definition – Features – Job Vs Process Costing – Process Account – Losses – By Products and Joint Products – WIP – Equivalent Units and its Calculation - Closing WIP with or without Process Loss.

UNIT-III

Operating Costing (Transport Costing): Cost Unit – Cost Classification – Operating Cost sheet.

UNIT-IV

Marginal Costing: Definition – Advantages and Limitation – Break Even Point – Margin of Safety – P/V Ratio – Key factor – Make or Buy Decision – Selection of Product Mix – Changes in Selling Price – Foreign Market Offer – Desired Level of Profit.

UNIT-V

Reconciliation of Cost and Financial Accounts.

(Weightage of Marks = Problems - 80%, Theory - 20%)

TEXT BOOKS:

1. T.S. Reddy &Hari Prasad Reddy – Cost Accounting – Margham Publications, Chennai
2. A.Murthy and S. Gurusamy, Cost Accounting 2nd Edition, Vijay Nicole Imprints Private Ltd., Chennai.
3. A.Murthyand S. Gurusamy, Cost Accounting, Tata McGraw-Hill Publishing Company Ltd. New Delhi.
4. Tulsian P.C. – Cost Accounting – Tata McGraw Hills.

REFERENCE BOOKS:

1. S.P.Jain and Narang – Cost Accounting – Kalyani Publishers, New Delhi
2. S.N.Maheswari – Principles of Cost Accounting – Sultan Chand & sons, New Delhi
3. S.P.Iyangar – Cost Accounting – Sultan Chand & Sons, New Delhi.

CORE PAPER - 18

MANAGEMENT ACCOUNTING

Objective:

To enable the students to gain knowledge in the application of accounting to Management.

UNIT-I

Management Accounting: Definition – objectives - Functions – Advantages and limitations – Financial Statement Analysis – Comparative and Common size statements – Trend Analysis.

UNIT-II

Ratio Analysis : Definition – Significance and Limitations – Classification – Liquidity, Solvency, Turnover and Profitability ratios – Computation of Ratios from Financial Statements – Preparation of Financial Statement from Ratios.

UNIT-III

Fund Flow and Cash Flow Analysis: Concept of Funds, Sources and Uses of Funds – Fund Flow Statement – Concept of Cash Flow – Cash Flow Statement as Per AS3.

UNIT-IV

Standard Costing – Variance Analysis – Material – Labour – Overheads – Fixed - Variable Sales Variance.

UNIT-V

Budget and Budgetary Control: Definition – Objectives – Essentials – Uses and Limitations – Preparation of Material Purchase, Production, Sales, Cash and Flexible Budget – Zero Base Budgeting.

(Weightage of Marks - Problems - 80%, theory - 20%)

Reference Books:

1. S.N.Maheswari, Management Accounting – Sultan Chand & Sons, New Delhi.
2. A.Murthy and S.Gurusamy, Management Accounting, Tata Mc-Graw Hill Publishing Company, New Delhi.

Reference Books:

1. Manmohan&Goyal, Management Accounting – SahithiyaBhavan, Agra.
2. S.P.Gupta, Management Accounting – Sultan Chand & Sons, New Delhi.
3. R.S.N.Pillai&Bhagavathi, Management Accounting – S.Chand& Co. Ltd., New Delhi.
4. T.S.Reddy&Hari Prasad Reddy, Management Accounting – Margham Publications, Chennai.

CORE PAPER - 19

INCOME TAX LAW AND PRACTICE – II

Objective:

To enable the students to have a knowledge of law of practice of Income tax.

Unit I: Capital gains

What are capital assets? – what are not capital assets? – kinds of capital assets – transfer u/s 2 (47) – cost of acquisition – cost of improvement – computation of short term capital gain - computation of long term capital gain – exemptions from capital gains.

Unit II: Income from other sources

Specific incomes chargeable to tax – general incomes chargeable to tax – Interest on securities – Interest exempt from tax u/s 10 (15) - deductions allowed from Income from other sources – computation of income from other sources.

Unit III: Clubbing of Incomes and Set off and carry forward of losses

Income transfer without asset transfer – cross transfer –transfer for the benefit of son's wife – capital gain on an asset gifted before marriage – gifted money used for construction of house by spouse – income including losses – clubbing of business income – clubbing of minor's income – computation of total income.

Provisions relating to set off of losses- Provisions relating to set off and carry forward of losses – unabsorbed depreciation – order of set off – computation of total income.

Unit IV: Agricultural Income and Deductions from gross total income

Meaning of agricultural income – types of agricultural income – income from growing and manufacturing rubber - income from growing and manufacturing coffee - income from growing and manufacturing tea – income of a sugar mill growing its own sugarcane – computation of tax of an assessee having agricultural income.

Permissible deductions from gross total income – section 80C, 80CCC, 80CCD, 80D, 80DD, 80DDB, 80E, 80G, 80GG, 80GGA, 80QQB, 80RRB, 80U.

Unit V: Assessment of Individuals and Assessment procedures

Sources of income of an individual – computation of total income and tax liability of an individual.

Filing of returns – permanent account number (PAN) –Usage of PAN – TDS - types of assessment – self assessment – Best judgement assessment – Income escaping assessment (reassessment) – Advance payment of tax

Note: Questions in Sec .A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text books

1. Gaur & Narang, Income Tax Law & Practice, Kalyani Publishers.
2. Murthy.A, Income Tax Law & Practice,Vijay Nicole Imprints Pvt. Ltd. Chennai
3. Reddy,T.S.& Hariprasad Reddy, Y, Income Tax Theory, Law & Practice, Margham Publications, Chennai.

Reference books

1. Mehrotra-Income Tax Law & Accounts, Sahithiya Bhavan Publications.
2. Vinod,K.Singhania, Students Guide to Income Tax, Taxman Publications Pvt.Ltd.

ELECTIVE

PAPER - 2

A. FINANCIAL MANAGEMENT

UNIT-I

Nature and Importance of Finance Functions – Organizing Finance Functions – Functions of Finance Manager – Objectives of Finance Function – Methods and Sources of Raising Finance – Critical Appraisal of the Various Sources of Finance.

UNIT-II

Goals of Finance Function – Financing Decisions – Financial Planning – Financial Forecasting – Capital Structure Decisions – Capitalization – Cost of Capital – Dividend Policy

UNIT-III

Investment Decisions – Estimation of Cash Flows – Evaluation of Alternative Investment Proposals like NPV, ARR, IRR Methods – Decision Making Under Risk and Uncertainty – Inflation and Investment Decisions

UNIT-IV

Working Capital – Gross and Net Working Capital – Determinants of Working Capital – Sources of WC – Credit and Collection Policies.

UNIT-V

Security Analysis and Portfolio Management - Leverages – Financial Ratio Analysis.

(Weightage of Marks = Problems - 60%, Theory - 40%)

Reference Books:

1. Dr. S.N.Maheswari, Financial Management, Sultan Chand & Sons, New Delhi.
2. Dr. A.Murthy, Financial Management, Margham Publications, Chennai.
3. Dr. J. Srinivasan, Sridhar and Ramalingam, Financial Management, Vijay Nicole Imprints Pvt .Ltd. Chennai

Reference Books:

1. I.M.Pandey, Financial Management.
2. Prasanna Chandra, Financial Management.
3. Subirkumar Banerjee, Financial Management.
4. Vyuptakesh Sharan, Fundamentals of Financial Management.
5. Dr .N. Premavathy, Financial Management, Sri Vishnu Publications, Chennai.

ELECTIVE

PAPER - 2

B. BUSINESS ENVIRONMENT

UNIT-I

The concept of Business Environment - Its nature and significance - Brief overview of political - Cultural - Legal - Economic and social environments and their impact on business and strategic decisions.

UNIT-II

Political Environment - Government and Business relationship in India - Provisions of Indian constitution pertaining to business

UNIT-III

Social Environment - Cultural heritage - Social attitudes - impact of foreign culture - castes and communities - Joint family systems - Linguistic and Religious groups - Types of Social Organization

UNIT-IV

Economic Environment - Economic Systems and their impact of Business - Macro Economic Parameters like GDP - Growth Rate - Population - Urbanization - Fiscal deficit - Plan investment - Per capita Income and their impact on business decisions

UNIT-V

Financial Environment - Financial System - Commercial banks - RBI - IDBI - Non-Banking Financial Companies NBFC's

Text Books:

1. Dr. S. Sankaran - Business Environment. Margham Publications, Chennai
2. Aswathappa - Business Environment, Himalaya Pub. House, 2009.

Reference Books:

1. Dasgupta and Sengupta - Government and Business in India.
2. Srinivasan K - Productivity and Social Environment.
3. International Business Environment - Prentice - Hall of India.
4. Dhana bakiyam & M. Kavitha, Business Environment, Vijay Nicole Imprints Pvt .Ltd. Chennai.

ELECTIVE

PAPER - 2

C. OFFICE MANAGEMENT

UNIT-I

Meaning and scope -Function and qualifications of Office Manager -Poor and good organization Departments -Flow of Work -Organization Charts and manual

UNIT-II

Administrative arrangements and physical conditions - Centralization and Decentralization of Office services - Office Accommodation and Layout -Office Furniture - Meaning of Various terms - Basic pattern of work -Sub-division - Standardization and Standards - Work Measurement and control

UNIT-III

Office equipments - Reproduction equipments - Typewriter - Duplicators - Photo Copier - Franking Machine - Communication Equipments - Dictaphone - Intercom - Telephone - Telex - Teleprinters - PABX - PBX - STD - Storage equipments - Filling Cabinets - Time Clocks - Use of Computers in Office Management

Office System - Procedure - Routine - And methods - Paper work in office Filling functions - essentials of good filling systems - Central vs. Departmental Filling classification - Methods of filling Old and Modern - Micro filing - Indexing Types.

UNIT-IV

Mail service and communication - Office Correspondence - Central vs. Departmental Correspondence - Handling Mail - Postal Services - Postbag and Post Box Numbers - Registered and Insured Posts - VPP Communications - Oral written - Internal and external communication - Records Management Types - Forms Controls - Principles - Foremost - Continuous stationery

UNIT-V

Office Supervisor - Meaning and characteristics of Supervisor - Status - Place and Role of Supervisor - Effective Supervisor - Qualification - Knowledge and skill of Supervisor.

Text Books:

1. Pillai R.S.N, Bhagwathi. V - Office Management, S.Chand, New Delhi.
2. Arora SP - Office Management, Vikas Publications Pvt. Ltd., Chennai.

Reference Books:

1. Dr.T.S. Devanarayan, N.S.Raghunathan - Office Management.
2. Balachandiran. V and Chandrasekaran, Office Management, Vijay Nicole imprints Private Limited, Chennai.

ELECTIVE

(To choose any 1 out of 3)

PAPER - 3

A. HUMAN RESOURCE MANAGEMENT

Objective:

To enable the students to recognize that the Human beings are the important assets in the organisation and to replace the term personnel by Human Resource Management.

To make the students to acquire knowledge about the development of Human Resource Managementwhich is crucial for quality productivity and growth.

UNIT-I

Nature and scope of HRM – personnel Management and HRM – Functions of HRM – Functions of HR Manager – HRM as a profession – Indian perspective

UNIT-II

Human Resource Planning – Recruitment – Selection – Methods of Selection – Use of Various tests – Interview techniques in selection – Induction - Placement

UNIT-III

Training methods – Techniques – Identification of training needs.

UNIT-IV

Job satisfaction – Motivation (Maslow's and Two Factor Theory only) – Performance Appraisal – Methods – Compensation – Incentives – Monetary and Non-Monetary

UNIT-V

Transfer – Promotion and Termination of Services – Career Development - Monitoring

TEXT BOOKS:

1. Dr.K.Sundar&Dr.J.Srinivasan, Human Resource Management, Vijay Nicole Publications, Chennai.
2. C B Gupta, Human Resource Management, S.Chnd, New Delhi.
3. Aswathappa, Human Resource and Personnel Management, Vikas Publications Pvt. Ltd., Chennai.

REFERENCE BOOKS:

1. Dr.K.Sundar & Dr.J.Srinivasan, Human Resource Development, Margham Publications, Chennai.
2. J. Jayasankar, Human Resource Management, Margham Publications, Chennai.
3. Dr. N. Premavathy, Human Resource Management & Development, Sri Vishnu Publications, Chennai.

ELECTIVE

PAPER - 3

B. FINANCIAL SERVICES

Objective:

To enable the students to gain knowledge of business financial services.

UNIT-I

Financial services – meaning – Financial services and economic environment – legal and regulatory framework – financial institutions and other participants in the financial services sector – capital and money markets – Instruments – Government – Securities market – SWAP Analysis

UNIT-II

Introduction to leasing – legal and tax aspects – lease evaluation – Merits and Demerits – Accounting and Reporting for Lease – lease funding – Types of lease – Lease agreement – Hire purchase Vs lease – Legal aspects of Hire purchase – rights and duties of hire vendor and hire purchaser.

UNIT-III

Factoring – Types and feature of factoring agreement – Factoring Vs Bills discounting – Services of factor – Consumer Finance and credit card services – forfeiting.

UNIT-IV

Venture capital – meaning and characteristics – criteria for assistance – schemes and guidelines – infrastructure financing – assessment of risk – legal aspects.

UNIT-V

Mutual funds – SEBI Guidelines – Features and types – Management structure and performance evaluation – Growth and recent trends – Investor services – Credit rating agencies – CRISIL, CARE, ICRA – Services – Criteria for rating – Symbols.

Text Books:

1. Dr.S.Gurusamy, Financial Services, Vijay Nicholes Imprint Pvt. Ltd., 2004 – Chennai

Reference Books:

1. Dr.V.Balu, Merchant Banking & Finance Services, Sri Venkateswara Publication, Chennai.
2. Dr.S.Gurusamy, Financial Services and Systems, Vijay Nicholes Imprint Pvt. Ltd., 2004 – Chennai
3. Dr.S.Gurusamy, Essentials of Financial Services, 2nd Edition, Vijay Nicholes Imprint Pvt. Ltd.,– Chennai
4. Dr. N. Premavathy, Financial Services and Stock Exchange, Sri Vishnu Publications, Chennai.

ELECTIVE

PAPER – 3

C. PORTFOLIO MANAGEMENT

UNIT-I

Portfolio Regulation and Management – Need – Traditional Approach – Efficient Market Hypothesis – Approaches to Portfolio Theory and Practices – Need for costing – Share Costing – Risk and Return.

UNIT-II

Portfolio Analysis – Theory and Practices – Risk Analysis – Types of Risks – Risk Management –Diversification of risk – Analysis of risk – Building a balanced portfolio.

UNIT-III

Characteristics of portfolio – Principles and Practices – Characteristics of Portfolio Analysis – Liquidity Vs. Safety – Income Vs. growth – Short Term and Long Term –Risk Vs. Return – Need for insuring risk to attract stable investors.

UNIT-IV

Revision of Investment Portfolio – Diversification of Investment Portfolio – International Scenario influencing portfolio – Need for reviewing portfolio constantly.

UNIT-V

Regulation of Investment Portfolio – Evaluation of investments in terms of market trends – Shape of Optimal Portfolio – Need for Investment Consultancy – Importance of Computer data Analysis for Security Analysis and Portfolio Analysis.

Text Books:

1. Dr. S. Guruswamy, Security Analysis and Portfolio Management, Vijay Nicholes Imprint Pvt. Ltd., – Chennai.
2. V. K. Bhalla, Portfolio Analysis and Management, Sultan Chand & Sons
3. PunithavathyPandian, Security Analysis and Portfolio Management, Vikas Publishing House Pvt. Ltd.

Reference Books:

1. **I. M. Pandey**, Financial Management, Vikas Publishing House Pvt. Ltd. Chennai.
2. Fischer & Jordan, Security Analysis and Portfolio Management, Prentice Hall India.
3. V. A. Avadhani, Investment and Securities Market in India, Himalaya Publishing House.

SKILL BASED SUBJECT

PAPER - 4

COMPUTER APPLICATION IN BUSINESS

Objective:

To provide basic knowledge of computer applications in business.

UNIT-I

Introduction to Computer–Characteristicsof a Computer –History of Computer– Computer generation - Hardware–Software – System Software and application software.

UNIT-II

MS - Word Processing: Starting MS word - MS word environment - working with word documents, text, tables - checking spelling and grammar - printing a documents.

UNIT-III

MS Excel - MS Excel Sheet - MS Excel environment - Working with Excel workbook - worksheet - Formulas and functions - Inserting charts - printing in Excel.

UNIT-IV

MS Power Point - Starting MSPower Point - MS power point environment - working with power point - working with different views – designing, presentation &printing in Power Point.

UNIT-V

Electronic Commerce - Types - Advantages and Disadvantages - Electronic data interchange (EDI) working of EDI - EDI benefits &Limitations - SMART card - SMART card applications.

TEXT BOOK

1. AnanthiSheshasaayee: Computer Application in Business and Management, Margam Publication.
2. Leon & Leon, Computer Applications in Business, Vijay Nicholes Imprint Pvt. Ltd.,– Chennai

REFERENCE BOOK

3. A. Zakiudeen Ahmed: Computer Application in Business, Margam Publication.

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Question Paper Pattern:

Pattern	Total Questions	To answer	Marks per Question	Total Marks
Section A	10	10 (All)	2	20
Section B	8	5	5	25
Section C	5	3	10	30

Instructions to Paper Setter:

Section-A: Minimum 2 Questions to be asked from each of the five Units

Section-B: Minimum 1 Question to be asked from each of the five Units.

Section-C: 1 Question to be asked from each of the five Units.

THIRUVALLUVAR UNIVERSITY

B.Sc. (Mathematics)
Curriculum & Syllabus
2017 – 2018 onwards

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THIRUVALLUVAR UNIVERSITY
B.Sc. MATHEMATICS
SYLLABUS
CBCS PATTERN
(For the candidates admitted from 2017 - 2018)

S.No.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title							
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper - 1	5	3	Algebra	25	75	100
4	III	Core Theory	Paper –2	4	3	Trigonometry	25	75	100
5	III	ALLIED -1 (Theory)	Paper-1	7	4	(**to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
6	IV	Environ. Studies		2	2	Environmental Studies	25	75	100
				30	**20**		**150**	**450**	**600**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
7	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8	II	English	Paper-2	4	4	English	25	75	100
9	III	Core Theory	Paper-3	5	3	Calculus	25	75	100
10	III	Core Theory	Paper-4	4	3	Analytical Geometry of three dimensions	25	75	100
11	III	Allied 2 Theory	Paper-2	4	4	(**to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
12	III	Allied 1 Practical	Practical 1	3	2	(**to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
13	IV	Value Education		2	2	Value Education	25	75	100
14	IV	Soft Skill		2	1	Soft Skill	25	75	100

S.No.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
				30	**23**		**200**	**600**	**800**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
15	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
16	II	English	Paper-3	6	4	English	25	75	100
17	III	Core Theory	Paper-5	6	4	Differential Equations	25	75	100
18	III	Allied – 2 Theory	Paper – 3	7	4	(**to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
19	IV	Skill Based Subject	Paper – 1	3	3	Linear Programming	25	75	100
20	IV	Non-major Elective	Paper – 1	2	2	Basic Mathematics	25	75	100
				30	**21**		**150**	**450**	**600**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
21	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
22	II	English	Paper-4	6	4	English	25	75	100
23	III	Core Theory	Paper-6	6	4	Vector Analysis and Fourier analysis	25	75	100
24	III	Allied – 2 Theory	Paper – 4	4	4	(**to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
25	III	Allied – 2 Practical	Practical – 2	3	2	(**to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
26	IV	Skill Based Subject	Paper -2	3	3	Mathematics for competitive Examinations – I	25	75	100
27	IV	Non-Major	Paper-2	2	2	Foundation Mathematics	25	75	100

S.No.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Elective				for Competitive Examinations - I			
				30	**3**		**175**	**525**	**700**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
28	III	Core Theory	Paper-7	5	4	Abstract Algebra	25	75	100
29	III	Core Theory	Paper-8	5	4	Real Analysis - I	25	75	100
30	III	Core Theory	Paper – 9	5	4	Complex Analysis - I	25	75	100
31	III	Core Theory	Paper – 10	5	4	Statics	25	75	100
32	III	Core Theory	Paper – 11	4	4	Dynamics	25	75	100
33	III	Elective	Paper-1	3	3	(**to choose any 1 out of 2)** 1. Graph Theory 2. Astronomy	25	75	100
34	IV	Skill Based Subject	Paper-3	3	3	Mathematics for Competitive Examinations – II	25	75	100
				30	**26**		**175**	**525**	**700**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
35	III	Core Theory	Paper -12	5	4	Linear Algebra	25	75	100
36	III	Core Theory	Paper -13	5	4	Real Analysis II	25	75	100
37	III	Core Theory	Paper -14	5	4	Complex Analysis II	25	75	100
38	III	Core Theory	Paper -15	3	3	Programming in C Language	25	75	100
39	III	Core Practical	Practical - 1	3	3	Practical in C Language	25	75	100
40	III	Elective	Paper-2	3	3	(**to choose any 1 out of 2)** 1. Operations	25	75	100

S.No.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
						Research 2. Calculus of finite differences & Numerical Methods. (to be chosen only those students who have not taken numerical methods as allied subject)			
41	IV	Elective	Paper-3	3	3	**(to choose any 1 out of 2)** 1. Special functions 2. Fuzzy Mathematics	25	75	100
42	IV	Skill Based Subject	Paper -4	3	3	Mathematics for Competitive Examinations – III	25	75	100
43	V	Extension Activities		0	1		100	0	100
		Total		**30**	**27**		**300**	**600**	**900**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	4	8	100	200
	Allied (Even Semester)	2	4	8	100	200
	Allied Practical (Even Sem)	2	2	4	100	200
	Electives	3	3	9	100	300
	Core	15	(3-7)	55	100	1500
	Core Practical	1	2	2	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**43**		**140**		**4300**

THIRUVALLUVAR UNIVERSITY

B.Sc. MATHEMATICS

SYLLABUS
CBCS PATTERN
(For the candidates admitted from 2017 - 2018)

SEMESTER I

PAPER - 1

ALGEBRA

Objectives

In this Course students are exposed to topics like Theory of Equations, Summation of Series, Matrices, Continued Fractions and Elementary Number Theory. The stress is on the development of problem solving skills.

UNIT-I: THEORY OF EQUATIONS

Polynomial Equations - Symmetric Functions of roots in terms of Coefficients - Reciprocal Equations - Transformation of Equations.

UNIT-II: THEORY OF EQUATIONS (Contd...)

Descartes Rule of Signs - Approximate Solutions of Polynomials by Horner's method - Newton - Raphson method of Solution of a Cubic Polynomial.

UNIT-III: SUMMATION OF SERIES

Summation of series using Binomial - Exponential and Logarithmic series (Theorems without proofs) - Approximation using Binomial & Exponential series and logarithmic series simple problems.

UNIT-IV: MATRICES

Symmetric - Skew symmetric, - Hermitian - Skew Hermitian - Orthogonal and Unitary Matrices - Cayley-Hamilton Theorem (without proof) - Eigen Values - Eigen Vectors–Similar Matrices - Diagonalisation of a Matrix.

UNIT-V: ELEMENTARY NUMBER THEORY

Prime Number - Composite Number - Decomposition of a Composite Number as a Product of Primes uniquely (without proof) - Divisors of a Positive Integer - Congruence Modulo *n* - Euler Function (without Proof) - Highest Power of a Prime Number p contained in *n!*- Fermat's and Wilson's Theorems (statements only) - simple problems.

Recommended Texts

T.K.ManicavachagomPillay, T.Natarajan and K.S.Ganapathy.(2004) *Algebra,* Volume I & II S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books

1. P.Kandasamy, K.Thilagavathy (2004), Mathematics for B.Sc. Vol-I, II, III & IV, S.Chand& Company Ltd., New Delhi-55.
2. S.Arumugam (2003) *Algebra*. New Gamma Publishing House, Palayamkottai.
3. A.Singaravelu (2003) *Algebra and Trigonometry*, Vol.-I & II Meenakshi Agency, Chennai.
4. S.Sudha(1998) *Algebra and Trigonometry*. Emerald Publishes, Chennai.

PAPER - 2

TRIGONOMETRY

Objectives

This course is a fundamental one for many courses of this Degree Programme. This covers topics on the expansions of trigonometric functions, hyperbolic functions, inverse circular, inverse hyperbolic functions and it aims to develop computational skills.

UNIT-I

Expansions of cosnθ , sin nθ - Expansion of tan nθ in terms of tan θ - Expansion of tan(A+B+C+…) - Formation of Equations. Chapter III section 1 to 3

UNIT-II

Powers of sines and cosines of θ in terms of functions of multiples of θ - expansions of sin θ and cos θ in a series of ascending powers of θ - Expansion of Inverse Circular Functions. Chapter III section 4 and 5

UNIT-III: Hyperbolic Functions

Definition – Relation between Hyperbolic Functions - Inverse Hyperbolic Functions. Chapter IV sections 1 to 2.3

UNIT-IV

Resolution into Factors - simple problems only - DeMoivre's Property on the Circle and Cote's Property on the Circle.Logarithm of complex quantities.
Chapter V sections 2 and 3(Problems only)
Chapter V sections 4, 4.1, 4.2, 5, 5.1, 5.2...

UNIT-V

Summation of Trigonometric Series: When the angles are in A.P, C+iS method of summation - Method of Differences - Gregory Series - Euler Series.
Chapter VI section 1, 2 ,3 ,3.1, 3.2.

Recommended Text

1. S.Narayanan and T.K.ManicavachagomPillay (2004) *Trigonometry*.S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books

1. P.Kandasamy, K.Thilagavathy (2004), Mathematic for B.Sc. Vol.-I, II, III & IV, S.Chand& Company Ltd., New Delhi-55.
2. S.Duraipandian and LaxmiDuraipandian (1984) *Trigonometry*. Emerald Publishers, Chennai.
3. B.S.Grewal. (2002) *Higher Engineering Mathematics.*Khanna Publishers. New Delhi.
4. S.L.Loney. (1982) *Plane Trigonometry,* Part II, Cambridge University Press, London.
5. A.Singaravelu (2003) *Algebra and Trigonometry*, Vol.-I Meenakshi Agency, Chennai.
6. P.R.Vittal. (2004) *Trigonometry*, Margham Publications, Chennai.

SEMESTER II

PAPER - 3

CALCULUS

Objectives

The course introduces students to the fundamental principles, concepts and knowledge in the areas of Differential and Integral Calculus. This prepares the students to apply these fundamental concepts and working knowledge to other courses.

UNIT-I

Differential Calculus: n^{th} derivative - Leibnitz's theorem (Without proof) and its application - Jacobians - Total differential - maxima and minima functions of 2 & 3 independent variable, Lagrange's method (without proof), problems on this concepts.

UNIT-II: Differential Calculus (Contd…)

Polar coordinates – Angle between radius vector and tangent – Angle between two curves, Curvature, Radius of Curvature in Cartesian and Polar coordinates, p-r equation, Evolutes.

UNIT-III: Differential Calculus (Contd…)

Asymptotes: Methods (without proof) of finding asymptotes of rational algebraic curves with special cases.(First 5 sections only)

UNIT-IV: Integral Calculus

Reduction formulae, $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \sin^m x\cos^n x\,dx$, Beta and Gamma Functions - Properties and Problems.

UNIT-V: Integral Calculus (Contd…)

Double Integrals - Change of order of Integration - Triple Integrals - Applications to Area, Surface Area and Volume.

Recommended Text

S.Narayanan and T.K.ManicavachagomPillay (2004) *Calculus.*S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books

1. P.Kandasamy, K.Thilagavathy (2004), Mathematic for B.Sc. Vol.-I, II, III & IV, S.Chand& Company Ltd., New Delhi-55.
2. Shanti Narayan (2001) *Differential Calculus*. Shyamlal Charitable Trust, New Delhi.
3. Shanti Narayan (2001) *Integral Calculus.*S.Chand& Co. New Delhi.
4. S.Sudha (1998) *Calculus.* Emerald Publishers, Chennai.
5. G.B.Thomas and R.L.Finney. (1998) *Calculus and Analytic Geometry*, Addison Wesley (9^{th}Edn.), Mass. (Indian Print)
6. P.R.Vittal. (2004) *Calculus*, Margham Publication, Chennai.

PAPER - 4

ANALYTICAL GEOMETRY OF THREE DIMENSIONS

Objective:

To deepen the knowledge of the students in various concepts of Analytical Solid Geometry.

Unit I: Plane

General equation of a plane – Equation of a plane in the normal form – Angle between planes – Plane through three given points – Equation of a plane through the line of intersection of two planes.

UNIT II: Straight Line

Symmetrical form of a straight line – Image of a point with respect to a plane – Image of a line with respect to a plane – Length and equation of the shortest distance between two skew lines - Coplanar lines.

UNIT III: Sphere

Equation of the sphere – Length of the tangent – Tangent plane – Section of a sphere by a plane – Orthogonal spheres – Equation of a sphere through a given circle.

UNIT IV: Cone

Equation of a cone with a given vertex and a given guiding curve - Equation of a cone with its vertex at the origin - Condition for the general equation of the second degree to represent a cone - Right circular cone – Enveloping cone - Tangency of a plane to a cone.

UNIT V: Cylinder

Equation of a cylinder with a given generator and a given guiding curve - Right circular cylinder - Enveloping cylinder – Enveloping cylinder as a limiting form of an enveloping cone.

Recommended Text

T.K.ManickavachagomPillay& others. (2004) *Analytical Geometry*(Three Dimensions) S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books

1. P.Duraipandian and LaxmiDuraipandian (1965) *Analytical Geometry-2D*, Asia Publishing company, Bombay
2. P.Duraipandian and LaxmiDuriapandian (1975) *Analytical Geometry-3 D*, Emerald Publishers, Chennai.
3. G.B.Thomas and R.L.Finney.(1998) *Calculus and Analytic Geometr*y, Addison Wesley (9^{th}Edn.), Mass. (Indian Print).
4. P.R.Vittal (2003) *Coordinate Geometry.*Margham Publishers, Chennai

SEMESTER III

PAPER - 5

DIFFERENTIAL EQUATIONS

Objectives

This course aims to provide logical skills in the formation of differential equations, to expose to different techniques of finding solutions to these equations and in addition stress is laid on the application of these equations in geometrical and physical problems.

UNIT-I: Ordinary Linear Differential Equations

Bernoulli Equation – Exact Differential Equations – Equations Reducible to Exact Equations – Equations of First order and Higher degree: Equations solvable for p, Equation solvable for x and Equations Solvable for y – Clairaut's Equation.

UNIT-II: Ordinary Linear Differential Equations [Contd...]

Method of Variation of Parameters – 2^{nd} order Differential Equations with Constant Coefficients for finding the P.I's of the form e^{ax} V, where V is sin(mx) or cos(mx) and x^n – Equations reducible to Linear equations with constant coefficients – Cauchy's homogeneous Linear Equations – Legendre's Linear Equations.

UNIT-III: Differential Equations of Other Types

Simultaneous Equations with Constant coefficients – Total Differential Equations Simultaneous Total Differential Equations – Equations of the form dx/P = dy/Q = dz/R

UNIT-IV: Laplace Transform

Transform-Inverse Transform – Properties – Application of Laplace Transform to solution of first and second order Linear Differential equations [with constant coefficients].

UNIT-V: Partial Differential Equations

Formation of PDF – Complete Integral – Particular Integral – Singular Integral – equations Solvable by direct Integration – Linear Equations of the first order – Non-linear Equations of the first Order:

Types:

f[p,q]=0,

f[x,p,q]=0, f[y, p, q]=0, f(z, p, q]=0, f[x, q]= f[y, p],

z= px+qy + f[p, q]

Recommended Text

S.Narayananand T.K.Manickavachagapillai[2004] Calculus S.Viswanathan Printers and publishers Pvt.Ltd.,Cheenai.

Reference Books

1. M.D. Raisinghania, [2001] Ordinary and Partial Differential Equations, S.Chand and Co., New Delhi.
2. M.R.Spiegel [2005] Advanced mathematics for Engineers and Scientists, Tata McGraw Hill Edition, New Delhi.
3. M.R.Spiegel [2005] Laplace Transforms, Tata McGraw Hill Edition, New Delhi.
4. S.Sudha [2003] Differential Equations and Integral Transforms, Emerald Publishers, Chennai.
5. M.K.Venkataraman [1998] Higher Engineering Mathematics, III-B, National Publishing Co., Chennai.
6. P.r.Vittal [2004] Differential Equations and Laplace Transform, Margham Publications, Chennai.
7. P.Kandasamy, K.Thilagarathy [2004] Mathematics for B.Sc. Vol. III S.Chand& Co., Ltd., New Delhi-55.
8. B.S.Grewal [2002] Higher Engineering Mathematics, Khanna Publishers, New Delhi.
9. Sheply. L.Ross [1984] Differential Equations, III Edition john Wiley and Sons, New York.

SKILL BASED SUBJECT

PAPER - 1

LINEAR PROGRAMMING

Objectives

To improve the skills of solving very common problems which we come across in various fields like transportation, games and industries with machines.

UNIT-I

Linear programming problem - Mathematical formulation of the problem - Graphical solution method - simple method - Duality - primal and dual relation (simple Problems).

UNIT-II

Transportation problem - Degeneracy in transportation problem.

UNIT-III

The Assignment problem – Travelling salesman method.

UNIT-IV

Game theory - two persons zero sum game - the maximin minimax principle - saddle points - games without saddle points.

UNIT-V

Simulation - application - advantages and disadvantages - Monte Carlo method - simple problems.

Recommended Text

Gupta P.K.and Hira D.S., (2000) Problems in Operations Research, S.Chand & Co. Delhi

Reference Books

1. Quantitative Aptitude - R.S. Aggarwal (S.Chand & Co - New Delhi 2008)
2. Quantitative Aptitude for Competitive Examinations – Abhigit Guha (Tata McGraw - Hill Pub., Co., Ltd. New Delhi - III Edn.,)
3. Course in Mental Abilities and Quantitative Aptitude for Competitive Examinations - Edgar Thorpe (Tata McGraw - Hill Pub., Co., Ltd. New Delhi - II Edn.,)
4. Statistic, RSN Pillai and A. Bagavathi, S.Chand & Co.,
5. Elements of statistics, Sivadanu Pillai.
6. Algebra, Manickavachakam Pillai & Narayanan

NON-MAJOR ELECTIVE

PAPER -1

BASIC MATHEMATICS

Objectives

To introduce a few basic and elementary concepts of mathematics for other major students.

UNIT-I: Sets

Definition - Subsets - Power sets - Equality of sets - Finite and Infinite sets - Set operations - De-Morgan's laws - Distributive tables - Cartesian products.

UNIT-II: Number system

Binary, octal, hexadecimal numbers - conversion from one system to another system - addition and subtraction - one's complement.

UNIT-III: Symbolic logics

Logical statements - connectives - truth tables - tautologies operations - groups – (problems and simple properties only).

UNIT-IV: Determinants

Definition - properties (without proof) - application of determinants - Cramer's rule for the solution of a system of equations

UNIT-V: Matrices

Definition - types of matrices - operations on matrices - adjoint and inverse - applications - solving non-homogeneous equations.

Recommended Texts

1. Dr.M.K.Venkataraman & others, "Discrete mathematics and structures", The National Publishing Company, Madras.
2. Trembly J.P and Manohar.R "Discrete Mathematical Structures with applications to computer science" Tata McGraw - Hill Pub., Co., Ltd. New Delhi 2003.

Reference Books

1. P.R.Vittal "Algebra, Analytical Geometry and trigonometry" Margham Publications, Chennai.
2. Richard Johnsonbaugh, "Discrete Mathematics" fifth Edn., Pearson Education Asia, New Delhi 2002.

SEMESTER-IV

PAPER-6

VECTOR ANALYSIS AND FOURIER ANALYSIS

Objectives

This course covers the topics in vector and tensor calculus which are essential tools of modern applied mathematics. To develop deep understanding of key concepts followed by problems of applied nature. The portion on Fourier analysis will lead to post-graduate studies and research in pure as well as applied mathematics.

UNIT-I: Differential Vector Calculus

Differentiation of a Vector - Geometrical Interpretation of the Derivative - Differentiation Formulae - Differentiation of dot and Cross Products - Partial Derivatives of Vectors - Differentials of Vectors.

UNIT-II: Gradient, Divergence and Curl

Vector Differential Operator Del - Gradient of a Scalar Function - Directional Derivative - Geometric Interpretation - Gradient of the sum of Functions; of the product of functions and of a function of function - Operations involving Del - Divergence of a Vector and its Physical Interpretation - Curl of a Vector and its Physical Interpretation - Expansion Formulae for Operators involving Del - Solenoidal and Irrotational.

UNIT-III: Vector Integration

The Line Integral - Surface Integral and its Physical Meaning – Volume integral. Simple problems.

UNIT-IV: Vector Integration(Contd.)

Statements of Stoke's Theorem, Gauss Divergence Theorem and Green's Theorem and problems.

UNIT-V: Fourier Series

Euler's Formulae - Conditions for Fourier Expansion - Functions having Discontinuity - Change of Interval - Odd and Even Functions - Expansions of Odd or Even periodic Functions - Half-range Series-Typical Wave Forms - Parseval's Formula.

Recommended Text

P.R.Vittal. (2004) *Vector Calculus, Fourier series and Fourier Transform*.Margham Publications, Chennai.

Reference Books

1. G.B.Thomas and R.L.Finney. (1998) *Calculus and Analytic Geometry*, Addison Wesley (9^{th} Edn), Mass. (Indian Print).
2. M.K.Venkataraman. (1992) *Engineering Mathematics-Part B.* National Publishing Company, Chennai.
3. B.S.Grewal. *Higher Engineering Mathematics* (2002), Khanna Publishers, New Delhi.

SKILL BASED SUBJECT

PAPER - 2

MATHEMATICS FOR COMPETETIVE EXAMINATIONS-I

Objectives

To introduce concepts of mathematics with emphasis on analytical ability and computational skill needed in competitive examinations.

Unit- I

Numbers, H.C.F. and L.C.M. of numbers, Decimal Fractions.

Unit -II

Simplification, Square roots and Cube Roots, Average.

Unit- III

Problems on numbers, problems on Ages.

Unit -IV

Surds and Indices, Percentage, Profit and Loss.

Unit -V

Ratio and Proportion, Partnership.

Text Books:-

1. Quantitative Aptitude for competitive Examination, R.S.Aggarwal. S.Chand and company Ltd, 152, Anna salai, Chennai. (2001)
2. Quantitative Aptitude and Reasoning Praveen PHI P. Ltd.

NON-MAJOR ELECTIVE

PAPER -2

FOUNDATION MATHEMATICS FOR COMPETETIVE EXAMINATIONS

Objectives

To introduce concepts of mathematics with emphasis on analytical ability and computational skill needed in competitive examinations.

UNIT-I

Ratio and proportions

UNIT-II

Percentages

UNIT-III

Profit and loss, discounts.

UNIT-IV

Simple and compound interest**.**

UNIT-V

Time, Distance and Work

Recommended Text book:

Quantitative Aptitude - R.S. Aggarwal (S. Chand & Co. - New Delhi 2008)

SEMESTER - V

PAPER - 7

ABSTRACT ALGEBRA

Objectives

This course aims to impart emphasis on concepts and technology of the groups and rings as these algebraic structures have applications in Mathematical Physics, Mathematical Chemistry and Computer Science.

UNIT-I: Groups

Definition of a Group - Examples - Subgroups;

UNIT-II: Groups (Contd)

Counting Principle - Normal Subgroups - Homomorphisms.

UNIT-III: Groups (Contd)

Automorphisms - Cayley's Theorem - Permutation Groups.

UNIT-IV: Rings

Definition and Examples - Integral Domain - Homomorphism of Rings - Ideals and Quotient Rings.

UNIT-V: Rings (Contd)

Prime Ideal and Maximal Ideal - The field of quotients of an Integral domain – Euclidean rings.

Recommended Text

I.N.Herstein (1989), Topics in Algebra, (2nd Edn.)Wiley Eastern Ltd. New Delhi

Chapter-2: Sections 2.1-2.10 (Omit Applications 1 and 2 of 2.7)

Chapter-3: Sections 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7

Reference Books

1. S.Arumugam. (2004) *Modern Algebra.*Scitech Publications, Chennai.
2. J.B.Fraleigh (1987). *A First Course in Algebra* (3rd Edition) Addison Wesley, Mass. (Indian Print)
3. Lloyd R.Jaisingh and Frank Ayres,Jr. (2005) *Abstract Algebra,* (2nd Edition), Tata McGraw Hill Edition, New Delhi.
4. M.L.Santiago (2002) *Modern Algebra,* Tata McGraw Hill, New Delhi.
5. Surjeet Singh and QaziZameeruddin. (1982) *Modern Algebra*. Vikas Publishing House Pvt. Ltd. New Delhi.

PAPER - 8

REAL ANALYSIS I

Objectives

To understand various limiting behavior of sequences and series

To explore the various limiting processes viz.continuity, uniform continuity, differentiability and integrability and to enhance the mathematical maturity and to work comfortably with concepts.

UNIT-I: Functions & Sequences

Functions – real valued functions – equivalence – countability and real numbers – least upper bound – definition of sequence and subsequence – limit of a sequence – convergent sequence
Ch. 1.4 to 1.7, 2.1 to 2.3 of Goldberg.

UNIT-I: Sequences [Contd...]

Divergent sequences – Bounded sequences – Monotone sequence – Operations on convergent sequences – Operations on divergent sequences – Limit superior and Limit inferior – Cauchy sequences
Ch. 2.4 to 2.10 of Goldberg.

UNIT-III: Series of Real Numbers

Convergence and Divergence – Series with non negative terms – Alternating series – conditional convergence and Absolute convergence – Test for Absolute convergence.
Ch. 3.1 to 3.4 and 3.6 of Goldberg.

UNIT-IV: Series of Real Numbers [Contd...]

Test for Absolute convergence – The class ℓ^2 – Limit of a function on the real line – Metric spaces – Limits in Metric spaces.
Ch. 3.7, 3.10, 4.1 to 4.3 of Goldberg.

UNIT-V: Continuous Functions on Metric Spaces

Functions Continuous at a point on the real line – Reformulation – Functions Continuous on a Metric Spaces – Open Sets – Closed Sets.
Ch. 5.1 to 5.5 of Goldberg

Recommended Text

R.Goldberg [2000] Methods of Real Analysis. Oxford & IBH Publishing Co., New Delhi.

Reference Books

1. Tom M.Apostol [1974] Mathematical Analysis, 2nd Edition, Addison-Wesley New York.
2. Bartle, R.G. and Shebert [1976] Real Analysis, John Wiley and Sons Inc., New York.
3. Malik, S.C. and SavitaArora [1991] Mathematical Analysis, Wiley Eastern Limited, New Delhi.
4. Sanjay Arora and BansiLal [1991], Introduction to Real Analysis, SatyaPrakashan, New Delhi.

PAPER - 9

COMPLEX ANALYSIS - I

Objectives

This course provides

(i) a modern treatment of concepts and techniques of complex function theory

(ii) To gain knowledge about the complex number system, the complex function and complex integration.

UNIT-I: Complex numbers and Elementary functions

Complex Number system, complex numbers –Algebraic properties-Point at Infinity Stereographic Projection-Function of a complex variable-Mappings-Elementary Functions- The Logarithmic function- Branches of log Z.
Sections 1-10, 21-30.

UNIT-II: Analytic functions

Definitions of Limits -Continuity-Derivatives and Differentiation formula-Cauchy-Riemann equations-Cauchy-Riemann equations in polar form-properties of Analytic functions-Necessary and sufficient conditions for Analytic functions-problems. Sections 11-19.

UNIT-III: Conformal Mappings

Harmonic functions-Determination of Harmonic conjugate and Analytic functions-conformal mapping-Isogonal mapping-Further properties and examples-transformations of Harmonic functions**.**
Sections 20, 76-80.

UNIT-IV Mapping by Elementary transformations

The transformations $w=z+d$, $w=1/z$, $w=z^2$, $\overline{w}=\sqrt{z}$, $w = e^z$, $w=\sin z$ Bilinear Transformation andspecial Bilinear Transformation problems.
Sections 31-36, 38-39

UNIT-V: Integrals

Contours - Line Integrals _ Cauchy-Goursat's Theorem (without proof) Cauchy's Integral Formula - Derivatives of Analytic Functions - problems. Sections 43-46, 50-52.

Recommended Text

R.V.Churchill and J.W.Brown, (1984) *Complex Variables and Applications*. McGraw Hill International Book Co., Singapore. (Third Edition)

Reference Books:

1. P. Duraipandian and LaxmiDuraipandian (1976) Complex Analysis: Emerald Publishers, Chennai
2. S. Ponnusamy. (2000) Foundations of Complex Analysis, Narosa Publishing House, New Delhi
3. Murray R. Spiegel. (2005) Theory and Problems of Complex Variable. Tata-Mcgraw Hill Edition, New Delhi.

PAPER - 10

STATICS

OBJECTIVES

This course introduces the students the basic concepts of forces, moments, couple, friction law virtual displacement and work, catenary and the centre of gravity and kinematics. This course stresses the development of skills in formation of suitable mathematical models and problems solving techniques.

UNIT- I

Forces, Type of forces- Resultant of three forces related to triangle acting at a point - Resultant of several forces acting on a particle - Equilibrium of a particle under three forces - Equilibrium of a particle under several forces - Limiting Equilibrium of a particle on an inclined plane.

UNIT- II

Moment of a forces- General motion of a Rigid body- Equivalent system of forces – Parallel forces- Forces along the sides of the triangle.

UNIT- III

Couples- Resultant of several coplanar forces – Equation of line of action of the resultant – Equilibrium of a rigid body under three coplanar forces.

UNIT - IV

Reduction of coplanar forces into a force and a couple – Friction – laws of friction – cone of friction and angle of friction – Applications involving frictional forces.

UNIT - V

Center of mass – Center of mass of a triangular lamina – Three particles of same mass - Three particles of certain masses – uniform rods forming a triangle – lamina in the form of a trapezium and solid tetrahedron – Center of mass using integration – circular arc – circular lamina – elliptic lamina – solid hemisphere – solid right circular cone – hemispherical shell – hollow right circular cone.

Recommended Text

P. Duraipandian, LaxmiDuraipandian ,MuthamizhJayapragasam, Mechanics, 6-e,
S. Chand and Company Ltd, 2005**.**

Reference Books

1. S. Narayanan, R. HanumanthaRao, K. Sitaraman, P. Kandaswamy, *Statics*, S. Chand and Company Ltd, New Delhi.
2. S. L. Loney, *An Elementary Treatise on Statics*, Combridge University Press, 1951
3. A.V. Dharmapadam(1991) *Mechanics*. S. Viswanathan Printers & Publishers. Chennai.
4. M.K. Venkataraman (1990) *Statics*. A Rajhans Publications. (16thEdn), Meerut.
5. Joseph F. Shelley (2005) *Vector Mechanics for Engineers Vol-I: Statics*, Tata McGraw Hill Edition, New Delhi.

PAPER - 11

DYNAMICS

OBJECTIVES

This course aims to provide models for some real life problems. This covers topics like Simple Harmonic Motion, Projectiles, Central Orbits and Moment of Inertia. Stress is on the mathematical formulation of the physics aspects of the problems and it develops logical deduction and interpretation.

UNIT- I

Velocity, Relative Velocity, Angular Velocity, Acceleration, Rectilinear motion, Rectilinear motion with constant acceleration, Relative angular velocity, Work, Power, Energy.

UNIT- II

Motion of a projectile, Nature of a trajectory, Results pertaining to the motion of a projectile, Range on an inclined plane, Maximum range on the inclined plane. Simple problems.

UNIT -III

Impulsive force, Conservation of linear momentum, Impact of a sphere, Laws of impact, Impact of two smooth spheres, Direct impact of two smooth spheres, Direct impact of a smooth sphere on a plane, oblique impact of a smooth sphere on a plane. Simple problems.

UNIT- IV

Central force and Central Orbit, Equation of central orbit, finding law of force and speed for a given orbit, Determination of the orbit when law of force is given, Kepler's Laws on planetary motion. Simple Problems.

UNIT -V

Moment of Inertia of simple bodies, Theorems of parallel and perpendicular axes, Moment of inertia of triangular lamina, circular lamina, circular ring, right circular cone, sphere. Simple problems.

Recommended Text

P. Duraipandian, LaxmiDuraipandian ,MuthamizhJayapragasam, Mechanics, 6-e,
S. Chand and Company Ltd, 2005**.**

Reference Books

1. S. Narayanan, R. HanumanthaRao, K. Sitaraman, P. Kandaswamy, *Statics*, S. Chand and Company Ltd, New Delhi.
2. S. L. Loney, *An Elementary Treatise on Statics*, Combridge University Press, 1951
3. A.V. Dharmapadam(1991) *Mechanics*. S. Viswanathan Printers & Publishers. Chennai.
4. M.K. Venkataraman (1990) *Statics*. A Rajhans Publications. (16thEdn), Meerut.
5. Joseph F. Shelley (2005) *Vector Mechanics for Engineers Vol-I: Statics*, Tata McGraw Hill Edition, New Delhi.

ELECTIVE

PAPER - 1

A. GRAPH THEORY

Objectives

To study and develop the concepts of graphs, subgraphs, trees connectivity, Eulerian and Hamiltonian graphs, matching colorings of graphs and planar graphs

UNIT-I

Graphs, subgraphs, Degree of a vertex, Isomorphism of graphs, independent sets and coverings.

UNIT-II

Intersection graphs; Adjacency and incidence of matrices; Operations on graphs;;

UNIT-III

Walks; trails; paths; Connectedness and components; cut point, bridge, block.

UNIT-IV

Connectivity theorems and simple problems. Eulerian graphs and Hamiltonian graphs; simple problems

UNIT-V

Trees, theorems, and simple problems.

Recommended Text

S.Arumugam and S.Ramachandran, "Invitation to Graph Theory", SITECH Publications India Pvt. Ltd., 7/3C, Madley Road, T.Nagar, Chennai - 17

Reference Books

1. S.Kumaravelu, SusheelaKumaravelu, Graph Theory, Publishers, 182, Chidambara Nagar, Nagercoil-629 002.
2. S.A.Choudham, A First Course in Graph Theory, Macmillan India Ltd.
3. Robin J.Wilson, Introduction to Graph Theory, Longman Group Ltd.
4. J.A.Bondy and U.S.R. Murthy, Graph Theory with Applications, Macmillon, London.

B. ASTRONOMY

Objectives

This course aims to provide working knowledge about the universe.

UNIT-I

Celestial Sphere - Diurnal motion - Simple Problems page 39 - 83 (Use the results 65,67,83,84) to solve problems.No derivation.)

UNIT-II

Zones of Earth - Terrestrial Latitudes and Longitudes - Rotation of Earth - Dip of the horizon - - Simple problems. Page 90-131 (Use the results of 96,99,102 to solve problems. No need for derivation.

UNIT-III

Twilight-simple problems-Astronomical refraction - Simple problems.page 131-157. (use the result of 124,125,126,127 to solve problems. No need to derive the result)

UNIT-IV

Kepler's Laws - simple problems page 172-189. (Use result s of 159,160 to solve the problems.No need to derive the results.

UNIT-V

Moon - phases of moon - Eclipses - Introduction - umbra and penumbra - lunar eclipse - solar eclipse - condition for the occurrence of lunar and solar eclipses. Page 334-377. (Use the results of 270,271,272 to solve problem, no need to derive the results)

Recommended Text

S.Kumaravelu and SusheelaKumaravelu.(2004) *Astronomy.* SKV Publishers, Nagarkoil

Reference Books

1. L.W.Frederick and R.H.Baker (1976) *Astronomy* (10thEdn) Vas Nostrand, New York.
2. R.Jastrow and M.H.Thompson (1984) *Astronomy : Fundamentals and Frontiers*, (4thEdn) John Wiley & Sons, New York.
3. H.Karttunenet. al. (2003) *Fundamental Astronomy* (4thEdn) Springer Verlag, Berlin.
4. L.Motz and A.Duveen. (1977) *Essentials of Astronomy* (2ndEdn) Columbia University Press, New York.
5. G.V.Ramachandran. (1965) *A Text Book of Astronomy* (5thEdn) Published by Mrs. RukmaniRamachandran, Tiruchirappalli
6. M.Zeilik (2002) *Astronomy: The Evolving Universe* (9thEdn) Cambridge University Press, Cambridge.

SKILL BASED SUBJECT

PAPER - 3

MATHEMATICS FOR COMPETETIVE EXAMINATIONS - II

Unit- I

Chain rule –Time and work.

Unit- II

Time and Distance

Unit- III

Problems on Trains.

Unit- IV

Boats and Streams.

Unit- V

Alligation or Mixture.

Text Book:-

Quantitative Aptitude for competitive Examination R.S. Aggarwal. S. Chand and company Ltd,152,Anna salai, Chennai. 2001

SEMESTER VI

PAPER - 12

LINEAR ALGEBRA

Objectives

To study the Algebraic structures of Vector Spaces and Linear Transformation

UNIT-I: Vector Spaces

Definition and examples-Linear dependence and independence

UNIT-II: Vector Spaces (Contd)

Dual space - Inner Product spaces.

UNIT-III: Linear Transformation

Algebra of linear transformations - Characteristic roots

UNIT-IV: Linear Transformation (Contd)

Matrices, Canonical forms; Triangular forms.

UNIT-V: Linear Transformation (Contd)

Trace and Transpose, Determinants

Recommended Text

I.N.Herstein. (1989) *Topics in Algebra*.Wiley Eastern Ltd. New Delhi.
Chapter-4: Sections 4.1, 4.2, 4.3, 4.4,
Chapter-6: Sections 6.1, 6.2, 6.3, 6.4, 6.8, 6.9

Reference Books

1. S.Arumugam. (2004) *Modern Algebra.*Scitech Publications, Chennai.
2. J.B.Fraleigh (1986) *A First Course in Algebra* (3rd Edition) Addison Wesley. Mass. (Indian Print)
3. S.Lipschutz (2005) *Beginning Linear Algebra*, Tata McGraw Hill Edition, New Delhi.
4. M.L.Santiago. (2002) *Modern Algebra*, Tata McGraw Hill, New Delhi.
5. Surjeet Singh and QaziZameeruddin. (1982) *Modern Algebra.*Vikas Publishing House Pvt. Ltd., New Delhi, 1982

PAPER - 13

REAL ANALYSIS II

Objectives

To understand Integration process of Riemann
To develop the understanding of point wise and uniform convergence of sequence and series of functions.
To enhance the mathematical maturity and to work comfortably with concepts.

UNIT-I: Connectedness, Completeness

Open Sets – Connected Sets – Bounded Sets and Totally Bounded Sets – Complete Metric Spaces.
Ch. 6.1 to 6.4 of Goldberg

UNIT-II: Compactness

Compact Metric Space – Continuous Functions on Compact Metric Spaces - Continuity of Inverse Functions – Uniform Continuity.
Ch. 6.5 to 6.8 of Goldberg

UNIT-III: Riemann Integration

Sets of measure zero - Definition Riemann Integral – Properties of Riemann Integral – Derivatives.
Ch. 7.1, 7.2 7.4, 7.5 of Goldberg.

UNIT-IV: Riemann **Integration [Contd...]**

Rolle's Theorem – The law of mean – Fundamental theorems of calculus – Taylor's theorem.

Ch. 7.6 to 7.8 and 8.5 of Goldberg.

UNIT-V: Sequences and Series of Functions

Pointwise convergence of sequences of functions – Uniform convergence of sequences of functions – consequences of uniform convergence – Convergence and uniform convergence of series of functions.

Ch. 9.1 to 9.4 of Goldberg.

Recommended Text

R.Goldberg Methods of Real Analysis Oxford & IBH Publishing Co., New Delhi.

Reference Books

1. Tom M.Apostol [1974] Mathematical Analysis, 2nd Edition, Addison-Wesley Publishing Company Inc. New York.
2. Bartle, R.G. and Shebert [1976] Real Analysis, John Wiley and Sons Inc., New York,
3. Malik, S.C. and SavitaArora [1991] Mathematical Analysis, Wiley Eastern Limited, New Delhi.
4. Sanjay Arora and BansiLal [1991] Introduction to Real Analysis, Satya Prakashan, New Delhi.

PAPER - 14

COMPLEX ANALYSIS II

Objectives:

(1) To gain knowledge about complex Integration and series.
(2) This course provides methods to solve problems in pure as well as in applied mathematics.

UNIT-I: Integrals:

Morera's theorem- Maximum Moduli of functions- The fundamental theorem of Algebra-Lioulle's theorem-convergence of sequences and series-uniform convergence. Sections 53-56, 61.

UNIT-II: Power series.

Taylor's and Laurent's theorem-Integration and differentiation o f power series-problems.
Sections 57-60.

UNIT-III: Singularities and Residues.

Singularities and classifications- Isolated singularties:Removable singularity Pole and essential singularity-Residues-Cauchy's Residue theorem-problems.
Sections 67-71.

UNIT-IV: Analytic continuation

Conditions under which f (z)=o-Uniqueness-Singular points:Poles and zeros-Essential singular points-Number of zeros and poles-The Argument principal.
Sections 106 -114.

UNIT V: Contour Integration

Evaluation of Improper Real Integrals-Improper integrals involving Trigonometric functions -Integration around a Branch point.
Sections 72-75.

Recommended Text

R.V.Churchill and J.W.Brown, (1984) *Complex Variables and Applications*. McGraw Hill International Book Co., Singapore. (Third Edition)

Reference Books

1. P. Duraipandian and LaxmiDuraipandian (1976) Complex Analysis: Emerald Publishers, Chennai.
2. S. Ponnusamy. (2000) Foundations of Complex Analysis, Narosa Publishing House, New Delhi.
3. Murray R. Spiegel. (2005) Theory and Problems of Complex Variable. Tata-Mcgraw Hill Edition, New Delhi.

PAPER - 15

PROGRAMMING IN C LANGUAGE

Objectives

To develop programming skill in the Computer Language C

UNIT-I

C Constants, variables, Data-type, Declaration of variables, assigning values to variables.

UNIT-II: Operators

Arithmetic, Relational, Logical, Assignment, Increment and decrement, Conditional, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic operators, Formatted input and output.

UNIT-III: Operators

Decision making and branching If, simple if, If else, Nesting of if - else, Else - If ladder, Switch statement, the?: operator, Go to statement. Decision making with looping: While, Do, for statement, Jumps in loops.

UNIT-IV: Arrays

One - dimensional array, two - dimensional array, Initializing arrays, Multi - dimensional arrays.

UNIT-V: User-Defined Function

Need for User-defined function, Multi-function program, the form of C-Function, Return Value and their types.

Structures and Unions:

Structure definition, Structure initialization, Comparison of structure variables, union**.**

Recommended Text

E.Balagurusamy. (1996) *Programming in* ANSI *C*. Tata McGraw Hill, New Delhi

Reference Books

1. V.Rajaraman. (1995) *Computer Programming in C*. Prentice Hall. New Delhi
2. H. Schildt, Obsborne. (1994) *Teach Yourself C* McGraw Hill. New York.
3. Mullish Cooper. *The Spirit of C- An Introduction to Modern Programming.*Jaico Publishing House. Delhi. 1998.
4. Yashavantkanetkar, let us C, 16TH edition BPB publication.
5. Dr.P.Rizwan Ahmed, Programming in C, Margham Publications, 2016

PRACTICAL

PRACTICAL IN C LANGUAGE

Objectives

This computer practice course aims to provide strong logical thinking and error-free syntax codes writing, to master the debugging techniques and to present the results in neat form in C Language for numerical methods. Students will be able to solve problems numerically whenever theoretical methods are not available.

The following exercises shall be performed as minimum mandatory requirements (for eligibility to take the practical examination) and a RECORD of the code-listing and outputs shall be maintained by each students.

1. Assigning the ASCII value.
2. Square of numbers: Using For loop, While loop
3. Square of numbers: Do-While loop, Goto statement.
4. Characters between two given characters.
5. Number of vowels and consonants.
6. Three – dimensional matrix.
7. Prime numbers between two give numbers.
8. Fibonacci series.
9. Factorial numbers
10. Power of a value.
11. Interchange sort.
12. Student record.

Note: Mathematics faculty should be appointed as an Examiner.

Reference Books

1. The spirit of C, Mullish Cooper, Indian Edition by Jaico Publishers, 1987.
2. Teach yourself C, Herbert Schildt, Obsbome Megrawhill, 2nd Edition 1994.
3. Programming in C, Schaum Series.

ELECTIVE
(to choose 1 out of the given 2)

PAPER - 2

OPERATIONS RESEARCH

Objectives

To develop computational skill and logical thinking in formulating industry oriented problems as a mathematical problem and finding solutions to these problems.

UNIT-I

Network-construction of network diagram-Critical path method (CPM) – Three floats

UNIT-II

Three time estimates-Network scheduling by PERT Method-PERT Computation

UNIT-III

Inventory models - EOQ model (a) Uniform demand rate infinite production rate with no shortages (b) Uniform demand rate finite production rate with no shortages – Inventory control with Price Breaks.

UNIT-IV

Sequencing problem - n jobs through 2 machines, n jobs through 3 machines - two jobs through m machines – n jobs through m machines.

UNIT-V

Queuing Theory - Basic concepts - Steady state analysis of M/M/1 and M/M/N systems with finite and infinite capacities.

Recommended Text: Gupta P.K. and Hira D.S. (2000) *Problems in Operations Research,* S.Chand& Co. Delhi

Reference Books

1. J.K.Sharma, (2001) Operations Research: Theory and Applications, Macmillan, Delhi
2. KantiSwaroop, Gupta P.K. and Manmohan, (1999) *Problems in Operations Research*, Sultan Chand & Sons., Delhi.
3. V.K.Kapoor [1989] *Operations Research*, sultan Chand & sons.
4. Ravindran A., Philips D.T. and Solberg J.J., (1987) *Operations research*, John Wiley & Sons, New York.
5. Taha H.A. (2003) *Operations Research,* Macmillan Publishing Company, New York.
6. P.R.Vittal (2003) *Operations Research,* Margham Publications, Chennai.
7. S.J.Venkatesan, *Operations Research,* J.S. Publishers, Cheyyar-604 407.
8. Arumugam&Issac, Operations research - Vol. - I, New Gamma Pub., House. Palayamkottai.

PAPER - 2

CALCULUS OF FINITE DIFFERENCES AND NUMERICAL METHODS

(To be chosen only by those students who have not taken Numerical Methods as Allied subject)

Objectives

This course covers the basic methods for finding the finite difference, solution of simultaneous equations and the techniques of Numerical Differentiation and Numerical Integration. It also deals with solution of Algebraic and Transcendental equations.

(Note: All The Formulae Without Proof - Units I to V)

UNIT-I: Finite differences & Interpolation

Forward difference operator ▲ and Backward difference operator ▼ and shifting operator E, Relation between ▲, ▼and E - Interpolation - Newton - Gregory forward & backward formulae, Estimating the missing terms- Lagrange's and Newton's divided difference Formula for unequal intervals.

UNIT-II: Solutions of simultaneous linear equations

Gauss elimination method - matrix inversion method - Gauss-Jordan Method, Gauss – Seidal method.

UNIT-III: Numerical Differentiation

Newton's forward and backward differences formulae to compute derivatives - using Guass forward and backward formulae.

UNIT-IV: Numerical Integration

General Quadrature formula - Trapezoidal rule - Simpson's one third rule - Simpson's three-eight rule.

UNIT-V: Solution of Algebraic and Transcendental Equations:

Bisection method - Regula - falsi method (False Position method) – Newton - Raphson method. Numerical solution of ordinary Differential equation (First order only): Euler's method, modified Euler's method, Picard's method, Runge - Kutta method

Recommended Text

1. B.D. Gupta. (2001) *Numerical Analysis.* Konark Pub. Ltd., Delhi.

2. H.C.Saxena, Calculus of finite differences and Numerical Analysis, S. Chand & Co., New Delhi. IX Edition.

Reference Books

1. M.K.Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.
2. S. Arumugam (2003) - Numerical Methods, New Gamma Pub., for Palayamkottai.
3. A.Singaravelu, Numerical Methods, Meenakshi Publications-First Edition 1992.

ELECTIVE - III

PAPER – 3

A. SPECIAL FUNCTIONS

Objectives

To develop computational skill in certain special functions which are frequently occurring in higher mathematics and mathematical physics.

UNIT-I

Properties of Linear Operators - Simultaneous Linear Differential Equations -

UNIT-II

Special Solvable Types of Nonlinear Equations. Numerical Solutions Using Taylor Series -

UNIT-III

Adams and Modified Adams Method - Extrapolation with
Differences Properties of Power Series - Examples

UNIT-IV

Singular Points of Linear Second Order Differential Equations - Method of Frobenius.

UNIT-V

Bessel Functions - Properties – Legendre Functions.

Recommended Text

F.B.Hildebrand. (1977) *Advanced Calculus for Applications.*Prentice Hall. New Jersey.

Reference Books

1. J.N.Sharma and R.K.Gupta (1998) *Special Functions*, Krishna PrakashanMandir, Meerut.
2. SatyaPrakash. (2004)*Mathematical Physics.* Sultan & Sons. New Delhi.
3. B.D.Gupta (1978) Mathematical Physics, Vikas Publishing House.

PAPER – 3

B.FUZZY MATHEMATICS

Objectives

1. To know the fundamentals of fuzzy Algebra.
2. To know the basic definitions of fuzzy theory
3. To know the applications of fuzzy Technology.

UNIT-I

Introduction- Fuzzy subsets-Lattices and Boolean Algebras- L fuzzy sets-operations on fuzzy –α level sets – properties of fuzzy subsets of a set. section s 1.1-1.10

UNIT-II

Algebraic product and sum of two fuzzy subsets-properties satisfied by Addition and product-cartesian product of fuzzy subsets. Sections 1.11-1.13.

UNIT-III

Introduction- Algebra of fuzzy relations-logic-connectives. section s 2.1-2.4

UNIT-IV

Some more connectives-Introduction-fuzzy subgroup-homomorphic image and Pre-image of subgroupoid. Sections 2.5,3.1-3.3

UNIT-V

Fuzzy invariant subgroups-fuzzy subrings.
Section 3.4 and 3.5.
Recommended Text S.Nanda and N.R.Das "Fuzzy Mathematical concepts,Narosa Publishing House, New Delhi.

SKILL BASED SUBJECT

PAPER - 4

MATHEMATICS FOR COMPETETIVE EXAMINATIONS - III

Unit- I

Simple Interest.

Unit- II

Compound Interest

Unit- III

Logarithms – Races and Games of Skill.

Unit- IV

Area

Unit- V

Volume and surface areas.

Text Book:-

Quantitative Aptitude for competitive Examination , R.S.Aggarwal. S.Chand and company Ltd, 152, Anna salai, Chennai. 2001

ALLIED SUBJECTS FOR MATHEMATICS STUDENTS

To choose any two out of the following Four Allied subjects as Allied I and Allied II. Each Allied subject consists of two Examination papers as paper I and Paper II.

1. Mathematical Statistics (Paper I and II)
2. Numerical Methods (Paper I and II)
3. Physics (Paper I and II)
4. Chemistry (Paper I and II)

ALLIED

MATHEMATICAL STATISTICS - I

Objective

To apply Statistics Methods for Mathematical Problems

UNIT-I

Concept of Sample Space - Events - Definition of Probability (Classical, Statistical and Axiomatic) - Addition and Multiplication laws of Probability - Independence of Events - Conditional Probability - Baye's Theorem - Simple Problems.

UNIT -II

Random Variables (Discrete and Continuous) - Distribution Function - Expectation and Moments - Moment Generating Function - Probability Generating Function - Cumulant Generating Function - Simple Problems.

UNIT-III

Characteristic Function - Properties - Uniqueness and Inversion Theorem (Statement only) Chebychev's Inequality - Simple Problems

UNIT-IV

Concept of Bivariate Distribution - Correlation - Karl Pearson's Coefficient of Correlation - Rank Correlation - Linear Regression.

UNIT-V

Standard distributions: Discrete distributions - Binomial, Poisson, Hyper Geometric and Negative Binomial Distributions - Continuous Distributions Normal, Uniform, Exponential.

Recommanded text book:

S.C. Gupta & V.K. Kapoor : Fundamentals of Mathematical Statistics, Sultan & sons

Books for Reference

1. Hogg, R.V. &Craig.A.T.(1998) : Introduction to Mathematical Statistics, Macmillan
2. Mood. A.M. Graybill. F.A.&Boes.D.G.(1974) : Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967) : Statistical Methods, Oxford and IBH
4. Hoel, P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. Wilks S.S. Elementary Statistical Analysis, Oxford and IBH

ALLIED

MATHEMATICAL STATISTICS II

Objective

To apply Statistics for Mathematical problems

UNIT-I

Statistical Population Census and Sampling Survey - Parameter and Statistics - Sampling and Sampling Distribution and Standard Error. Sampling distributions - students 't', chi - square and F distributions.

UNIT-II

Test of significance - Large sample test for proportion, mean and standard deviation - Exact test based on 't', Chi - square and F distribution with respect to population mean, variance and correlation coefficient - Tests of independence of attributes - goodness of fit tests.

UNIT-III

Point estimation - Concept of unbiasedness, consistency, efficiency and sufficiency - Cramer- Rao Inequality - Methods of Estimation - Maximum Likelihood Estimation - Method of Moments.

UNIT-IV

Test of Hypothesis: Null and Alternate Hypothesis - Type I and Type II error - Power of the test - Neymann Pearson lemma - Likelihood Ratio Test - Concept of Most Powerful test (Statement and Results only) - Simple Problems

UNIT-V

Analysis of Variance - One - way and Two-way Classification - Basic Principles of Design of Experiments - Randomization, Replication, Local Control, Completely Randomized Design, Randomized Block Design and Latin Square Design.

Recommended Text:

S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan & sons

Books for Reference

1. Hogg, R.V. & Craig. A. T. (1998): Introduction to Mathematical Statistics, Macmillan
2. Mood.A.M.,Graybill. F.A.&Boes. D.G.(1974): Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967): Statistical Methods, Oxford and IBH
4. Hoel.P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. Wilks . S. S.Elementary Statistical Analysis, Oxford and IBH
6. O. Kempthone - Design of Experiments
7. Das and Giri : Design of Experiments Wiley Eastern

ALLIED PRACTICAL

MATHEMATICAL STATISTICS

1. Measures of location and Dispersion (absolute and relative)
2. Computation of Correlation Coefficient for raw and Grouped data, Rank Correlation Coefficient
3. Computation of Regression Equations for Raw and Grouped Data
4. Curve Fitting by the Method of Least Squares
   a. $y=ax+b$
   b. $y=ax^2+bx+c$
   c. $y=ae^{bx}$
   d. $y=ax^b$
5. Fitting of Binomial, Poisson, Normal distributions and tests of goodness of fit.
6. Large sample tests with regard to population mean, proportion, standard deviation
7. Exact tests with Respect to Mean, Variance and Coefficient of Correlation
8. Test for Independence of Attributes Based on Chi-Square Distribution
9. Confidence Interval based on Normal, t and Chi-square and F Distributions
10. Problems based on ANOVA-one way and two way Classification
11. Completely Randomized Design
12. Randomized Block Design
13. Latin Square Design

Note
Use of scientific calculator shall be permitted for practical examination.
Statistical and Mathematical tables are to be provided to the students at the examination hall.

- Mathematics faculty alone should be appointed as examiners.

Books for Reference

1. Hogg, R.V. &Craig.A.T.(1998): Introduction to Mathematical Statistics, Macmillan.
2. Mood.A.M. ,Graybill. F.A.&Boes.D.G.(1974) : Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967): Statistical Methods, Oxford and IBH
4. Hoel.P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan &sons
6. S.C. Gupta & V.K. Kapoor: Fundamentals of Applied Statistics, Sultan & sons
7. Wilks . S. S. Elementary Statistical Analysis, Oxford and IBH
8. O. Kempthone - Design of Experiments.

ALLIED PAPERS

NUMERICAL METHODS - I

Objectives

This course will cover basic methods for finding the Finite differences, Central differences, Inverse interpolation, Summation of series, Interpolation for equal & unequal intervals, Solutions of simultaneous equations, Important principles, Method and Processes to get numerical results, Reliability of numerical result.

UNIT-I: Finite Differences

First and higher order differences-forward differences and Backward differences-Properties of operators-Differences of a Polynomial-Factorial Polynomials-Operator E, Relation between ▲,▼and E–Interpolation - Newton - Gregory forward & backward formulae for interpolation.

UNIT-II: Central Differences

Central difference Operators-Central differences formulae: Gauss Forward and Backward formulae-Sterling's formula-Bessel's formula.

UNIT-III: Interpolation for Unequal Intervals

Divided differences-Newton's divided differences formula and Lagrange's-Estimating the Missing terms (With one or more missing values).

UNIT-IV: Inverse Interpolation

Lagrange's method and Reversion of series method (Using Newton's forward formula only).

Summation of series: Sum to n term of the series whose general term is the first difference of a function-summation by parts.

UNIT-V: Solutions of Simultaneous Linear Equations

Gauss elimination method-matrix inversion method-Gauss-Jordan Method, Gauss-Seidal method (Three unknowns only).

Recommended Text

1. B.D. Gupta.(2001) *Numerical Analysis.*Konark Pub. Ltd., Delhi
2. M.K. Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.

Reference Books

1. S. Arumugham. (2003) *Numerical Methods*, New Gamma Publishing, Palamkottai.
2. H.C. Saxena. (1991) *Finite differences and Numerical analysis* S.Chand & Co., Delhi
3. A.Singaravelu (2004). *Numerical Methods*Meenakshi Agency, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite difference & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

NUMERICAL METHODS II

Objectives

This course covers the techniques of Numerical Differentiation and Numerical Integration. It also deals with solution of difference equations, Algebraic and Transcendental equations and Numerical solution of Ordinary differential equations of first order.

UNIT-I: Numerical Differentiation

Newton's forward and backward differences to compute derivatives-derivative using divided differences formula-maxima and minima using the above formulae.

UNIT-II: Numerical Integration

General Quadrature formula-Trapezoidal rule-Simpson's one third rule-Simpson's three-eight rule, Weddle's rule- Euler-Maclaurin Summation Formula

UNIT-III: Difference Equations

Linear differences equations-Linear homogeneous difference equation with constant co-efficient-Particular integrals for a^x, x^m, sinax, cosax and $a^x f(x)$.

UNIT-IV: Solution of Algebraic and Transcendental Equations

Bisection method-Iteration method-Regula-falsi method (False Position Method)-Newton-Rapson Method.

UNIT-V: Numerical Solution of Ordinary Differential Equations (First order only)

Euler's method- Euler's modified method-Picard's method - Taylor's methods-Runge-Kutta method (Fourth order only).

Recommended Text

1. B.D. Gupta. (2001) *Numerical Analysis.*Konark Pub. Ltd., Delhi
2. M.K.Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.

Reference Books

1. Gupta-Malik, Calculus of finite differences and numerical Analysis, KrishbaPrakashanMandir, Meerut Seveenth Edition.
2. S.C.Saxena, Calculus of finite differences and Numerical Analysis, S.Chand& Co., New Delhi. IX Edition.
3. A.Singaravelu, Numerical methods, Meenakshi Publications-First Edition 1992.
4. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite Difference & Numerical Analysis, S.Chand& Company Ltd., New Delhi-55.

ALLIED PRACTICAL

NUMERICAL METHODS

LIST OF PROBLEMS

1. Derivatives by Newton's method
2. Gauss elimination method.
3. Gauss-Jacobi method.
4. Gauss-Siedel method.
5. Power method (eigenvalue).
6. Newton's forward and backward interpolation.
7. Lagrange interpolation.
8. Trapezoidal and Simpson one-third rules.
9. Euler's method.
10. Picard's method
11. Runge-Kutta's method.
12. Predictor-corrector method.

ALLIED

PHYSICS - I

UNIT – I: PROPERTIES OF MATTER

Elasticity : Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula .

Surface Tension: Surface Tension – Surface Tension and interfacial surface tension by the method of drops.

UNIT – II: HEAT

Heat: Specific heat – Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power.
Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Super conductors. Type I and II – Meisner Effect – Helium I and II.

UNIT – III: ELECTRICITY AND MAGNETISM

Electricity: Potentiometer – Principle – Calibration of low range voltmeter – Measurement of internal resistance of cell – measurement of an unknown resistance.

Magnetism – Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer in Tan C position and the vibration magnetometer.

UNIT – IV: SOUND AND ACOUSTICS OF BUILDING

Sound: Transverse vibration of strings – Velocity and frequency of vibrations of a stretched string – laws – sonometer – A.C. Frequency – Steel Wire – Brass wire.

Ultrasonics – Production by Piezo – electric method – properties and uses.
Acoustics of buildings: Reverberation – Reverberation time – Sabine's formula (definition only) – Sound absorption co-efficient of surface – conditions for the perfect acoustics.

UNIT – V: OPTICS

Interference: Air Wedge – Description – Test for optical flatness of glass plate – Determination of diameter of a thin wire by air wedge.

Diffraction: Theory of transmission grating – Normal Incidence – Determination of Wavelength of monochromatic source and Wavelength of mercury line using a grating by normal Incidence.

Fibre optics: principle-classification of optical fibres-fibre optic communication system block diagram.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Introduction to Fibre optics- K.Thyagarajan and Ajay Ghatak,Cambridge,University Press(1999).

ALLIED

PHYSICS II

UNIT – I: WAVE MECHANICS

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

UNIT – II : NUCLEAR PHYSICS

Particle accelerators – cyclotron, particle detectors – GM Counter Artificial Transmutation – Rutherford's Experiment – The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions.

Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy – Conservation of Parity – Quantities conserved and quantities not conserved in a nuclear reaction.

UNIT – III : ENERGY PHYSICS

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

UNIT – IV: CRYSTALLOGRAPHY

Crystallography : The crystal structure – Unit Cell –Bravais lattice- structures of simple cubic-BCC and FCC- co ordination number, packing factor calculation for the above structures –Hexogonal closed packed(HCP) structure -Miller indices – concept of Reciprocal Vectors.

UNIT – V: ELECTRONICS

Electronics: Transistor characteristics in common base and common emitter mode- Transistor single stage amplifier- Expression for input impedence, output impedence and current gain.
Digital Electronics : NAND and NOR as universal building blocks- De Morgan's theorem –statement and proof- Fabrication of diodes and transistors using Monolithic technology–limitations.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
9. Introduction to Solid State Physics – C. Kittel, 5^{th} Edition Wiley Eastern Ltd.
10. Renewable & Sustainable energy sources – Agarwal.

ALLIED PRACTICAL

PHYSICS

(Any 15 Experiments)

1. Young's modulus – non uniform bending – pin and microscope.
2. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
3. Ridigity modulus – Torsional oscillation method (without symmetric masses).
4. Determination of Co-efficient of Viscosity – Graduated Burette.
5. Surface Tension and Interfacial Tension – By drop weight method.
6. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
7. Sonometer – Determining A.C. Frequency. (Screw Gauge is given).
8. Sonometer – frequency of tuning fork.
9. Newton's Rings – Radius of Curvature.
10. Air Wedge – Determination of thickness of thin wire.
11. Spectrometer Grating – Minimum Deviation – Mercury Lines.
12. Spectrometer – Refractive Index of a liquid – Hollow Prism.
13. Potentiometer – Calibration of High Range Ammeter.
14. Potentiometer – Calibration of Low Range Voltmeter.
15. Determination of M and B_H using Deflection Magnetometer in Tan C position and vibration magnetometer.
16. Figure of merit and voltage sensitiveness of table galvanometer.
17. Construction of AND, OR gates using diodes and NOT by transistors.
18. Zener diode – Voltage Regulation.
19. NAND / NOR as universal gate.
20. Demorgan's theorem verification.

ALLIED

PAPER – 1

CHEMISTRY – I

OBJECTIVE:

- Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications wherever necessary are to be taught for I- Semester.

UNIT – I

1.1General Metallurgy - Extraction of Metals - Minerals and Ores- Difference between Minerals and Ores – Minerals of Iron, Aluminum and Copper - Ore Dressing or Concentration of Ores - Types of Ore Dressing- Froth Floatation process, Gravity separation and Magnetic separation.

1.2 Calcination, Smelting, Roasting, Fux, Slag - Definition - Reduction methods - Goldschmidt Aluminothermic process and Carbon Reduction method - Refining of Metals - Electrolytic, Van Arkel and Zone Refining.

1.3 Ores of Titanium and Cobalt - Extraction of Titanium and Cobalt.

UNIT – II

2. Cycloalkanes - Preparation – Wurtz reaction and Dieckmann's condensation - Properties of Cycloalkanes – Substitution and Ring opening reactions.

2.2 Polarisation - Inductive effect, Mesomeric effect and Steric effect (Acid and Base Strength).

2.3Stereoisomerism – Types - Cause of Optical Activity – Enantiomers - Diastereomers - Meso form - Optical Activity of Lactic acid and Tartaric acid - Racemisation and Resolution – Definition and Methods - Geometrical isomerism – Definition and example - Maleic and Fumaric acid – Differences.

UNIT – III

3.1 Chemical Kinetics – Rate of a reaction – Definition of Order and Molecularity – Distinction between Order and Molecularity - Derivation of First order rate equation - Half Life Period of first order reaction.

3.2 Catalysis - Catalyst - Autocatalyst - Enzyme catalyst - Promoters - Catalytic poisons –

Active Centre - Differences between Homogeneous and Heterogeneous Catalysis - Industrial Applications of Catalysts.

3.3 Photochemistry – Grothus-Draper's law – Stark-Einstein's law - Quantum yield – Photosynthesis - Phosphorescence – Fluorescence.

UNIT – IV

4.1 VSEPR Theory – Hybridisation and Shapes of simple molecules BF_3, PCl_5, SF_6 and XeF_6.

4.2 Fuels – Classification of Fuels - Calorific value of Fuels – Water gas, Carbureted Water gas and Producer gas – Composition and Uses - Non-Conventional fuels - Need of Solar Energy - Applications - Biofuels – Oil gas, Natural gas and LPG – Uses.

4.3 Osmosis - Osmotic pressure - Reverse osmosis – Definition - Desalination of Sea water.

UNIT – V

5.1Nuclear Chemistry – Atomic number, Mass number - Isotopes, Isobars and Isotones – Definition and Examples - Definition of Half life period - Nuclear Binding Energy, Mass Defect and N/P ratio - Nuclear Fission and Nuclear Fusion (Elementary idea) - Applications of Radioisotopes in Medicine, Agriculture and Industries – Carbon Dating.

5.2 Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking – Naphthalene – Preparation – Haworth's method – Properties – Oxidation, Reduction and Uses of Naphthalene - Structure of Naphthalene (Structural elucidation not necessary).

5.3 Conductors, Insulators, Semiconductors, N- and P- Type Semiconductors – Definitions and Examples.

ALLIED

PAPER – 2

CHEMISTRY – II

OBJECTIVE:

- Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins, Medicinal Chemistry, Corrosion and Applications wherever necessary are to be taught for II- semester.

UNIT – I

1.1 Coordination Chemistry - Nomenclature of Coordination Compounds - Ligands, Central Metal Ion and Complex Ion – Definition and Examples – Coordination Number - Werner's Theory of Coordination Compounds - Chelates - Functions and Structure of Haemoglobin and Chlorophyll.

1.2 Industrial Chemistry - Fertilisers and Manures – Biofertilisers - Organic Manures and their importance - Role of NPK in plants - Preparation and Uses of Urea, Ammonium Nitrate, Potassium Nitrite and Super Phosphate of Lime.

1.3 Contents in Match Sticks and Match Box - Industrial making of Safety Matches – Preparation and Uses of Chloroform, DDT, Gammexane and Freons.

UNIT – II

2.1 Carbohydrates - Definition and Examples - Classification – Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate.

2.2 Amino Acids – Definition and Examples - Classification of Amino Acids - Preparation - Gabriel Phthalimide Synthesis – Properties – zwitterion and Isoelectric point - Structure of Glycine.

2.3 Proteins – Definition - Classification of Proteins based on Physical properties and Biologcal functions - Primary and Secondary Structure of Proteins (Elementary Treatment only) – Composition of RNA and DNA and their Biological role - Tanning of Leather - Alum (Aluminum chloride tanning) - Vegetable tanning – Chrome Tanning.

UNIT – III

3.1 Electrochemistry - Electrolytes – Definition and Examples – Classification - Specific and Equivalent Conductance - their determination – Variation of Specific and Equivalent conductance with Dilution – Ostwald's Dilution Law and its Limitations.

3.2 Kohlrausch's Law - Determination of Dissociation Constant of weak Electrolytes using Conductance measurement - Conductometric titrations.

3.3 pH – Definition and pH determination by indicator method - Buffer solutions - Buffer action - Importance of buffers in the living systems.

UNIT – IV

4.1Paints - Components of Paint – Requisites of a Good Paint - Pigments – Classification of Pigments on the basis of Colour – Examples - Dyes – Definition – Chromophores and Auxochromes – Examples - Colour and Dyes - Classification based on Constitution and Application – Examples.

4.2 Vitamins – Definition – Classification – Water Soluble and Fat Soluble – Occurrence - Biological Activities and Deficiency Diseases caused by Vitamin A, B, C, D, E and K - Hormones – Definition and Examples – Biological Functions of Insulin and Adrenaline.

4.3 Chromatography - Principles and Applications of Column and Paper chromatography- R_f value.

UNIT – V

5.1 Drugs - Sulpha Drugs – Preparation and Uses of Sulphapyridine and Sulphadiazine - Mode of Action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicol and Streptomycin - Drug Abuse and Their Implication - Alcohol – LSD.

5.2 Anaesthetics - General and Local Anaesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS.

5.3 Electrochemical Corrosion and its Prevention – Electroplating – Applications.

ALLIED PRACTICAL

CHEMISTRY

VOLUMETRIC ANALYSIS

1. Estimation of HCl – Standard sulphuric acid.
2. Estimation of Borax - Standard Sodium Carbonate.
3. Estimation of NaOH – Standard Oxalic Acid.
4. Estimation of $FeSO_4$ – Standard FAS.
5. Estimation of Oxalic acid – Standard $FeSO_4$.
6. Estimation of FAS – Standard Oxalic Acid.
7. Estimation of Oxalic acid – Standard Oxalic Acid.
8. Estimation of Fe^{2+} using Diphenylamine / N- Phenyl Anthranilic acid as indicator.

ORGANIC ANALYSIS

Systematic Analysis of Organic Compounds containing One Functional Group and Characterisation by Confirmatory Tests.

Reactions of Aromatic Aldehyde, Carbohydrates, Mono and Dicarboxylic acids, Phenol, Aromatic Primary Amine, Amide and Diamide.

REFERENCE BOOKS

- Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).
- Inorganic Chemistry - B. R.. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications (2013).
- Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
- Text Book of Inorganic Chemistry – R. Gopalan, Universities Press – 2012.
- Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
- Advanced Organic Chemistry - Bahl and Arun Bahl - Sultan Chand and Co. Ltd – 2012.

- Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
- A Text Book of Organic Chemistry K. S. Tewari, N. K. Vishol, S. N. Mehrotra- Vikas Publishing House – 2011.
- Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishal Publishing Company – 2013.
- Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha andU. N. Dash - Sultan Chand & Co – 2006.
- Understanding chemistry – C. N. R. Rao, Universities Press – 2011.

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SCHEME OF VALUATION FOR ALLIED CHEMISTRY PRACTICALS

Internal assessment: 25 Marks

External assessment: 75 marks

Total: 100 marks

Max. Marks: 75

Record: 15 Marks

Volumetric Analysis: 30 Marks

Organic Analysis : 30 Marks

Volumetric Analysis : 30 Marks (Maximum)

Procedure : 5 Marks

Error upto 2 % : 25 Marks

2.1 to 3 % : 20 Marks

3.1 to 4 % : 15 Marks

4.1 to 5 % : 10 Marks

> 5 % : 5 Marks

Arithmetic error : Deduct 1 mark

Wrong calculation : Deduct 20 % of marks scored

No calculation : Deduct 40 % of marks scored

Organic Analysis : 30 Marks

Preliminary Reactions : 4 Marks

Aliphatic or Aromatic : 4 Marks

Saturated or unsaturated : 4 Marks

Tests for 3 elements : 9 Marks (3 x 3)

Tests for functional group : 9 Marks.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. MICROBIOLOGY

DEGREE COURSE
CBCS PATTERN
(With effect from 2017-2018)

The Course of Study and the Scheme of Examinations

S.NO	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title							
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper-1	6	5	Fundamentals of Microbiology	25	75	100
4	III	Core Practical	Practical-1	3	0		0	0	0
5	III	ALLIED - 1	Paper-1	4	4	Biochemistry I	25	75	100
6	III	Allied Practical	Practical-1	3	0		0	0	0
7	IV	Environ. Studies		2	2	Environmental Studies	25	75	100
				30	**19**		**125**	**375**	**500**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English	Paper-2	4	4	English	25	75	100
10	III	Core Theory	Paper-2	6	5	Microbial Physiology	25	75	100
11	III	Core Practical	Practical-1	3	3	Subjects covering Core Papers 1 & 2	25	75	100
12	III	ALLIED-1	Paper-2	4	4	Biochemistry II	25	75	100
13	III	Allied Practical	Practical-1	3	2	Biochemistry	25	75	100

14	IV	Value Education		2	2	Value Education	25	75	100
15	IV	Soft Skill		2	1	Soft Skill	25	75	100
				30	**25**		**200**	**600**	**800**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
16	I	Language	Paper-3	6	4	Tamil/Other Languages	25	75	100
17	II	English	Paper-3	6	4	English	25	75	100
18	III	Core Theory	Paper-3	3	3	Immunology	25	75	100
19	III	Core Practical	Practical-2	3	0		0	0	0
20	III	ALLIED-2	Paper-3	4	4	Human anatomy and physiology	25	75	100
21	III	Allied Practical	Practical-2	3	0		0	0	0
22	IV	Skill based Subject	Paper-1	3	3	Haematology and blood banking	25	75	100
23	IV	Non-major elective	Paper-1	2	2	Computer Applications in Biology	25	75	100
				30	**20**		**150**	**450**	**600**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
24	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
25	II	English	Paper-4	6	4	English	25	75	100
26	III	Core Theory	Paper-4	3	3	Microbial Genetics	25	75	100
27	III	Core Practical	Practical-2	3	3	Subjects covering Core Papers 3 & 4	25	75	100
28	III	ALLIED-2	Paper-4	4	4	Bio-statistics	25	75	100
29	III	Allied Practical-2	Practical-2	3	2	Human anatomy and physiology	25	75	100
30	IV	Skill based Subject	Paper-2	3	3	Vermi tech	25	75	100

31	IV	Non-major elective	Paper-2	2	2	Human microbial diseases, causes and control	25	75	100
				30	**25**		**200**	**600**	**800**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
32	III	Core Theory	Paper-5	7	5	Molecular Biology and Genetic Engineering	25	75	100
33	III	Core Theory	Paper-6	7	5	Medical Bacteriology	25	75	100
34	III	Core Theory	Paper-7	7	5	Medical Virology, Mycology and Parasitology	25	75	100
35	III	Core Practical	Practical-3	3	0	Subjects covering Core Papers 5, 6 & 7	0	0	0
36	III	Elective	Paper-1	3	3	Herbal Technology	25	75	100
37	IV	Skill based Subject	Paper-3	3	3	Mushroom culture techniques	25	75	100
				30	**21**		**125**	**450**	**600**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
38	III	Core Theory	Paper-8	5	5	Food Microbiology	25	75	100
39	III	Core Theory	Paper-9	5	4	Soil, Agricultural and Environmental Microbiology	25	75	100
40	III	Core Theory	Paper-10	5	5	Industrial and Pharmaceutical Microbiology	25	75	100
41	III	Core Practical	Practical-3	3	3	Subjects covering Core Papers 5, 6 & 7	25	75	100
42	III	Core Practical	Practical-4	3	3	Subjects covering Core Papers 8 & 9	25	75	100
43	III	Elective	Paper-2	3	3	Bio inoculants technology	25	75	100
44	III	Elective	Paper-3	3	3	Food analysis and quality control	25	75	100

45	IV	Skill based Subject	Paper-4	3	3	Bioinstrumentation	25	75	100
46	V	Extension Activities		0	1		100	0	100
				30	**30**		**300**	**600**	**900**

Part	**Subject**	**Papers**	**Credit**	**Total credits**	**Marks**	**Total marks**
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Sem)	2	4	8	100	200
	Allied (Even Sem)	2	4	8	100	200
	Allied -Prac(Even Sem)	2	2	4	100	200
	Electives	3	3	9	100	300
	Core	10	(3-7)	45	100	1000
	Core Practical	4	3	12	100	400
Part IV	Env. Science	1	2	2	100	100
	Soft skill)	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**41**		**140**	**1400**	**4100**

THIRUVALLUVAR UNIVERSITY

B.Sc. MICROBIOLOGY

SYLLABUS
UNDER CBCS PATTERN
(With effect from 2017-2018)

SEMESTER I

PAPER - 1

FUNDAMENTALS OF MICROBIOLOGY

Objective

To make the students to understand the fundamentals on microbes.

UNIT-I

Definition and scope of Microbiology - History of Microbiology. The origin of Microbial life - Theory of spontaneous generation. Pasteurs's Tyndall experiments fermentation studies. Contributions of Leewenhoek, Lister, Robert Koch, Thomas J.Burrill, Sergei N. Winogeadsky, Willen Beijerinck, Emil Christian Hansen, S.A. Wakmann, Alexander flaming, Stanely Iwenewsky - Impact of Microbiology and the future.

UNIT-II

Microscopy - simple, compound, dark field, phase contrast, Florescence & Electron microscopy. Staining methods and its principles.

UNIT-III

Microbial Evolution and Diversity - Endosymbiotic theory. Binomial nomenclature of Microbes. Classification - Five kindom concept - eight kindom concept (Cavalier Smith).

UNIT-IV

Anatomy of prokaryotes - cell wall, cytoplasmic membrane, cilia flagella capsule, cytoplasmic inclusions, sporulation.

UNIT-V

Sterilization - methods of sterilization and Disinfection. Antimicrobial chemotherapy - tests for sensitivity to antimicrobial agents.

Text Books:

1. Rajan. S and Selvi Christy (2015). Essentials of Microbiology, Anjanaa Book House Publishers, Chennai.
2. Pelczar Jr. M.J. Chan. E.C.S and Kreig. N.R (2006). "Microbiology"- 5th Edition Mc Graw Hill Inc. New York.
3. Ananthanarayan and Panikers (2013) Textbook Microbiology 9th edition, Universities Press (India) Private Ltd.
4. David, B.D., Delbecco, R., Eisen, H.N and Ginsburg, H.S (1990) "Microbiology" 5th Edition. Harper & Row, New York.
5. Dubey RC and Maheswari DK (2005). A text book of Microbiology, Revised Multicolour edition, S.Chand Publishers, New Delhi.
6. Purohit SS (2005). Microbiology - Fundamentals and Applications. Student Edition Publishers, Jodhpur.
7. Powar & daginawala (2005). General Microbiology Vol.I & II 8th Edition, Himalaya Publishing House, Mumbai.
8. Salle, AJ (2001). Fundamentals & Principles of Bacteriology. 7th edition. Tata McGraw-Hill, Davis,
9. Delbecco, Eisen & Ginsburg (1990) Microbiology 5th Edition Harper & raw, New York

Reference Books:

1. Lansing M. Prescott., John. P. Harley., Donald A, Klein, "Microbiology"-Mc Graw Hill Inc. New York.
2. Robert F.Boyd., "General Microbiology" 2nd Edition, Times MIRROR/Moshy College Publishing Virginia.

ALLIED - 1
PAPER - 1
BIOCHEMISTRY I

UNIT-I: Chemistry of Carbohydrates

Definition and Classification of carbohydrate. Monosaccharides - occurrence, structure; physical and chemical properties, linear and ring forms (Haworth formula) for glucose and fructose. Disaccharides - occurrence, structure; physical and chemical properties of sucrose and lactose. Polysaccharides - occurrence, structure, physical and chemical properties of starch.

UNIT-II: Chemistry of amino acids

Definition and classification of amino acids. Reaction with ninhydrin, common properties of amino acids, amphoteric nature, isoelectric point, isoelectric pH and Zwitter ion.

UNIT-III: Chemistry of Proteins

Classification based on solubility, shape and size. Physical properties: salting in and salting out, denaturation, peptide bond. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT-IV: Chemistry of Lipids

Definition, classification and functions of lipids. Occurrence, chemistry and biological functions of simple lipids, compound lipids (e.g. phospholipids) and derived lipids: steroids (e.g. cholesterol). Physical property-emulsification. Chemical property-saponification. Functions of bile acids and bile salts.

UNIT-V: Chemistry of Nucleic acids

Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNA and its biological functions. Structure, types and functions of RNA: tRNA, mRNA and rRNA. Differences between DNA and RNA.

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan , MJP Publishers, Chennai - 5.

SEMESTER II
PAPER - 2
MICROBIAL PHYSIOLOGY

Objective

To make the students to understand the physiology of microbes.

UNIT-I

Basic concepts of metabolism - Nutritional types of microorganisms uptake of nutrient in to the cell. Transport of nutrients by active and passive ways.

UNIT-II

Cultivation of microbes - Bacteria fungi, virus. Culture technique - media preparation. Types of media. Isolation of pure culture - preservation of cultures.

UNIT-III

Microbial growth - Growth curve measurement of microbial growth - Measurement of cell number, measurement of cell mass. Factors affecting growth.

UNIT-IV

Control of microbial growth by Antiseptics. Antiparasitic and Antiviral drugs - Antimicrobial resistance.

UNIT-V

Basic concepts of metabolism - Mechanism of ATP formation - Substrate phosphorylation. Electron transport, phosphorylation, photophosphorylation. Energy production during oxidation of organic substrate - Amino acid and assimilatory pathway. Bacterial enzymes - coenzymes - isoenzymes - structure, classification and properties.

Text Books:

1. Rajan. S and Selvi Christy (2015). Essentials of Microbiology, Anjanaa Book House Publishers, Chennai.

2. Ananthanarayan and Panikers (2013) Textbook Microbiology 9th edition, Universities Press (India) Private Ltd.

3. Pelczar Jr. M.J. Chan. E.C.S and Kreig. N.R (2006). "Microbiology"- 5th Edition Mc Graw Hill Inc. New York.

4. Sale, A.J (1992) "Fundamentals Principles of Bacteriology", 7th Edition. McGraw Hill Publishing Co. Ltd., New York.

5. Dubey, R.C. and Maheswari, D.K. (2005) A Text book of microbiology. S. Chand & Company Ltd. New Delhi.

6. David, B.D., Delbecco,. R., Eisen, H.N and Ginsburg, H.S (1990) "Microbiology" 5th Edition. Harper & Row, New York.

7. Dubey RC and Maheswari DK (2005). A text book of Microbiology, Revised Multicolour edition, S.Chand Publishers, New Delhi.

8. Purohit SS (2005). Microbiology - Fundamentals and Applications. Student Edition Publishers, Jodhpur.

9. Powar & daginawala (2005). General Microbiology Vol.I & II 8th Edition, Himalaya Publishing House, Mumbai.

10. Delbecco, Eisen & Ginsburg (1990) Microbiology 5th Edition Harper & raw, New York

Reference Books:

1. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L and Painter, P.R. (1986). "General Microbiology" -Mac Milan Education Ltd. London.

2. Dall, D.O and Rao, K.K (1995) "Photosynthesis" –Cambridge University press.

3. Chandar Sbekar, C.N. (2006). Manipal Manual of Physiology, CBS Publishers and distributors Pvt. Ltd., Chennai.

4. Pal, G.K and Pravathi Pal (2016), A text book of Practical Physiology, 4th Edition Universities Press (India) Pvt Ltd,

CORE PRACTICAL
PAPER 1 & 2

Objective:

To impart hand on training on basics of microbiology and microbial physiology.

1. Cleaning of glass ware.

2. Sterilization principle and methods-moist heat - dry heat and filtration methods.

3. Media preparation: Liquid media, solid media, Agar deep, Agar slants, Agar plates, Basal, enriched, selective media preparation - quality control of media, growth supporting properties and sterility check of media.

4. Pure culture technique: Streak plate, pour plate, spread plate, decimal dilution.

5. Cultural characteristics of microorganisms: Growth on different media, growth characteristics and description. Demonstration of pigment production and extraction.

6. Microscopy: Light microscopy, bright field microscopy, dark field microscopy and phase contrast microscopy.

7. Motility demonstration: Hanging drop preparation, wet mount, dark field microscopy, semisolid agar, Craigies tube method.

8. Staining techniques: Smear preparation, simple staining, Gram's staining, Acid fast staining, staining for metachromatic granules.

9. Morphology of microorganisms: Morphological variations in algae. Morphology of fungi, yeasts, slide culture techniques.

10. Antibiotic sensitivity testing: Disc diffusion test - Quality control with standard strains.

11. Micrometry: Determination of size of Bacteria, yeast. Fungal filaments.

12. Physiological characteristics: IMViC test, MR-VP test, H_2S, Oxidase, catalase, urease test, gelatin liquefaction, casein, starch degradation. Carbohydrate fermentation, Maintenance of pure culture, Paraffin method - Stab culture - maintenance of mound culture.

References Book:

1. Rajan. S and Selvi Christy (2015). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.

ALLIED - 1

PAPER - 2
BIOCHEMISTRY II

UNIT-I: Metabolism

Glycolysis, TCA cycle and its energetics, HMP shunt pathway. Deamination, transamination reaction, transaminase enzymes, Urea cycle.

UNIT-II: Metabolic Disorders

Diabetes mellitus, Glycogen storage diseases, Glycosuria, Ketosis, Jaundice, Phenyl ketonuria, Alkaptonuria. Dehydration: definition, causes, symptom and prevention.

UNIT-III: Enzymes

Definition, classification of enzymes with one example. Mechanism of enzyme action - Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Enzyme inhibition: competitive, uncompetitive and non competitive. Biological functions of enzymes.

UNIT-IV: Molecular Biology

Central dogma of molecular biology. DNA and RNA act as genetic material. Replication: Definition, types, mode of action of replication, mechanism of replication. General mechanism of transcription and translation. Genetic code.

UNIT-V: Vitamins

A brief outline of source, requirement, biological function and deficiency of Vitamins (fat soluble and water soluble vitamins).

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Robert K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan, MJP Publishers, Chennai-5.

ALLIED PRACTICAL
BIOCHEMISTRY I & II

PRACTICAL I

Volumetric Estimation

1. Estimation of HCl using Na2CO3 as link and NaOH as primary standard.

2. Estimation of Iron in Ferrous Ammonium Sulphate using potassium permanganate as link solution and oxalic acid as primary standard.

3. Estimation of Glucose by Benedict's method.

4. Estimation of Glycine by formal titration.

5. Estimation of Ascorbic acid.

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SEMESTER III
PAPER - 3
IMMUNOLOGY

Objective:

To make the students to understand the immune system

UNIT-I

History of Immunology - Immunohaematology. Blood groups - Blood transfusion - Host parasite relationships. Microbial infections.

UNIT-II

Structure and function of the cells, tissues and organs of immune system. Types of immunity - Humoral and cell-mediated, innate, acquired immunity. Complement system - function and pathways.

UNIT-III

Antigen - types, properties. Hapten, adjuvants, Immunoglobulins: Structure types properties and their function - Theory of antibody production.

UNIT-IV

Vaccines and Immunization - Types and their characteristics. Monoclonal Antibody - Hybridoma Technology. Cell mediated immune response - Lymphokines, Cytokines.

UNIT-V

Antigen-antibody interaction in vitro Agglutination, complement fixation, Precipitation, ELISA, RIA, Flow cytometry and Fluorescence immunoblotting – Hypersensitivity. Skin tests (In vivo).

Text Books:

1. Roitt, I.M (1998) Essential Immunology Blackwell Scientific Publishers.
2. Kuby, J. (1994) Immunology, 2nd edition, W.H. Freeman and Company. New York.
3. Leffel, Donnenberg, A: and rose, W.1997 hand book of human Immunology Boca Raton Fla: C.R.C Press.
4. Ajoy Paul (2016). Text Book of Immunology, Books and Allied (P) Ltd, Kolkatha.
5. Sudha Gangal and Shubhangi Sontakke, (2013) Text Book of basic and clinical Immunology, Universities Press (India) Private Ltd.

Reference Book:

1. Abbas, A.K. Lichtman, A.M. and Pober, J.S. (1997) Cellular and Molecular immunology 3rd edition Philadelphia: W.B. Saunders.

ALLIED - 2
PAPER - 3
HUMAN ANATOMY AND PHYSIOLOGY

Objective: To make the students to understand the importance of human anatomy.

UNIT-I: Respiratory System (RS) and Special Sensory Organs (SSS)

Introduction to applied human anatomy and physiology.

Respiratory System (RS): Different organs of the Respiratory System. Functions of the different organs of the Respiratory System.

Special Sensory Organs (SSS): Introduction to special sensory organs. Function and functions of eye, ear, nose, tongue, and skin.

UNIT-II: Gastro Intestinal (GI) System

Gastro Intestinal (GI) System: Different organs associated with the Gastro Intestinal system: (Salivary glands, Pancreas, Liver and Gall bladder and others).

UNIT-III: Musculoskeletal System (MSS), Skin and Nervous System (NS)

Musculoskeletal System (MSS) and Skin: Introduction of musculo-skeleton system. Different parts of involved in skeleton system. Function of skeleton. Parts and function of skin.

Nervous System (NS): Introduction to nervous system. Different organs and function of central nervous system (CNS) and peripheral nervous system PNS and related to infection

UNIT-IV: Circulatory System (CS) and Endocrine System (ES)

Circulatory System (CS): Blood: Site of formation, composition, functions of blood cells, Different parts of the circulatory system and its function.

Endocrine System (ES): Introduction to endocrine system.

UNIT-V: Reproductive System (RS) and Urinary System (US)

Reproductive System (RS): Introduction Male reproductive system – physiological anatomy, spermatogenesis and its regulation, testicular hormones, composition of semen Female reproductive system – menstrual cycle, pregnancy and parturition, lactation and family planning.

Urinary System (US): Different organs and Functions of Urinary System.
Mechanism of urine formation and composition of urine.

Text books:

1. Sampath Madhyastha, (2016) Manipal Manual of Anatomy, 3rd Edition, CBS Publishers and Distributors Pvt Ltd. Chennai.
2. Chandar Sbekar, C.N. (2006). Manipal Manual of Physiology, CBS Publishers and distributors Pvt Ltd., Chennai.
3. Chaurasia, B.D, (2005) Handbook of Human anatomy 3rd Edition, CBS Publishers and Distributors Pvt Ltd. Chennai.
4. Human physiology, 2nd edition- BJ Mejer, HS Meij, AC Meyer, AITBs publishers abd distributers.
5. Cell physiology by Giese, 5th edition, W.B Saunders Company, Tokyo, Japan.
6. A text book of animal physiology, KA Goel, KV Sastri, Rastogi publications Meerut.
7. Animal physiology and Biochemistry- RA Agarval, Anil. K, Srivastava, Kausshal Kumar, S. Chand & Co.
8. A Hand Book of Basic Human physiology- K. Saradha subramanyam, S. Chand & Co., Ltd.

References Books:

1. Srivastava, (2013), Text book of Anatomy, Books and Allied (P) Ltd, Kolkatha.
2. Suresh.R, (2012), Essentials of Human Physiology, Books and Allied (P) Ltd, Kolkatha.
3. Asis Das (2006), Medical Physiology, Books and Allied (P) Ltd, Kolkatha.
4. Guide to physiology- Y. Rajakshmi, S. Chand & Co., Ltd. Cathleen JW Wilson OBE Anne Wangh: Anatomy and physiology in Health and illness. Churchill Livingstone Publication, UK, NK, 1996.
5. Waugh A., Grant, A Ross and Wilson's Anatomy and Physiology in Health and Illness, 9th Edition, Churchill Livingston, London.2001.
6. Guyton AC and Hall JE. Guyton Human Physiology and Mechanisms of Disease. Hartcourt Publishers, Limited, 1996.
7. Williams PL (Ed). Gray' anatomy, Churchill Livingstone, London.

SKILL BASED SUBJECT
PAPER - 1
HEMATOLOGY AND BLOOD BANKING

UNIT-I

Blood: Definition, Characters, Composition. Collection of Blood - Capillary Blood: from Adults / Infants, Examinations employed. Advantages/Disadvantages - venous blood: from Adults / Infants, Examinations employed Advantages/Disadvantage. Anticoagulants: Definition - Type: Wintrobes /EDTA /Heparin /Citrate, Concentration, Examinations, Advantages /Disadvantage.

UNIT-II

Counting of Blood Cells: Neubaeur counting chamber - Total RBC count : diluting fluids , Macro dilution / Micro dilution technique , Falsely Law and High Counts , Normal values - Total WBC count : diluting fluids , Macro dilution / Micro dilution technique , Falsely Law and High Counts , Normal values - correction for TWBC - Absolute Eosinophil count - Differential Leucocyte count: Granulocyte / Agranulocytes, Morphology / Function, Staining Technique - Platelet Count : Morphological characters / Functions , Direct /Indirect method - Reticulocyte count, Dry/ Wet smear technique. Haemoglobin: Composition/Normal Values: Determinations: Tallqvist/Acid Haematin /Alkaline Haematin, Haldane's Carboxy/Drabkins /Dare, Spencers/Specific gravity/ Gasometric, Chemical.

UNIT-III

Coagulation Mechanism: Factors: Bleeding time, Clotting time. Halmotological indices:- Packed cell volume : Wintrobes / Micro HCT method - Mean corpuscular Volume - Mean corpuscular haemoglobin - Mean Corpuscular haemoglobin concentration - Volume index- volume thickness index - Mean corpuscular diameter - saturation index. Erythrocyte sedimentation etc, Principle-Determination: introbes / Westegren Method - advantages / disadvantages - Factors influencing.

UNIT-IV

Preparations of stains and staining techniques: Wright stain - Leishmans stain - Gienisa's stain -Jaswanth singh and Bhattarcharji stain - Fields stain - Peroxidase stain: Examination of Blood smear:-Peripheral smear report: Size/colour/shapes/inclusions -Blood parasites: Malarial parasite/Microfilaria.

UNIT-V

ABO Grouping: History/Discovery - slide / Tube technique - Rh. Typing: Slide / Tube technique, Bovine replacement technique - Coombs test: Direct /Indirect - Donor screening - Cross matching: Major / Minor - Collection Of blood / preservation /storage.

Text books:

1. Mukerjee, K.L. (1988). Medical Laboratory Technologies Vol I – III Tata McGraw Hill. Publishers, New Delhi.

2. Mukerjee, K.L. (1988). Medical Laboratory Technology: A Procedures Manual for Routine Diagnostic Tests. Tata McGraw Hill. Publishers, New Delhi.

3. Gadkar, P.B and Gadakar, D.P. Textbook Medical Laboratory Technology by Gudkar.

4. Medical Laboratory Technologies by Samuel. 5. Medical Laboratory Technologies by Malhotra.

5. Rajan. S and Selvi Christy (2010). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.

6. Pal, G.K and Pravathi Pal (2016), A text book of Practical Physiology, 4th Edition Universities Press (India) Pvt Ltd,

NON-MAJOR ELECTIVE
PAPER - 1
COMPUTER APPLICATIONS IN BIOLOGY

Objective

To make the students to understand the applications of computers in biology.

UNIT-I

Introduction to Computers. History of Computers, Basic Anatomy of Computers.

UNIT-II

Input and output devices, hardware and software. Operating system. MS Windows, Desk top publishing: MS Word, Data bases and graph generation: MS-Excel, project presentation: MS-PowerPoint.

UNIT-III

Programming in C (Basic) Introduction, simple programs, Decision is making and looping, functions, structures, input and output filing system.

UNIT-IV

Basic of WEB Design using HTML: Basic HTML, text styles, list and special characters, adding pointers and links, adding pictures, backgrounds and music, tables and frames.

UNIT-V

Computers in Taxonomy and Systemic Data Analysis in Microbiology. Computers in clinical microbiology - Computer applications in fermentation - Technology Computers in Drug - Designing using various software's in Drug designing.

Text Books:

1. Dave Taylor 1995 HTML. Tata McGraw - Hill Publishing Company Ltd, New Delhi

2. Paul McFedries 1997. Microsoft office 97 sams publishing techmedia, New Delhi.

3. Rajagopalan 1987. Understanding Computers Tata McGraw-Hill Publishing Company Ltd, New Delhi.

4. Sharon Crawford 1998. Windows 98 No Experience Required. BPB publications, New Delhi.

5. Yashwant Canetrar 1980. Let us C. BPP Publishers, New Delhi.

SEMESTER IV
PAPER - 4
MICROBIAL GENETICS

Objective:

To make the students to understand the genetics of microbes.

UNIT-I

Genetics - Historical Introduction - Discovery of DNA structure and organization of DNA and RNA - DNA and RNA as genetic material - Genetic code.

UNIT-II

Organization & functioning of prokaryotic genome plasmids - Structure and types - Replication of DNA.

UNIT-III

Gene transfer mechanism - transformation, transduction, Conjugation.

UNIT-IV

Oncogenes and cancer - Mutation - its types, transforming viruses carrying oncogenes - Retroviral oncogenes - Immortalization & transformation.

UNIT-V

RNA and Protein synthesis in prokaryotes and eukaryotes. Operon concept - Lac & Try Operon. Mutagenesis - Mutation - Mutants - Types of mutants - DNA repair mechanism.

Text Books:

1. Lodish, H. Baltimore Daerk . A. Zipsury, S.L. Marsudaisa. P. Darnel. J. (1995) Molecular cell biology.

2. Gardner- Simon snustad Principles of genetics, 8th Edition. John Wiley & sons. Inc. New York.

Reference books:

1. Maloy, S.R. Cronan Jr. J.E, Freifelder D (1994), Microbial genetics. Jones and Barlett publishers.

2. Ajoy Paul (2011). Text Book of Genetics- from Genes to Genomes, Books and Allied (P) Ltd, Kolkatha.

CORE PRACTICAL - 2
PAPER 3 & 4

Objective:

To impart hands on training on immunology and microbial genetics.

1. Blood groups and Rh. typing coomb's test.

2. Precipitation reaction in gel. Ouchterlony double immuno diffusion test, single redial immuno diffusion test.

3. VDRL, RPR

4. Agglutination reactions: Slide and Tube methods RBC agglutination IHA, TPHA, Bacterial agglutination: Widal, typing of bacteria Latex agglutination: RA, ASLO (Latex) B HCG.

5. Complement fixation test. Titration of amboceptor complements (Demonstration only)

6. Immunofluorescence, ELISA (Demonstration only).

7. Isolation of Buffy coat, using heparin lymphocytes (T cells, B cells) enumeration of different cells types, Peripheral blood cell counts, absolute cell counts.

8. Antibody productions in rabbits against sheep RBC and its titration (Demonstration only).

9. Anaphylactic reactions in guinea pigs. Authorities' reaction in rabbits. (Demonstration).

10. Skin tests. Both immediate and delayed hypersensitivity reactions of egg proteins, bacterial, fungal antigens.

ALLIED - 2
PAPER - 4
BIOSTATISTICS

Objective:

To make the students to understand the biostatistics.

UNIT-I

Nature and scope of statistical methods and their limitations - compilation Classification and tabulation of statistical - data.

UNIT-II Events and sets - samples space - concepts of probability - Addition and multiplication theorem on probability - conditional probability and independence of events.

UNIT-III

Coefficient of correlation - scattered diagram - regression lines.

UNIT-IV

Standard distributions - Binomial Poisson and normal distributions - Standard distributions - Binomial Poisson and normal distributing. To test based on normal - t, Chi - square and R- non parametric test run median, Sign, Mann, Whitney and Wilcox signed rank test.

UNIT-V

Principles of scientific experiment Randomization replication and local control Analysis of Variance - One way and two way classifications.

ALLIED PRACTICAL-2
(Subjects covering Paper- Allied - 2 Paper – 3 only)

HUMAN ANATOMY AND PHYSIOLOGY

Objective:

To impart hands on training on human anatomy and physiology

1. Absolute Eosinophil Count
2. Demonstration of ECG/Echo and its interpretation techniques.
3. Determination of Bleeding Time and Clotting Time
4. Determination of Erythrocyte Sedimentation Rate
5. Determination of Specific Gravity of Blood
6. Estimation of Bile Salt
7. Estimation of Hemoglobin Concentration
8. Estimation of Urine albumin,
9. Estimation of Urine sugar
10. Hair perforation Test
11. Measurement of Pulse, BP
12. Preparation and Examination of Blood smear
13. Serum cholesterol analysis
14. Serum Sugar analysis
15. Study of different histological slides
16. Total Platelet count

Reference books:

1. Rajan. S and Selvi Christy (2010). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.
2. Pal, G.K and Pravathi Pal (2016), A text book of Practical Physiology, 4th Edition Universities Press (India) Pvt Ltd.

SKILL BASED SUBJECT
PAPER - 2
VERMITECH

UNIT-I

General properties of the soil - structure of the soil -sand, clay, salt, types of soils - soil organisms.

UNIT-II

Physical properties of soil - soil colour, soil moisture, soil temperature, bulk density of soil, chemical properties of soil PH, Electrical conductivity, organic, Nitrogen, Phosphate and potash.

UNIT-III

Soil biota -Earthworms -Ecological classification of earth worms as Epigeics - Introduction to earthworm biology -physical and chemical effects of earth worms on soils - Role of earthworms in soil -classification of earthworms based on ecological strategies- Burrowing activity of earthworms- Drilospheres -Microorganisms and their relationship with earthworms.

UNIT-IV

Composing -anaerobic composing, aerobic composing, types of composing, vermicompost- earthworm species used in vermicompost production - endemic species, exotic species.

UNIT-V

Vermicopost -setting up vermicompost quality N, P, K, C, N, Microbial quality applications - vermiculture -vermiwash -role of vermicompost in organic farming - its quality and advantages over chemical inputs. Earthworms in Bio-reclamation of soil. Problems in vermiculture units - remedial suggestions. Vermicomposting as a tool for solid waste management - a small scale industry and its economics.

Reference Books:

1. Brady, C.N, 1974 "The Nature and Properties of soils" Macmillan publishing Co. New York, London. 2. Edwards, C.A., and Bohlen, P.J., 1996. Biology and Ecology of Earthworms, Chapman and Hall, London Ismail, S.A., 1997, Vermicology: The Biology Earth worm Orient Longman.

3. Kale Radha,D 1998. Earthworm: Cinderella of organic farming. Prism Books Pvt. Ltd., Bangalore.

4. Satchell, J.E., 1983 Earthworm ecology: From Darwin to Agriculture. Chapman and Hall, London StephensonJ., 1923. The fauna of British India -Oligo.

NON MAJOR ELECTIVE
PAPER – 2
HUMAN MICROBIAL DISEASES, CAUSES AND CONTROL

UNIT I:

Morphology, pathogenicity and laboratory diagnosis of Gram positive organisms, *Staphylococcus aureus, Streptococcus pyogenes, Bacillus anthracis, Corynebacterium diphtheriae, Clostridium perfringens, Clostridium tetani*. Morphology, pathogenicity and laboratory diagnosis of Gram negative organisms - *Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, Salmonella typhi, Shigella dysentriae, Pseudomonas aeuruginosa, Vibrio cholerae*.

UNIT II:

Morphology, pathogenicity and laboratory diagnosis of *Mycobacterium tuberculosis, Mycobacterium leprae, Treponema pallidum, Leptospira icterohaemorragens, Chlamydia trachomatis, Rickettsia rickettsi.*

UNIT III:

Mycology, superficial infections – Dermatophytes – *Microsporum – Trichophyton, Epidermophyton* – Madura mycosis – Opportunistic fungal infections – *Candida albicans, Aspergillus, Mucor.*

UNIT IV:

Parasitic diseases – *Plasmodium vivax, Giardia, Taenia solium, Ancylostoma, Ascariasis, Wuchereria bancrofti, Enterobius, Trichuris trichura*.

UNIT V:

Antibiotics and chemotherapeutic agents – mechanism of actions – Drug resistance – Antimicrobial susceptibility testing – Disc diffusion – Kirby Bauer - MIC, MBC, Serum killing power.

Text books:

1. Ananthanarayanan, R. and C.K., Jayaram Paniker, Textbook of Microbiology. Orient Longman, 5th Edition, (1994).
2. Jawetz, E., Melnic, J.L. and Adelberg E. A., Review of Medical Microbiology Lange Medical publications, USA, 4th Edition, (1998).

Reference books:

1. Mackie and Mc Cartney, Medical Microbiology No 1 and II. Churchill Livingston, 14th Edition, (1994).
2. Chakraborty, P. A text book of microbiology, New central Book agency pvt Ltd. Calcutta, 2nd Edition, (1995).
3. Bailey and Scotts, Diagnostic Microbiology, Baron and Finegold CV Mosby publications, 9th Edition, (1994).

SEMESTER V
PAPER - 5
MOLECULAR BIOLOGY AND GENETIC ENGINEERING

Objective

To make the students to understand the molecular biology and genetic engineering.

UNIT-I

Historical perspectives - Synthetic DNA, DNA amplification technique - PCR.

UNIT-II

Preparation of genomic library, DNA library, gene cloning system, vectors enzymes, expression system.

UNIT-III

Application of genetic engineering in medical field - genetherapy, vaccines preparation, Hybridoma and monoclonal antibody techniques.

UNIT-IV

Application in agricultural field - Production of biotechnological products. Food - SCP (algae, yeast, mushrooms, Biopesticide) 'Nif' gene - transfer - development of resistant plant variety,

UNIT-V

Application in Pharmaceuticals - antigens, interferons, vaccines, insulin, Social impact of recombinant DNA technology.

Text Books:

1. Old, R.S. and Primrose, S.B. (1995) Principles of Gene manipulation. An introduction to genetic Engineering. 5th Edition. Blackwell Scientific Publication, London.

2. Lodish, H. Baltimore Daerk . A. Zipsury, S.L. Marsudaisa. P. Darnel. J. (1995) Molecular cell biology.

Reference Books:

1. Click. B.R. and-Pasternat J.J. (1994) Molecular Biotechnology. ASM press. Washington DC.

2. Benjamin Lewin (1997) Genes VI, Oxford University Press.

3. Ajoy Paul (2007). Textbook of Cell and Molecular Biology, Books and Allied (P) Ltd, Kolkatha.

PAPER - 6
MEDICAL BACTERIOLOGY

Objective:

To make the students to understand the medical bacteriology.

UNIT-I

Normal microbial flora of human body; General attributes and virulence factors of bacteria causing infections. Host Parasite relationships.

UNIT-II

Specimen Collection, Transport and Storage; Specimen processing. (Blood, Urine, GSF, Sputum, other body fluids)

UNIT-III

Classification morphology, cultural characteristics, pathogenicity, epidemiology, laboratory diagnosis, treatment, prevention and control of diseases caused by: Staphylococci, Streptococci, Pneumococci, Neisseriae (Gonococci and Meningococci), Corynebacterium, Mycobacterium, Clostridium, Bacillus, Pseudomonas and Haemophilus.

UNIT-IV

Human Pathogens - of Salmonella, Shigella, Vibrios, Brucella, Bordetella, Escherichia, Gramnegative anaerobes, Spirochaetes, Rickettsiae, Chlamydiae, Mycoplasmas and Ureoplasmas.

UNIT-V

Zoonotic diseases and their control; Hospital acquired infections and their control; Hospital waste disposal; Ethical committee and their functions.

Text Books:

1. Ananthanarayanan R. and Jayaram Panicker C.K. (1994). Text book of Microbiology. Orient Longman.
2. Balasubramanian, A. and Senthil kumar, P.K, (2017) Medical Microbiology. Darshan Publication, Rasipuram.
3. Salle, A.J. (1992). Fundamental Principles of Bacteriology. 7th Edition, Mc. Graw Hill Publishing Co. Ltd., New York.
4. Baron, E.J. and Finegold S.M. (1995). Scientific Company. Diagnostic Microbiology. Blackwell Scientific Company.

Reference Book: 1. Bergeys Manual of determinative Bacteriology.

PAPER - 7
MEDICAL VIROLOGY, MYCOLOGY AND PARASITOLOGY

Objective

To make the students to understand the medical virology, mycology and parasitology.

UNIT-I

General properties of viruses - Detection of viruses and antigens in clinical specimens - Serological diagnosis of virus infections. Cultivation of viruses. Structure & properties of viroids, prions.

UNIT-II

Arthropod borne and rodent borne virus diseases - Picorna viruses and diseases, Hepatitis viruses-Rabies and other neuro viruses - Orthomyxo and paramyxo viruses. Pox, Adeno, Horpes, Reo, Rota and AIDS viruses. Oncogenic viruses. Viral vaccines, their preparation and their immunisation schedules. Viruses of importance to plants and soil.

UNIT-III

Viruses of importance to bacteria - Bacteriophages - Their structure, types - Uses in Microbiology - Typing and application in bacterial genetics.

UNIT-IV

General Introduction Morphology and taxonomy of fungi of medical importance. Detection and recovery of fungi from clinical specimens. Dermatophytes and agents of superficial mycoses. Yeasts of medical importance dimorphic fungi causing systemic mycoses.

UNIT-V

Classification Morphology, Pathogenicity, lab diagnosis of common protozoan diseases - Amoebiasis, Giardiasis, Balantidiosis, Trypanosomiasis, Malaria, Toxoplasmosis, Leishmaniasis. Classification Morphology, Pathogenicity, lab diagnosis of common parasitic metazoan diseases – Ascariasis, Hook worm, Filariasis, Hydatidosis, Taenia infection.

Text Books:

1. Rajesh Karykarte and Ajit Damle (2003). Medical Parasitology, 3rd Edition. Books and Allied (P) Ltd, Kolkatha.

2. Balasubramanian, A. and Senthil kumar, P.K, (2017) Medical Microbiology. Darshan Publication, Rasipuram.

3. Morag C. and Timbury M.C. (1994). Medical Virology, 10th Edition. Churchil Livingston London.

4. Dimmock N.J., Primrose S.B. (1994). Introduction to Modern Virology 4th Edition. Blackwell Scientific Publications. Oxford.

5. Conrat, HF, Kimball, PC and Levy JA, (1994). Virology. 12th Edition. Prentice Hall, Englewood Cliff. New Jersey.

6. Parija, S.C. (1996). Textbook of Medical Parasitology. Orient Longman.

7. Jagdish Chandra (1996) Textbook of Medical mycology. Orient Longman.

Reference Books:

1. Baker, F.J. and Brech (1990) Medical Microbiologigal techniques. Butter worths, London.

2. Chatterjee, K.D. Parasitology, M.D. 12th Edition. Chatter (1980) Joe media Publishers Culcutta.

ELECTIVE
PAPER - 1

HERBAL TECHNOLOGY

OBJECTIVES

To enable the students to understand the basic knowledge in Herbal technology.

UNIT - I

Pharmacognosy: Pharmacology - Definition and history, Indian systems of medicine - Siddha, ayurvedha, and Unani systems. Taxonomy of locally available medicinal plants, their chemical constituents and medicinal uses - Classification of Crude drugs - Chemistry of Drugs - Future of pharmacognosy.

UNIT - II

Classification of medicinal plants - Vernacular name and family - Geographical source, cultivation, collection, and processing for market and commerce in crude drugs. Morphological and histological studies, chemical constituents - Therapeutic and other pharmaceutical uses. Underground stem - ginger, Alpinia - Roots - Rauolfia - Belladona - Aerial parts - Bark - Cinchona.

UNIT - III

Leaves - Adathoda, Eucalyptus - Flower - Clove fruits seeds - Nux vomica Nutmegs, Gooseberry - unorganized drugs - Gum - Acacia - Resin - Turpentine, fixed oil - castor oil.

UNIT - IV

Herbal medicines for Human ailments - Drugs acting on cardiac diseases, cerebral diseases, Nasal, diseases - Blood pressure Drugs acting on Nervous system - Depressants. - stimulants - Respiration and Drugs - Urogenital system and drugs - Psychoactive plants.

UNIT - V

Propagation of medicinal plants - Micro and macro propagation conservation of rare medicinal plants Role of biotechnology in medicinal plants banks - cultivation of medicinal and aromatic plants - Drug adulteration - methods of Drug evaluation, Herbal food - Food processing - packaging - Herbal sale and Export of medicinal plants - marketing - Intellectual property rights - Export laws.

Reference books:

1. Agarwal, S.S and Paridhavi, M (2012) Herbal Drug Technology, 2nd Edition. Universities Press (India) Private Ltd.
2. Wallis, T.E, Text book of pharmacognosy by 5th edition. CBS publishers and distributors Chennai.
3. Kuntal Das (2014). Herbal Plants and their Applications in Cosmeceuticals, CBS publishers and distributors Pvt. Ltd., Chennai.
4. George Edward Trease and W.C. Evans - Pharmacognosy 12th edition, English Language Books Society, Baelliere Tindall.
5. Handa, S.S. and Kapoor, V.K. Pharamcognosy by 2nd Edition, Vallabh Prakashan Publishers, New Delhi.
6. Jain, S.K (1980) Indian Medicinal plants.
7. Kokate, C.K., Durohit, A.P. and Gokhale, S.R., Pharmacognosy by 12th edition - Nirali Prakasham Publishers, Pune.
8. Kumar N.C. (1993) Introduction to Medical Botany and Pharmacognosy.
9. Nadkarni (1981) Indian Materia Medica.
10. Shah, S.C. and Qudary (1990). A text book of Pharmacognosy.

SKILL BASED SUBJECT
PAPER - 3
MUSHROOM-CULTURE TECHNIQUES

UNIT-I

Edible and non-edible mushroom (Historical account, most commonly cultivated mushrooms in the world, distribution and production in various countries).

UNIT-II

Cultivation of button mushroom -morphology raising a pure culture & spawn preparation. Preparation of compost & cultivation of Agaricus bisporus, Pleurotus flabelltus, harvest.

UNIT-III

Cultivation of oyster and paddy straw mushroom - preparation of pure culture & spawn cultivation methods, harvest.

UNIT-IV

Pests and diseases of Edible mushrooms (Environmental, fungal, bacterial, viral, insect pests and Nematode diseases and competitor moulds.

UNIT-V

Economics of mushroom cultivation (fixed assets, recurring expenditure, labour, economics of cultivation throughout the year and seasonal growing formulation of project report for getting finance from funding agencies). Precautions in mushroom cultivation (precaution to be taken while selecting the area, spawn preparation, spawn run, during cropping harvesting etc.). Mushroom recipes (western and Indian recipes, pickles, powders, jams etc.

Reference books:

1. Changs. T. W.A. Hayanes 1978. "Biology and cultivation of Mushrooms" Acad Press.N.Y.

2. Zadrazil. F & K. Grabbe 1983 "Edible Mushroom, Biotechnology" Vol. 3, Weinheim: Verlag Chemie, Berlin.

3. Kannaiyan. 2001. Handbook of Edible Mushrooms" TNAU Publication.

SEMESTER VI
PAPER - 8
FOOD MICROBIOLOGY

Objective

To enable the students to understand the microbes in the food.

UNIT – I

Food as a substrate for microorganisms - factors affecting the growth of micro-organism in food. Mold, yeast and bacteria- general characteristics, classification & importance.

UNIT – II

Principles of food preservation – Methods of food preservation – asepsis, removal of microorganism anaerobic conditions, high temperature- low temperature, drying and food additives – Canning.

UNIT – III

Contamination and spoilage of milk and milk products, meat and meat products, fish and fish products, vegetables and fruits and canned food.

UNIT – IV

Fermented foods – Bread, malt beverages, Beer & wine, vinegar, fermented vegetables – Fermented Dairy products. Microorganisms as food –SCP.

UNIT –V

Food bore disease – food borne infections and intoxication – laboratory testing – preventing measures - food sanitation – plant sanitation.

Text books:

1) Frazier, W.C and Westhoff, D.C (1988). Food microbiology, 4th edition, Tata Mac Graw Hill, New Delhi.

2) Adams, M.R and Moss M.O (1995) Food Microbiology New Age International (p) Limited Publishers.

3) Banwart, G.J., (1989). Basic Food Microbiology, 2nd Edition CBS Publishers and Distributors, New Delhi.

4) Robinson R.K (1990) Dairy Microbiology, Elsevier Applied science, London.

5) Hobbs BC Roberts D (1993). Food Poisoning and Food Hygiene Edward Arnold, London.

PAPER - 9

SOIL, AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY

Objective

To enable the students to understand the microbes in the Agriculture and environment.

UNIT-I

Soil – physical and chemical properties of soil – types of sil – Microflora of soil.

UNIT-II

Biogeochemical cycles – carbon, nitrogen, phosphorus, sulphur and iron. Organic matter decomposition - Composting & Vermicomposting. Biopesticide (Bacterial, Viral & Fungal).

UNIT-III

Microbial interaction between microorganisms, plants and animals – Rhizosphere, phyllosphere. Rumen microbiology.

UNIT-IV

Microbiology of air – Sources of microorganisms in air – Assessment of air quality – air sampling techniques – Enumeration of air borne organisms – air borne diseases – air sanitation.

UNIT-V

Aquatic Microbiology – Ecosystems – Fresh water (Ponds, Lakes, Streams, Marine, Esturies, Mangrooves, Deep sea). Microbial assessment of water quality – Water purification. Water borne diseases. Waste treatment – Solid and liquid waste treatment.

Text Books:

1. Alexander. (1997). Introduction to soil Microbiology. John Wiley and Sons. N.Y.

2. Subba Rao, N.S. (1995) .Soil Micro organisms and plant growth, Oxford and IBH publishing Co. Pvt. Ltd.

3. Atlas, R. M. and Bartha. R. (1992). Microbial Ecology: Fundamentals and Applications. 3 rd Edition. Benjamin| Cummings. Redwood City. CA.

Reference Books:

1. Michell, R. (1974). Introduction to Environmental Microbiology. Prentice- Hall. Inc. Englewood Clilffs – New Jersy.

2. Paul, E.A. and Clark. F.E. (1989). Soil Microbiology and Biochemistry. Academic pres New York.

3. Subba Rao, N.S. (1995). Biofertilizers in Agriculture and Forestry. 3rd Edition. Oxford and IBH publication Co. Pvt. Ltd., New Delhi.

PAPER - 10
INDUSTRIAL AND PHARMACEUTICAL MICROBIOLOGY

Objective

To enable the students to understand microbial processes in industries and pharmaceutical companies.

UNIT-I

Industrially important microbes and their products, screening, strain development strategies.

UNIT-II

Food fermentations and food produced by microbes, bread, fermented dairy products. Microbial cell as food, feed, SCP.

UNIT-III

Bioreactors – Structure and types. Fermentation media, media sterilization, Types of fermentation (Batch and Continuous) and downstream processing.

UNIT-IV

Microbial productions of citric acid, lactic acid, acetic acid, alpha amylase. Ethanol. Production of pharmaceutical compounds through microbes – TPA, Insulin, Recombinant Vaccines.

UNIT-V

Tannery technology – Tanning – types of tanning – chrome tanning and vegetable tanning. Tanning Process (pre tanning, tanning, post tanning and finishing). Treatment of tannery effluents by microbes.

Text Books:

1. Hugo, W.B., Russell, A.D, pharmaceutical Microbiology 4th edition. Blackwell scientific publications / Oxford.
2. Balasubramanian D, Bryce CFA, Dharmalingam K, Green J, Jayaraman K. (1996). Concepts in Biotechnology, University Press, India.
3. Satyanarayana.U, Biotechnology, Books and Allied (P) Ltd, Kolkatha: 2005.
4. Glazer AN, Nikaido H. (1994) Microbial Biotechnology - Fundamentals of Applied Microbiology WH Freeman and Company, New York.
5. Arumugam, N. and Kumaresan, V. (2016) Fundamentals of Biotechnology, Saras Publication, Nagercoil.

Reference Books:

1. Russell and Ayliffe, G.A.J (1982) Principles and practice of Disinfection, preservation and sterilization Oxford:

2. Gregory P.H. Microbiology of the atmosphere, 2nd edition. Leonard Hill.

3. Mann, I. Process of utilization of Animal by products, FAO Rome 1962.

4. Scaria .K.J. Mahendrakumar and Divakaran, S. Animal byproducts – Their processing and utilization, CLRI, Madras, 1961.

CORE PRACTICAL - 3

PAPERS 5, 6 & 7

Objective

To impart hands on training on molecular biology, genetic engineering and medical microbiology.

1. General requirements of collections, transport of clinical specimens Direct examinations - staining of specimens, - Methods of enriched, selective and enrichment culture techniques used to isolate organisms from clinical materials.
2. Wet mounts examinations of stool for parasites. Cholera stool, vaginal specimens for Trichomonas.
3. KOG and Lacto phenol preparations for skin scrapings, for fungi and for scables mites.
4. Simple, differential and special staining of clinical materials viz. Throat swab, vaginal swab, slit smears, pus, urine, sputum, stool etc.,
5. Enumeration of Bacteria in urine. Quantitative test for yeasts.
6. Estimation of worm burden in stool. Floatation and sedimentation techniques of stool examination.
7. Germ tube, Assimilation, fermentation tests for yeasts.
8. Isolation and identification of bacterial pathogens from clinical specimens their biochemical reactions.
9. Antimicrobial sensitivity testing and determination of MIC and quality control.
10. Identification of pathogenic microbes including viruses in slides / smears / specimens as spotters.

CORE PRACTICAL - 4

PAPERS - 8 & 9

Objective

To impart hands on training on microbes of food, agriculture and environment and industrial and pharmaceutical microbiology.

1. Water analysis by MPN technique Presumptive coli forms test Confirmed coli forms test Completed coli forms test.

2. Isolation of microorganisms from air - air sampler technique - settle plate method.

3. Isolation and counting of fecal bacteria from water.

4. Detection of bacteria in milk by SPC - Dye reduction test Detection of number of bacteria in milk.

5. Litmus mil reaction. 6. Isolation of lactobacilli and staphylococcus from curd.

7. Azolla - Morphological study; Seed inoculation with rhizobia.

8. Isolation of bacteria and fungi from spoiled food. 9. Isolation of fungi from molting leaves.

ELECTIVE
PAPER - 2
BIOINOCULANTS TECHNOLOGY

UNIT- I

General account of the microbes used as biofertilizers for crop plants and their advantages. Symbiotic N2 fixers: Rhizobium - Isolation, characterization, identification, Classification, inoculum production and field application. Frankia - Isolation, characterization - actinorrhizal nodules - non-leguminous crop symbiosis.

UNIT- II

Non - Symbiotic N2 fixers - Azospirillum - Free living - Azotobacter - free isolation, characterization, mass inoculum production and field application.

UNIT-III

Symbiotic N2 fixers - Cyanobacteria, Azolla - Isolation, characterization, mass multiplication - Role in rice cultivation - Crop response – field application - immobilization.

UNIT-IV

Phosphate solubilizers - Phosphate solubilizing microbes - Isolation, characterization, mass inoculum production, field application - Phosphate solubilization mechanism.

UNIT-V

Mycorrhizal bioinoculants - classification - importance of mycorrizal Ectomycorzhizae - Endomycorrhizae - Ectendo mycorrhizae - Taxonomy of mycorrhizae - Isolation of VA mycorrhizae - Quantification and assessment of VAM in roots - Mass inoculum production of VAM - field applications of Ectomycorrhizae and VAM.

Reference:

1. Kannaiyan, S. (2003). Bioetchnology of Biofertilizers, CHIPS, Texas.
2. Mahendra K. Rai (2005). Hand book of Microbial biofertilizers, The Haworth Press, Inc. New York.
3. Reddy, S.M. et. al. (2002). Bioinoculants for sustainable agriculture and forestry, Scientific Publishers.
4. Subba Rao N.S (1995) Soil microorganisms and plant growth Oxford and IBH publishing co. Pvt. Ltd. NewDelhi.
5. Subba Rao N.S. (1988) Biofertilizers in Agriculture and forestry Oxford and IBH Publishing Co., Ltd., New Delhi.

ELECTIVE
PAPER - 3
FOOD ANALYSIS AND QUALITY CONTROL

Objectives: The paper focuses on physical, chemical, microbial and sensory analysis of food, concepts of quality control and quality management, national and international food loss and adulterants in various food products

UNIT-I

Sampling – Sampling techniques and preparation of food samples.

Techniques used in food analysis – Chromatography, Electrophoresis, Electrometric determinations, Refractometry and Polarimetry Spectrophotometry, Fluorimetry, Radio - active tracer techniques, Atomic absorption

UNIT-II

Physico chemical methods for food analysis - Moisture and Total solids, Carbohydrates, Proteins, Fats, Fiber, Ash and its types, Minerals, Vitamins. Enzymatic methods

Biological methods of food analysis - Standard plate count; Plate loop method; Spiral plate; Droplet technique; Dye reduction; Catalase test and ELISA. Testing of food for organisms such as *B. cereus, C. botulinum, E. coli, L. monocytogenes, S.aureus, Salmonella* and *Shigella.*

UNIT-III

Sensory assessment of food quality –Appearance of food, Flavor of food, Texture of food.

Sensory Tests – Difference, Rating and Sensitivity tests. Types of panels, Testing area and schedule.

Quality control of following food products – Milk and milk products, Oils and Fats, Cereal grains and flours, Fruits and vegetable products, Canned foods, Egg and egg products, Meat and Meat products

UNIT-IV

Food quality management – Objectives, Importance and Functions of quality control. Total quality, management, Good manufacturing practices, seven principles of HACCP and codex in food. Quality control, methods of – a. raw materials, b. manufacturing process and c. finished products.

UNIT-V

Food Safety – Role of voluntary agencies and legal aspects of consumer protection. National and International food laws – PFA, FDA, BIS, AGMARK, Essential Commodity Act, Export (quality and inspection act, Consumer protection act), Nutritional labeling requirements of foods, Food adulteration.

INDUSTRIAL VISIT: Food and Pharmaceuticals Industry and Report.

References books:

1. Pomeranz.Y, Meloan.C.E, 1996, Food Analysis – Theory & Practice, CBS Publiushers, New Delhi.
2. Adams, M.R and Moss M.O (1995) Food Microbiology New Age International (p) Limited Publishers.
3. Ananthanarayanan R and CK Jayaram Panicker, 1994, Textbook of microbiology Orient Longman.
4. Chakraborty P 1995, A Text book of microbiology, New Central Book Agency Pvt Ltd. Calcutta.
5. Rajan. S and Selvi Christy (2010). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.
6. Debnath, 2005, Tools & Techniques of Biotechnology, Pointer Publishers, Jaipur.
7. Frazier, W.C and Westhoff, D.C (1988). Food microbiology, 4th edition, Tata Mac Graw Hill, New Delhi.
8. Jacobs.M.B., 1999, Chemical Analysis of Food & Food Products, CBS Publiishers, New Delhi.
9. Jay.J.M, 1996, Modern Food Microbiology, CBS Publishers, New Delhi.
10. Nielsen, S.S, 2004, Introduction to chemical Analysis of foods, CBS Publishers, New Delhi.
11. Ranganna. S., 2001, Handbook of Analysis & Quality control for Fruit & Vegetable Products, Tata McGraw Hill, New Delhi.
12. Robinson R.K (1990) Dairy Microbiology, Elsevier Applied science, London.
13. Salle, A.J. (1992). Fundamental Principles of Bacteriology. 7th Edition, Mc. Graw Hill Publishing Co. Ltd., New York.

SKILL BASED SUBJECT
PAPER - 4
BIOINSTRUMENTATION

UNIT-I

Centrifuge: Basic principles of sedimentation – relative centrifugal force – Types of centrifuges (clinical, high speed, refrigerated and ultra). Centrifugation - Principles and various types – Applications.

UNIT-II

Calorimetry – principle, Beer – Lambert's law – Applications. Spectrophotometry – UV & Visible, Parts of a spectrophotometer – IR, NMR & Atomic absorption spectrophotometry – Applications.

UNIT-III

Chromatography – Paper, TLC, Column, Adsorption, Ion exchange, GC & HPLC – Principle & applications.

UNIT-IV

Electrophoresis techniques: proteins and nucleic acids – Types of electrophoresis – Paper, Gel, Immunoelectrophoresis.

UNIT-V

Radioisotopes and their applications. Radioisotopic techniques – RIA. Detection and measurement of radioactivity – GM counter, Scintillation counter, Autoradiography. Biosensor & its types.

Text books:

1. Keith Wilson and John Walker, 1994. Practical Biochemistry – principles and techniques. Cambridge Press, New York.

2. Principles of Applied Biomedical Instrumentation – A. Geddes and L.E Baker John Wiley & Sons.

3. Instrumental methods of analysis – Den, Williard & Merrit. Asian Edition.

Industrial Visit (IV)

Factory Industrial Visit (M. Sc. Applied Microbiology)

Course Objectives: Students will be exposed to professional work environment to acquire the knowledge, independent working capacity and leadership so that at the end of the course they will be able to manage the laboratory and research work with full responsibility and reliability.

Factory Industrial Visit Guide Line: Internship will be conducted in an institute under the supervision of supervisor/s.

During the **Industrial Visit**, students should his/her visiting work should be submitted to the supervisor/department. A report of an industrial Visit should be submitted to the department after completion of the work should be authorized by the concerned supervisor of the institute/factory.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS

DEGREE COURSE

CBCS PATTERN

(With effect from 2017-2018)

The Course of Study and the Scheme of Examinations

S.No.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper -1	6	6	Digital Logic & Programming in C	25	75	100
4	IIII	Core Practical	Practical-1	3	2	Programming in C Lab	25	75	100
5	III	ALLIED-1	Paper-1	7	4	Mathematical Foundations - I	25	75	100
6	IV	Environ. Studies		2	2	Environmental Science	25	75	100
				30	**22**		**150**	**450**	**600**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
7	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8	II	English	Paper-2	4	4	English	25	75	100
9	III	Core Theory	Paper-2	6	6	C++ & Data Structure	25	75	100
10	III	Core Practical	Practical-2	3	2	C++ and Data Structures Lab	25	75	100
11	III	ALLIED-1	Paper-2	7	6	Mathematical Foundations - II	25	75	100
12	IV	Value Education		2	2	Value Education	25	75	100
13	IV	Soft Skill		2	1	Soft Skill	25	75	100
				30	**25**		**175**	**525**	**700**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
14	III	Core Theory	Paper-3	5	3	Java Programming	25	75	100
15	III	Core Theory	Paper-4	4	4	E-Commerce	25	75	100
16	III	Core	Paper-5	5	4	Resource Management	25	75	100

S.No.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Theory				Techniques			
17	III	Core Practical	Practical-3	4	3	Java Programming Lab	25	75	100
18	III	ALLIED-2	Paper-3	7	4	Financial Accounting - I	25	75	100
19	IV	Skill based Subject	Paper-1	3	3	Design and Analysis of Algorithm	25	75	100
20	IV	Non-major elective	Paper-1	2	2	Introduction to Information Technology	25	75	100
				30	**23**		**175**	**525**	**700**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
21	III	Core Theory	Paper-6	5	3	Database Management Systems	25	75	100
22	III	Core Theory	Paper-7	4	4	Enterprise Resource Planning	25	75	100
23	III	Core Theory	Paper-8	5	4	Decision Support System	25	75	100
24	III	Core Practical	Practical-4	4	3	RDBMS Lab	25	75	100
25	III	ALLIED-2	Paper-4	7	6	Financial Accounting - II	25	75	100
26	IV	Skill based Subject	Paper-2	3	3	Computer Organisation and Architecture	25	75	100
27	IV	Non-major elective	Paper-2	2	2	Internet and its applications	25	75	100
				30	**25**		**175**	**525**	**700**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
28	III	Core Theory	Paper-9	6	3	Mobile Application Development	25	75	100
29	III	Core Theory	Paper-10	6	3	Operating System	25	75	100
30	III	Core Theory	Paper – 11	4	2	Data Communication & Network	25	75	100
31	III	Core Practical	Practical-5	4	3	Mobile Applications Development - Lab	25	75	100
32	III	Core Practical	Practical-6	4	3	Operating System - Lab	25	75	100
33	III	Elective I	Paper-1	3	3	A. Data Mining	25	75	100

S.No.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
						B. Computer Graphics C. Information Security			
34	IV	Skill Based Subject III	Paper-3	3	3	Software Engineering	25	75	100
				30	**20**		**175**	**525**	**700**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
35	III	Core Theory	Paper-12	7	5	Cloud Computing	25	75	100
36	III	Core Theory	Paper-13	6	4	Open Source Programming	25	75	100
37	III	Core Practical	Practical-7	4	3	ASP .NET Lab	25	75	100
38	III	Core Practical	Practical-8	4	3	Open Source Programming - Lab	25	75	100
39	III	Elective II	Paper-2	3	3	A. Software Testing B. Mobile Computing C. Microprocessor	25	75	100
40	III	Elective III	Paper-3	3	3	A. Internet of Things B. System Software C. Multimedia Systems	25	75	100
41	IV	Skill Based Subject IV	Paper-4	3	3	ASP .NET	25	75	100
42	V	Extension Activities		0	1		100	0	100
				30	**25**		**275**	**525**	**800**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	2	4	8	100	200
Part II	English	2	4	8	100	200
Part III	Allied (Odd Semester)	2	4	8	100+100 (I + III SEM)	200
	Allied (Even Semester)	2	6+6	12	100+100 (II + IV SEM)	200
	Electives	3	3	9	100	300
	Core	13	(3-6)	51	100	1300
	Core Practical	8	(2-3)	22	100	800
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**42**		**140**		**4200**

THIRUVALLUVAR UNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS

SYLLABUS
UNDER CBCS

(with effect from 2017 - 2018)

SEMESTER I

PAPER – 1
Digital Logic &Programming in C

Objective :

Provide basic knowledge on Digital Electronics to understand the working principles of Digital computer and to develop programming skill using C language .

UNIT I: Number systems and Boolean Algebra

Number Systems -Decimal, Binary, Octal, Hexadecimal and their inter conversions, - Binary Arithmetic -1's complement, 2's complement and 9's complement .Binary codes - BCD, Excess-3, Graycode.

Boolean Algebra : Boolean Laws - Simplification of Boolean Functions - Logic gates and Truth Table – Universal Gates (NAND and NOR) - The K-map method up to five variables, don't care conditions, POS & SOP forms.

UNIT-II: Combinational and Sequential Circuits

Combinational Logic: Half/Full adder/subtractor , code conversion, Multiplexers,demultiplexers, encoders, decoders, Combinational design using MUX & DEMUX. BCD adder, magnitude comparator.**Sequential logic**: Flip flops (RS, Clocked RS, D, JK, JK Master Slave)-Counters & types Synchronous and Asynchronous counters- Registers, Shift registers and their types.

UNIT –III: C Basics and Control constructs

C fundamentals- Operators- Constants- Expression – Library functions- Decision making and branching- Switch- FOR,WHILE, DO WHILE loops- Continue- break

Unit IV: Arrays, Functions and Structures

Arrays-Multi dimensional arrays- User defines functions- Call by Value and reference- Recursion- Storage classes- Structures and Union –Self referential structures

Unit – V: Pointers and Files

Pointers- Pointer operations and Arithmetic- File management in C :File opening and closing- - I/O operations on files - Error handling during I/O operations - Random access to files - Command line arguments

Text Book:

1. Morris Mono M. "**Digital Logic and Computer Design**",PHI Latest Pub. Ed. (Unit I and 2)
2. ReemaThareja,**" Programming in C "** Oxford University Press

Reference Book

1. Albert Paul Malvino, Donald P Leach, **Digital principles and applications**TMH,1996.
2. Balagurusamy," Programming in C" TMH

CORE PRACTICAL – I

PROGRAMMING IN C- LAB

1. Summation of Series: Sin(x) (Compare with built in functions)
2. Summation of Series Cos(x) (Compare with built in functions)
3. Counting the no. of vowels, consonants, words, white spaces in a line of text
4. Reverse a string & check for palindrome without built in string function
5. ${}^{n}P_{r}$, ${}^{n}C_{r}$ in a single program using function
6. Matrix Addison, subtraction and multiplication
7. Linear Search of a number in an array
8. Sorting an array in ascending and descending order
9. Finding maximum and minimum of list of numbers
10. Call by value and call by reference of functions
11. Employee pay bill using structure
12. Preparing an EB bill using file

ALLIED

PAPER - I

MATHEMATICAL FOUNDATIONS - I

Objectives

To know about Logical operators, validity of arguments, set theory and set operations, relations and functions, Binary operations, Binary algebra, Permutations & Combinations, Differentiation, Straight lines, pair of straight lines, Circles, Parabola, Ellipse, Hyperbola.

UNIT-I: SYMBOLIC LOGIC

Proposition, Logical operators, conjunction, disjunction, negation, conditional and bi-conditional operators, converse, Inverse, Contra Positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

UNIT-II: SET THEORY

Sets, set operations, venndiagram, Properties of sets, number of elements in a set, Cartesian product, relations & functions,

Relations : Equivalence relation. Equivalence class, Partially and Totally Ordered sets,

Functions: Types of Functions, Composition of Functions.

UNIT-III: BINARY OPERATIONS

Types of Binary Operations: Commutative, Associative, Distributive and identity, Boolean algebra: simple properties. Permutations and Combinations.

UNIT-IV: DIFFERENTIATION

Simple problems using standard limits,

$$\lim_{x \to a} \frac{x^n - a^n}{x - a}, \lim_{x \to 0} \frac{\sin x}{x}, \lim_{x \to 0} \frac{\tan x}{x}, \lim_{x \to 0} \frac{e^x - 1}{x}, \lim_{n \to \infty} (1 + 1/n)^n, \lim_{n \to 0} (1+n)^{1/n}$$

Differentiation, successive differentiation, Leibnitz theorem, partial differentiation, Applications of differentiation, Tangent and normal, angle between two curves.

UNIT-V: TWO DIMENSIONAL ANALYTICAL GEOMETRY

Straight Lines - Pair Straight Lines

Text Book.

P.R. Vittal, Mathematical Foundations – Maragham Publication,

Chennai.

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V.Sundaram& Others, Dircrete Mathematical Foundation - A.P.Publication, sirkali.
3. P.Duraipandian& Others, Analytical Geometry 2 Dimension - Emerald publication 1992 Reprint.
4. Manicavachagompillay&Natarajan. Analytical Geometry part I - Two Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

SEMESTER II

CORE THEORY PAPER – 2

C++ AND DATA STRUCTURE

Objective: To develop Object oriented programming skills using C++ and to introduce data structure concepts.

UNIT-I : Object Oriented Concepts and C++

C++ Fundamentals - Operators, Expressions and Control Structures: If, If..Else, Switch - Repetitive Statements- for, while, do..while - Input and Output in C++ - manipulators- manipulators with parameters. - Pointers and arrays

UNIT-II : Functions and Classes

Functions in C++ - Main Function - Function Prototyping - Parameters Passing in Functions - Values Return by Functions - inline Functions - Function Overloading.
Classes and Objects; Constructors and Destructors; and Operator Overloading - Type of Constructors

UNIT – III : Inheritance, Polymorphism & Files

Inheritance : Single Inheritance - Multilevel inheritance - Multiple inheritance - Hierarchical Inheritance - Hybrid Inheritance - Polymorphism - Working with Files : Classes for File Stream Operations - Opening and Closing a File - End-of-File Detection - Updating a File - Error Handling during File Operations .

UNIT-IV : Fundamental Data Structures

Definition of a Data structure - primitive and composite Data Types, Stacks (Array) - Operations –Linked Stack-Operations- Applications of Stack (Infix to Postfix Conversion).

Queue (Array)- operations-Linked Queue- Operations- - Singly Linked List - Operations, Application of List (Polynomial Addition)-. Doubly Linked List - Operations.

UNIT-V : Trees and Graphs

Trees: Binary Trees –Binary Search Tree- Operations - Recursive Tree Traversals- Recursion
Graph - Definition, Types of Graphs, Graph Traversal –Dijkstras shortest path- DFS and BFS.

Text Books

1. Mastering in C++, K.R.Venugopal, Raj Kumar, T.Ravisankar – McGraw Hill, 2011.
2. C++ Plus Data Structure by Nell Dale ,Narosa Publications, 2000

Reference Books:

1.ReemaThareja , Object Oriented Programming with C++, Oxford University Press, 2015

2. Balagurusamy, c++ programming, TMH.

3. Fundamentals of Data Structures in C++ by Ellis Horowitz, SartajSahni and Dinesh Mehtha, Second Edition, University Press

4. Data Structures using C++ byVarshaH.Patil. Oxford University Press, 2012

PRACTICAL – II

C++ & DATA STRUCTURE - LAB

1. Implementing classes, object, constructors and member functions for calculating area and perimeter of a circle.
2. Implementing function overloading(Find area/volume of rectangle, circle, sphere, cylinder, cone etc).
3. Implementing operator over loading(Addition, subtraction, multiplication of matrices)
4. Implementing single , multiple , hierarchical inheritance.
5. Implementing sequential file operations using error handling functions.
6. Implementing PUSH, POP operations of stack using Arrays.
7. Implementing add, delete operations of a queue using Arrays.
8. Implementing Infix to postfix conversion of an expression using stack
9. Implementing Binary tree recursive traversals (in-order, pre-order, and post-order).
10. Implementing Polynomial addition using linked list.

ALLIED II

MATHEMATICAL FOUNDATIONS II

Objectives

To know about Matrix Operations, Symmetric, Skew-Symmetric, Hermitian, Skew-Hermitian, Orthogonal, Unitary Matrices. Rank of a Matrix Solutions of linear equations Consistency and Inconsistency, Characteristic roots and Characteristics Vectors, Cayley - Hamilton Theorem, Integration of rational functions, Integration by parts, Reduction formulae, Area and volume using integration, Planes, Straight lines, Spheres, Curves, Cylinders.

UNIT-I: MATRICES

Multiplication of matrices, Singular and Non-Singular matrices, Adjoint of a Matrix, Inverse of a matrix Symmetric and Skew-Symmetric, Hermitian and Skew-Hermition, Orthogonal and unitary matrices, Rank of a matrix, Solution of Simultaneous Linear equations by

(i) Cramer's rule.

(ii) Matrix Inversion Method.

UNIT-II: MATRICES

Test for Consistency and Inconsistency of linear equations, (Rank Method), characteristic roots and characteristic vectors, Cayley - Hamilton theorem, matrix of linear transformations: reflection about the x, y axes and the line y=x, rotation about the origin through an angle, expansion or compression, shears, translation.

UNIT-III

Integration Simple problems, integration of rational function involving algebraic expressions of the form

$$\frac{1}{\sqrt{ax^2+bx+c}}, \frac{1}{\sqrt{ax^2+bx+c}\sqrt{ax^2+bx+c}}, \frac{px+q}{\sqrt{ax^2+bx+c}}, \frac{px+q}{\sqrt{ax^2+bx+c}}, \sqrt{px+q}$$

integrations using simple substitutions integrations involving trigonometric functions of the form

$$\frac{1}{a+b\cos x}, \frac{1}{a^2\sin^2 x+b^2\cos^2 x}$$

Integration by parts.

UNIT-IV

Properties of definite integrals. Reduction formulae for

$\int x^n e^{ax} dx$, $\int \sin^n x dx$, $\int \cos^n x dx$, $\int x^m (1-x)^n dx$, applications of integration for (i) Area under plane caurves, (ii) Volume of solid of revolution.

UNIT-V: ANALYTICAL GEOMETRY OF THREE DIMENSION

Planes, straight lines.

Text Book.

P.R.Vittal, Mathematical Foundations - Margham Publication, Chennai.

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V.Sundaram& Others, Dircrete Mathematical Foundation - A.P.Publication, sirkali.
3. P.Duraipandian& Others, Analytical Geometry 3 Dimension – Emerald publication 1992 Reprint.
4. Manicavachagompillay&Natarajan. Analytical Geometry part II - three Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

SEMESTER III

CORE THEORY PAPER – 3

JAVA Programming

Objectives:
To improve Object Oriented Programming gathered already through an independent platform.

Unit – I: BASICS, ESSENTIALS, CONTROL STATEMENT AND CLASSES & OBJECTS

Computer and its Languages – Stage, Origin and Features for Java - JDK–OOP; Java Essentials:Program – API - Variables& Literals - Data Types - String Class – Operators - Type conversion - Constants - Scope – Comments - Keyboard Input; Control Statements: Conditional Statements – Looping Statements - Break and Continue Statements; Classes and Objects: Modifiers - Arguments - Constructors - Packages and import - Static Class - Overloaded Methods and Constructors - Returning Objects – toString() - this reference – Enumeration - Garbage Collection.

Unit – II: ARRAYS, INHERITANCE, INTERFACES AND PACKAGES

Arrays - Three or More Dimensions; Inheritance: Basics - Calling the Superclass Constructor - Overriding Superclass Methods - Inheritance from Subclasses – Polymorphism -Abstract Classes and Methods - Interfaces: Fields - Multiple inheritance - Interface inheritance; Packages: Creating packages – Accessing package from other packages- Access Specifier.

Unit – III: STRING HANDLING, EXCEPTION HANDLING AND MULTITHREADING

String Handling: Basics - Operations –String Methods - String Buffer class - String Builder – to String method -String Tokenizer class. Exception Basics: try and catch block - Multiple catch block - Nested try - throws keyword - Throw vs Throws - Final vs Finally vs Finalize - Method Overriding - Custom Exception - Multithreading: Life Cycle - Methods in Thread - thread application – Thread priority – Synchronization - Inter-thread communication - Suspending, Resuming, and Stopping Threads;

Unit – IV: APPLET AND GUI APPLICATION

Applets: Basis - Lifecycle - Applet classes - Application – Graphics; AWT-I: GUI Programming - AWT classes - Windows fundamentals- Creating Windows - Dialog Boxes - Layout Managers - Radio Buttons and Check Boxes – Borders-Swing

Unit – V: JAVA DATABASE CONNECTIVITY

JDBC - Types of Drivers- Architecture- Classes and Interfaces - Developing JDBC Application - New Database and Table with JDBC - Working with Database Metadata.

Text Book

1. S.Sagayaraj, R.Denis, P.Karthik & D.Gajalakshmi, "Java Programming", Universities Press, 2017

References

1. Patrick Naughton and Herbert Schildt. "The Complete Reference JAVA 2". 3rd Edition. Tata McGraw-Hill Edition, 1999.
2. Muthu C. "Programming with JAVA". 2nd Edition. Vijay Nicole Imprints, 2011.
3. Ken Arnold Gosling and Davis Holmen. "The Java Programming Language". 3rd Edition. Addition Wesley Publication.

CORE THEORY PAPER – 4

E-Commerce

UNIT-I

Electronic Commerce Framework, Traditional vs. Electronic business applications, the anatomy of E-commerce applications.

UNIT-II

Network infrastructure for E-Commerce - components of the I-way - Global information distribution networks - public policy issues shaping the I-way.The internet as a network infrastructure.The Business of the internet commercialization.

UNIT-III

Network security and firewalls - client server network security - firewalls and network security - data and message security - encrypted documents and electronic mail.

UNIT-IV

Electronic Commerce and world wide web, consumer oriented E-commerce, Electronic payment systems, Electronic data interchange (EDI),EDI applications in business ,EDI and E-commerce EDI implementation.

UNIT-V

Intraorganizational Electronic Commerce supply chain management.
Electronic Commerce catalogs, Document Management and digital libraries.

Text Book

1. R. Kalakota and A. B. Whinston, Frontiers of Electronic Commerce, Addison Wesley, 1996.

Reference Books

1.R.Kalakota and A.B.Whinston,Readings in Electronic Commerce, Addison Wesley, 1997.
2. David Kosiur, Understanding Electronic Commerce, Microsoft Press, 1997.
3. E-Commerce and E-Business, P.Rizwan Ahmed, Margham Publications.

CORE THEORY PAPER – 5

RESOURCE MANAGEMENT TECHNIQUES

Objectives: To improve the skills of solving very common problems which we come across in various fields like transportation and industries with machines. To develop computational skill and logical thinking in formulating industry oriented problems as a mathematical problem and finding solutions.

UNIT – I: Introduction and Linear Programming

.

BASICS OF OPERATIONS RESEARCH: Development – Definition – Characteristics – Phases – Models – Advantages and Limitations **LINEAR PROGRAMMING :** Formulation – Graphical Method of Solution – General Linear Programming Problem – Canonical and Standard form of LPP – Simplex method.

UNIT – II: Transportation and Assignment Model

TRANSPORTATION MODEL : Definition – Formulation and Solution – Additional Problems **ASSIGNMENT MODEL :** Definition – Solution of Assignment Models – Hungarian Method – Additional Problems – Traveling Salesman problem.

UNIT – III : SEQUENCING MODLES

Sequencing Problems – Assumptions – Processing *n* jobs through two machines – Processing *n* jobs through three machines – Processing of two jobs through *m* machines.

UNIT – IV: REPLACEMENT MODELS

Introduction – Replacement of items that deteriorate – Replacement of items whose maintenance and repair cost increase with time – Replacement of items that fail suddenly – group replacement policy.

UNIT – V: NETWORKING ANALYSIS

Project – Project Planning – Project Scheduling – Project Controlling – Activity on Node diagram – Critical Path Method – Program Evaluation and Review Technique

TEXT BOOK

Operations Research, P. K. Gupta and D.S. Hira, , S. Chand & Co, 5th Edition,-2008.

REFERENCES:

1. Operations Research , S.D.Sharma-Kedarnath - Ramnath Delhi 16th Revised Edition, 2010.
2. Introduction to Operations Research, Hiller & Libermann , CBS Publishes, 1st Edition, 1994.

CORE PRACTICAL

Practical 3- JAVA Programming LAB

List of Practical's

1. Implementing Package, inheritances and interfaces
2. Implementing Flow, Border and Grid Layouts
3. Implementing Dialogs , Menu and Frame
4. Implementing User defined Exception Handling
5. Implementing Multithreading
6. Implementing I/O Stream File handling
7. Implementing a Calculator using Swing
8. CRUD operation Using JDBC
9. Client Server using TCP and UDP Socket
10. GUI application with JDBC

ALLIED - 2

FINANCIAL ACCOUNTING - I

Objective:

To gain knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Introduction

Meaning of accounting – objectives of accounting – advantages and limitations of accounting- Accounting concepts and conventions - Methods of accounting -Rules of debit and credit- Journal - Ledger accounts– Trial Balance - Errors and their rectification - Rectification of Errors without suspense a/c - Rectification errors with suspense a/c (effect of rectification on profit and rectification during subsequent accounting year are excluded) - Bank Reconciliation Statement.

Unit - II: Depreciation, Provisions and Reserve

Meaning of depreciation – causes for depreciation – need for charging depreciation – Methods of calculating depreciation: straight line method and written down value method (change in method of depreciation is excluded) – Methods of recording depreciation: by charging depreciation to assets account or by creating provision for depreciation account.

Unit - III: Bills of exchange

Meaning of bill of exchange - features and advantages of bill of exchange- types of bill of exchange: Trade bills and accommodation bills - Accounting treatment of trade bills (accommodation bills are excluded).

Unit - IV: Final accounts

Meaning of final accounts – adjustments in preparation of final accounts – preparation of trading, profit & loss account and balance sheet of sole proprietorship concern.

Unit V: Accounts from incomplete records

Meaning of single entry system – features and limitations of single entry system – Distinction between single entry system and double entry system - Methods of calculation of profit: Statement of affairs method and Conversion method **–** Distinction between statement of affairs and balance sheet.

Note: Questions in section A,B and C shall be in the proportion of 20: 80 between theory and problems

Text books

1. Jain &Narang,Financial Accounting, KalyaniPublishers, New Delhi.
2. T.S. Reddy & Dr. A.Murthy, Financial Accounting, MarghamPublications, Chennai.

Reference books

1. Gupta,R.L&Gupta,V.K,AdvancedAccounting,Sulthan Chand&Sons,NewDelhi.
2. Shukla&Grewal,AdvancedAccounting,S.Chand&Co.NewDelhi.
3. Parthasarathy,S.&Jaffarulla,A.FinancialAccounting,KalyaniPublishers, NewDelhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

SKILL BASED SUBJECT – PAPER 1

DESIGN AND ANALYSIS OF ALGORITHMS

Objective: To build a solid foundation of the most important fundamental subject in computer science. Creative thinking is essential to algorithm design and mathematical acumen and programming skills.

UNIT -I: ALGORITHM AND ANALYSIS

What is an Algorithm? - Algorithm Specification- Performance Analysis- Randomized Algorithms.

UNIT - II: DIVIDE AND CONQUER

General Method - Binary Search - Finding the Maximum and Minimum-Merge Sort - Quick Sort - Selection Sort- Stassen's Matrix Multiplications.

UNIT - III: THE GREEDY METHOD

The General Method - Knapsack Problem – Tree Vertex Splitting - Job Sequencing with Deadlines- Minimum Cost Spanning Trees - Optimal Storage on Tapes - Optimal Merge Pattern - Single Source Shortest Paths.

UNIT - IV: DYNAMIC POGRAMMING

The General Method – Multistage Graphs - All pair shortest path - String Editing - 0/1 Knapsack – Reliability Design - The Traveling Salesperson Problem

UNIT - V: TRAVERSAL, SEARCHING & BACKTRACKING

Techniques for Binary Trees- Techniques for Graphs - The General Method - The 8-Queens Problem – Sum of Subsets- Graph Coloring- Hamiltonian Cycles

TEXT BOOK

Fundamentals of Computer Algorithms, Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, GalgotiaPublications, 1998.

REFERENCE BOOKS:

1. Introduction to Algorithms ,Coremen T.H.,Leiserson C.E. and Rivest R.L., PHI 1998.

2. Introduction to the Design and Analysis of Algorithms, AnanyLevitin, Pearson Education, 2nd Edition.

NON MAJOR ELECTIVE – I

INTRODUCTION TO INFORMATION TECHNOLOGY

Objective:

To enable the student to be proficient with Information Technology with a better knowledge of Computer

UNIT – I

Introduction to Computers: Definition - Characteristics of a Computer - Classification of Computers -Basic Anatomy of the Computer - Applications / Uses of Computers in different fields

UNIT – II

Input and Output Devices: Input Devices - Output Devices - Data Representation - Programming Languages / Computer Languages - **Software**: System Software - Application Software

UNIT – III

Data Communication and Computer Networks: Data Communication - Computer Network - The Uses of a Network - Types of Networks - Network Topologies- Transmission Media: Guided Transmission Media - Wireless Transmission

UNIT – IV

Internet and its Applications : History of Internet - Uses of Internet - Advantages of Internet - ISP - Internet Services - IP Address - Web Browser - URL - DNS - Internet Explorer - Types of internet connections - E-mail - Search Engine.

UNIT – V

Operating System: Evolution of operating systems - Function of Operating System - Classification of Operating –System - Example of Operating System – DOS –Windows – UNIX - Linux

TEXT BOOKS:

1. Alexis Leon and Mathews Leon, "Fundamentals of Information Technology", Vikas Publishing House Pvt. Ltd.
2. Introduction to Information Technology, P.Rizwan Ahmed, Second Edition, Margham Publications, 2016
3. Introduction to Information Technology, PelinAksoy, Laura DeNardis, Cengage Learning India Private Limited.

SEMESTER IV

CORE THEORY PAPER – 6

DATABASE MANAGEMENT SYSTEM

Objective: To incorporate a strong knowledge on databases to students

UNIT - I Database Basics

Introduction: Flat File – Database System – Database – Actionable for DBA. The Entity – Relationship Model: Introduction – The Entity Relationship Model. Data Models: Introduction – Relational Approach – The Hierarchical Approach – The Network Approach.

UNIT – II Relational Algebra

Structure of Relational Databases – Fundamental Relational Algebra Operations –Additional Relational Algebra Opearations - Extended Relational Algebra Operations - Null Values - Modification of the Database - The Tuple Relational Calculus – The Domain Relational Calculus

UNIT – III Normalization

Normalization: Introduction - Normalization – Definition of Functional Dependence (FD) – Normal Forms: 1NF, 2NF, 3NF and BCNF.

UNIT – IV Structured Query Language

Structured Query Language: Features of SQL – Select SQL Operations – Grouping the Output of the Query – Querying from Multiple Tables – Retrieval Using Set operators – Nested Queries. T-SQL – Triggers and Dynamic Execution: Transact-SQL..

UNIT – V Procedural Language

Procedural Language- SQL: PL/SQL Block Structure – PL/SQL Tables. Cursor Management and Advanced PL/SQL: Opening and Closing a Cursor – Processing Explicit Cursor – Implicit Cursor – Exception Handlers – Sub Programs in PL/SQL – Functions – Precaution While Using PL/SQL Functions – Stored Procedure – Object Oriented Technology.

Text Book

1. Rajesh Narang, "Database Management Systems", PHI Learning Private Limited, New Delhi, sixth printing, 2010.

Reference

1. S.K. Singh, "Database Systems – Concepts, Design and Appplications", Dorling Kindersley (India) Pvt. Ltd., Second Impression, 2008

2. Database System Concepts , Abraham Silberchatz, Henry F Korth , S.Sudarshan, McGraw-Hill - 5th Edition - 2006.

CORE THEORY PAPER – 7

ENTERPRISE RESOURCE PLANNING

UNIT - I

Business function and Business process: Functional areas and Business Process - functional area of operations - Business process - Marketing Sales - supply chain management - Accounting and finance - Human Resource - Functional areas of information system - The development of ERP system SAP R/3 - New directions in ERP - significance and benefits of ERP software and systems.

UNIT - II

Marketing information system and sales order process in ERP: sales and Distribution in ERP - Pre sales activities - sales order processing - inventory Sourcing - Delivery - Billing - payment - Customer relationship Management - benefits of CRM.

UNIT - III

Production and supply chain management information system: Production overview - The production planning process - The SAP ERP Approach to production planning - Sales forecasting - sales and operation Planning - Demand management - Material requirement planning in SAP ERP - ERP and supplier - Supply chain

UNIT - IV

Accounting in ERP: Accounting activities - using ERP for accounting Information - operational decision making problem - credit management - Industrial credit management in SAP ERP - product profitability analysis - Management reporting with ERP system - Document flow for customer Service.

UNIT - V

Human resource process in ERP: HR with ERP - Advance HR features - Time management - Payroll - Travel management - Training and Development - Management by objectives - ERP process modeling.

Text Book:

1) ELLEN MONK and BRET WAGNER, ENTERPRISE RESOURCE PLANNING - 3rd edition - MGH.

CORE THEORY PAPER – 8

DECISION SUPPORT SYSTEM

UNIT I

DECISION-MAKING AND COMPUTERIZED SUPPORT-Management Support Systems: An Overview, Decision Making, Systems, Modeling, and Support.

UNIT II

DECISION SUPPORT SYSTEMS-An Overview, Data Management: Warehousing, Access, and Visualization , Modeling and Analysis , Knowledge based Decision Support and Artificial Intelligence , User Interface and Decision Visualization Applications , Constructing a Decision Support System and DSS Research.

UNIT III

COLLABORATION, COMMUNICATION, AND ENTERPRISE SUPPORT SYSTEMS-Networked Decision Support: The Internet, Intranets, and Collaborative Technologies, Group Decision Support Systems, Executive Information and Support Systems.

UNIT IV

FUNDAMENTALS OF EXPERT SYSTEMS AND INTELLIGEN SYSTEMS-Fundamentals of Expert Systems, Knowledge Acquisition and Validation, Knowledge Representation, Inferences, Explanations, and Uncertainty, Building Expert Systems: Process and Tools.

UNIT V

CUTTING-EDGE DECISION SUPPORT TECHNOLOGIES-Neural Computing: The Basics, Neural Computing Applications, Genetic Algorithms, Fuzzy Logic, and Hybrid Intelligent Systems , Intelligent Agents and Creativity , Implementing and Integrating Management Support Systems , Organizational and Societal Impacts of Management Support Systems.

Text Book :

1. Efraim Turban, Jay E. Aronson, "Decision Support Systems and Intelligent Systems", Prentice Hall, New Delhi, 2004

Reference book:

1. George Marakas, "Decision Support Systems in the 21st Century", Prentice Hall, New Delhi, 2003
2. Robert J Thierauf, "User Oriented Decision Support Systems", Prentice Hall, New Delhi

PRACTICAL – IV

RDBMS Lab

1. Table creation and simple Queries
2. Queries using Aggregate Function and Set Operations
3. Table creation with various Joins
4. Nested Sub queries and correlated Sub queries
5. View creation and manipulation
6. PL/SQL program for cursor
7. PL/SQL program for packages
8. PL/SQL program for triggers and its type
9. PL/SQL program for procedures and functions

ALLIED – II

FINANCIAL ACCOUNTING - II

Objective:

To gain a knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Branch accounts

Meaning – objects of branch accounts – accounting in respect of dependent branches: debtors system; stock and debtors system; wholesale branch system and final accounts system - Independent branches – incorporation of branch trial balance in head office books.

Unit - II: Departmental Accounting

Meaning of departments and departmental accounting – Distinction between departments and branches- need for departmental accounting – advantages of departmental accounting - Apportionment of indirect expenses – Inter departmental transfers at cost and selling price - preparation of departmental trading, profit & loss account and balance sheet.

Unit - III: Hire purchase and Instalment purchase systems

Meaning and features of hire purchase system - calculation of interest – books of hire purchaser and books of hire vendor - default and repossession (Hire purchase trading account excluded)

Meaning of instalment system -distinction between hire purchase system and instalment system - calculation of interest – books of buyer and books of seller.

Unit - IV: Partnership accounts (fundamentals and reconstitution of partnership)

Meaning and features of partnership – Partnership deed - calculation of Interest on capital and interest on drawings – preparation of profit & loss appropriation account – preparation of capital accounts (fixed and fluctuating) – admission of a partner – retirement of a partner – death of a partner – treatment of goodwill as per AS 10.

Unit - V: Partnership Accounts (Dissolution of partnership firms)

Dissolution of a firm – insolvency of a partner (Garner Vs Murray rule) – Insolvency of all the partners – Piecemeal distribution: proportionate capital method and maximum loss method.

Note: Questions in section A, B and C shall be in the proportion of 20: 80 between theory and problems.

Text books

1. Jain &Narang ,Financial accounting, Kalyani publishers, New Delhi
2. T.S. Reddy & Dr. A.Murthy, Financial accounting, Margham publications, Chennai

Reference books

1. Gupta,R.L&Gupta,V.K,AdvancedAccounting,Sultan Chand&Sons,NewDelhi.
2. Shukla&Grewal,AdvancedAccounting,S.Chand&Co.NewDelhi.
3. Parthasarathy,S.&Jaffarulla,A.FinancialAccounting,KalyaniPublishers,NewDelhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

SKILLED BASED SUBJECT - II

COMPUTER ORGANISATION AND ARCHITECTURE

Objective: To enable the student to have a better understanding of architecture of computer and prepare the student for higher level of programming

UNIT - I

Instruction Codes – Computer Registers – Computer Instructions – Timing and Control – Instruction Cycle – Memory Reference Instructions – Input-Output and Interrupts.

UNIT - II

Control Memory – Address Sequencing – Micro program Examples – Design of Control Unit.

UNIT - III

Introduction – General Register Organization – Instruction Formats – Addressing Modes.

UNIT – IV

Peripheral Devices – I/O interface – Asynchronous Data Transfer – Modes of Transfer - Direct Memory Access – Input Output Processor (Excluding IBM and Intel IOPs).

UNIT - V

Auxiliary Memory – Main Memory – Auxiliary Memory - Associative Memory – Cache Memory -Virtual Memory.

TEXT BOOK

1. Morris Mano M. Computer System Architecture. New Delhi **:**Prentice Hall of India Private Limited, 2011

REFERENCES

1. William Stallings . Computer Organization and Architecture. 8th edition. Pearson publication, 2010
2. Morris Mano. Digital Login and Computer Design. New Delhi :Prentice Hall of India Private Limited, 2001

NON MAJOR ELECTIVE II

INTERNET AND ITS APPLICATION

Objective: To equip students to basics of Internet usage and prepare them for digital

UNIT- I

Introduction to Computers Programming Language types History of Internet Personal Computers History of World Wide Web- Micro software .NET Java-Web resources.

UNIT – II

Web Browsers- Internet Explorer- connecting to Internet Features of Internet explorer6 Searching the Internet- online help and tutorials- File Transmission Protocol (FTP) Browser settings.

UNIT – III

Attaching a file, Electronic mail Creating an E-mail id Sending and Receiving mails-attaching a file-Instance messaging- other web browsers.

UNIT - IV

Introduction to HTML headers - Linking- Images-special characters and line breaks- unordered lists- simple HTML programs.

UNIT - V

E-marketing consumer tracking Electronic advertising search engine-CRM- credit card Payments- Digital cash – e wallets – smart card.

Textbook

Internet and World Wide Web Third edition H.M.Deital, P.J. Deital and A.B.Goldberg-PHI

Book for Reference

1. The Internet- Complete Reference Harley hahn, Tata McGraw hill
2. Internet and its Applications, P.Rizwan Ahmed, Margham Publication, 2014

SEMESTER V

CORE THEORY PAPER – 9

MOBILE APPLICATIONS DEVELOPMENT

Objectives:

This course aims to provide the students with a detailed knowledge on Mobile Application and Development and covers Android programming from fundamentals to building mobile applications for smart gadgets.

UNIT I Introduction to Mobile Applications:

Native and web applications - Mobile operating systems and applications - Mobile Databases. Android: History of Android - Android Features – OSS – OHA - Android Versions and compatibility - Android devices - Prerequisites to learn Android -– Setting up software – IDE - XML. Android Architecture: Android Stack - Linux Kernel - Android Runtime - Dalvik VM - Application Framework - Android emulator - Android applications.

UNIT II Android development:

Java - Android Studio – Eclipse – Virtualization – APIs and Android tools – Debugging with DDMS – Android File system – Working with emulator and smart devices - A Basic Android Application - Deployment. Android Activities: The Activity Lifecycle – Lifecycle methods – Creating Activity. Intents – Intent Filters – Activity stack.

UNIT III Android Services:

Simple services – Binding and Querying the service – Executing services.- Broadcast Receivers: Creating and managing receivers – Receiver intents – ordered broadcasts. Content Providers: Creating and using content providers – Content resolver. Working with databases: SQLite – coding for SQLite using Android – Sample database applications – Data analysis.

UNIT IV Android User Interface:

Android Layouts – Attributes – Layout styles - Linear – Relative – Table – Grid – Frame. Menus: Option menu – context menu - pop-up menu – Lists and Notifications: creation and display. Input Controls: Buttons-Text Fields-Checkboxes-alert dialogs-Spinners-rating bar-progress bar.

UNIT V Publishing and Internationalizing mobile applications :

Live mobile application development: Game, Clock, Calendar, Convertor, Phone book. App Deployment and Testing: Doodlz app – Tip calculator app – Weather viewer app.

Text Books

1. Barry Burd, "Android Application Development – All-in-one for Dummies", 2nd Edition, Wiley India, 2016.

Reference

1. Paul Deitel, Harvey Deitel, Alexander Wald, " Android 6 for Programmers – An App-driven Approach", 3rd edition, Pearson education, 2016.
2. Jerome (J. F) DiMarzio, "Android – A Programmer"s Guide", McGraw Hill Education, 8th reprint, 2015.
3. http://www.developer.android.com

CORE THEORY PAPER - 10

OPERATING SYSTEM

Objective: Enable the student to get sufficient knowledge on various system resources.

Unit – I Operating System Basics

Basic Concepts of Operating System - Services of Operating System-Classification of Operating System- Architecture and Design of an Operating System-Process Management -Introduction to Process-Process State -PCB - Process Scheduling - Interprocess Communication

Unit –II Operating System Scheduling

CPU Scheduling**:** Introduction - Types of CPU Scheduler - Scheduling Criteria - Scheduling Algorithms - FCFS Scheduling – SJF Scheduling;-Priority Scheduling - Round-Robin Scheduling- Multilevel Queue Scheduling - Deadlock - Basic Concept of Deadlock- Deadlock Prevention - Deadlock Avoidance- Deadlock - Detection and Recovery

Unit- III Memory management

Memory Management - Basic Concept of Memory - Address Binding; Logical and Physical Address Space- Memory Partitioning - Memory Allocation-Protection-Fragmentation and Compaction

Unit – IV Swapping

Swapping- Using Bitmaps - Using Linked Lists- Paging-Mapping of Pages to Frames - Hierarchical Page Tables- Segmentation - Virtual Memory - Basic Concept of Virtual Memory-Demand Paging - Transaction Look aside Buffer (TLB) - Inverted Page Table-Page Replacement Algorithms

Unit –V File Management

File Management - Basic Concept of File-Directory Structure-File Protection-Allocation Methods – Various Disk Scheduling algorithms

Text Books:

Abraham Silberschatz Peter B. Galvin, G. Gagne, “Operating System Concepts”, Sixth Edition, Addison Wesley Publishing Co., 2003.

Reference

1. Operating systems - Internals and Design Principles, W. Stallings, 6th Edition, Pearson
2. Willam-Stalling “Operating System” Fourth Edition, Pearson Education, 2003.

CORE THEORY PAPER - 11
DATA COMMUNICATION & NETWORKS

Objective:

To equip students to basics of Data Communication and prepare them for better computer networking

UNIT I

Introductory Concepts - Network hardware - Network software – Network Architecture - Physical layer - Guided transmission media - Cable television.

UNIT II

Data Link Layer - Design issues - Channel allocation problem - Multiple access protocols - Ethernet - Wireless LAN - 802.11 architecture.

UNIT III

Network Layer : Design issues, Routing Algorithms, Shortest path routing, Flooding, Broadcast & Multicast routing congestion, Control & internetworking.

UNIT IV

Transport Layer - Transport service - Elements of transport protocols - User Datagram Protocol - Transmission Control Protocol.

UNIT V

Application Layer - DNS - Electronic mail - World Wide Web - Multimedia - Network security.

TEXT BOOK

1. Tannenbaum, A.S., 2003 : Computer Networks, Prentice Hall.

REFERENCES

1. Stallings, William, 2008 : Local and Metropolution Area Networks : An Introduction, Macmillian Publishing Co.
2. Black : Data Network, Prentice Hall of India.
3. W. Stallings, "Data and Computer Communication", Pearson Education, Fifth Edition, 2001

CORE PRACTICAL – 5

MOBILE APPLICATIONS DEVELOPMENT – LAB

1. Intent and Activity
2. Using Controls
3. Alert Dialogs
4. List View
5. Options Menu
6. Seek Bars
7. Shared Preferences
8. Status Bar Notifications
9. Tab Widgets Talking Clock.
10. Tween Animation
11. Grid View
12. Internal Storage - Files
13. SQlite - Database
14. Google Map
15. Permissions

CORE PRACTICAL – 6

OPERATING SYSTEM LAB

1. Implementing the Process system calls.
2. Implementing I/O system calls.
3. Implementing IPC using message queues.
4. Implementing CPU& scheduling algorithm for first come first serve scheduling.
5. Implementing CPU scheduling algorithm for shortest job first scheduling.
6. Implementing perform priority scheduling.
7. Implementing CPU scheduling for Round Robin Scheduling.
8. Implementing pipe processing.
9. Implementing first fit, best fit algorithm for memory management.
10. A program to simulate producer-consumer problem using semaphores.
11. A Shell Program to find factorial of a given number
12. A shell program to generate Fibonacci number

Elective – 1

A. DATA MINING

Objective: Enable the student to get sufficient knowledge on mining the data .

UNIT - I: Data Mining Basics

Introduction: Definition of data mining - data mining vs. query tools - machine learning - steps in data mining process - overview of data mining techniques.

UNIT - II: Data Models

Multidimensional Data Model - Data Cube - Dimension Modeling - OLAP Operations - Meta Data - Types of Meta Data.

UNIT - III: Data Editing

Data Pre-Processing And Characterization :Data Cleaning - Data Integration and Transformation - Data Reduction - Data Mining Query Language - Generalization - Summarization - Association Rule Mining

UNIT - IV: Classification

Classification: Classification - Decision Tree Induction - Bayesian Classification - Prediction - Back Propagation - Cluster Analysis - Hierarchical Method - Density Based Method - Grid Based Method - Outlier Analysis.

UNIT - V: Analysis

Cluster analysis: Types of data - Clustering Methods - Partitioning methods - Model based clustering methods - outlier analysis. Advanced topics: Web Mining - Web Content Mining - Structure and Usage Mining - Spatial Mining - Time Series and Sequence Mining.

TEXT BOOKS:

1. PaulrajPonnaiah, "Data Warehousing Fundamentals", Wiley Publishers, 2001.

2. Jiawei Han, MichelineKamber, "Data Mining: Concepts and Techniques",Morgan Kaufman Publishers, 2006.

REFERENCES:

1. UsamaM.Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth RamasamyUthurusamy, "Advances in Knowledge Discover and Data Mining", the M.I.T. Press, 2007.
2. Ralph Kimball, Margy Ross, The Data Warehouse Toolkit, John Wiley and Sons Inc., 2002
3. Alex Berson, Stephen Smith, Kurt Thearling, "Building Data Mining Applications for CRM", Tata McGraw Hill, 2000.
4. Margaret Dunham, "Data Mining: Introductory and Advanced Topics", Prentice Hall, 2002.
5. Daniel T. Larose John Wiley & Sons, Hoboken, "Discovering Knowledge in Data: An Introduction to Data Mining", New Jersey, 2004

B. COMPUTER GRAPHICS

Objectives: To equip students to basics of computer drawing and prepare them for computer modeling of objects

UNIT – I : OVERVIEW OF GRAPHICS SYSTEMS AND OUTPUT PRIMITIVES
Video Display Devices- Raster Scan System- Random Scan Systems- Hard Copy Deices- Graphic Software- Line Drawing Algorithms: DDA- Bresenham's Line -Circle Generating Algorithms

UNIT – II : ATTRIBUTES AND TWO DIMESIONAL TRANSFORMATIONS
Line Attributes- Curve Attributes-Color And Gray Scale Level- Area Fill Attributes- Character Attributes- Inquiry Functions- Basic Transformations - Composite Transformation – Other transformation

UNIT – III : TWO DIMENSIONAL VIEWING AND CLIPPING
The Viewing Pipeline- Window To Viewport Transformation –Clipping Operations- Point Clipping- Line Clipping: Cohen Sutherland- Liang Barsky-Sutherland Hodgeman Polygon Clipping- Text Clipping- Exterior Clipping- Logical Classification Of Input Devices- Interactive Picture Construction

UNIT – IV : THREE DIMENSION TRANSFORMATION, VIEWING AND CLIPPING
Translation-Rotation-Scaling-Viewing Pipeline- Viewing Coordinates- Projections -View Volumes and General Projection Transformation- Clipping -

UNIT – V : VISIBLE SURFACE DETECTION METHODS
Classification of Visible Surface Detection Algorithms - Back Face Detection - Depth Buffer Method - A Buffer Method - Scan Line Method - Depth Sorting Method- BSP Tree Method - Area Sub Division Method - Octree Methods - Ray Casting Method

TEXT BOOK:

Computer Graphics(C version), Donald Hearn and M.Pauline Baker, Pearson- 2nd Edit. 2012.

REFERENCE BOOKS:

1. Interactive Computer Graphics–A top down approach using Open GL, Edward Angel , Pearson, 5th Edition.

2. Computer Graphics, Peter Shirley, Steve Marschner, Cengage Learning, Indian Edition,2009.

C. INFORMATION SECURITY

Objective: To enable the student to understand various methodology available for securing information

UNIT I Information Security Basics

INTRODUCTION -History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II Security Investigation

SECURITY INVESTIGATION - Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

UNIT III Security Analysis

SECURITY ANALYSIS-Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV Security Models

LOGICAL DESIGN-Blueprint for Security, Information Security Poicy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V Security Physical Design

PHYSICAL DESIGN-Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

Text Book

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003

Reference

1. Micki Krause, Harold F. Tipton, " Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
2. Stuart McClure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003
3. Matt Bishop, " Computer Security Art and Science", Pearson/PHI, 2002.

SKILL BASED SUBJECT - 3

SOFTWARE ENGINEERING

Objective:
This course introduces the concepts and methods required for the construction of large software intensive systems.

UNIT-I:
Introduction - Evolving Role of Software - Changing Nature of Software – SoftwareMyths; A Generic View of Process: Layered Technology - Process Models: Waterfall Model - Evolutionary Process Models.

UNIT-II:
Requirements Engineering: Tasks - Initiating the Requirements Engineering Process - Eliciting Requirements - Building the Analysis Model - Requirements Analysis - Data Modeling Concepts.

UNIT-III:
Data Engineering: Design Process and Design Quality - Design Concepts - The Design Model Creating an Architectural Design: Software Architecture - Data Design -Architectural Design - Mapping Data Flow into Software Architecture; Performing User Interface Design: Golden Rules.

UNIT-IV:
Testing Strategies: Strategic Approach to Software Testing- Test Strategies for Conventional and Object Oriented Software - Validation Testing - System Testing -Art of Debugging. Testing Tactics: Fundamentals - White Box- Basis Path - Control Structure - Black Box Testing Methods

UNIT-V:
Project Management: Management Spectrum - People - Product - Process - Project. Estimation: Project Planning Process - Resources - Software Project Estimation - Project Scheduling - Quality Concepts - Software Quality Assurance - Formal Technical Reviews.

TEXT BOOK:
Roger S Pressman, "Software Engineering - A Practitioner's Approach", Sixth Edition, McGraw Hill International Edition, New York: 2005.

REFERENCES:

1. Ian Somerville, "Software Engineering", 7th Edition, Pearson Education, 2006.
2. Mall Rajib, " Software Engineering", 2/E, PHI, 2006.

SEMESTER VI

CORE THEORY PAPER – 12

CLOUD COMPUTING

Objective:

To enable the students to learn the basic functions, principles and concepts of cloud Systems.

UNIT I: UNDERSTANDING CLOUD COMPUTING

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Cloud Services.

UNIT II: DEVELOPING CLOUD SERVICES

Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

UNIT III: CLOUD COMPUTING FOR EVERYONE

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events.

UNIT IV: PROGRAMMING MODEL

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Aneka, CloudSim.

UNIT V: SECURITY IN THE CLOUD

Security Overview - Cloud Security Challenges and Risks - Software-as-a-Service Security- Security Governance - Risk Management - Security Monitoring - Security Architecture Design - Data Security - Application Security - Virtual Machine Security - Identity Management and Access Control - Autonomic Security.

TEXT BOOK:

1. Michael Miller, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, August 2008.

REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
4. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India, 2011.
5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly

CORE THEORY PAPER – 13

OPEN SOURCE PROGRAMMING

Objectives:
To discuss techniques that can be effectively applied in practice about HTML5, JavaScript, PHP , CSS and Linux

UNIT I : INTRODUCTION TO HTML5,JAVA SCRIPT, PHP AND CSS
Introduction to Dynamic Web content- HTTP and HTML- Request and Response Procedure- The Benefits of PHP, JAVA Script, CSS, and HTML5- Introduction to HTML5- The Canvas - The HTML5 Canvas- HTML5 Audio and Video- Introduction to CSS- CSS Rules-Style Types- CSS Selectors- CSS Colors.

UNIT-II : LINUX

Introduction : Linux Essential Commands – File system Concept – Standard Files – The Linux Security Model – Vi Editor – Partitions Creation – Shell Introduction – String Processing – Investigation and Managing Processes – Network Clients – Installing Application.

UNI- III : MYSQL

Introduction to MY SQL – The show Databases and Table – The USE command – Create Database and Tables – Describe Table – Select, Insert, Update, and Delete statement – Some Administrative detail – Table Joins – Loading and Dumping a Database.

UNIT-IV : PHP

PHP Introduction – General Syntactic Characteristics – PHP Scripting – Commenting your code – Primitives, Operations and Expressions – PHP Variables – Operations and Expressions Control -statement – Array – Functions.

UNIT – V PHP

Basic Form Processing – File and Folder Access – Cooking – Sessions – Database Access with PHP – MySQL - MySQL Functions – Inserting Records – Selecting Records – Deleting Records – Update Records.

Text Books

1. "Learning PHP, MySQL, Java Script, CSS and HTML5", Robin Nixon, O'Reilly Publications, 3rd Edition, 2014.
2. Steven Holzner, "HTML Black Book", Dreamtech Press &Paraglyph Press Publishers, 2007
3.

Reference Books

Open Source Software, P.Rizwan Ahmed, Margham Publication, Chennai, 2015

Core Practical

PRACTICAL – VII

ASP.NET Lab

1. Implement Validation Controls
2. Write a Program to implement ad rotator control
3. Write a Program to implement state management techniques
4. Write a Program to implement view State and Session State.
5. Write a Program to displaying data with the grid view
6. Write a Program to implement ASP.Net Server Side Controls.
7. Write a Program to implement ASP.Net Master Pages, Themes and Skins.
8. Write a Program working with forms using ASP.Net
9. Write a Program working with pages using ASP.Net.
10. Write a Program to access data sources through ADO.NET

Core Practical

PRACTICAL – VIII

Open Source Programming Lab

1. Create a web page with Frames and Tables.
2. Create a web page incorporating CSS (Cascading Style Sheets)
3. Write a shell program to find the factorial of an integer positive number
4. Write a shell program for checking whether a given string is a palindrome or not.
5. Create a simple calculator in Java script.
6. Write a JavaScript program to scroll your name in the scroll bar.
7. Develop a program and check message passing mechanism between pages.
8. Develop a program and check file system functions, date &time functions.
9. Create a student database table in MYSQL and manipulate records (insert, delete, update) records in a web browser.
10. Develop a program using cookies and session.

Elective II PAPER – 2

(A) SOFTWARE TESTING

Objective: To make the student more proficient with error free software development

UNIT-I PRINCIPLES OF TESTING

A test in time - The cat and the saint - Test the tests first - The Policemen on the bridge - Phase of software project - Quality, Quality Assurance and Quality Control - Testing, Verification and Validation -Process model to represent different phases - Life cycle models.

UNIT-II BLACK BOX AND WHITE BOX TESTING

White box testing - Challenges - Static testing - Structural testing - Black box testing.

UNIT-III INTEGRATION, SYSTEM AND ACCEPTANCE TESTING

Integration testing - Types - Phase of testing - Scenario testing - Defect bash - System and Acceptance testing: Overview - Functional vs. Non-Functional testing - Functional system testing - Non-functional testing-Acceptance testing.

UNIT-IV PERFORMANCE AND REGRESSION TESTING

Introduction - Factors Governing - Methodology for Performance testing - Tools and Process for Performance Testing - Regression Testing - Types of Regression testing - How to do Regression Testing?

UNIT-V INTERNATIONALIZATION AND ADHOC TESTING

Introduction to Internationalization - Primer on Internationalization - Test phases for Internationalization testing - Enabling testing - Locale testing - Internationalization Validation- Fake language testing - Language testing - Localization testing - Tools used for Internationalization - Challenges and Issues - Overview of Ad Hoc testing - Buddy, Pair, Exploratory, Iterative, Agile and Extreme Testing - Defect Seeding.

TEXT BOOK:

1. Srinivasan Desikan, Gopalaswamy Ramesh, “Software Testing: Principles and Practices”, Pearson Publications, 2006.

REFERENCES:

1. RenuRajani, Pradeep Oak, “Software Testing- Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2004.
2. Boris Beizer, “Software Testing Techniques”, Dream Tech Press, Second Edition, 2003.

Elective II PAPER – 2

(B) MOBILE COMPUTING

Objective: To impart good knowledge of wireless communication to students

UNIT I **WIRELESS COMMUNICATION FUNDAMENTALS**

Cellular systems- Frequency Management and Channel Assignment- types of handoff and their characteristics, dropped call rates & their evaluation -MAC – SDMA – FDMA –TDMA – CDMA – Cellular Wireless Networks.

UNIT II **TELECOMMUNICATION NETWORKS & WIRLESS LAN**

Telecommunication systems – GSM – GPRS - Satellite Networks ,Wireless LAN – IEEE 802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a -802.11b standards – HIPERLAN – Blue Tooth.

UNIT III **MOBILE NETWORK LAYER & TRANSPORT LAYER**

Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR – Alternative Metrics. Traditional TCP, Mobile TCP

UNIT IV **APPLICATION LAYER**

WAP Model- Mobile Location based services -WAP Gateway –WAP protocols – WAP user agent profile- caching model-wireless bearers for WAP - WML – WML Scripts

UNIT V **DATABASE ISSUES**

Database Issues : Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2002.

REFERENCE BOOKS:

1. KavehPahlavan, PrasanthKrishnamoorthy, “Principles of Wireless Networks”, PHI/Pearson Education, 2003.

2. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003..

Elective II PAPER – 2

C. MICROPROCESSORS AND ITS APPLICATIONS

Objective:
To learn the architecture, programming, interfacing and rudiments of system design of microprocessors.

Unit-I : 8085 MICROPROCESSOR AND ARCHITECTURE
Microprocessors - Memory - I/O Devices - Memory Mapped I/O - Pin diagram and internal architecture of 8085 - Registers, ALU, Control & Status Registers - Instruction and Machine Cycles. Interrupts

Unit II : PROGRAMMING THE 8085
Introduction to 8085 Assembly language programming - 8085 instructions - Programming techniques with Additional instructions - Counters and Time Delays - Stack and Subroutines - Code Conversions

Unit-III : 8086 MICROPROCESSOR AND ARCHITECTURE
Pin Details and Internal Architecture of 8086 - Register organization, Bus interface unit, Execution unit, Memory addressing, Memory segmentation. Operating modes - Hardware and Software interrupts - Addressing Modes.

Unit-IV : PROGRAMMING THE 8086
8086 Assembly Language Programming - Implementing Standard Program Structures - String - Procedure and Macros. Instruction Description and Assembler Directives

Unit-V : INTERFACING PERIPHERALS
8255 PPI , 8253/8254 PIT, 8237 DMAC,8259 PIC, 8251 USART.

TEXT BOOK

1. Microprocessor Architecture, Programming and Applications with 8085, Ramesh S.Gaonkar, Penram International Publishing (India) Pvt. Ltd. 4th Ed. (for Units I,II and V)
2. Microprocessors and Interfacing,Douglas V. Hall, Tata McGraw Hill , 2nd Ed. (for Units III and IV)

REFERENCE BOOKS:

1. Assembly Language Programming the IBM PC ,Alan R. Miller, SubexInc, 1987.
2. Advanced Microprocessors and Peripherals, Ray A K ,Bhurchandi K M , TMH.

Elective III PAPER – 3

(A) Internet of Things

Objective: To prepare the student for better application of internet technology.

Unit – I IoT Introduction

Introduction to Internet of Things: Definition – Characteristics of IOT – Physical Design of IoT – Things in IoT – IoT Protocols – Logical Design of IoT – Iot Functional Blocks – IoT Communication Models – IoT Communication APIs – IoT Enabling Technologies

Unit – II Domain Specific IoT - 1

Domain Specific IoT – I : Smart Lighting – Smart Appliances – Intrusion Detection – Smoke / Gas Detection – Smart Parking – Smart Roads – Structural Health Monitoring – Surveillance – Emergency Response – Weather Monitoring –

Unit – III Domain Specific IoT II

Domain Specific IoT – II : Air Pollution Monitoring – Noise Pollution Monitoring – Forest Fire Detection – River Flood Detection – Smart Grids- Smart Vending Machines – Route Generation & Scheduling – Fleet Tracking – Shipment Monitoring –

Unit – IV Domain Specific IoT III

Domain Specific IoT – III: Remote Vehicle Diagnostics – Smart Irrigation - Green House Control – Machine Diagnosis & Prognosis – Indoor Air Quality Monitoring – Health & Fitness Monitoring – Wearable Electronics

Unit – V IoT and M2M

IoT And M2M: M2M – Difference Between Iot And M2M – SDN And NFV For IoT – IoT System Management With NETCONF – YANG : Need For Iot Systems Management – SNMP-Network Operator Requirements – NETCONF – YANG-IoT Systems Management With NETCONF - YANG

Text Books:

1. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam

Dunkels, Morgan Kuffmann.

Reference

1. Internet of Things, P.Rizwan Ahmed, Margham Publications, Chennai.

2. Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally

(B) System Software

Objective: To make the student to become more proficient with system programming

Unit – I LANGUAGE PROCESSORS

Language Processing Activities – Fundamentals of Language Processing – Fundamentals of Language Specification – Language Processor Development Tools.

UNIT II ASSEMBLERS AND MACRO

Elements of Assembly Language Programming – Overview of Assembly Process - Design of a Two – Pass Assembler - Macro Definition and Call – Macro Expansion – Nested Macro Calls.

UNIT III COMPILER I

Scanning: Finite State Automate – Regular Expressions – Building DFA – Performing Semantic Action – Writing a Scanner – Parsing: Parse Tree and Abstract Syntax Trees – Top Down Parsing – Bottom-Up Parsing.

UNIT IV COMPILER II AND INTERPRERTERS

Aspects of Compilation –Memory Allocation - Compilation of Expressions-Compilation of Control Structure-Code Optimization - Interpreters.

UNIT V LINKERS

Relocation and Linking Concepts – Design of a Linker – Self-Relocating Programs – Linking for Overlays - Loader.

TEXT BOOK

D.M. Dhamdhere, “System Programming And Operating Systems”, New Delhi: Tata McGraw-Hill Publishing Company Limited, 1993.

Elective III PAPER – 3

(C) Multimedia Systems

Objective :

This course presents the Introduction to Multimedia, Images & Animation and enable the students to learn the concepts of Multimedia.

UNIT I Introduction to Multimedia:

Introduction to Multimedia PCs – Components of Multimedia – Multimedia Tools Sound and Graphics : Digital Sound – Editing and Mixing sound files – MIDI creation – Tracking Procedure – Interactive and Non Interactive Graphics – High Resolution Graphics – Difference between TV and Computer Display.

UNIT II Video and Animation :

Digital Image concepts – Video Capturing – Scanning Images – Digital Filters Morphing and Warping – Two Dimensional and Three dimensional animation – Animation Tools – Layering technique – Blue Screen technique – Latest movie technologies – Motion Tracking System – Motion Capturing System.

UNIT III Creating Presentation:

Script Writing and creating interactive and non-interactive presentation – Linear and Non Linear Editing – Authoring Tools – File Formates SOUND, VIDEO, ANIMATION, Presentation Images. Multimedia Programming: Text Links – Hyper Text system – Form Creation – File storing - Error Trapping.

UNIT IV Sound Links:

Multimedia interfaces – MCI- API- High Level Multimedia Functions – WAVE , MIDI file processing. Animation : Color Palette – Events – ROPs.

UNIT V Imaging Special Visual Effects :

Bitmap – Brushes – Dissolve –Hotspot Editor – Scorlling. Media Control Interface : Simple Commands – API functions – CD Player – Video Capturing – Form – AVI Play Form.

Text Books :

1. Kaliyaperumal Karthikeyan,"Introduction to Multimedia System", LAP Lambert Academic Publishing, 2011
2. TayVaughan, "Multimedia Making It Work Eighth Edition", Tata McGraw-Hill Publishing Company, 2011
3. ParagHavaldarand Gerald Medioni, "Multimedia Systems", Cengage Learning, 2011
4. S. K. Bansal,"Multimedia Systems", Aph Publishing Corporation, 2011

Skilled Based Subject IV – Paper 4

ASP .NET

Objective: Students to become well aware of .NET technology

UNIT I : ASP.NET Basics

Introduction to ASP.NET: .NET Framework (CLR, CLI, BCL), ASP.NET Basics, ASP.NET Page Structure, Page Life Cycle. Controls: HTML Server Controls, Web Server Controls, Web User Controls, Validation Controls, Custom Web Controls.

UNIT II : Form

Form validation: Client side validation, Server side validation, Validation Controls: Required Field Comparison Range, Calendar Control, Ad rotator Control, Internet Explorer Control. State Management: View State, Control State, Hidden Fields, Cookies, Query Strings, Application State, Session State.

UNIT III : ADO.NET

Architecture of ADO. NET, Connected and Disconnected Database, Create Database, Create connection Using ADO.NET Object model, Connection Class, Command Class, Data Adapter Class, Dataset Class, Display data on data bound controls and Data Grid.

UNIT IV : Database accessing

Database accessing on Web Applications: Data Binding Concept with web, Creating Data Grid, Binding standard web server controls, Display data on web form using Data Bound Controls.

UNIT V : XML

Writing Datasets to XML, Reading datasets with XML. WEB services: Remote method call using XML, SOAP, Web service description language, Building and Consuming a web service, Web Application deployment.

Textbook:

Professional ASP.NET 1.1 Bill Evjen , Devin Rader , Farhan Muhammad, Scott Hanselman , SrivakumarWrox

REFERENCE BOOKS:

1. Introducing Microsoft ASP .NET 2.0 Esposito PHI
2. Professional ADO.NET BipinJoshi, Donny Mack, Doug Seven , Fabio Claudio Ferracchiati, Jan D Narkiewiez Wrox
3. Special Edition Using ASP.NET Richard Leineker Person Education
4. The Complete Reference ASP.NET Matthew MacDonald TMH
5. ASP.NET Black Book DreamTech

THIRUVALLUVAR UNIVERSITY

B.COM. (COMPUTER APPLICATION)

Degree Course

CBCS Pattern

(With effect from 2017-18)

The course of study and the scheme of Examination

S. No.	Part	Study component course title	Ins. Hrs. Week	Credit	Title of the paper	CIA	Uni. Exam	Total
SEMESTER – I								
1	I	Language – I	6	4	Tamil – I / Other Language	25	75	100
2	II	English – I	6	4	English – I	25	75	100
3	III	Core Paper – I	6	4	Financial Accounting – I	25	75	100
4	III	Core Paper – II	4	3	Business Applications & Accounting Software	25	75	100
5	III	Allied – I	6	4	**(To choose one out of 3)** a. Indian Economy – I b. Business Statistics – I c. Consumer Protection and Consumer Rights	25	75	100
6	IV	EVS	2	2	EVS	25	75	100
			30	**21**		**150**	**450**	**600**
SEMESTER – II						**CIA**	**Uni. Exam**	**Total**
1	I	Language – II	6	4	Tamil – II / Other Language	25	75	100
2	II	English – II	4	4	English – II	25	75	100
3	III	Core Paper – III	6	4	Financial Accounting – II	25	75	100
4	III	Core Paper – IV	4	3	Software & Tally Lab	25	75	100
5	III	Allied – II	6	6	**(To choose one out of 3)** a. Indian Economy – II b. Logistic Management c. Business Statistics – II	25	75	100
6	IV	Value Education	2	2	Value Education	25	75	100
7	IV	Soft Skill	2	1	Soft Skill	25	75	100
			30	**21**		**175**	**525**	**700**
SEMESTER – III						**CIA**	**Uni. Exam**	**Total**
1	I	Core Paper – V	6	4	Corporate Accounting – I	25	75	100
2	II	Core Paper – VI	5	4	Business Law	25	75	100
3	III	Core Paper – VII	4	3	Banking Theory, Law & Practice	25	75	100
4	III	Core Paper – VIII	4	3	MIS	25	75	100
5	III	Allied – III	6	4	Mobile Computing	25	75	100
6	IV	Skill based Subject - I	3	3	Elements of Insurance	25	75	100
7	IV	Non-Major - I	2	2	Elements of Accountancy	25	75	100
			30	**23**		**175**	**525**	**700**
SEMESTER – IV						**CIA**	**Uni. Exam**	**Total**

1	III	Core Paper – IX	6	4	Corporate Accounting – II	25	75	100
2	III	Core Paper – X	5	4	Principles of Marketing	25	75	100
3	III	Core Paper – XI	4	3	RDBMS	25	75	100
4	III	Core Paper – XII	4	3	RDBMS Lab	25	75	100
5	III	Allied – IV	6	6	E-Commerce & Its Applications	25	75	100
6	IV	Skill based Subject - II	3	3	Industrial Organisation	25	75	100
7	IV	Non-Major - II	2	2	Advertising and Salesmanship	25	75	100
			30	**25**		**175**	**525**	**700**
SEMESTER – V						**CIA**	**Uni. Exam**	**Total**
1	III	Core Paper – XIII	6	4	Cost Accounting – I	25	75	100
2	III	Core Paper – XIV	5	4	Management Accounting	25	75	100
3	III	Core Paper – XV	6	4	Business Management	25	75	100
4	III	Core Paper – XVI	6	4	Internet & Its Applications	25	75	100
5	III	Elective – I	4	3	**(To choose one out of 3)** a. Entrepreneurial Development b. Practical Auditing c. Income Tax Law & Practice – I	25	75	100
6	IV	Skill based Subject - III	3	3	Computer Application in Business	25	75	100
			30	**22**		**150**	**450**	**600**
SEMESTER – VI						**CIA**	**Uni. Exam**	**Total**
1	III	Core Paper – XVII	6	5	Cost Accounting – II	25	75	100
2	III	Core Paper – XVIII	6	5	Web Technology	25	75	100
3	III	Core Paper – XIX	6	5	Web Technology Lab	25	75	100
4	III	Elective – II	5	3	**(To choose one out of 3)** a. Income Tax Law & Practice – II b. Business Environment c. Services Marketing	25	75	100
5	III	Elective – III	4	3	**(To choose one out of 3)** a. Software Engineering b. Data Mining c. Enterprise Resource Planning	25	75	100
6	IV	Skill based Subject – IV	3	3	Industrial Relations	25	75	100
7		Extension Activities	-	1		100	0	100
			30	**25**		**250**	**450**	**700**

Part	subject	Papers	credit	Total credits	Marks	Total Marks
Part - I	Languages	2	4	8	100	200
Part - II	English	2	4	8	100	200
Part - III	Allied (Odd Semester)	2	4	8	100	200
	Allied (Even Semester)	2	6	12	100	200
	Electives	3	3	9	100	300
	Core	19	(3-7)	73	100	1900
Part - IV	Environmental Science	1	2	2	100	100
	Soft Skills	1	1	1	100	100
	Value Education	1	2	2	100	100
	Language & Others / NME	2	2	4	100	200
	Skill based	4	3	12	100	400
Part - V	Extension Activities	1	1	1	100	100
	Total	**40**		**140**		**4000**

THRUVALLUVAR UNVERSITY
B.COM (COMPUTER APPLICATION)
SYLLABUS
UNDER CBCS
(With effect from 2017-2018)
SEMESTER I
CORE PAPER - 1
FINANCIAL ACCOUNTING – I

Objective:

To gain knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Introduction

Meaning of accounting – objectives of accounting – advantages and limitations of accounting- Accounting concepts and conventions - Methods of accounting - Rules of debit and credit- Journal - Ledger accounts– Trial Balance - Errors and their rectification - Rectification of Errors without suspense a/c - Rectification errors with suspense a/c (effect of rectification on profit and rectification during subsequent accounting year are excluded) - Bank Reconciliation Statement.

Unit - II: Depreciation, Provisions and Reserve

Meaning of depreciation – causes for depreciation – need for charging depreciation – Methods of calculating depreciation: straight line method and written down value method (change in method of depreciation is excluded) – Methods of recording depreciation: by charging depreciation to assets account or by creating provision for depreciation account.

Unit - III: Bills of exchange

Meaning of bill of exchange - features and advantages of bill of exchange- types of bill of exchange: Trade bills and accommodation bills - Accounting treatment of trade bills (accommodation bills are excluded).

Unit - IV: Final accounts

Meaning of final accounts – adjustments in preparation of final accounts – preparation of trading, profit & loss account and balance sheet of sole proprietorship concern.

Unit V: Accounts from incomplete records

Meaning of single entry system – features and limitations of single entry system – Distinction between single entry system and double entry system - Methods of calculation of profit: Statement of affairs method and Conversion method – Distinction between statement of affairs and balance sheet.

Note: Questions in section A, B and C shall be in the proportion of 20: 80 between theory and problems

Text books

1. Jain &Narang, Financial Accounting, Kalyani Publishers, New Delhi.
2. T.S. Reddy & Dr. A. Murthy, Financial Accounting, Margham Publications, Chennai.

Reference books

1. Gupta, R.L & Gupta,V.K, Advanced Accounting, Sulthan Chand & Sons, New Delhi.
2. Shukla & Grewal, Advanced Accounting, S. Chand & Co. New Delhi.
3. Parthasarathy, S. & Jaffarulla, A. Financial Accounting, Kalyani Publishers, New Delhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER – 2

Business Application & Accounting Software

UNIT – I Word and Excel

MS Word: Creating and Editing Documents –Menus, Commands, Toolbars and Icons—Formatting document – Creating Tables – Mail Merger.
MS Excel: Spreadsheet Overview – Menus, Toolbars, Icons-Creating worksheets – Editing and Formatting – excel Formulas and Functions – Creating a Chart Data Forms, Sort, and Filter.

UNIT – II PowerPoint and Access

MS Power Point – Introduction – Menus – Toolbars – Text and Formats – Animation, Art and Sound – Making the presentation template.
MS Access: Database overview – Creating a database – Modifying table and Creating Form – Query – Creating reports – Mailing Labels.

UNIT-III Tally introduction

Introduction to Tally – Company Creation – Alter – Display – Accounts info – Ledger Creation – Voucher Creation – Bank Reconciliation Statement – Bill wise Details – Cost Centre and Cost Category – Multi Currency – Interest calculation – Budgets and Credit Limits – Day Book.

UNIT-IV Inventory

Inventory info – Stock Group – Stock Category – Stock Item – Unit of Measures – Godowns – Inventory vouchers – Re-order level and status – Batch-wise Details – Bill of Material.

UNIT-V Taxation

Statutory and Taxation – Value Added Tax (VAT) – Tax Deducted at Source (TDS) – Tax Collected at Source (TCS) – Service Tax – Security Control and Tally audit – Export and Import – Backup and Restore – Open Database Connectivity.

Text Books:

TEXT BOOKS:

1. MS Office 2000 for Every One - Vikas Publishing House Pvt. Ltd., Sanjay Saxena.
2. MS Office 2000 Professional Fast & Easy – June Slton, BPB publications.
3. Guide to MS Office 2000 PH. - I Loura Acklen.
4. The ABC & MS Office Professional Edition - Guy Hart-Davis.
5. Tally 9.0 – A complete Reference – Tally Solutions (P) Limited.

ALLIED 1

(To choose any 1 out of 3)

PAPER - 1

A. INDIAN ECONOMY - I

Objective

To acquire sufficient knowledge about India's Economic features; occupational structure and the relative shares of the different Sectors. Students should know that India is an emerging economic power in the World market.

UNIT-I

Features of less developed and developing Economies. - Economic and Non-Economic factors impeding Economic development - Concept of growth and development - Indicators - Factors in Economic Development.

UNIT-II

Capital Formation - Human and Physical, Savings and Investment pattern since 1991 - National Income - Methods, trends, limitation - Distribution - Recent trends in National Income - Black Money - Corruption.

UNIT-III

Human Resources - Human Resource Development Size and growth of population-Causes, impact-measures to control population-Recent Population Policy.

UNIT-IV

Agriculture - It's Contribution to Economic Development - Food Problems - Methods of solving it - Agricultural productivity - Land Reforms - Green Revolution

UNIT-V

Agricultural labour – Definition – Features- Problems – Remedies Agricultural Credit - Grameen Bank.

BOOKS FOR REFERENCE:

1. Agrawal, A.N. : Indian Economy, Vikas Publishing House, New Delhi.
2. Alak Ghosh : Indian Economy, The World Press, Kolkata.
3. Arora, R.C. : Integrated Rural Development, S. Chand & Co.,
4. Arthur Lewis : The Theory of Economic Growth.
5. Arun Ghosh : India in Transition, Economic Policy Options, S. Chand & co.,

6.	Bimal Jalan	:	Indian Economic Crisis, Oxford University Press, Chennai.
7.	Bright Singh	:	Economics of Development.
8.	Dewett, Verma & Sharma	:	Indian Economics, S. Chand & Co.,
9.	Dhingra, I.C.	:	Indian Economy, Sultan Chand & Co.,
10.	Hajela & Goswami (E.D.)	:	Economic Reforms and Employment, Indian Economic Association, New Delhi.
11.	Jhingan, M.L.	:	Economics of Development & Planning, Konark Publishers , New Delhi.
12.	Kanka, S.S.	:	Human Resource Management, S. Chand & Co.,
13.	Kindle berger	:	Economic Development.
14.	Minhas	:	Planning for the Poor.
15.	Mongia, J.N. (Editor)	:	India's Economic Policies, Allied Publishers
16.	Pndey, B.N.	:	Role of Science & Technology in Rural and Economic Development of India, S. Chand & Co.,
17.	Pramit Chaudhury	:	The Indian Economy, Poverty and Development, Vikas Publishing House, New Delhi.
18.	Pramod Verma	:	Labour Economics and Industrial Relations, Tata McGraw Hill
19.	Ray, S.K.	:	Economics of Development - Prentice Hall of India.

ALLIED - 1

PAPER - 1

B. BUSINESS STATISTICS – I

Objective

To understand and apply statistical tools in business.

UNIT-I

Statistics - Definitions - Scope and Limitations - Collection of Data - Primary and Secondary Data - Questionnaire - Classification and Tabulation - Diagrammatic and graphical representation of data.

UNIT-II

Measures of Central tendency - Mean - Median - Mode - Harmonic Mean and Geometric Mean,

UNIT-III

Measures of Dispersion - Range - Quartile deviation - Mean Deviation - Standard Deviation - Coefficient of Variation - Lorenz Curve.

UNIT-IV

Measures of Skewness - Karl Pearson's and Bowlay's Coefficient of Skewness - Kurtosis - Characteristics of Kurtosis - Measures - Calculation.

UNIT-V

Statistical Quality Control - Control Charts - X, P, C, R - Charts - Acceptance sampling only.

(Weightage of Marks = Problems - 80%, Theory - 20%)

Text Books:

1. Dr. S.P. Gupta, Business Statistics & Operation Research - Sultan Chand.
2. PA. Navanitham, Business Statistics & Operation Research, Jai Publications, Trichy.
3. S.P. Rajagopalan & R. Sattanathan, Business Statistics & Operation Research 3rd Edition, Vijay Nicole Publications, Chennai.

Reference Books:

1. Dr. S.P. Gupta, Statistical Methods - Sultan Chand.
2. R.S.N. Pillai & Bhagavathi, Statistics.
3. J.K. Sharma, Business Statistics - Pearson Education.
4. B. Agarwal, Basic Statistics - Wiley Eastern.

ALLIED - 1

PAPER - 1

C. CONSUMER PROTECTION AND CONSUMER RIGHTS

Objective:

To make students to acquire basic knowledge of consumer laws, consumer rights and consumer welfare and protection.

Unit - I

Introduction of Consumer Protection Act 1986 – Objectives - Consumer Protection Act 2006 (Amendments) – Salient features.

Unit - II

Definitions of the term: - Consumer – Types of Consumer Appropriate authority – Complainant – Consumer dispute – Restrictive Trade Practice.

Unit - III

The various Consumer Rights: - Right to Safety, Right to Information, Right to Choose, Right to be heard – Right against exploitation – Right to Consumer Education.

Unit - IV

Consumer Production Council: - Composition and Powers of National Commission, State Commission and District Consumer Forum.

Unit - V

Redressal of consumer grievances-Goods & Services covered under Consumer Protection Act-Procedure for filing of complaints with District Forum, State Commission , National Commission.

Books for reference

1. Lecture on Torts and Consumer Protection Laws by Dr. Rega Surya Rao – Asia Law House, Hyderabad.
2. Consumer Protection Laws – By Prof. RakeshKhanna – Central – Law Agency.
3. Consumer Protection (Amendment) Act, 2002. S. Chand & Sons.2012.

SEMESTER – II

CORE PAPER - 3

FINANCIAL ACCOUNTING – II

Objective:

To gain a knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Branch accounts

Meaning – objects of branch accounts – accounting in respect of dependent branches: debtors system; stock and debtors system; wholesale branch system and final accounts system - Independent branches – incorporation of branch trial balance in head office books.

Unit - II: Departmental Accounting

Meaning of departments and departmental accounting – Distinction between departments and branches- need for departmental accounting – advantages of departmental accounting - Apportionment of indirect expenses – Inter departmental transfers at cost and selling price - preparation of departmental trading, profit & loss account and balance sheet.

Unit - III: Hire purchase and Instalment purchase systems

Meaning and features of hire purchase system - calculation of interest – books of hire purchaser and books of hire vendor - default and repossession (Hire purchase trading account excluded)

Meaning of instalment system -distinction between hire purchase system and instalment system - calculation of interest – books of buyer and books of seller.

Unit - IV: Partnership accounts (fundamentals and reconstitution of partnership)

Meaning and features of partnership – Partnership deed - calculation of Interest on capital and interest on drawings – preparation of profit & loss appropriation account – preparation of capital accounts (fixed and fluctuating) – admission of a partner – retirement of a partner – death of a partner – treatment of goodwill as per AS 10.

Unit - V: Partnership Accounts (Dissolution of partnership firms)

Dissolution of a firm – insolvency of a partner (Garner Vs Murray rule) – Insolvency of all the partners – Piecemeal distribution: proportionate capital method and maximum loss method.

Note: Questions in section A, B and C shall be in the proportion of 20: 80 between theory and problems.

Text books

1. Jain & Narang, Financial accounting, Kalyani publishers, New Delhi.
2. T.S. Reddy & Dr. A.Murthy, Financial accounting, Margham publications, Chennai.

Reference books

1. Gupta, R.L & Gupta, V.K, Advanced Accounting, Sultan Chand & Sons, New Delhi.
2. Shukla & Grewal, Advanced Accounting, S.Chand & Co.New Delhi.
3. Parthasarathy, S.& Jaffarulla, A.Financial Accounting, Kalyani Publishers, New Delhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER - 4

Software & Tally Lab

MS.WORD:

1. a. Starting MS-WORD, Creating, Saving, Printing (with options), Closing and Exiting.
   b. Study of Word – Menu / toolbars.
2. a. Create a document, save it and edit the document as follows:
   i) Find and Replace options.
   ii) Cut, Copy, Paste options.
   iii) Undo and Redo options.
   b. Format the document:
   i) Using Bold, Underline and Italic.
   ii) Change Character size sing the font dialog box.
   iii) Formatting paragraph: Center, Left aligns & Right align
   iv) Changing paragraph and line spacing, Using Bullets and Numbering in Paragraphs.
   v) Creating Hanging Paragraphs.
3. Using tap settings enhancing the documents (Header, Footer, Page Setup, Border, Opening & Closing Toolbars, Print Preview).
4. Creating Tables in a document, Selecting Rows & Column sort the record by using tables format painter and Auto Format.
5. Drawing flow chart using (creating main document, data source, inserting merge fields and veiwing merge data, viewing and printing merged letter, using mail merge to print envelope creating mailing labels).

MS-EXCEL

1. a. Create a worksheet, moving/ copying/ inserting/ deleting rows and columns (usage of cut, paste, commands, copying a single cell, copying a range of data, filling up a cell. Undo command, inserting a row, column, deleting rows and columns).
   b. Formatting work sheets.
   1. Bold style.
   2. Italic style.
   3. Font size changing.
   4. Formatting numbers (Auto fill, Selection Command, Currency format, Currency)
   5. Specifying percentage (%) Scientific notations.
   6. Drawing border around cells.
   7. Printing a work sheet (Pring preview, Margin Setting, Header, Footer).
2. a. Database Concept: database, record field and filed name – creating and sorting a data base and maintaining a database (data form).
   b. Using auto filter, advanced filter
   c. Creating subtotals and grad totals - using database fucntions.

3. Creating charts
   - i) Using chart wizard (five steps)
   - ii) Changing the chart type (Pie,Bar, Line)
   - iii) Inserting titles for the axes X. Y
   - iv) Changing colors.
   - v) Printing charts.

4. a. Using date, time, maths functions:
   - i) entering current data.
   - ii) Using date arithmetic (adding and subtracting dates)
   - iii) Date functioins (day, month, second)

   b. Math Functions
   - i) SUM, COUNT, AVERAGE
   - ii) MAX, MIN
   - iii) STDDEV, VAR
   - iv) ABS, EXP, INT
   - v) LOG 10 AND LOG
   - vi) MOD, ROUND, SORT
   - vii) Using auto sum

   c. Logical and Financial Functions
   - i) Logical (IP / AND / OR / NOT)
   - ii) Financial (PMD, FV, NPER, RATE)

5. i) Creating and running a macro.
   - ii) Assigning button to a defined macro.
   - iii) Editing a macro.

MS-POWER POINT:

1. Creating a presentation using auto content wizard.
2. Different views in power point presentation.
3. Setting animation effects / grouping / ungrouping / cropping power / point objects.
4. Printing a presentation / Importing – Exporting files
5. Creating an organisation chart in Power Point.

TALLY:

1. Company Information

a. Company creation
b.Select Company
c. Shut Company
d. Alter Company
e. Split Company Data
f. Backup and Restore

2. Gateway of Tally

a.Accounts info

i) Groups
ii) Ledgers
iii) Voucher Types

b. Inventory info

i) Stock Group
ii) Stock Category
iii) Stock item
iv) Unit of Measures
v) Godown

c. Accounting Vouchers
d. Inventory Vouchers

3. Statutory and Taxation

a. Value Added Tax (VAT)
b. Tax Deducted at Source (TDS)
c. Tax Collected at Source (TCS)
d. Service Tax

4. Display

a. Trial Balance
b. Day Book
c. Accounts Book
d. Statement of Accounts
e. Inventory Books
f. Statement of Inventory
g. Statutory Info
h. Statutory Reports
i. Cash flow and Fund flow

ALLIED - 2

(To choose any 1 out of 3)

PAPER – 2

A. INDIAN ECONOMY II

UNIT-I

Role of Technology - Information Technology BPO in India - their impact on Economic Development – Cyber Crime.

UNIT-II

Role of industries - Cottage & Small Scale industries - Some Large Scale industries (Cotton, Sugar, Iron & Steel, Tea & Petro Chemical) Industrial Policy - 1991 and after - Public sector Enterprises - Dis-investment and Privatisation.

UNIT-III

Transport - Importance of Transport (Roadways, Railways, Shipping and Civil Aviations) to Economic growth - Evaluation of Government in Policy in relation to privatisation policy - Transport Coordination.

UNIT-IV

Planning in India - Strategy of Indian Planning - Resources for Financing Plan - Agriculture and Industrial Development - Planning techniques - Investment Priorities – General Objectives – Targets, Achievements and Failures – 11^{th} and 12^{th} five year plans- NITIAYOG

UNIT-V

Poverty in India - Poverty Eradication Programmes - Recent Employment scheme- Swaraj Bharat Mission - Role of Micro finance - (SHG, Cottage and Household Sector etc.,) - Regional Development Disparities -India's Foreign Trade and Balance of Payments.

ALLIED - 2

PAPER - 2

B. LOGISTIC MANAGEMENT

Objective:

To understand the comprehensive nature of Logistics Management.

UNIT-I

Logistics - definition - scope - functions - objectives of Logistics Management - customer service and logistics.

UNIT-II

Supply Chain - components - role of logistics in supply chain - Warehousing - functions - types - warehouse layout - material handling and logistics - Inventory Management.

UNIT-III

Transportation - infrastructure - freight management - transportation network - route planning - containerization.

UNIT-IV

Logistical packaging - logistics information needs - logistics design for distribution channels - logistics outsourcing.

UNIT-V

Government policies and regulations - Motor Vehicles Act, carriage by air, sea, multi-modal transportation etc., Documentation - Airway Bill, Railway Receipt, Lorry Receipt, Bill of Lading etc.

Text Books:

1. Ronal H. Ballou, Business Logistics / Supply Chain Management, Pearson Education, Prentice Hall, New Delhi - 2001.

Reference Books:

1. Vinod V. Sople, Logistics Management, Pearson Education (Singapore) P. Ltd.,
2. Satis C. Ailawadi, Rakesh Singh, Logistics Management, Prentice Hall of India, New Delhi - 110 001.
3. Sunil Chopra & Peter Meindi, Supply Chain Management / Strategy, Planning and Operation - Pearson Education Asia, New Delhi.
4. B. S. Sahay, Supply Chain Management for Global Competitiveness, Macmillan India Ltd., Delhi.

ALLIED - 2

PAPER - 2

C. BUSINESS STATISTICS – II

Objective

To understand and apply statistical tools in Business.

UNIT-I

Correlation - Definition - Karl Pearson's Coefficient of Correlation - Rank Correlation.

UNIT-II

Regression Equations – Properties of Regression Lines and Coefficients – Standard Error of Estimate.

UNIT-III

Index Number - Definition - Uses - Unweighted Index Number - Simple Aggregate Price Index, Simple Average of Price Relatives Index - Weighted Index - Laspeyre'sPaasche, DorbishBowley's - Marshall Edgeworth, Fisher Ideal Index - Time and Factor Reversal Test - Cost of Living Index.

UNIT-IV

Time Series - Definition and Uses - Components - Semi Average, Moving Average - Method of Least Square - Seasonal Variation - Simple Average Method.

UNIT-V

Probability - Addition and Multiplication Theorem - Permutation and Combination - Baye's Theorem.

(Weightage of Marks = Problems - 80%, Theory - 20%)

Text Books:

1. Dr. S.P. Gupta, Business Statistics & Operation Research - Sultan Chand.
2. PA. Navanitham, Business Statistics & Operation Research, Jai Publications, Trichy.
3. S.P. Rajagopalan& R. Sattanathan, Business Statistics & Operation Research 3rd Edition, Vijay Nicole Publications, Chennai.

Reference Books:

1. Dr. S.P. Gupta, Statistical Methods - Sultan Chand.
2. R.S.N. Pillai&Bhagavathi, Statistics.
3. J.K. Sharma, Business Statistics - Pearson Education.
4. B. Agarwal, Basic Statistics - Wiley Eastern.

SEMESTER – III

CORE PAPER - 5

CORPORATE ACCOUNTING – I

Objective:

To gain comprehensive understanding of all aspects relating to corporate accounting.

Unit - I: Share capital

Meaning and types of shares - Issue and allotment of equity and preference shares- issue at par, premium and at discount – calls in advance – calls in arrears – forfeiture of shares – reissue of forfeited shares – redemption of preference shares – underwriting of shares (Determining the liability of underwriters – firm underwriting)

Unit - II: Debentures

Meaning and types of debentures - Issue of debentures at par, premium and at discount – writing off discount on issue of debentures – issue of debentures as collateral security – issue of debentures for consideration other than cash - redemption of debentures – methods – open market buying – conversion of debentures into shares – sinking fund method – insurance policy method.

Unit - III: Acquisition of Business

Meaning of Acquisition of business – accounting treatment – new set of books to be opened - same set of books to be continued – profit prior to incorporation

Unit - IV: Final accounts

Preparation of Statement of profit & loss and Balance sheet (as per revised schedule VI)

Unit - V: Amalgamation, Absorption, External and Internal reconstruction

Purchase consideration – methods - Amalgamation in the nature of merger or purchase – absorption (AS 14). Alteration of share capital – reduction of share capital (scheme of capital reduction is excluded).

Note: Questions in Sec.A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text Books

1. Jain,S.P & Narang,N.L., Advanced Accounting, Kalyani Publications.
2. ReddyT.S.& Murthy,A, Corporate Accounting, Margham Publications, Chennai.

Reference Books

1. Gupta,R.L & Radhaswamy,M, Advanced Accounts, Sulthan Chand, NewDelhi.
2. Shukla & Grewal & Gupta, Advanced Accounting, S. Chand &Co.,N ew Delhi.
3. Palaniyappan, Corporate Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER - 6

BUSINESS LAW

Objective:

To gain a comprehensive knowledge on all aspects of law as applied to business.

UNIT-I

Contract - Formation and Essential Elements of Contract – Types of Contract and Agreements – Rules as to offer, Acceptance and Consideration – Capacity to Contract – Lawful Object and Free Consent – Quasi Contract.

UNIT-II

Performance of Contract – Devolution of Joint Rights and Liabilities – Discharge of Contract – Breach of Contract and Remedies.

UNIT-III

Indemnity and Guarantee – Features and Distinctions – Extent of Surety's Liability – Rights and Discharge of Surety – Bailment and Pledge – Features – Difference – Rights and Duties of Bailor and Bailee – Law Relating to Lien and Finder of Lost Goods – Rights and Duties of Pawnor and Pawnee – Pledge by Non-Owner.

UNIT-IV

Contract of Agency – Definition and Meaning – Creation – Ratification and Requisites – Rights of Principal and Agent – Relation of Principal with Third Parties – Personal Liability of Agent – Termination of Agency – Irrevocable Agency.

UNIT-V

Sale of Goods Act 1930 – Definition of Sale – Sale Vs Agreement to Sell – Subject Matter – Express and Implied Conditions and Warranties – Caveat Emptor and Exceptions – Performance of Contract – Transfer of Property – Rights of an Unpaid Seller – Sale by Non-owner – Auction Sale.

Text Books:

1. N.D.Kapoor, Business Laws, Sultan Chand & Sons, New Delhi.
2. R.S.N.Pillai & Bagavathi, Business Laws, S. Chand & Co., New Delhi.

Reference Books:

1. M.C.Dhandapani, Business Laws, Sultan Chand & Sons, New Delhi.
2. M.C.Shukla, Mercantile Law, S. Chand& Co., New Delhi.
3. P.C. Tulsian, Business Laws, Tata McGraw Hill, New Delhi.
4. Dr.N.Premavathy, Business Law, Sri Vishnu Publications, Chennai.
5. Dr.N.Premavathy, Business Law (in Tamil), Sri Vishnu Publications, Chennai.
6. Balachandran. V and Thothadri. R, Business Law, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER – 7
BANKING THEORY, LAW AND PRACTICE

Objective:

To study in detail about the Central Bank and Commercial Banking System including the latest directives and decisions of Reserve Bank of India. To study the recent developments in Indian banking system.To acquire the basic knowledge about the banking transactions.

Unit - I

Origin of banks – Banking Regulation Act, 1949 – Roll of Banks and Economic Development – Central Banking and Role of RBI and their functions - Credit Control Measures of Central Bank.

Unit - II

Commercial Banks – Functions – E-Banking – ATM Cards, Debit cards, Personal Identification Number – Online enquiry and update facility – Electronic Fund Transfer – Electronic Clearing System – Credit Creation and Credit Control – Role of SBI in the Economic Development of India.

Unit - III

Types of Bank Accounts - Savings Account, Current Account - Types of Deposit Account – Fixed and Recurring Deposits Account – Procedure for opening of an Account – Types of customers (Individuals, firms and Companies) – Importance of CRM – Customer grievances and redressal – Ombudsman.

Unit - IV

Negotiable instruments – Promissory Note – Bills of Exchange, Cheque, Draft – Definitions, Features – Crossing – Endorsement – Material Alteration – Dishonour of Cheques – Paying Banker – Rights, Duties and Statutory Protection to Paying Banker – Collecting banker – Rights and Duties.

Unit - V

Principles of lending – Types of Loans – Precautions to be taken by a banker while lending against LIC Policies, Shares, Gold, Silver Ornament and Jewellery.

Text Books:

1. Banking Law Theory and Practice – Sundaram and Varshney – Sultan Chand Co.
2. Banking and Financial Systems – B. Santhanam, Margham Publishers.
3. Banking Law Theory and Practice – S.N. Maheswari – Kalyani Publications.
4. Banking Theory Law and Practice, Dr. S. Guruswamy, 3rd Edition, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books:

1. Indian Banking – Parameswaran – S. Chand and Co.
2. Financial Services – Dr. S. Gurusamy, Tata McGraw-Hill Education India.
3. Banking Theory Law Theory and Practice – Dr. S. Gurusamy, Tata McGraw-Hill Education India.

CORE PAPER - 8

MANAGEMENT INFORMATION SYSTEM

Unit-I:

Management Information – Meaning of Information – Information needs of Managers – Web Data basis – Data warehousing – Knowledge management – Information system for decision making.

Unit-II:

Types of Information System – Transaction Processing System – Office Automation System – Decision Support System – Executive Support System – MIS – Evolution of MIS – Computer and MIS.

Unit-III:

System Analysis – System Planning and Mutual Investigation – System Design - The Process and Stages of System Design – Input / Output forms Design – File Organisation – System Implementation.

Unit-IV:

Management Information Needs and Communication links for Marketing system, Production System, Accounting System, Manufacturing System, Inventory Control System and Budget Control System - IS Organisation – Top Management Responsibility – Processing Group Responsibility.

Unit-V:

Development – Maintenance of MIS – Operation of manual Information System – Role of Computer in MIS – Data base Concept – Expert Systems – System Audit.

Text Book:

1. M. Assam – Fundamentals of Management Information System – Vijay Nicole Imprints Private Ltd., Chennai.
2. Effy Oz, "Management Information Systems", Second edition, Thomson Learning Course Technology, 2002.
3. JawadekarW.S, "Management Information Systems", Tata McGraw Hill Publishing Company Ltd, 2002.
4. Kenneth.CLaudon and Jane P. Laudon, "Management Information Systems", Prentice Hall of India Ltd, 2002.

Reference Books:

1. David Knoenke (1989), "Management Information Systems", Tata McGraw Hill, New Delhi.
2. IandonK.C and Landon J.P (2001), "Management Information Systems', Maxwell Macmillan Publishing Company.
3. Murdic Rose and Elaggett, "Information System for Modern Management, Prentice Hall.
4. Robert Schultheis, Mary Sumner, "Management Information Systems" – The Manager's View, Fourth edition, Tata McGraw Hill Edition, 1999

ALLIED - 3

PAPER - 3

MOBILE COMPUTING

Unit I : INTRODUCTION

Mobile Computing – Mobile Computing Vs wireless Networking – Why Go Mobile- Mobile Computing Applications – Characteristics of Mobile computing – Types of Wireless Devices Structure of Mobile Computing Application- Mobile Communication Networks.

Unit II : WIRELESS MAC PROTOCOLS & MOBILE INTERNET PROTOCOL

Wireless MAC Protocols- FDMA TDMA – CDMA – Advantages and Disadvantages- Why Mobile IP- What is Mobile IP-Motivations for Mobile IP- What Mobile IP does-Requirements to Mobile IP- Mobile IP terminologies- Mobile IP features-Key Mechanism in Mobile IP-Data transfer to the mobile system- Data transfer from mobile system- Key Mechanism in Mobile IP-DHCP.

Unit III : MOBILE TELECOMMUNICATION SYSTEM

Global System for Mobile Communication(GSM)-What is GSM-GSM Services- GSM Subscriber Services-GSM Supplementary Services- GSM Architecture- Mobile Station-General packet radio service(GPRS)-GPRS Services-Advantages of GPRS-Applications of GPRS-Universal Mobile Telecommunications System(UMTS).

Unit IV : MOBILE PLATFORMS AND APPLICATIONS

Mobile Device Operating Systems – Special Constraints & Requirements – Commercial Mobile Operating Systems – Windows Mobile- Palm OS- Symbian OS- iOS- Android- Blackberry Operating system-Software Development Kit - M-Commerce – Structure – Pros & Cons –Mobile Payment System – Bluetooth Security-Security Issues.

Unit V : E-BUSINESS, E-COMMERCE & M-COMMERCE

Introduction, Potential Benefits, Limitations, Classifications, Impact of E-Commerce on Business models.

E-Commerce Applications: Entertainment, E-Marketing, E-Advertising, Search Engines, E-Banking, Mobile Commerce, Online Trading, ELearning, E-Shopping.

Text Books:

1. Prasant Kumar Pattinaik, Rajib Mall , "Fundamentals of Mobile Computing", PHI Learning Pvt Ltd, New Delhi, 2012
2. E-Commerce: A Managerial Perspective: Micheal change, etc. A1
3. Electronic Commerce – Security: Greenstein & Feinman Risk Management & Control

SKILL BASED SUBJECT – I

PAPER – 1

ELEMENTS OF INSURANCE

Objective:

To gain a knowledge of insurance and its importance.

UNIT-I

Definition of insurance - classification of Contracts of insurance - marine and non-marine - general principles of law as applied to non-marine insurance.

UNIT-II

Life Assurance - objects of life Assurance - principles of life Assurance - different plans of life Assurance and annuities - policy condition and privilege - assignment and nomination - lapses and revivals - surrender values and loans - claims - double insurance.

UNIT-III

Marine insurance - principles of marine insurance - functions of marine insurance - proximate clause - subrogation and contribution

UNIT-IV

Types of marine policy - clauses in general use - warranties - kinds of marine losses - reinsurance and double insurance.

UNIT-V

Fire insurance - principles of law as applied to fire insurance - the subject matter of fire insurance - fire waste - hazard types of fire policy - cover notes - surveys and inspection average - re-insurance - renewals.

Text and Reference Books:

1. Dr. B. Vardharajan - Insurance Vol 1 and 2. - Tamil Text Book.
2. R.S. Sharma - Insurance Principle & Practice - Vara Bombay, 2006.

A. Murthy - Elements of Insurance Risk management & Insurance - Harrington, 2006 - Tata McGraw Hill pub.

NON-MAJOR ELECTIVE – I

PAPER – 1

ELEMENTS OF ACCOUNTANCY

Objectives:

To facilitate the non- commerce students to have a basic knowledge in Book-Keeping and Accounting.

Unit - I:

Need for Accounting – Definition (AICPA) – Steps – Objectives — Double Entry System - Meaning of Debit and Credit - Advantages – Limitations – Types of Accounts – Accounting Rules – Accounting Terminology – Accounting Concepts and Conventions – Meaning and Types – Accounting Equation.

Unit - II:

Journal – Ledger Accounts – Trial Balance.

Unit - III:

Subsidiary Books – Meaning – Types (no problems from Bills Receivable Book and Bills Payable Book but only theory) – Advantages over Journal – Ledger Accounts – Trial Balance.

Unit - IV:

Errors – Classification – Rectification (Rectification after the preparation of final account is excluded) – Suspense Account – Meaning and Need.

Unit - V:

Closing and Adjustment Entries – Final Accounts with simple Adjustments.

(Weightage: Theory: 25%, Problems: 75%)

Text Books

1. Jain,S.P&Narang,N.L.,AdvancedAccounting,KalyaniPublications.
2. Jaya Charulatha and Baskar, Introduction to Accountancy, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books

1. Gupta,R.L&Radhaswamy,M,AdvancedAccounts,SulthanChand,NewDelhi.
2. Shukla&Grewal&Gupta,AdvancedAccounting,S.Chand&Co.,NewDelhi.

SEMESTER – IV

CORE PAPER – 9

CORPORATE ACCOUNTING – II

Objective:

To gain accounting knowledge in advanced corporate accounting.

Unit - I: Valuation of goodwill and shares

Methods of Valuation of Goodwill – Average Profit Method – Super Profit Method – Capitalisation Method.

Methods of Valuation of Shares- Net Assets Method – Yield Method – Fair Value Method.

Unit - II: Liquidation of companies

Order of Payments – Preferential Creditors – Liquidator's Remuneration - Liquidator's Final Statement of Account - Statement of Affairs and Deficiency Account.

Unit - III: Bank and Insurance Company accounts

NPA – Interest on Doubtful Debts – Rebate on Bills Discounted – Preparation of Bank Profit & Loss Account and Balance Sheet.

Life insurance – Ascertaining Correct Assurance Fund –Revenue Account – Valuation Balance Sheet - Profit & Loss account – Balance Sheet (new format).

General Insurance – Revenue Account – Profit & Loss Account – Balance Sheet (new format).

Unit - IV: Holding company accounts

Capital Profit - Revenue Profit - Cost Of Control - Minority Interest– Elimination Of Common Transactions – Unrealised Profit – Revaluation of Assets and Liabilities – Bonus Shares - Consolidated Balance Sheet (Intercompany Investment is Excluded).

Unit - V: Inflation accounting (Accounting for price level changes)

Limitations of Historical Accounting – Meaning of Inflation Accounting – Methods of Inflation Accounting – CPP Method; Gain or Loss on Monetary Items; Valuation of Cost of Sales and Closing Inventory – CCA Method: COSA; MWCA; Depreciation Adjustment; Gearing Adjustment.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text Books

1. Jain,S.P & Narang,N.L., Advanced Accounting, Kalyani Publications.
2. ReddyT.S.& Murthy,A, Corporate Accounting, Margham Publications, Chennai.

Reference Books

1. Gupta, R.L & Radhaswamy,M, Advanced Accounts, Sulthan Chand, New Delhi.
2. Shukla & Grewal & Gupta, Advanced Accounting, S. Chand & Co., New Delhi.

CORE PAPER - 10
PRINCIPLES OF MARKETING

Objective:

To enable the students to understand the concept and importance of marketing and the developments that have taken place in the field of marketing in the global scenario.

Unit - I Introduction

Meaning of market – classification of markets- meaning and definition of marketing- features of marketing – importance of marketing – difference between marketing and selling – Evolution of marketing concepts - functions of marketing.

Unit - II Market Segmentation and Consumer Behaviour

Meaning and definition of market segmentation – different patterns of market segmentation – Bases for segmenting consumer markets – benefits and limitations of market segmentation

Definition of consumer behaviour - consumer behaviour theories - factors determining consumer behaviour.

Unit - III Marketing Mix and Product policy

Definition and components of marketing mix - four P's of marketing mix - definition of product - features of a product - classification of products - stages in new product development - product life cycle – Branding – advantages of branding a product - packaging – functions of package – labelling – functions of labelling – kinds of labels.

Unit - IV Pricing policy, Channel of distribution and Promotion Mix

Meaning of price – factors affecting price decision – Types of pricing strategies - definition of channel of distribution – features of marketing channels – types of Channel of distribution - factors determining Channel of distribution - functions of wholesalers – types of retailers – promotion mix – Advertising – types of advertising – personal selling – qualities of a good salesman – sales promotion – kinds of sales promotion.

Unit - V Recent trends in Marketing

Social marketing – De-marketing – Re – marketing – Over marketing – Meta marketing – E- Marketing – online retailing – shopping malls.

Text Books:

1. Rajan Nair, Marketing, Sultan Chand & Sons , New Delhi
2. Varshney, Marketing Management, Sultan Chand & Sons , New Delhi.

Reference Books:

1. Jaisankar, Marketing, Margham Publications, Chennai
2. L. Natarajan, Marketing, Margham Publications, Chennai
3. Dr. K. Sundar, Essentials of Marketing, Vijay Nicole Imprints Private Ltd., Chennai.

CORE PAPER – 11

RELATIONAL DATABASE MANAGEMENT SYSTEMS

UNIT-I

Purpose of Database - Overall System Structure - Entity Relationship Model.

UNIT-II

Relational Model - Structure - Formal Query Language - Relational Algebra - Tuple and Domain Relational Calculus.

UNIT-III

Structured Query Language - Basic Structure - Set Operations - Aggregate Functions – Date and Numeric - Modification Of Databases - Joined Relations-DDL - Embedded SQL.

UNIT-IV

Relational Database Design - Pitfalls - Normalisation Using Functional Dependencies - First Normal Form-Second Normal Form-Third Normal Form.

UNIT-V

Oracle - Introduction - SQL (DDL, DML, DCL Commands) - Integrity Constraints - PL/SQL - PL/SQL Block - procedure, function.

Text Books:

1. Singh-Database systems: Concepts, Design & applications, Pearson Education.
2. Abraham Silberschatz, H.F.Korth And S.Sudarshan-Database System Concepts Mcgraw Hill Publication
3. Gerald V.Post - DBMS-Designing And Business Applications - McGraw Hill Publications
4. Michael Abbey And Michael.J.Corey-Oracle- A Beginners guide TMH

CORE PAPER – 12

RDBMS LAB

1. Create a table student_master with the following fields name, regno, dept and year with suitable data types. Use Select command to do the following.

   a) Select the student's name column.
   b) Eliminate the duplicate entry in table.
   c) Sort the table in alphabetical order.
   d) Select all the Students of a particular department.

2. Create a table master_book to contain the information of magazine code, magazine name, and publisher. Write PL/SQL block to perform insert, update, delete operations on the above table.

3. Create a table to contain phone number, user name, address of the phone user. Write a function to search for a address using phone numbers.

4. Create a table to store the salary details of the employees in a company. Declare the Cursor to contain employee number, employee name and net salary . Use Cursor to update the employee salaries.

5. Create a table to contain the information about the voters in a particular constituency. Write a proper trigger to update or delete a row in the table.

6. Create a table to store the details of the Alumni in an institution. Write a PL/SQL block to change address of particular alumni. Write proper exceptions and appropriate error messages.

ALLIED - 2

PAPER - 4

E-COMMERCE AND ITS APPLICATIONS

Unit - I:

Introduction to E-Commerce – Meaning – Working of E-Commerce – Electronic Business – Categories of E-Commerce Application – Global Trading Environment and Adoption of E-Commerce – Product suitability – Comparison between Traditional and Electronic Commerce – Advantages and Disadvantages of E-Commerce.

Unit - II:

Business Models of E-Commerce – Introduction – Major challenges of B2C E-Commerce – Meaning of B2B Exchange – Development of B2B E-Commerce – Types of B2B Markets – Difference between B2C and B2B Commerce.

Unit - III:

Introduction to E-Hub Concept – Introduction to B2G Concept – E-filing.

Unit - IV:

Internet – Internet Operation – Internet Explorer – Creation of E-mail ID, E-mail etiquettes.

Unit - V:

Web Browsing – Role of Website in B2C E-Commerce, Website strategies and goals. Websites Design Principles for E-Commerce websites.

Text Books:

E-Commerce – SrinivasaVallabhan. S.V – Vijay Nicole Imprints Private Ltd.,

Chennai.

SKILL BASED SUBJECT – II

PAPER - 2

INDUSTRIAL ORGANIZATION

Objective:

To gain knowledge of the basic industrial structure and its working.

UNIT-I

Meaning of Industrial Organisation – Industrial Revolution – Industrial Growth – Aggregation, Consolidation, Integration - Mass Production – Importance, Advantages, Limitations – Specialisation – division of labour – its advantages and disadvantages – Industrial growth in India – major industries in India – current scenario.

UNIT-II

Industrial ownership – Sole Proprietorship - Features, merits and demerits – partnership - Features, merits and demerits - Joint Stock Company - Features, merits and demerits - Types – Public Ltd and Private Ltd companies.

UNIT-III

Physical facilities – plant location – need for selection of location – stages in selection of location – plant layout – definition, objectives, advantages, types – factors influencing plant layout – tools used for design of plant layout – principles of a good plant layout.

UNIT-IV

Production management – product design – characteristics of a good product design – design of production system – its types – design of work study – motion study – time study - production planning – objectives, levels – production control – factors determining production control operation – functions of production planning and control.

UNIT-V

Materials management – its meaning, objectives, advantages, functions – purchasing-types of purchasing policy – store keeping – organisation of stores department – inventory control – its objectives, functions, benefits.

Text Book:

1. Dr. A. Murthy, Industrial Organisation, Margham Publications, Chennai.

Reference Books:

1. L Bethel, Atwater, Smith and Stackman, Industrial Organisational Management, McGraw Hill.
2. Kimball & Kimball, Principles of Industrial Organisation, McGraw Hill.
3. Lundy, Effective Industrial Management Eurasia Publishing House (Pvt.) Ltd., New Delhi.

NON-MAJOR ELECTIVE – II

PAPER - 2

ADVERTISING AND SALESMANSHIP

Objectives:

To study the concept of Advertisement and Salesmanship.

To gain knowledge about the role of Advertisement and Salesmanship in boosting the volume of sales.

To study the qualities to be imparted by a salesman in the present global competitive market.

UNIT-I

Origin and Development of Advertising – Objectives – Nature – Functions – Types – Benefits – Difference between Advertising and Publicity – Scope of Advertising – DAGMAR approach.

UNIT-II

Various media of Advertising – Print Media – Newspapers – Magazines – Advantages – Limitations – Radio and TV advertising - Advantages – Limitations.

UNIT-III

Advertisement copy – Characteristics – Clarification – Components – Salesmen Recruitment – Salesmen report – Types – Salesmanship and Psychology.

UNIT-IV

Salesmanship – Characteristics of Salesmanship – Objectives of Personal selling – Advantages – Limitations – Essentials of Effective selling – Advertising and Salesmanship.

UNIT-V

Qualities of Good Salesman – Sales Promotion – Kinds of Sales promotion – Importance of Salesmanship – Types of Salesmen – Methods of Remuneration – Qualities of successful Salesman.

Text Books:

1. Modern Marketing (Principles and Practises) R.S.N. Pillai&Bagavathi, S. Chand & Co. New Delhi
2. Sales and Advertisement Management S Rajkumar, V Rajagopalan, S. Chand & Company Pvt. Ltd.

Reference Books:

1. Advertising (Principles and Practise) ChunawallaK.C. Sethia, Himalaya Publishing House, Delhi.
2. Advertising Management Dr. M.M. Varma, R. K. Agarwal, Forward 300K Depot, New Delhi.
3. Advertising Management Mahendra Mohan, Tata Mcgraw-hill Publishing Company Limited,New Delhi, India.
4. Advertising Marketing and Sales Management G.R. Basotia N. K Sharama, Mangal Deep Jaipur.
3. Essentials of Marketing, Dr. K. Sundar, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

SEMESTER – V

CORE PAPER - 13

COST ACCOUNTING – I

Objective:

To understand the basic concepts and methods of Cost Accounting.

UNIT-I: Nature and Scope of Cost Accounting

Cost Accounting : Nature and Scope – Objectives, Advantages and Limitations – Financial Vs. Cost Accounting - Costing System - Types of Costing and Cost Classification – Cost Sheet and Tenders – Cost Unit – Cost Centre and Profit Centre.

UNIT-II: Material Purchase and Control

Purchase Department and its Objectives – Purchase Procedure – Classification and Codification of Materials, Material Control: Levels of Stock and EOQ – Perpetual Inventory System, ABC and VED Analysis – Accounting of Material Losses.

UNIT-III: Methods of pricing of Material Issues

Cost Price Methods: FIFO, LIFO, Average Price Methods: Simple and Weighted Average Price Methods, Notional Price Methods: Standards Price, and Market Price Methods

UNIT-IV: Labour Cost Control

Labour Turnover: Causes, Methods of Measurement and Reduction of Labour Turnover – Idle and Over Time – Remuneration and Inventive: Time and Piece Rate – Taylor's, Merricks and Gantt's Task – Premium Bonus System – Halsey, Rowan and Emerson's Plans – Calculation of Earnings of Workers.

UNIT-V: Overheads

Classification of Overhead Costs – Departmentalization of Overheads – Allocation Absorption and Appointment of Overhead Costs – Primary and Secondary Distribution of Overheads – Computation of Machine Hour Rate and Labour Hour Rate.

(Weightage of Marks = Problems 80%, Theory 20%)

Text Books:

1. T.S. Reddy &Hari Prasad Reddy – Cost Accounting – Margham Publications, Chennai
2. A.Murthy and S. Gurusamy, Cost Accounting 2nd Edition, Vijay Nicole Imprints Private Ltd., Chennai.

3. A.Murthy and S. Gurusamy, Cost Accounting, Tata McGraw-Hill Publishing Company Ltd. New Delhi.
4. Tulsian P.C. – Cost Accounting – Tata McGraw Hills.

Reference Books:

1. S.P.Jain and Narang – Cost Accounting – Kalyani Publishers, New Delhi
2. S.N.Maheswari – Principles of Cost Accounting – Sultan Chand & sons, New Delhi
3. A.Murthy and S. Gurusamy, Essentials of Cost Accounting, Vijay Nicole Imprints Private Ltd., Chennai.
4. S.P.Iyangar – Cost Accounting – Sultan Chand & Sons, New Delhi.

CORE PAPER - 14

MANAGEMENT ACCOUNTING

Objective:

To enable the students to gain knowledge in the application of accounting to Management.

UNIT-I

Management Accounting: Definition – objectives - Functions – Advantages and limitations – Financial Statement Analysis – Comparative and Common size statements – Trend Analysis.

UNIT-II

Ratio Analysis : Definition – Significance and Limitations – Classification – Liquidity, Solvency, Turnover and Profitability ratios – Computation of Ratios from Financial Statements – Preparation of Financial Statement from Ratios.

UNIT-III

Fund Flow and Cash Flow Analysis: Concept of Funds, Sources and Uses of Funds – Fund Flow Statement – Concept of Cash Flow – Cash Flow Statement as Per AS3.

UNIT-IV

Standard Costing – Variance Analysis – Material – Labour – Overheads – Fixed - Variable Sales Variance.

UNIT-V

Budget and Budgetary Control: Definition – Objectives – Essentials – Uses and Limitations – Preparation of Material Purchase, Production, Sales, Cash and Flexible Budget – Zero Base Budgeting.

(Weightage of Marks - Problems - 80%, theory - 20%)

Reference Books:

1. S.N.Maheswari, Management Accounting – Sultan Chand & Sons, New Delhi.
2. A.Murthy and S.Gurusamy, Management Accounting, Tata Mc-Graw Hill Publishing Company, New Delhi.

Reference Books:

1. Manmohan&Goyal, Management Accounting – SahithiyaBhavan, Agra.
2. S.P.Gupta, Management Accounting – Sultan Chand & Sons, New Delhi.
3. R.S.N.Pillai&Bhagavathi, Management Accounting – S. Chand& Co. Ltd., New Delhi.
4. T.S.Reddy&Hari Prasad Reddy, Management Accounting – Margham Publications, Chennai.

CORE PAPER - 15

BUSINESS MANAGEMENT

Objective:

To understand the basic principles of Business Management.

UNIT-I

Management – Meaning – Definition – Nature – Importance – Distinction between Administration and Management – Scope – Principles and Functions of Management.

UNIT-II

Planning – Meaning – Nature – Importance – Advantages and Limitations – Process of Planning – Types of Plans – MBO – Forecasting – Decision Making.

UNIT-III

Organising – Meaning – Definition – characteristics – Importance – Types – Authority and Responsibility – Centralisation and Decentralisation and Departmentation.

UNIT-IV

Directing – Meaning – Definition – Characteristics – Directing Process – Span of Supervision – Motivation – Leadership - Communication.

UNIT-V

Controlling – Definition – Principles – Controlling process – Types of Controls – Control Techniques - Coordination.

Reference Books:

1. Dr. C.B. Gupta, Business Management –Sultan Chand & Sons
2. Jayashankar, Business Management –Margham Publications, Chennai.

Reference Books:

3. Koontz, Weihrich and Aryasri, Principles of Management, Tata McGraw hill
4. Dr.H.C. Das Gupta, Principles & Practice of Management &SahityaBhawan. Agra
5. Lallan Prasad &S.S.Gulshan, Management principles and Practices &S. Chand& Co.
6. Dr.N.Premavathy, Principles of Management, Sri Vishnu Publications, Chennai.

CORE PAPER - 16

INTERNET AND ITS APPLICATIONS

UNIT-I

Introduction to Computers - Programming Language types – History of Internet – Personal Computers - History of World Wide Web – Micro Software .NET Java – Webresoures.

UNIT-II

Web Browsers – Internet Explorer – Connecting to Internet – Types of Internet connection – Features of Internet Explorer6 – Searching the Internet – Online help and tutorials – File Transmission Protocol (FTP) – Browser settings.

UNIT-III

Attaching a file – Electronic Mail – Creating an E-mail ID – Sending and Receiving Mails – Attaching a File – Instance Messaging – Other Web browsers.

UNIT-IV

Introduction to HTML headers – Linking – Images – Types of computer viruses – Ill-effect of Viruses – Remedy for Viruses.

UNIT-V

E-marketing – Consumer tracking – Electronic advertising search engine – CRM – Credit Card payments – Digital cash and e-wallets – Micro Payments – Smart Card.

Text Book:

Internet and World Wide Web, Third Edition, H.M. Deital, P.J. Deital and A.B. Goldberg – PHI

Reference Book:

Harley Hahn, The Internet – Complete Reference, Tata McGraw Hill.

ELECTIVE– I

(To choose any 1 out of 3)

PAPER - 1

A. ENTREPRENEURIAL DEVELOPMENT

Objective:

To encourage students to become entrepreneurs.

UNIT-I

Meaning of Entrepreneur – Entrepreneur and Enterprise – Entrepreneur and Manager – Entrepreneur and Intrapreneur – Qualities (Traits) of True Entrepreneur – Characteristics of Entrepreneur – Types of Entrepreneurs – Functions of an Entrepreneur – Roles of Entrepreneurs in the Economic Development.

UNIT-II

Establishing an Enterprise – Project Identification – Selection of the Product – Project Formulation – Assessment of Project Feasibility – Preparation of Project Report – Selection of Site (Location).

UNIT-III

Selection of Types of Organization – Sole Proprietorship – Partnership Joint Stock Company – Factors Influencing the Choice of Organization – Sources of Project Finance – Sources of Long Term Finance – Sources of Short Term Finance.

UNIT-IV

Incentives and Subsidies – Meaning of Incentives and Subsidies – Need and Problems – Incentives for Development of Backward Area – Incentives for SSI Units in Backward Areas – Taxation Benefits to SSI Units – Subsidies and Incentives in Tamil Nadu.

UNIT-V

Women Entrepreneurs – Concept – Functions and Role – Problems of Women Entrepreneurs – Suggestions for Development of Women Entrepreneurs – Rural Entrepreneurship – Need – Problems – How to Develop Rural Entrepreneurship.

Text Books:

1. C.B. Gupta, Entrepreneurship development in India – Sultan Chand.
2. Gupta C.B and SrinivasanN.P. Entrepreneurial Development, Sultan Chand & Sons, New Delhi.

Reference Books:

1. P Sarvanavel, Entrepreneurial development – Ess Pee kay Publishing House.
2. S.S. Khanka, Entrepreneurial Development, S. Chand & Co., New Delhi.

ELECTIVE–I

PAPER - 1

B. PRACTICAL AUDITING

Objective:

To gain knowledge of the principles and practice of auditing.

UNIT-I

Meaning and Definition of Auditing – Nature and Scope of Auditing – Accountancy and Auditing, Auditing and Investigation – Objectives of Auditing – Limitations of Audit – Advantages of Audit – Classification of Audit

UNIT-II

Meaning and Definition of Audit Programme – Advantages and Disadvantages – Audit File, Audit Note Book, Audit Working Papers – Purposes and Importance of Working Papers – Internal Check – Meaning, Object of Internal Check – Features of Good Internal Check System – Auditors duty with regards to Internal Check System – Internal Check and Internal Audit.

UNIT-III

Vouching – Meaning – Objects – Importance of Vouching – Meaning of Voucher – Vouching of Cash Receipts and Vouching of Cash Payments – Vouching of Trading Transactions.

UNIT-IV

Verification and Valuation of assets and liabilities – Meaning and objects of verification – Vouching and verification – Verification and Valuation of different kinds of Assets and Liabilities.

UNIT-V

The Audit of Limited Companies – Necessity of Company Audit – Qualification and Disqualification of Auditors – Appointment – Removal – Remuneration – Status of Auditors – Rights – Powers – Duties and Liability of Auditors – Auditor's Report – Importance and Contents.

Text Books:

1. B.N. Tandon, Sultan Chand – A handbook of practical auditing
2. B.N. Tandon, Sudharsanam, Sundharabahu – S Chand – Practical auditing.
3. Sundar. K and Pari. K, Vijay Nicole Imprints Private Ltd., Chennai.

Reference Books:

1. Sharma, SahityaBhavan, Agra – Auditing
2. Dr.N.Premavathy, Practical Auditing, Sri Vishnu Publications, Chennai.
3. Dr.N.Premavathy, Practical Auditing (in Tamil), Sri Vishnu Publications, Chennai.

ELECTIVE–I

PAPER – 1

C. INCOME TAX LAW AND PRACTICE - I

Objective:

To enable the students to have a knowledge of law of practice of Income tax.

Unit - I: Introduction

Income Tax Act 1961- Basic Concepts – Assessment Year – Previous Year – Person – Assessee – Income – Gross Total Income – Total Income - Agricultural Income – Casual Income – Capital and Revenue Receipts – Capital and Revenue Expenditures – Exempted Incomes u/s 10.

Residential status of an individual- Residential status of a HUF – Residential status of a firm and association of persons – Residential status of a company – incidence of tax liability.

Unit - II: Salaries

Meaning and features of Salary – Allowances – Perquisites – Profits in lieu of Salary – Provident Fund and its types – payments exempted u/s 10: Leave travel concession; gratuity; pension; leave encashment; retrenchment compensation; VRS – Deductions from salary: EA and professional tax- deduction u/s 80C- taxable salary

Unit - III: Income from House Property

Annual value – Determination of annual value- Income from let out house property – Income from self-occupied house property – Deductions allowed from Income from house property u/s 24.

Unit - IV: Profit and Gains of Business or profession and depreciation

Meaning of business and profession – deductions expressly allowed – expenses expressly disallowed – treatment/ admissibility of certain expenses and incomes – income from business- income from profession.

Meaning of depreciation – conditions for depreciation – actual cost – written down value – computation of allowable depreciation.

Unit - V: Income tax authorities

CBDT – powers – Director General of income tax – Chief commissioner of income tax – Assessing officer – appointment – Jurisdiction – powers relating to search and seizure.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text books

1. Gaur & Narang, Income Tax Law & Practice, Kalyani Publishers.
2. Dr. A. Murthy, Income Tax Law & Practice, Vijay Nicole Imprints Pvt. Ltd. Chennai
3. Reddy,T.S. & Hariprasad Reddy,Y,Income Tax Theory, Law & Practice, Margham Publications, Chennai.

Reference books

1. Mehrotra-Income Tax Law & Accounts, Sahithiya Bhavan Publications.
2. Vinod, K. Singhania, Students Guide to Income Tax, Taxman Publications Pvt. Ltd.

SKILL BASED SUBJECT – III

PAPER - 3

COMPUTER APPLICATION IN BUSINESS

Objective:

To provide basic knowledge of computer applications in business.

UNIT-I

Introduction to Computer – Characteristics of a Computer – History of Computer – Computer generation - Hardware – Software – System Software and application software.

UNIT-II

MS - Word Processing: Starting MS word - MS word environment - working with word documents, text, tables - checking spelling and grammar - printing a documents.

UNIT-III

MS Excel - MS Excel Sheet - MS Excel environment - Working with Excel workbook - worksheet - Formulas and functions - Inserting charts - printing in Excel.

UNIT-IV

MS Power Point - Starting MS Power Point - MS power point environment - working with power point - working with different views – designing, presentation & printing in Power Point.

UNIT-V

Electronic Commerce - Types - Advantages and Disadvantages - Electronic data interchange (EDI) working of EDI - EDI benefits & Limitations - SMART card - SMART card applications.

TEXT BOOK

1. Ananthi Sheshasaayee: Computer Application in Business and Management, Margam Publication.
2. Leon & Leon, Computer Applications in Business, Vijay Nicholes Imprint Pvt. Ltd.,– Chennai

REFERENCE BOOK

3. A. Zakiudeen Ahmed: Computer Application in Business, Margam Publication.

SEMESTER – VI

CORE PAPER - 17

COST ACCOUNTING - II

Objective:

To understand the basic concepts and methods of Cost Accounting.

UNIT-I

Job, Batch, Contract Costing: Job Costing – definition – Features – Procedure – WIP – Cost Accumulation, Batch Costing – EBQ, Contract Costing – Definition, Features, Work Certified and Uncertified – Incomplete Contact – Escalation Clause – Cost Plus Contract – Contract Account

UNIT-II

Process Costing : Definition – Features – Job Vs Process Costing – Process Account – Losses – By Products and Joint Products – WIP – Equivalent Units and its Calculation - Closing WIP with or without Process Loss.

UNIT-III

Operating Costing (Transport Costing): Cost Unit – Cost Classification – Operating Cost sheet.

UNIT-IV

Marginal Costing: Definition – Advantages and Limitation – Break Even Point – Margin of Safety – P/V Ratio – Key factor – Make or Buy Decision – Selection of Product Mix – Changes in Selling Price – Foreign Market Offer – Desired Level of Profit.

UNIT-V

Reconciliation of Cost and Financial Accounts.

(Weightage of Marks = Problems - 80%, Theory - 20%)

Text Books:

1. T.S. Reddy &Hari Prasad Reddy – Cost Accounting – Margham Publications, Chennai
2. A.Murthy and S. Gurusamy, Cost Accounting 2nd Edition, Vijay Nicole Imprints Private Ltd., Chennai.
3. A.Murthy and S. Gurusamy, Cost Accounting, Tata McGraw-Hill Publishing Company Ltd. New Delhi.
4. Tulsian P.C. – Cost Accounting – Tata McGraw Hills.

Reference Books:

1. S.P.Jain and Narang – Cost Accounting – Kalyani Publishers, New Delhi
2. S.N.Maheswari – Principles of Cost Accounting – Sultan Chand & sons, New Delhi
3. S.P.Iyangar – Cost Accounting – Sultan Chand & Sons, New Delhi.

CORE PAPER – 18

WEB TECHNOLOGY

UNIT-I

Internet Basic - Introduction to HTML - List - Creating Table - Linking document Frames - Graphics to HTML Doc.

UNIT-II

Style sheet - Style sheet basic - Add style to document - Creating Style sheet rules - Style sheet properties - Font - Text - List - Color and background color - Box - Display properties.

UNIT-III

Introduction - Object in HTML - Event Handling - Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Build in Object - User defined object.

UNIT-IV

HTML server controls - Anchor, Tables, Forms, Files. Basic Web server Controls- L.able, Textbox, Button, Image, Links, Check & Radio button, Hyperlink. Data List Web Server Controls - Check box list, Radio button list, Drop down list, List box, Data grid, Repeater.

UNIT-V

Request and Response Objects, Cookies, Working with Data - OLEDB connection class, command class, transaction class, data adaptor class, data set class.

Reference Books:

1. Deitel&Deitel ,internet & world wide web How to program, Pearson Education
2. I. Bayross, Web Enable Commercial Application Development Using HTML, DHTML, Javascript, Pen CGI, BPB Publications, 2000
3. J. Jaworski, Mastering Javascript, BPB Publications, 1999
4. T. A. Powell, Complete Reference HTML (Third Edition),TMH, 2002
5. G. Buczek, ASP.NET Developers Guide, TMH, 2002

CORE PAPER - 19

WEB TECHNOLOGY LAB

1. Create a simple page introducing yourself how old you are, what you do, what you like and dislike. Modify the introduction to include a bullet list of what you do and put list the 5 things you like most and dislike as numbered lists. Create another page about your favorite hobby and link it to (and from) your main page. Center something, and put a quote on one of your pages
2. Put an existing image on a web page. Create a table, use a heading and at least one use of row span/col. span. Color a page and some text within the page. Link to another site
3. Create a new file called index. html.
   - ❖ Put the normal HTML document structure tags in the file.
   - ❖ Give it a title.
   - ❖ At the bottom of the page (i.e. the last thing between the body tags) put the following:
     - ♦ A horizontal rule.
     - ♦ A Link to your e-mail Address (With your name between the tag) ; remember to put the link to your E- Mail address within address tags.
     - ♦ A line break.
     - ♦ The date. (I have this same structure at the bottom of this page).
     - ♦ Above this block (which is called the footer), put a title in heading tags.
     - ♦ Add some text describing yourself (you can split this into multiple headings and Paragraphs if you wish).
4. Write a script to create an array of 10 elements and display its contents.
5. Create a document that accepts the user's name in a text field form and displays the sanie the next time when the user visits the site informing him that he has accessed the site for the second time, and so on.

ELECTIVE– II

PAPER - 2

A. INCOME TAX LAW AND PRACTICE – II

Objective:

To enable the students to have a knowledge of law of practice of Income tax.

Unit I: Capital gains

What are capital assets? – what are not capital assets? – kinds of capital assets – transfer u/s 2 (47) – cost of acquisition – cost of improvement – computation of short term capital gain - computation of long term capital gain – exemptions from capital gains.

Unit II: Income from other sources

Specific incomes chargeable to tax – general incomes chargeable to tax – Interest on securities – Interest exempt from tax u/s 10 (15) - deductions allowed from Income from other sources – computation of income from other sources.

Unit III: Clubbing of Incomes and Set off and carry forward of losses

Income transfer without asset transfer – cross transfer –transfer for the benefit of son's wife – capital gain on an asset gifted before marriage – gifted money used for construction of house by spouse – income including losses – clubbing of business income – clubbing of minor's income – computation of total income.

Provisions relating to set off of losses- Provisions relating to set off and carry forward of losses – unabsorbed depreciation – order of set off – computation of total income.

Unit IV: Agricultural Income and Deductions from gross total income

Meaning of agricultural income – types of agricultural income – income from growing and manufacturing rubber - income from growing and manufacturing coffee - income from growing and manufacturing tea – income of a sugar mill growing its own sugarcane – computation of tax of an assessee having agricultural income.

Permissible deductions from gross total income – section 80C, 80CCC, 80CCD, 80D, 80DD, 80DDB, 80E, 80G, 80GG, 80GGA, 80QQB, 80RRB, 80U.

Unit V: Assessment of Individuals and Assessment procedures

Sources of income of an individual – computation of total income and tax liability of an individual.

Filing of returns – permanent account number (PAN) –Usage of PAN – TDS - types of assessment – self assessment – Best judgement assessment – Income escaping assessment (reassessment) – Advance payment of tax

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text books

1. Gaur & Narang, Income Tax Law & Practice, Kalyani Publishers.
2. Murthy.A,IncomeTaxLaw&Practice,VijayNicoleImprintsPvt.Ltd.Chennai
3. Reddy, T.S. &Hariprasad Reddy, Y, Income Tax Theory, Law & Practice, Margham Publications, Chennai.

Reference books

1. Mehrotra-Income Tax Law & Accounts, Sahithiya Bhavan Publications.
2. Vinod, K.Singhania, Students Guide to Income Tax, Taxman Publications Pvt. Ltd.

ELECTIVE–II

PAPER - 2

B. BUSINESS ENVIRONMENT

UNIT-I

The concept of Business Environment - Its nature and significance - Brief overview of political - Cultural - Legal - Economic and social environments and their impact on business and strategic decisions.

UNIT-II

Political Environment - Government and Business relationship in India - Provisions of Indian constitution pertaining to business

UNIT-III

Social Environment - Cultural heritage - Social attitudes - impact of foreign culture - castes and communities - Joint family systems - Linguistic and Religious groups - Types of Social Organization

UNIT-IV

Economic Environment - Economic Systems and their impact of Business - Macro Economic Parameters like GDP - Growth Rate - Population - Urbanization - Fiscal deficit - Plan investment - Per capita Income and their impact on business decisions

UNIT-V

Financial Environment - Financial System - Commercial banks - RBI - IDBI - Non-Banking Financial Companies NBFC's

Text Books:

1. Dr. S. Sankaran - Business Environment. Margham Publications, Chennai
2. Aswathappa - Business Environment, Himalaya Pub. House, 2009.

Reference Books:

1. Dasgupta and Sengupta - Government and Business in India.
2. Srinivasan K - Productivity and Social Environment.
3. International Business Environment - Prentice - Hall of India.
3. Dhanabakiyam & M. Kavitha, Business Environment, Vijay Nicole Imprints Pvt. Ltd. Chennai.

ELECTIVE–II

PAPER - 2

C. SERVICES MARKETING

Objective:

To enable the students to acquire a deep knowledge in services marketing.

UNIT-I

Concept of service – Meaning, definitions – Components and types – Service Vs goods – Service Marketing mix characteristics – Advertising – objectives – Advertising message and media selection – merits – personal selling – process - Advantages

UNIT-II

Physical evidence – Essential and peripheral evidence – Guidelines for physical evidence – Managing demand and supply Capacity constraints – demand patterns – Capacity planning and types – Managing capacity to match demand – Managing demand to match capacity

UNIT-III

Pricing in services – objectives – types of pricing – characteristics and factors affecting pricing decisions – customer relationship marketing – objectives and requisites – benefits

UNIT-IV

Quality of service – five dimensions of quality – Gap analysis and causes for customer gap – key factors leading to Customer Gap – Provider Gaps

UNIT-V

Marketing of Services by Insurance business – Banks – Education – Tourism – Transport.

REFERENCE BOOKS:

1. S.M.Jha, Services Marketing, Himalaya Publications, New Delhi
2. M.K.Rampal & S.L.Gupta, Services Marketing, Galgotta Pub. House
3. Dr.B.Baly, Services Marketing, S. Chand & Co., New Delhi
4. Vasanthi Venugopal & Raghu V.N, Services Marketing, Himalaya Publications, New Delhi.
5. Dr.L.Natarajan, Services Marketing, Margham Publications, Chennai.

ELECTIVE–III

(To choose any 1 out of 3)

PAPER – 3

A. SOFTWARE ENGINEERING

UNIT-I:
Introduction - Evolving Role of Software - Changing Nature of Software – Software Myths; a Generic View of Process: Layered Technology - Process Models: Waterfall Model - Evolutionary Process Models.

UNIT-II:
Requirements Engineering: Tasks - Initiating the Requirements Engineering Process - Eliciting Requirements - Building the Analysis Model - Requirements Analysis - Data Modeling Concepts.

UNIT-III:
Data Engineering: Design Process and Design Quality - Design Concepts - The Design Model Creating an Architectural Design: Software Architecture - Data Design -Architectural Design - Mapping Data Flow into Software Architecture; Performing User Interface Design: Golden Rules.

UNIT-IV:
Testing Strategies: Strategic Approach to Software Testing- Test Strategies for Conventional and Object Oriented Software - Validation Testing - System Testing -Art of Debugging. Testing Tactics: Fundamentals - White Box- Basis Path - Control Structure - Black Box Testing Methods

UNIT-V:
Project Management: Management Spectrum - People - Product - Process - Project. Estimation: Project Planning Process - Resources - Software Project Estimation - Project Scheduling - Quality Concepts - Software Quality Assurance - Formal Technical Reviews.

TEXT BOOK:

1. Roger S Pressman, "Software Engineering - A Practitioner's Approach", Sixth Edition, McGraw Hill International Edition, New York: 2005.

REFERENCES:

1. Ian Somerville, "Software Engineering", 7th Edition, Pearson Education, 2006.
2. Mall Rajib," Software Engineering", 2/E, PHI, 2006.

ELECTIVE–III
PAPER - 3
B. DATA MINING

UNIT-I

Data Mining - Introduction - Meaning- importance of Data mining - various kinds of data - Data Mining Functionalities – Various kinds of Patterns - Pattern Interesting Classification of Data mining Systems - Data mining Task Primitives – Integration of Data Mining System – Major issues in Data Mining.

UNIT-II

Data Processing - Process the Data Descriptive Data Summarization – Measuring Central Tendency Dispersion of Data Graphic Displays of –Basic Descriptive Data Summaries Data Cleaning Data Integration and Transformation data Reduction Data Discrimination - Concept Hierarchy Generation

UNIT-III

Data Warehouse OLAP Technology An overview - Data Warehouse Multidimensional Data Model Data Warehouse Architecture Data Warehouse Implementation from Data Warehouse to Data mining

UNIT-IV

Mining – Frequent Patterns Associations Correlations - Basic Concepts Road Map Efficient Scalable Frequent Item set Mining methods Mining – Various Kinds of Association rules Analysis - Association mining to Correlation Constrain Based Association mining

UNIT-V

Applications Trends - Data mining Applications Data mining – System Products Research Prototype Additional Themes on Data Mining Social impact of Data mining Trends in Data mining

Text Book:

1. **Data Mining** (Concepts and Techniques) Second Ed (Chapter 1,2,3,5,11)

Author: Jiawei Han and Micheline Kamber **Publishers:** Morgan Kaufmann Publishers (An imprint of Elsevier)

Reference Books:

1. Data Mining (Next Generation Challenges and Future Directions) Author: Karguta, Joshi, Sivakumar & Yesha **Publishers:** Printice Hall of India (2007)
2. Data Mining (Practical Machine Learning Tools and Techniques (Second Edition) **Author:** Ian H. Witten &Eibe Frank **Publishers:** Morgan Kaufmann Publishers (An imprint of Elsevier)
3. Data Warehousing, Data mining & OLAP (Edition 2004) **Author:** Alex Benson, Stephen V. Smith **Publishers:** Tata McGraw – Hill

ELECTIVE–III

PAPER – 3

C. ENTERPRISE RESOURCE PLANNING

UNIT - I

Business function and Business process: Functional areas and Business Process - functional area of operations - Business process - Marketing Sales - supply chain management - Accounting and finance - Human Resource - Functional areas of information system - The development of ERP system SAP R/3 - New directions in ERP - significance and benefits of ERP software and systems.

UNIT - II

Marketing information system and sales order process in ERP: sales and Distribution in ERP - Pre sales activities - sales order processing - inventory Sourcing - Delivery - Billing - payment - Customer relationship Management - benefits of CRM.

UNIT - III

Production and supply chain management information system: Production overview - The production planning process - The SAP ERP Approach to production planning - Sales forecasting - sales and operation Planning - Demand management - Material requirement planning in SAP ERP - ERP and supplier - Supply chain

UNIT - IV

Accounting in ERP: Accounting activities - using ERP for accounting Information - operational decision making problem - credit management - Industrial credit management in SAP ERP - product profitability analysis - Management reporting with ERP system - Document flow for customer Service.

UNIT - V

Human resource process in ERP: HR with ERP - Advance HR features - Time management - Payroll - Travel management - Training and Development - Management by objectives - ERP process modeling.

Reference Book:

1) ELLEN MONK and BRET WAGNER, ENTERPRISE RESOURCE PLANNING - 3rd edition - MGH.

SKILL BASED SUBJECT – IV

PAPER – 4

INDUSTRIAL RELATIONS

Objective: To enable the students to learn the concepts of Industrial Relations including trade unions, collective bargaining and various labour enactments.

Unit - I: Industrial Relations (IR)

Concept of Industrial Relations; Nature of Industrial Relations; Objectives of IR; Factors affecting IR in changing Environment, Evolution of IR in India; Role of State; International Dimensions of IR.

Unit - II: Trade Union

Trade Union: Origin and growth, unions after Independence, unions in the era of liberalization; Factors affecting growth of Trade Unions in India, Major Provisions of Trade Union Act 1926.

Unit - III: Collective Bargaining and Worker's Participation in Management

Collective Bargaining: Meaning, Nature, Types, Process and Importance of Collective Bargaining Status of Collective Bargaining in India, Functions and role of Trade Unions in Collective bargaining.

Workers' Participation in Management: Consent, practices in India, Works Committees, Joint management councils; Participative Management and co-ownership; Productive Bargaining and Gain Sharing.

Unit - IV: The Industrial Disputes Act, 1947:

Definitions of Industry, workman, and Industrial Dispute; Authorities under the Act; Procedure, Powers and Duties of Authorities; Strikes and Lock outs; Lay-off and Retrenchment; Provisions relating to Layoff, Retrenchment, and closure.

Unit - V: The Factories Act, 1948:

Provisions relating to Health, Safety, Welfare facilities, working hours, Employment of young persons, Annual Leave with wages.

Text Books:

1. B. Nandhakumar, *Industrial Relations and Labour Welfare and Labour Laws* - Vijay Nicole Imprints Private Ltd., Chennai.
2. JP Sharma, *Simplified Approach to Labour Laws*, Bharat Law House (P) Ltd.

Reference Books:

1. PK Padhi, *Industrial Relations and Labour Law*, PHI Learning.
2. Arun Monalppa, *Industrial Relations and Labour Law*, McGraw Hill Education.
3. SC Srivastav, *Industrial Relations and Labour Law*, Vikas Publishing House.
4. C.S. Venkata Ratnam, *Industrial Relations*, Oxford University Press.
5. P.L. Malik's *Handbook of Labour and Industrial Law*, Vol 1 and Vol 2, Eastern Book Company.

******

Question Paper Pattern:

Pattern	Total Questions	To answer	Marks per Question	Total Marks
Section A	10	10 (All)	2	20
Section B	8	5	5	25
Section C	5	3	10	30

Instructions to Paper Setter:

Section-A: Minimum 2 Questions to be asked from each of the five Units

Section-B: Minimum 1 Question to be asked from each of the five Units.

Section-C: 1 Question to be asked from each of the five Units.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. BIOCHEMISTRY

DEGREE COURSE

UNDER CBCS

(With effect from 2017 - 2018)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper-1	6	4	Cell Biology	25	75	100
	III	Core Practical	Practical-1	3	0		0	0	0
4	III	Allied -1	Paper-1	4	4	Chemistry I	25	75	100
	III	Allied	Practical - 1	3	0		0	0	0
5	IV	Environmental Studies		2	2	Environmental Studies	25	75	100
				30	**18**		**125**	**375**	**500**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
6	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
7	II	English	Paper-2	4	4	English	25	75	100

8	III	Core Theory	Paper-2	6	4	Bio molecules	25	75	100
9	III	Core Practical	Practical-1	3	4	1. Experiment Involving Titrimetric Procedures 2. Qualitative Analysis	25	75	100
10	III	Allied-1	Paper-2	4	4	Chemistry II	25	75	100
11		Allied Practical - 1	Practical-1	3	2	Chemistry – I & II	25	75	100
12	IV	Value Education		2	2	Value Education	25	75	100
13	IV	Soft Skill		2	1	Soft skill	25	75	100
				30	**25**		**200**	**600**	**800**

S.NO.	**Part**	**Study Components** **Course Title**		**Ins. Hrs / week**	**Credit**	**Title of the Paper**	**Maximum Marks**		
		SEMESTER III					**CIA**	**Uni. Exam**	**Total**
14	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
15	II	English	Paper-3	6	4	English	25	75	100
16	III	Core Theory	Paper-3	3	3	Biochemical Techniques I	25	75	100
17	III	Allied-2	Paper-3	4	4	(Choose one out of two) 1.Microbiology – I 2. Zoology - I	25	75	100

		Allied Practical - 2	Practical-2	3	0		0	0	0
18	IV	Skill Based Subject	Paper-1	3	3	Fundamentals of Computer	25	75	100
19	IV	Non-Major Elective	Paper-1	2	2	Health and Nutrition	25	75	100
				30	**20**		**150**	**450**	**600**
		SEMESTER IV					**CIA**	**Uni. Exam**	**Total**
20	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
21	II	English	Paper-4	6	4	English	25	75	100
22	III	Core Theory	Paper-4	3	3	Biochemical Techniques II	25	75	100
23	III	Core Practical	Practical-2	3	4	1. Biochemical Preparations 2. Chromatographic Separation 3. Preparation of buffers 4. Colorimetric Estimation	25	75	100
24	III	Allied-2	Paper-4	4	4	Choose one out of two 1.Microbiology – II 2. Zoology - II	25	75	100
25	III	Allied Practical - 2	Practical-2	3	2	Microbiology – I & II/ Zoology – I & II	25	75	100
26	IV	Skill Based Subject	Paper-2	3	3	Computer Applications	25	75	100
27	IV	Non-Major Elective	Paper-2	2	2	First Aid	25	75	100
				30	**26**		**200**	**600**	**800**

S.NO.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER V					**CIA**	**Uni. Exam**	**Total**
28	III	Core Theory	Paper-5	6	6	Enzymes & Intermediary Metabolism	25	75	100
	III	Core Practical	Practical-3	3	0		0	0	0
29	III	Core Theory	Paper-6	6	5	Genetics and Molecular Biology	25	75	100
		Core Practical	Practical-4	3	0		0	0	0
30	III	Core Theory	Paper-7	5	4	Human Physiology & Nutritional Biochemistry	25	75	100
31	III	Elective	Paper-1	4	3	Medical Laboratory Technology-I	25	75	100
32	IV	Skill Based Subject	Paper-3	3	3	Bio Statistics-I	25	75	100
				30	**21**		**125**	**375**	**500**
		SEMESTER VI					**CIA**	**Uni. Exam**	**Total**
33	III	Core Theory	Paper-8	6	6	Clinical Biochemistry	25	75	100
34	III	Core Theory	Paper-9	6	6	Bio Technology	25	75	100
35	III	Core Practical	Practical-3	5	5	1. Colorimetric Estimation 2. Experiments on Enzymes 3.Biotechnology Experiments 4.Demonstration Experiments	25	75	100
36	III	Elective	Paper-2	4	3	Medical Laboratory Technology-II	25	75	100
37	III	Elective	Paper-3	3	3	Immunology	25	75	100
38	III	Elective Practical	Practical-4	3	3	Medical Laboratory Technology	25	75	100

39	IV	Skill based Subject	Paper-4	3	3	Bio Statistics-II	25	75	100
40	V	Extension Activities		0	1		100	0	100
		TOTAL		**30**	**30**		**275**	**525**	**800**

Part	**Subject**	**Papers**	**Credit**	**Total credits**	**Marks**	**Total Marks**
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	4	8	100	200
	Allied (Even Semester)	2	6	8	100	200
	Allied Practical	2	2	4	100	200
	Electives	3	3	9	100	300
	Elective Practical	1	3	3	100	100
	Core	9	(3-7)	42	100	900
	Core Practical	3		14	100	300
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	10	100	400
Part V	Extension	1	1	1	100	100
	Total	**40**		**140**		**4000**

University practical Examination marks

Subject	Exam Hrs	CIA	Uni. Exam	Total Marks
Core practical I	6	25	75	100
Core practical II	6	25	75	100
Core practical III	6	25	75	100
Elective practical IV	6	25	75	100
Allied Practical I	3	25	75	100
Allied practical II	3	25	75	100

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.SC. BIOCHEMISTRY

SYLLABUS
UNDER CBCS
(With effect from 2017 - 2018)

SEMESTER I

PAPER - 1

CELL BIOLOGY

UNIT - I

An overall view of cells - origin and evolution of cells. Cell theory. Classifications of cell - Prokaryotic and Eukaryotic cells. Differences between prokaryotic and eukaryotic cells. Molecular composition of Cells - Water, Carbohydrates, Lipids, Nucleic acids and Proteins.

UNIT - II

Cell membrane- Fluid Mosaic Model of membrane structure. Membrane proteins and their properties. Membrane carbohydrates and their role. Transport across membranes- diffusion, active and passive transport.

UNIT - III

Endoplasmic reticulum - types, structure and functions. Golgi apparatus- structures and functions. Lysosomes- structure and functions, Ribosomes - types, structure and functions.

UNIT - IV

Mitochondria: Structure and function. Cytoskeleton: Types of filaments and their functions. Microtubules: Chemistry and function (esp. cilia and flagella)

UNIT – V

Chromosome-chromatin structure, the cell cycle - phases of cell cycle. Meiotic and mitotic cell divisions, cell- cell communications, cell recognition, cell adhesion and cell functions.

References:

1. Cell biology structure and functions-David and Sadava, Jones Bartlett publishers.
2. Molecular Cell Biology - Lodish, Berk, Zipursky, Baltimore, Freeman.
3. Cytology-P.S. Verma, V.K. Agarwal, S. Chand Publications.
4. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan Worth Publishers.
5. Biochemistry - Garrett Grishmam. 3rd edition. International student's edition.
6. Biochemistry by L . Veerakumari , MJP publishers,Chennai-5.

ALLIED

CHEMISTRY – I

OBJECTIVE:

- Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications wherever necessary are to be taught for I- Semester.

UNIT – I

1.1General Metallurgy - Extraction of Metals - Minerals and Ores- Difference between Minerals and Ores – Minerals of Iron, Aluminum and Copper - Ore Dressing or Concentration of Ores - Types of Ore Dressing- Froth Floatation process, Gravity separation and Magnetic separation.

1.2 Calcination, Smelting, Roasting, Fux, Slag - Definition - Reduction methods - Goldschmidt Aluminothermic process and Carbon Reduction method - Refining of Metals - Electrolytic, Van Arkel and Zone Refining.

1.3 Ores of Titanium and Cobalt - Extraction of Titanium and Cobalt.

UNIT – II

2.1 Cycloalkanes - Preparation – Wurtz reaction and Dieckmann's condensation - Properties of Cycloalkanes – Substitution and Ring opening reactions.

2.2 Polarisation - Inductive effect, Mesomeric effect and Steric effect (Acid and Base Strength).

2.3Stereoisomerism – Types - Cause of Optical Activity – Enantiomers - Diastereomers - Meso form - Optical Activity of Lactic acid and Tartaric acid - Racemisation and Resolution – Definition and Methods - Geometrical isomerism – Definition and example - Maleic and Fumaric acid – Differences.

UNIT – III

3.1 Chemical Kinetics – Rate of a reaction – Definition of Order and Molecularity – Distinction between Order and Molecularity - Derivation of First order rate equation - Half Life Period of first order reaction.

3.2 Catalysis - Catalyst - Autocatalyst - Enzyme catalyst - Promoters - Catalytic poisons – Active Centre - Differences between Homogeneous and Heterogeneous Catalysis - Industrial Applications of Catalysts.

3.3 Photochemistry – Grothus-Draper's law – Stark-Einstein's law - Quantum yield – Photosynthesis - Phosphorescence – Fluorescence.

UNIT – IV

4.1 VSEPR Theory – Hybridisation and Shapes of simple molecules BF_3, PCl_5, SF_6 and XeF_6.

4.2 Fuels – Classification of Fuels - Calorific value of Fuels – Water gas, Carbureted Water gas and Producer gas – Composition and Uses - Non-Conventional fuels - Need of Solar Energy - Applications - Biofuels – Oil gas, Natural gas and LPG – Uses.

4.3 Osmosis - Osmotic pressure - Reverse osmosis – Definition - Desalination of Sea water.

UNIT – V

5.1Nuclear Chemistry – Atomic number, Mass number - Isotopes, Isobars and Isotones – Definition and Examples - Definition of Half life period - Nuclear Binding Energy, Mass Defect and N/P ratio - Nuclear Fission and Nuclear Fusion (Elementary idea) - Applications of Radioisotopes in Medicine, Agriculture and Industries – Carbon Dating.

5.2 Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking – Naphthalene – Preparation – Haworth's method – Properties – Oxidation, Reduction and Uses of Naphthalene - Structure of Naphthalene (Structural elucidation not necessary).

5.3 Conductors, Insulators, Semiconductors, N- and P- Type Semiconductors – Definitions and Examples.

SEMESTER II

PAPER – 2

BIOMOLECULES

UNIT-I: Carbohydrates

Classification of carbohydrates, stereo isomerism and optical isomerism of sugars, anomeric form and mutarotation. Occurrence, structure and biological importance of mono, di and polysaccharides (esp. starch, glycogen and cellulose). Reaction of Carbohydrates due to the presence of hydroxyl, aldehyde and ketone groups.

UNIT-II: Proteins

Classification and structure of amino acids based on structure. Introduction, classification of proteins based on solubility, size and shape. Structure of proteins - primary, secondary, tertiary and quaternary.

UNIT-III: Lipids

Introduction, definition, classification and functions of Lipids - simple lipids, compound lipids - phospholipids (esp. lecithin cephalin, phospotidyl inositol and phospotidyl serine) and derived lipids - steroid (cholesterol).

UNIT-IV: Nucleic acids

Nature of genetic material, structure of purine and pyrimidine nucleotides. Composition of DNA and RNA-Watson crick model of DNA. Types of nucleic acid (DNA and RNA).

Properties of nucleic acids-Tm, denaturation and renaturation, hypo and hyper chromicity.

UNIT-V: Vitamins

Dietary Sources, deficiency manifestation and biological functions of fat soluble and water soluble vitamins.

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan Worth Publishers.
2. Harper's Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C.Kannan , MJP Publishers,Chennai-5.

CORE PRACTICAL - I

Objectives

1. Students should know the principles, theory and calculations of each experiment.

2. They should know to prepare all the solutions by themselves. They should standardize their solutions individually.

1. EXPERIMENT INVOLVING TITRIMETRIC PROCEDURES

a. Estimation of amino acids by formal titration.

b. Estimation of ascorbic acid by titrimertic method using 2, 6-dichlorophenol indo phenol.

c. Determination of saponification value of edible oil.

d. Determination of Acid number of edible oil.

e. Estimation of reducing sugar from biological fluids by Benedict's titrimertic method.

f. Iodine number of oil.

2. QUALITATIVE ANALYSIS.

a. Reactions of simple sugars including glucose, fructose, galactose, mannose, pentose, maltose, sucrose, lactose, starch, glycogen and dextrin.

b. Reactions of proteins - solubility, Biuret, Millon's, Xanthoproteic test, denaturation by heat, pH change and precipitation by acidic reagents. Color reactions of amino acids like tryptophan, tyrosine, cysteine, methionine, arginine, proline and histidine.

c. Reactions of lipids - solubility, saponification tests for unsaturations, Liebermann-Burchard test for Cholesterol.

ALLIED – 2

CHEMISTRY – II

OBJECTIVE:

- Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins, Medicinal Chemistry, Corrosion and Applications wherever necessary are to be taught for II- semester.

UNIT – I

1.1 Coordination Chemistry - Nomenclature of Coordination Compounds - Ligands, Central Metal Ion and Complex Ion – Definition and Examples – Coordination Number - Werner's Theory of Coordination Compounds - Chelates - Functions and Structure of Haemoglobin and Chlorophyll.

1.2 Industrial Chemistry - Fertilisers and Manures – Biofertilisers - Organic Manures and their importance - Role of NPK in plants - Preparation and Uses of Urea, Ammonium Nitrate, Potassium Nitrite and Super Phosphate of Lime.

1.3 Contents in Match Sticks and Match Box - Industrial making of Safety Matches – Preparation and Uses of Chloroform, DDT, Gammexane and Freons.

UNIT – II

2.1 Carbohydrates - Definition and Examples - Classification – Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate.

2.2 Amino Acids – Definition and Examples - Classification of Amino Acids - Preparation - Gabriel Phthalimide Synthesis – Properties – zwitterion and Isoelectric point - Structure of Glycine.

2.3 Proteins – Definition - Classification of Proteins based on Physical properties and Biologcal functions - Primary and Secondary Structure of Proteins (Elementary Treatment only) – Composition of RNA and DNA and their Biological role - Tanning of Leather - Alum (Aluminum chloride tanning) - Vegetable tanning – Chrome Tanning.

UNIT – III

3.1 Electrochemistry - Electrolytes – Definition and Examples – Classification - Specific and Equivalent Conductance - their determination – Variation of Specific and Equivalent conductance with Dilution – Ostwald's Dilution Law and its Limitations.

3.2 Kohlrausch's Law - Determination of Dissociation Constant of weak Electrolytes using Conductance measurement - Conductometric titrations.

3.3 pH – Definition and pH determination by indicator method - Buffer solutions - Buffer action - Importance of buffers in the living systems.

UNIT – IV

4.1Paints - Components of Paint – Requisites of a Good Paint - Pigments – Classification of Pigments on the basis of Colour – Examples - Dyes – Definition – Chromophores and Auxochromes – Examples - Colour and Dyes - Classification based on Constitution and Application – Examples.

4.2 Vitamins – Definition – Classification – Water Soluble and Fat Soluble – Occurrence - Biological Activities and Deficiency Diseases caused by Vitamin A, B, C, D, E and K - Hormones – Definition and Examples – Biological Functions of Insulin and Adrenaline.

4.3 Chromatography - Principles and Applications of Column and Paper chromatography- R_f value.

UNIT – V

5.1 Drugs - Sulpha Drugs – Preparation and Uses of Sulphapyridine and Sulphadiazine - Mode of Action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicol and Streptomycin - Drug Abuse and Their Implication - Alcohol – LSD.

5.2 Anaesthetics - General and Local Anaesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS.

5.3 Electrochemical Corrosion and its Prevention – Electroplating – Applications.

ALLIED PRACTICAL

CHEMISTRY

VOLUMETRIC ANALYSIS

1. Estimation of HCl – Standard sulphuric acid.
2. Estimation of Borax - Standard Sodium Carbonate.
3. Estimation of NaOH – Standard Oxalic Acid.
4. Estimation of $FeSO_4$ – Standard FAS.
5. Estimation of Oxalic acid – Standard $FeSO_4$.
6. Estimation of FAS – Standard Oxalic Acid.
7. Estimation of Oxalic acid – Standard Oxalic Acid.
8. Estimation of Fe^{2+} using Diphenylamine / N- Phenyl Anthranilic acid as indicator.

ORGANIC ANALYSIS

Systematic Analysis of Organic Compounds containing One Functional Group and Characterisation by Confirmatory Tests.

Reactions of Aromatic Aldehyde, Carbohydrates, Mono and Dicarboxylic acids, Phenol, Aromatic Primary Amine, Amide and Diamide.

REFERENCE BOOKS

- Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).
- Inorganic Chemistry - B. R.. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications (2013).
- Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
- Text Book of Inorganic Chemistry – R. Gopalan, Universities Press – 2012.
- Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
- Advanced Organic Chemistry - Bahl and Arun Bahl - Sultan Chand and Co. Ltd – 2012.
- Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
- A Text Book of Organic Chemistry K. S. Tewari, N. K. Vishol, S. N. Mehrotra- Vikas Publishing House – 2011.
- Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishal Publishing Company – 2013.
- Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha andU. N. Dash - Sultan Chand & Co – 2006.
- Understanding chemistry – C. N. R. Rao, Universities Press – 2011.

SEMESTER III

PAPER – 3

BIOCHEMICAL TECHNIQUES – I

UNIT - I

Units of measurements of solutes in solution, e.g. Normality, Molality, Molarity, Ionic strength, Millimoles. Osmosis, Osmotic pressure, Osmolarity and its application. Concept of isotonic, hyper and hypotonic solution and its importance in biology.

UNIT - II

Concept of pH, pOH, buffer and its application, buffer capacity. Henderson - Hasselbalch equation and its importance. Buffer in body fluids, Red blood cells, white blood cells, tissues and its role.

UNIT - III

Principle, instrumentation and applications of hydrogen electrode, glass electrode in determination of pH. Principle, instrumentation and applications of Clark oxygen electrode.

UNIT - IV

General principle of chromatography. Partition and adsorption chromatography. Principle, operation procedure and applications of paper chromatography and their types. Principle, instrumentation, application of thin layer chromatography, ion exchange chromatography, and molecular gel exclusion chromatography and its application in separation of macromolecules.

UNIT – V: Basic principle of centrifugation techniques, sedimentation rate, Svedberg unit / sedimentation coefficient. Preparative ultracentrifuge, Differential centrifugation, density gradient centrifugation, rate zonal, isopycnic, equilibrium centrifugation. Analytical ultracentrifuge method - determination of molecular weight by sedimentation in an ultra centrifuge.

References:

1. A Biochemical Guide to Principles and techniques of Practical Biochemistry- Keith Wilson and Kenneth Goulding, Cambridge Press.
2. Principles and Techniques of Practical Biochemistry- Keith Wilson And John Walker, Cambridge Press.
3. Introduction to Practical Biochemistry - Shawney, Randhir Singh, Naraso Pub, N. Delhi.
4. Analytical Biochemistry - R.B. Turner, Elsevier, N.Y.
5. Biochemistry Laboratory: Modern theory and techniques -Rodney Boyer, Prentice Hall
6. Instrumental methods of chemical analysis - Chatwal -Anand, Himalayan Publication.
7. Biophysical Chemistry - Upadhyay and Upadhyay Nath, Himalayan Publication.

ALLIED - 3

1. MICROBIOLOGY – I

UNIT - I

Definition and scope of Microbiology, History and Recent Developments, Spontaneous generation, Biogenesis, Contribution of Louis Pasteur, Leewen Holk, Lazzarn - Spallanzani, John Tyndall, Joseph Lister, Robert Koch, Microscopy - Simple, Compound, Light Microscopy Dark ground, Phase contrast, Flurescence and Election microscopy.

UNIT - II

Five Kingdom consept cell Theory, Binomial Nomendature of microbes, species concept, classical approach with examples, Anatomy of Prokaryotes and Eukaryotes, ultra structure and function of cellwall and cell organelles.

UNIT - III

Culture Techniques, Media preparation, Preservation of cultures, Aerobic and Anaerobic culture techniques, Microbial morphology - wet mount, Hanging drop staining methods, Dyes, Simple - Differential and Special staining techniques Acid fast staining spore stain, Capsule stain, staining for met achromatic Granules, Development of Laboratory Techniques for pure and Mixed culture.

UNIT - IV

Antimicrobial chemotheraphy - Antibiotics - source, classification mode of action - Antimicrobial resistance - Tests for Sensitivity to Antimircrobial agents and its Quality control classical techniques of Microbial identification - Morphological, Physiological and Biochemical properties.

UNIT - V

Measurement of microbial growth Batch and continuous culture, Growth Determination - Growth curve. Structural characteristics of algae - Cholrella, Fungi - Mucor and Protozoa - Entamoeba.

ALLIED – 3

2. ZOOLOGY I

Objective:

To acquire knownledge about different kinds of animal species.

To study the systematic and fuctional morphology of invertebrates and chordates.

UNIT – I:
Type study includes life history.

Protozoa - Entamoeba, **Porifera** - Sycon. **Coelenterata** - Obelia geniculata. **Platyhelminthes** - Teania solium.

UNIT - II

Annelida - Earthworm, **Arthropoda** - Prawn, **Mollusca** - Fresh water mussel, **Echinodermata** - Sea star.

UNIT – III:
Type study includes Morphology, digestive system, respiratory system, circulatory system and urinogenital system of Chordate.

Chordata - Genaral charters, **Prochordata:** Morphology of Amphioxus. **Vertebrates: Pisces** - Shark.

UNIT - IV

Amphibia: Frog, **Reptiles:** Calotes

UNIT - V

Aves: Pigeon, **Mammalia:** Rabbit.

REFERENCES:

1. Ayyar, E.K. and T.N. Ananthakrishnan. 1992. Manual of Zoology. Vol I & II, S. Viswanathan (printers and publishers) Pvt. Ltd., Madras, 891 p.
2. Kotpal series, 1998 - 1992. Rastogi Publications, Meerut.
3. Jordan E.L. and P.S. Verma. 1993. Invertebrate Zoology 12th edition, S. Chand & Co., Ltd., New Delhi.
4. Jordan, E.L., and P.S. Verma. 1995. Chordate Zoology and Elements of Animal Physiology, S. Chand & Co., Ltd., New Delhi.

SKILL BASED SUBJECT

PAPER – 1

FUNDAMENTALS OF COMPUTER

UNIT - I

Computer fundamentals - Introduction, Definition, importance and advantages. Binary number system, types of computer, computer language, package, operating system, network. Differences between computer and human being.

UNIT - II

Classification of computers - digital, analog, hybrid, micro, mini and super computers. Generations of computer, personal and advanced computers and their types. Microsoft windows - windows fundamental. Managing the file system, printing in windows, windows accessories, control panel.

UNIT - III

Memory unit- primary and Auxiliary. Computer hardware - Input unit, Central processing Unit (CPU), output unit, UPS and external modem. MS Word - Introduction, starting MS Word, Standard menus–file, edit, view, Formatting a text, layouts, inserting a diagram, graph, page numbers, borders, bullet and numbering, spelling and grammar, letter and mailing, mail merge, tables and its applications.

UNIT - IV

MS Excel - Introduction, starting MS excel, creating a worksheet, page setup, print area, paste special, formula. Insert and formatting - cells, rows, columns and sheets. Functions, hyperlink, pivot charts, sorting, filters, header and footers, formula bars, status bar, options and its application.

UNIT - V

MS Power point- - Introduction, power point file types, creating a presentation, using color schemes, viewing a presentation, managing slide shows , adding pictures, transaction effects, animations, action setting and action buttons and its application.

References:

1. Computer fundamental, V.K. Jain

2. Working in Microsoft office, Ron Mansfield

NON MAJOR ELECTIVE

PAPER – 1

HEALTH AND NUTRITION

UNIT-I

Introduction and definition of food and Nutrition. Basic Food groups-Energy yielding, Body Building, Protective Foods. Basic concepts of Energy Expenditure, Unit of Energy, Calorific values of Proteins, Carbohydrates and Fats. BMR.

UNIT-II

Physiolgical role and Nutritional significance of Carbohydrates, Proteins, Lipids, Vitamins and Minerals. Biological value of Proteins (Animal and Plant), Single cell Proteins.

UNIT-III

Composition of Balanced Diet, RDA for Infants, Children, Adolescent, Adult male, female, Pregnant, Lactating women and Old age.

UNIT-IV

Food processing, Food Preservation. Principles of Diet therapy, therapeutic diets for Anaemia, heart diseases, obesity and Diabetes Mellitus.

UNIT-V

Protein Malnutrition (Kwashiorkar), Undernutrition (Marasmus) their preventive and curative measures. Deficiency diseases of Vitamins.

References

1. Text Book of Physiology and Nutrition-M.Swaminathan.
2. Human Nutrition &Dietetics-Davidson and Passemore.
3. Nutrition and Dietetics-Shubangini Joshi.

SEMESTER IV

PAPER – 4

BIOCHEMICAL TECHNIQUES – II

UNIT - I

Principles of electrophoresis, factors affecting electrophoretic mobility - sample, electric field, supporting medium, composition of buffer. Sodium dodecyl sulphate, polyacrylamide gel electrophoresis (SDS- PAGE) and its application. Determination of molecular weight of protein by SDS PAGE.

UNIT - II

Principle, methodology and application of immuno electrophoresis. Tiselius moving boundary electrophoresis and its application in serum protein separation. Principle, methods and application of Agarose gel electrophoresis.

UNIT - III

Basic principle of electromagnetic radiation, energy, wavelength, wave number, frequency. Absorption and emission spectra. Beer Lambert's law. Basic principle, instrumentation, application of colorimetry techniques. Principle, instrumentation, application of UV- visible spectroscopy.

UNIT - IV

Principle and instrumentation of spectrofluorimetry techniques. Principle, instrumentation and application in atomic absorption spectroscopy. Principle and instrumentation of flame photometry. Application in analysis of trace elements- sodium and potassium.

UNIT - V

Radiation, type of radioactive decay, half-life, unit of radioactivity. Detection and measurement of radioactivity - Methods based upon ionization (GM Counter), excitation (Scintillation counter). Application of radioisotopes in the elucidation of metabolic pathyways, clinical scanning and radio dating, RIA. Biological hazards of radiation and safety measures in handling radio isotopes.

References :

1. A Biochemical Guide to Principles and the techniques of Practical Biochemistry- Keith Wilson and Kenneth Goulding, Cambridge Press.
2. Principles and Techniques of Practical Biochemistry- Keith Wilson And John Walker, Cambridge Press.
3. Introduction to Practical Biochemistry - Shawney, Randhir Singh, Narosa Pub, N.Delhi.
4. Analytical Biochemistry - R.B. Turner, Elsevier, N.Y.
5. Biochemistry Laboratory: Modern theory and techniques -Rodney Boyer, Prentice Hall
6. Instrumental Methods of chemical analysis - Chatwal -Anand,Himalayan Publication.
7. Biophysical Chemistry - Upadhyay and Upadhyay Nath, Himalayan Publication.

CORE PRACTICAL – II

1. BIOCHEMICAL PREPARATIONS

a. Isolation of Lecithin from egg yolk.

b. Isolation of Cholesterol from egg yolk and its estimation.

c. Isolation of Starch from potato.

d. Isolation of Casein and Lactalbumin from milk.

e. Isolation of Lipids by Folch's methods.

f. Isolation of Chromosomal DNA from liver cells.

2. CHROMATOGRAPHIC SEPARATION

a. Paper chromatographic separation and detection of aminoacid & Simple sugars.

b. Chromatographic separation of Chlorophyll & Carotenes of flower pigments by using Column chromatography.

c. Verification of Chargaff's rule by paper chromatography (Demonstration only).

3. PREPARATION OF BUFFERS

Phosphate buffer, Tris buffer and Citrate buffer.

4. COLORIMETRIC ESTIMATION

a) Estimation of Amino acid by Ninhydrin method.

b) Estimation of Protein by Biuret method.

c) Determination of DNA by Diphenylamine method.

d) Determination of RNA by Orcinol method.

ALLIED - 4

1. MICROBIOLOGY – II

UNIT - I

Soil Microbiology - Soil structure, Soil formation, Characterisation of Soil Types and importance, Biofertilizers.

UNIT - II

Aquatic Microbiology, Sewage Treatment - Physiological and Biological. Microbes in air, Distribution and Source of Airborne Organisms.

UNIT - III

Food Microbiology, Microbial Spoilage of food, food preservation techniques, Microbes in Milk and their source, Pasteurisation techniques. Industrial Production - Pencillin.

UNIT - IV

Morphology, Classification, Characteristics Pathogenecity, Laboratory diagnosis and prevention of Infections caused by following organisms mycobacteria, dermatophytes, Hepatitis, Entamoeba histolytica, Antigens - Antibody reactions.

UNIT - V

Biotechnology - Definition of a Gene, structure, Cloning Techniques, Genomic library. Nan technology - SCP production. Gene Theraphy methods.

ALLIED

2. ZOOLOGY II

Objective:

To study the principles of cell biology, genetics, developmental biology, physiology, ecology and evolution.

UNIT - I

Cell Biology - structure of animal cell, **Genetics:** molecular structure of gene - gene function, sex linked inheritance. Genetic Engineering and its application.

UNIT - II

Embryology - cleavage and gastrulation of Amphioxus.

Human Physiology: Digestion, Circulation - blood components, structure of heart, heart function.

UNIT - III

Diseases of Circulatory system - blood pressure, heart disease - Ischemia, Myocardial Infarction, Rheumatic heart disease, stroke.

Excretion - structure of kidney and mechanism of urine formation.

UNIT - IV

Environmental Biology - Biotic factors and Abiotic factors, food chain and food web. Pollution - Environmental degradation, (Air, Water and Land) - Green house effect - Bioremediation, Biodegradation - Global warming - acid rain.

UNIT - V

Evolution: Theories of Lamarkism & Darwinism.

REFERENCES:

1. Ekambaranatha Ayyar, and Ananthakrishnan, T.N. 1993. Outlines of Zoology, Vol I & II, Viswanathan and Co, Madras.
2. Sambasiviah, I, Kamalakara Rao, A.P., Augustine Chellappa, S. 1983. Text book of Animal Physiology, S. Chand & Co., New Delhi.
3. Verma and Agarwal. 1983. Text book of animal Ecology, S. Chand & Co., New Delhi.
4. Verma and Agarwal and Tyagi. 1991. Chordate Embryology, S. Chand & Co., New Delhi.
5. Rastogi and Jayaraj. 2000. Text book of Genetics. Rastogi publications, Meerut.
6. Verma and Agarwal. 2000. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Co., New Delhi.

ALLIED PRACTICAL

1. MICROBIOLOGY – I & II

1. Clearing of glassware, sterilization techniques.

2. Gram stain, Motility (Hanging drop)

3. Enumeration of soil microbes.

4. Enumeration of sewage microbes.

5. Assessment of milk quality by MBET test.

6. Streak plate, pour plate techniques.

7. Isolation of puncture techniques.

8. Wet mount preparation fungal material.

9. Serial dilation techniques.

10. Slant preparation.

11. Study of SCP, blue greens algee

12. Assessment of Air quality

13. Plant viral diseases like TMV, Tomato milting HIV, Virus structure diseases.

14. Micro photographs in Biotechnology of Microbes and Microbial products demonstration and identification.

15. Diseases like Tuberculosis, Chorine beefier diphtheria demonstration identification.

16. Medically important pathogens micro photographs demonstration.

17. Root Nodules Rhizobium isolation and identification methods.

ALLIED PRACTICAL

2. ZOOLOGY

I MAJOR PRACTICAL

DISSECTIONS

Cockroach: Digestive and nervous system

Prawn: Nervous system

II MINOR PRACTICAL

MOUNTING

1. Mouth parts of **Mosquito** and **Honey bee**

2. **Earthworm** - Body setae

3. Placoid scales of **shark**

III SPOTTERS

Entamoeba, Sycon, Obelia, Taenia solium (entire, scolex) earthworm (entire, Pineal setae) Prawn (entire), Fresh water mussel, Sea star, Amphioxus - Entire, Amphioxus - T.S. through pharynx, Shark, Frog, Calotes, Pigeon, feathers of pigeon and Rabbit.

Sphygnomanometer, Stethoscope, Rain gauge.

REFERENCES:

1. Verma. P.S. 2011. A manual of practical Zoology - INVERTEBRATES. Chand & Co., Ltd., Ram Nagar, New Delhi.
2. Verma. P.S. 2011. A manual of practical Zoology - CHORDATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

SKILL BASED SUBJECT

PAPER – 2

COMPUTER APPLICATIONS

UNIT - I

Operating system - MS DOS, DOS Features, MS DOS opening and closing, DOS commands, Batch Files. Windows XP- opening and closing, background setting, date and time adjustment, note pad, word pad, painting. Unix features and commands.

UNIT - II

Introduction to telecommunication, Networking. Internet - Introduction, Importance, requirements for internet. Electronic mailing, chatting, search engine, web pages.

Multimedia - Introduction, applications, components and its uses. Multimedia design, multimedia concept.

UNIT – III

Computer maintenance - causes of failure, components failure, temperature and humidity, dust and other particle, power line problems. Downloading software and files, copying CD/DVD. Computer virus- introduction, types, symptoms, virus avoiding methods, antivirus programs.

UNIT – IV

Computer application in banking, industries, educational institutions, hospitals, Research institutions - ISRO, BARC. Network - local area network, wide area network.

UNIT – V

HTML – Introduction – history – basic tags – tables – frames – images – anchor tags – hyperlinking documents – web browsers.

References :

1. Computer fundamental, V.K. Jain

2. Multimedia, System design, Prabhat k. Andleigh, Kiran Thakrar.

3. Internet & World Wide Web, third edition, Dietel, Dietel, Gold Berg.

4. Rastogi.S.C, Namita -Mendiratta and Parag Rastogi, (2004) BioInformatics – Concepts, Skills and applications.

5. Mani.K and Vijayraja (2005), BioInformatics – A practical approach

NON MAJOR ELECTIVE

PAPER – 2

FIRST AID

Unit I

First Aid: Important Rules of First Aid, First Aid Box. Injuries (Head, Spinal, Eye, Ear), Sprains and Strains.

Unit II

Cuts and Abrasions, Bleeding, Fractures, Dislocations of bones, Burns, Amputations, Nose bleeds, Electric Shock, Radiation burns.

Unit III

Common medical emergencies - First aid during Chest pain, Stroke, Seizures, Breathing difficulties, Epilepsy.

Unit IV

Common medical emergencies - First aid during Diabetic emergencies, Choking, Fainting, Heart attack, Low Blood Pressure.

Unit V

Poisonous Bites (Insects and Snakes) and Stings (Honey bee) - Animal bites (Dog) – Some Common Poisons and their antidotes – Acid Poisoning – Alkali Poisoning – Poisoning by Disinfectant.

Reference

1. Jayashree Ghosh – A Textbook of Pharmaceutical Chemistry, 1st Ed – S.S. Chand & Company

SEMESTER V

PAPER – 5

ENZYMES AND INTERMEDIARY METABOLISM

UNIT-I: Enzymes

Definition, units, various classifications, nomenclature, specificity, isoenzymes, factors affecting enzyme activity - pH, temperature, enzyme concentration. Lock and key mechanism, Induced Fit theory. Michaelis Menten equation, Line weaver Burk plot. Enzyme inhibition - Competitive, Non competitive and Uncompetitive (Concepts with example) inhibition.

UNIT-II: Carbohydrates Metabolism

Role of high energy compounds-Electron transport chain and Oxidative phosphorylation. Glycolysis, Glycogenesis and glycogenolysis, Citric acid cycle, Gluconeogenesis, HMP shunt.

UNIT III: Lipid Metabolism

Oxidation of fatty acids – Beta oxidation, alpha oxidation and omega oxidation. Oxidation of fatty acids with odd number of carbon atoms. Ketogenesis. Biosynthesis of saturated fatty acids and unsaturated fatty acids. Biosynthesis and degradation of triacyl glycerol and phospholipids. Biosynthesis and degradation of cholesterol.

UNIT-IV: Protein Metabolism

Degradation of proteins, Oxidative, Non-oxidative, deamination and decarboxylation of amino acids, Urea Cycle and Creatinine formation.

UNIT-V: Nucleic acid Metabolism

Biosynthesis and degradation of purine and pyrimidine nucleotides, uricotelic and urotelic system, inhibitors of nucleotides biosynthesis.

References:

1. Enzymes - Dixon and Webb
2. Understanding enzymes - Palmer
3. Enzyme kinetics – Segel, I.H.
4. Lehninger's principles of Biochemistry - Nelson and Cox
5. Lippincott's Biochemistry - P.C. Champe
6. Harper's Biochemistry - Murray
7. Biochemistry - Voet and Voet

PAPER – 6

GENETICS AND MOLECULAR BIOLOLGY

UNIT-I

Mendelian genetics: Mendel's law of inheritance, test cross, back cross and law of incomplete dominance.

UNIT-II

Definition of gene, organization of genes and non coding DNA in prokaryotes. Eukaryotes – unique, moderately repetitive and highly repetitive DNA sequence, satellite DNA. Cot value. DNA is the genetic material - experimental evidence – Griffith, McLeod, McCarty and Avery, Hershey – Chase experiments. Definition and types of replication, experimental proofs for semi-conservative replication. Replication in prokaryotes and inhibitors of replication - requirements and mechanism of prokaryotic DNA-Replication.

UNIT-III

Prokaryotic transcription-RNA polymerases, role of sigma factor, initiation, elongation and termination. (Rho - dependent and independent). Post transcriptional modification in prokaryotes. Post-transcriptional modifications of mRNA, rRNA and tRNA. Inhibitors of transcription. Reverse transcription.

UNIT-IV

Translational activation of amino acids, initiation, elongation and termination of protein synthesis in prokaryotes. Inhibitors of protein synthesis. Post translational modification of proteins. Genetic code - definition, deciphering and salient features of genetic code. Composition of prokaryotic and eukaryotic ribosomes. Structure of t-RNA. Coding and non coding strands of DNA. Role of signal peptides.

UNIT - V

DNA repair mechanism-excision, SOS and UV repair. Prokaryotic gene regulation – Operon concept, Lac operon, positive and negative control. Gene mutation types - point, transition, transversion, frame shift, insertion and deletion.

References:

1. Genes VIII 2004. Benjamin Lewin, Oxford Univ press.
2. Cell and Molecular Biology - 3rd Edition (2002).G Karp. John Wiley and Sons N.Y
3. Molecular cell biology - David Freifielder 2nd Edition, Narosa publishing House.
4. Lehninger's principle of Biochemistry (2000), Nelson and Cox.
5. Harper's Biochemistry - Rober K. Murray, Daryl K.Grammer, McGrawHill, Lange Medical Books
6. Biochemistry of Nucleic acids - Adam et al
7. Molecular biology - SC Rastogi CBS publishing 2nd Edition
8. Cell biology and Genetics - P.S. Verma and V.K.Agarwal, S. Chand publication
9. Advanced molecular cell biology - R.M.Twyman.W.wisden Viva book House Yadav - Ist Edition 1998.
10. Genetics - Manju yadav Ist Edition 2003, Discovery publishing House.

PAPER – 7

HUMAN PHYSIOLOGY AND NUTRITIONAL BIOCHEMISTRY

UNIT-I: Respiratory and Circulatory Systems

Respiratory System: Components of transport of Oxygen and Carbon dioxide, Role of hemoglobin in transport. Mechanism of respiration, Chloride shift, Bohr's effect.

Circulatory System: Structure and functions of Heart, Blood vessels and its types, cardiac cycle, factors controlling blood pressure, electrocardiogram.

UNIT-II: Digestive and Excretory systems

Digestive system: Components of Digestive system, Digestion, absorption of carbohydrates, proteins and lipids. Mechanism of HCl formation, Role of various enzymes involved in digestive process.

Excretory System: Physiology of excretion, Kidney, GFR, Urine formation, Urine concentration, Micturition, Renin-Angiotensin system.

UNIT-III: Endocrine and Nervous systems

Endocrine glands: Hormones and its types, Functions of hormones. Brief outline of various endocrine hormones and their functions.

Nervous System: Brain, spinal cord, nerve cells, and nerve fibers. Synapse, chemical and electrical synapses, nerve impulses, action potential and neurotransmission.

UNIT-IV: Nutrition and Dietary Systems

Definition of food nutrition, basic food groups, Physiological role and nutritional significance of carbohydrates, protein, lipids, vitamins and minerals. Protein calorific malnutrition – Aetiology, management of Marasmus and Kwashiorkor. Nutrigenetics, Nutrigenomics (brief outline).

UNIT-V: Nutritive and Calorific Value of Food

Unit of energy measurements of food stuffs by Bomb colorimeter, calorific value and RQ of food stuffs. Basic metabolic rate (BMR) - its measurements and influencing factors, SDA of food. Essential amino acids. Nutritive value of protein. Composition of balanced diet for infants, pregnancy and lactating women and old age.

References :

1. Human physiology, 2nd edition- BJ Mejer, HS Meij, AC Meyer, AITBs publishers and distributors.
2. Cell physiology by Giese, 5th edition, W.B saunderscompany, Tokyo, Japan.
3. A text book of animal physiology, KA Goel, KV Sastri, Rastogi publications Meerut.
4. Animal physiology and Biochemistry- RA Agarval, Anil. K, Srivastava, Kausshal Kumar, S. Chand & Co.
5. A Hand Book of Basic Human physiology- K. Saradha subramanyam, S. Chand & Co., Ltd.
6. Guide to physiology- Y. Rajakshmi, S. Chand & Co., Ltd.

ELECTIVE

PAPER – 1

MEDICAL LABORATORY TECHNOLOGY – I

UNIT-I: Laboratory care and instrumentation

Code of conduct for laboratory personnel - safety measures in the laboratory-chemical/Reagents, labelling, storage and usage. First Aid in laboratory accidents - Precautions and first aid equipments.

UNIT-II: Laboratory equipments

Working of microscope - Phase contrast, Fluorescence, Electron microscope. Centrifuge, analytical balance, colorimeter - Usage and care. Glass wares, serological water bath, incubator.

Reporting laboratory tests and keeping records. Sterilization, preparation of reagents. General approach to quality control, quality control of quantitative data.

UNIT-III: Urine Analysis

Composition, collection, preservation, gross examination, interfering factors, chemical examination. Significance of sugar in urine, ketone bodies in urine, bile pigments, hematuria, uric acid, microscopic examination of the urinary sediment.

UNIT- IV: Stool Examination

Specimen collection- inspection of faeces- odour, pH, Interfering substance. Test for occult blood, faecal fat, microscopic examination of stool specimen.

UNIT-V: Clinical Hematology

Collection of blood - Anticoagulant, preservation, Estimation of Hb, PCV, WBC, RBC, Platelets, ESR. Clotting time, bleeding time - normal value, clinical interpretation.

SKILLED BASED SUBJECT

PAPER – 3

BIOSTATISTICS – I

UNIT - I

Nature and scope of statistical methods and their limitations. Collection, classification, tabulation of statistical data.. Organization of data - Individual series, discrete series, continuous series / class interval. Diagrammatic and graphical representation of statistical data (bar diagram, line diagram, pictogram, histogram & horizontal and vertical bar diagram).

UNIT - II

Measure of central tendency - Introduction, Characteristics of a good average, Mean, Median, Mode (Raw, Discrete & Continuous data) Merits and demerits.

UNIT - III

Measure of Dispersion- Introduction, definition, classification & properties. Range - Introduction, definition, location of range in individual, discrete, continuous series, merits and demerits of Range. Standard deviation, Variance, Coefficient of Variation.

UNIT - IV

Probability - Introduction, Definition, Kinds of Probabilities. Sample Space - Addition and Introduction, definition of mean deviation, quartile deviation – simple problems. Permutation and Combination - Definition, Factorial symbol, formula with example.

UNIT - V

Correlation Analysis - Introduction, Definition, uses, correlation and causation, kinds of correlation. Types of correlation - Positive and negative, linear and non linear, simple and multiple, partial and total correlation.

Books for References:

1. Sundar Rao - Biostatistics.

2. Daniel - Biostatistics, John wiley & sons

3. Lewis, A. E (1971) - Biostatistics

4. Gupta S.P,(1997) Biostatistical Methods, S. Chand & Sons

5. Sundar Rao P.S.S, Jesudian.G& Richard.J [1987], An Introduction for Biostatistics [2nd edition] Prestographit, vellore, India

6. Biostatistics - P. Rama Krishna, Saras Publication [1995].

7. elhance D.N [1972], Fundamentals of statistics kitab mahal, allahabad.

8. Lewis, A.E [1971]- Bio-Statistics.

9. Daniel: Biostatistics, John Wiley 7 Sons.

10. Zar. J - BioStatistical analysis, prentice Hall of India.

SEMESTER VI

PAPER – 8

CLINICAL BIOCHEMISTRY

UNIT-I: Diseases related to carbohydrate metabolism

Regulation of blood sugar, Glycosuria - types of glycosuria. Oral glucose tolerance test in normal and diabetic condition. Diabetes mellitus and Diabetes insipidus - hypoglycemia, hyperglycemia. Ketonuria, ketosis.

UNIT-II: Diseases related to lipid and lipoproteins metabolism

Lipids and lipoproteins: Classification, composition, mode of action.Cholesterol - Factors affecting blood cholesterol level. Dyslipoproteinemias, IHD, atheroscelorosis- risk factor, fatty liver.

UNIT-III: Inborn errors of metabolism

Introduction - clinical importance, phenyl ketonuria, cystinuria, alkaptonuria, Fanconi's syndrome, galactosemia, albinism, tyrosinemia and hemophilia.

UNIT-IV: Organ function test

Liver function tests: Metabolism of bilirubin, jaundice - types, differential diagnosis. Liver function test - Icteric index, Vandenberg test, plasma protein changes, PT.

Renal function tests: Clearance test – Urea, Creatinine, Inulin, PAH test, Concentration and dilution test.

Gastric function tests: Collection of gastric contents, examination of gastric residuum, FTM, stimulation test, tubeless gastric analysis.

UNIT-V: Clinical enzymology

Functional and non-functional plasma enzymes. Isoenzymes with examples. Enzyme patterns in acute pancreatitis, liver damage, bone disorder, myocardial infarction and muscle wasting.

References:

1. Text book of Clinical Biochemistry - Carl A. Burdis and Edward R Ashwood
2. Text book of Medical Biochemistry - Dr. M.N. Chatterjee and rane shinde
3. Clinical chemistry in diagnosis and treatment - Philip D. Mayne
4. Clinical chemistry – William Hoffman
5. Clinical Biochemistry with clinical correlation – Devin, Wiley
6. Practical clinical biochemistry – Harold Varley, CBS, New Delhi

PAPER – 9

BIOTECHNOLOGY

UNIT – I

Biotechnology: Definition and scope, types and branches of biotechnology. Enzymes for in vitro manipulation - Restriction endonucleases, SI nucleases, DNA ligases, Alkaline phosphatase, Reverse transcriptase, DNA polymerase, polynucleotide kinase, terminal transferase. Use of Linkers and Adapters. Cloning vectors, Plasmids - properties of ideal vectors and its types – pBR322, pUC18, pUC19. Bacteriophage ʎ, Cosmid, YAC, and Shuttle vector.

UNIT - II

Methods of gene transfer - transfection, microinjection, electroporation. Recombinant selection and screening methods, Insertional inactivation. Blotting Techniques - Southern, Northern and Western blotting techniques, DNA hybridization techniques, PCR.

UNIT - III

Plant tissue culture - Media composition, nutrients, growth regulators, initiation and differentiation. Callus and suspension culture. Micro propagation, Somatic embryogenesis and somoclonal variation. Protoplast isolation, protoplast fusion and regeneration of plants.

UNIT - IV

Equipments and requirements for animal cell culture - laminar flow, CO_2 incubator, natural media, synthetic media, substrate for cell culture, substrate treatment, disaggregation of tissues, Cell lines – types and properties.

UNIT - V

Applications of genetic engineering: Transgenic plants, transgenic mice (SCID and KNOCK OUT mice), transgenic sheep, transgenic fish, diagnostic and therapeutic applications of monoclonal antibodies.

References:

1. Concept in biotechnology - D. Balasubraniam et al., Universal press India 1996.
2. Plant tissue culture - Razdan, Oxford IBH Publisher.
3. Animal cell culture - Freshney, IRL Press.
4. Animal Biotechnology - 2005. A.K. Srivastava, R.K. Singh and M.P. Yadav Oxford & IBH.
5. Molecular biotechnology 2006 - Channarayappa Univ. Press
6. Molecular Biology & Biotechnology - H.D. Kumar(1997), Vivas publishing house Pvt .Ltd
7. Molecular biotechnology - principle and application of recombinant DNA 3rd edition Bernard, R. Glick Jack, J. Pasternak 2003, Library of Congress cataloging in publication data.
8. A text book of Biotechnology - R. C. Dubey, S. Chand & co
9. Biotechnology - Prakash S. Lohar, MJP publisher, Chennai -5.

CORE PRACTICAL – III

COLORIMETRIC ESTIMATION

1. Estimation of creatinine by Jaffe's method.
2. Estimation of urea by Diacetyl monoxine method.
3. Estimation of glucose by Folin Wu method
4. Estimation of glucose by O- Toludine method

EXPERIMENTS ON ENZYMES

1. Effect of pH, temperature and substrate concentration and determination of Km for amylase and Urease.
2. Assay of activity of alkaline phosphatase in serum.
3. Assay of serum Transaminases (SGOT, SGPT).

BIOTECHNOLOGY EXPERIMENTS

1. Preparation of media – liquid, solid, slant
2. Culture techniques – streak plate, pour plate, spread plate
3. Immuno diffusion – single diffusion

DEMONSTRATION EXPERIMENTS

1. Separation of proteins by SDS-PAGE
2. Isolation of plasmid DNA and separation by electrophoresis

ELECTIVE

PAPER – 2

MEDICAL LABORATORY TECHNOLOGY – II

UNIT - I: Blood Banking

Blood grouping- ABO System, ABO Grouping, Rh typing. Coomb's test. Blood transfusion - Blood donors, donor screening, drawing of blood, compatibility testing, cross matching, blood transfusion complications.

UNIT - II: CSF and Other Body Fluids

Cerebrospinal fluid analysis. Semen analysis, sputum examination, pregnancy test - Interpretation.

UNIT - III: Endocrine Function Test

Thyroid function test - thyroid hormones and its function. Clinical disorder - diagnosis.T_4, ^{131}I Uptake, TSH, Stimulation test, FT_4, FTI, TSH, TBG.

UNIT - IV: Medical Parasitology

Amoebiasis, malarial parasites – life cycle, pathogenesis of malaria – acute and chronic filariasis – diagnosis.

UNIT - V Medical Microbiology

Culturing of organisms from various specimens. Culture media and antibiotic sensitivity test (pus, urine, stool, sputum, throat swab, gram staining, Ziehl –Neilson staining (TB, Lepra bacilli). Safety procedure in microbiological techniques.

References:

1. Medical Laboratory Technology - K. Mukherjee. Vol. I, II, III. Tata Mcgraw-Hill Publishing Company Ltd.
2. Medical Laboratory Technology – V.H. Talib
3. Clinical Laboratory practices in CMC procedure, CMC, Vellore.
4. Medical Lab Technology - Ramnik Sood.

ELECTIVE

PAPER – 3

IMMUNOLOGY

UNIT - I

Immunity: Types of immunity-Innate and Acquired immunity, Humoral and cell mediated immune response, primary and secondary lymphoid organs, structure of T, B and NK cell, structure and function of Neutrophils, Eosinophils and Basophils, Macrophages – Phagocytosis and inflammation.

UNIT - II

Antigens: Properties, Specificity, Immunogenicity, antigenic determinants, haptens and adjuvants, Major Histocompatibility Complex [MHC]. Antibodies: Properties, Structure, Classes, Subclasses of Immunoglobins, Monoclonal antibodies - Production and its applications, complement pathways.

UNIT - III

Allergy and Hypersensitivity – types – I, II, III and IV and their clinical manifestations. Autoimmunity, mechanism of autoimmunity, Autoimmune diseases – Rheumatoid arthritis and Myasthenia gravis.

UNIT - IV

Transplantation – Immunologic response, Graft vs Host reaction, mechanism and prevention of graft rejection (skin), immunosuppressive drugs. Immunology of malignancy: Tumour antigens, immune response in malignancy and immunotherapy of cancer.

UNIT - V

Antigen and antibody interactions - precipitation and agglutination reactions, Precipitation in gel (Ouchterlony procedure, radial immunodiffusion, Immuno electrophoresis), Electro immunediffusion. RIA and ELISA.

References:

1. Immunology - J. Kannan, MJP Publishers, Chennai-5
2. Immunology - Roitt Ivan, Jonathan Brastoff, David Male, 1993.
3. Immunology - Janis Kuby, 4th edition, 2000.
4. Immunology - An introduction, Tizarrd, R. 1995.
5. Fundamentals of Immunology - Lippincot Praven publications, 4th edition.
6. Essential and clinical Immunology - Halen chapel, Mansal Haney, Siraj Misbah and Nial Snowdan.
7. Immunology - Geoffrey Zubay, W.M.C, Brown publishers, 4th edition 1992.
8. Immunology - The immune system in health and disease, 3rd edition.

ELECTIVE PRACTICAL

MEDICAL LABORATORY TECHNOLOGY

1. HAEMATOLOGY

Hematology – Haemoglobin by Sahli's method, RBC count, PCV, ESR, Total and differential WBC count, Platelet count, Blood grouping, ABO system, Rh System, Clotting time, Bleeding time.

Serology – VDRL, CRP, RA, HIV, HBsAg, Pregnancy test.

2. MICROBIOLOGY

Sterilization and disinfection, culture, gram staining, media preparation, antibiotic sensitivity testing

3. URINE AND FAECES ANALYSIS

1. Collection of urine and faecal samples
2. Faecal analysis to detect fats, undigested food and blood
3. Qualitative analysis of urine for normal and pathological conditions.

References:

1. Practical clinical Biochmistry - Harold Varley, CBS, New delhi
2. Medical Laboratory Technology – Kanai L. Mukherjee, Tata McGraw Hill Publication and co. ltd., Vol, I, II, III
3. Clinical chemistry – Ranjana Chawla
4. laboratory Manual in Biochemistry – Jayaraman
5. Biochemical methods – S.Sadasivan And Manickam
6. Introduction to practical biochemistry – David T. Plummer.

SKILLED BASED SUBJECT
PAPER – 4
BIOSTATISTICS – II

UNIT - I

Theoretical Distribution – Definition, Type of Theoretical Distribution, Binomial distribution and Poisson distribution- Definition, characteristics and Properties. Normal distribution, normal curve, standard Normal distribution - characteristics and Properties.

UNIT - II

Regression Analysis – Introduction, Definition, uses, types of regression- Positive and negative, linear and non linear, simple and multiple, partial and total. Regression equation – Regression equation of X on Y and Y on X.

UNIT - III

F-test and it's application, testing of Hypothesis – Null hypothesis, alternative hypothesis, standard error.

UNIT – IV

Chi- Square test- Introduction, Characteristics of Chi- Square test, Assumption, degree of freedom, application of chi- square test, t-test – Application and its Uses.

UNIT - V

Analysis of Variance- Introduction, techniques of Analysis of variance (ANOVA) – One way and two way classification, steps involved in analysis.

Books for References:

1. Sundar Rao- Biostatistics.
2. Daniel – Biostatistics, John wiley & sons
3. Lewis, A. E (1971) – Biostatistics
4. Gupta S.P,(1997) Biostatistical Methods, S. Chand & Sons
5. Sundar Rao P.S.S, Jesudian.G& Richard.J [1987], An Introduction for Biostatistics [2nd edition]
1. Prestographit, vellore, India
6. Biostatistics – P. Rama Krishna, Saras Publication [1995].
7. elhance D.N [1972], Fundamentals of statistics kitab mahal, allahabad.
8. Lewis, A.E [1971]- Bio-Statistics.
9. Daniel: Biostatistics, John Wiley & Sons.
10. Zar. J – BioStatistical analysis, prentice Hall of India.s

THIRUVALLUVAR UNIVERSITY

B.Sc., CHEMISTRY DEGREE COURSE

CBCS PATTERN
(With effect from 2017 - 2018)
The Course of Study and the Scheme of Examinations

S.NO.	Part	Study Components / Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper-1	6	6	General Chemistry - I	25	75	100
	III	Core Practical	Practical-1	3	0	Volumetric Analysis	0	0	0
4	III	Allied -1	Paper-1	4	4	**Any one from** 1. Physics –I 2. Botany –I 3. Zoology –I 4. Biochemistry – I 5. Mathematics – I*	25	75	100
	III	Allied Practical	Practical-1	3	0	Allied practical-1	0	0	0
5	IV	Environmental Studies		2	2	Environmental studies	25	75	100
				30	**20**		**125**	**375**	**500**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
6	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
7	II	English	Paper-2	4	4	English	25	75	100
8	III	Core Theory	Paper-2	6	5	General Chemistry - II	25	75	100
9	III	Core Practical	Practical-1	3	3	Volumetric Analysis	25	75	100
10	III	Allied-1	Paper-2	4	4	**Any one from** 1. Physics –II 2. Botany –II 3. Zoology –II 4. Biochemistry – II 5. Mathematics – II*	25	75	100
11	III	Allied Practical	Practical-1	3	2	Allied practical-1	25	75	100

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
12	IV	Value Education		2	2	Value Education	25	75	100
13	IV	Soft Skill		2	1	Soft Skill	25	75	100
				30	**25**		**150**	**650**	**800**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
14	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
15	II	English	Paper-3	6	4	English	25	75	100
16	III	Core Theory	Paper-3	3	3	General Chemistry – III	25	75	100
	III	Core Practical	Practical-2	3	0	Inorganic Qualitative Analysis & Preparations	0	0	0
17	III	ALLIED-2	Paper-3	4	4	**Any one from** 1. Physics –I 2. Botany –I 3. Zoology –I 4. Biochemistry – I 5. Mathematics – I*	25	75	100
	III	Allied Practical	Practical-2	3	0	Allied practical-II	0	0	0
18	IV	Skill Based Subject	Paper-1	3	3	Water Treatment and Analysis	25	75	100
19	IV	Non-Major Elective	Paper-1	2	2	Medicinal Chemistry	25	75	100
				30	**20**		**150**	**450**	**600**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
20	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
21	II	English	Paper-4	6	4	English	25	75	100
22	III	Core Theory	Paper-4	3	3	General Chemistry - IV	25	75	100
23	III	Core Practical	Practical-2	3	3	Inorganic Qualitative Analysis & Preparations	25	75	100
24	III	Allied-2	Paper-4	4	4	**Any one from** 1. Physics –II 2. Botany –II 3. Zoology –II 4. Biochemistry – II 5. Mathematics – II*	25	75	100
25	III	Allied Practical	Practical-2	3	2	Allied practical-II	25	75	100
26	IV	Skill Based Subject	Paper-2	3	3	Food Chemistry	25	75	100
27	IV	Non-Major Elective	Paper-2	2	2	Chemistry in Every Day Life	25	75	100
				30	**25**		**200**	**600**	**800**

S.NO.	Part	Study Components / Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
28	III	Core Theory	Paper-5	4	4	Inorganic Chemistry - I	25	75	100
	III	Core Practical	Practical-3	3	0	Gravimetric Estimation	0	0	0
29	III	Core Theory	Paper-6	4	4	Organic Chemistry – I	25	75	100
	III	Core Practical	Practical-4	3	0	Organic Analysis and Preparations	0	0	0
30	III	Core Theory	Paper-7	4	4	Physical Chemistry – I	25	75	100
	III	Core Practical	Practical-5	3	0	Physical Chemistry	0	0	0
31	III	Elective	Paper-1	3	3	**Any one from** A. Analytical chemistry – I B. Basis of computer programming in C and its applications in Chemistry C. Organic Synthesis	25	75	100
32	III	Elective	Paper - 2	3	3	**Any one from** A. Pharmaceutical Chemistry B. Polymer Chemistry C. Green Chemistry	25	75	100
33	IV	Skill Based Subject	Paper - 3	3	3	Applied chemistry	25	75	100
				30	**21**		**150**	**450**	**600**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
34	III	Core Theory	Paper-8	5	5	Inorganic Chemistry – II	25	75	100
35	III	Core Practical	Practical-3	3	3	Gravimetric Estimation	25	75	100
36	III	Core Theory	Paper-9	5	4	Organic Chemistry – II	25	75	100
37	III	Core Practical	Practical-4	3	3	Organic Analysis & Preparations	25	75	100
38	III	Core Theory	Paper-10	5	4	Physical Chemistry – II	25	75	100
39	III	Core Practical	Practical-5	3	3	Physical Chemistry Experiments	25	75	100
40	III	Elective	Paper-3	3	3	**Any one from** A. Analytical chemistry - II B. Textile chemistry C. Nano Chemistry	25	75	100
41	IV	Skill based Subject	Paper-4	3	3	Agriculture and Leather Chemistry	25	75	100
42	V	Extension Activities		-	1	Extension Activities	100	0	100
		TOTAL		**30**	**29**		**300**	**600**	**900**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester) *	2	4	8	100	200
	Allied (Even Semester) *	2	4	8	100	200
	Allied Practical (Even Semester)	2	2	4	100	200
	Electives	3	3	9	100	300
	Core (Theory & Practicals)	15	(3-6)	57	100	1500
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**42**		**140**		**4200**

* **Allied Mathematics**:

	Ins. Hrs/Week	Credit	CIA	University	Total Marks
Paper-1	7	4	25	75	100
Paper-2	7	6	25	75	100

if Mathematics is one of the Allied Subjects total no. of papers will be 41.

THIRUVALLUVAR UNIVERSITY

B.Sc., CHEMISTRY SYLLABUS UNDER CBCS

(With effect from 2017 - 2018)

SEMESTER I

PAPER – 1 GENERAL CHEMISTRY – I

Objective:

Basic concepts regarding Atomic Structure, Periodic Properties, Bonding Concepts, Ionic Bond, VSEPR and MO Theories, Nomenclature of Organic Compounds, Hybridisation, Reaction Intermediates, States of Matter, Principle of Volumetric Analysis, Related Problems and Applications wherever necessary are to be taught for I- Semester.

UNIT-I ATOMIC STRUCTURE

1.1 Quantum numbers n, l, m and s – Pauli's exclusion principle – Energy distribution and orbitals - Hund's rule of maximum multiplicity - Aufbau's principle - Electronic Configuration of elements - Stability of Half-filled and completely filled orbitals.

1.2 Classification of elements – General characteristics of s, p, d and f- Block elements – Periodicity of properties- Definition and Periodicity of the following properties – Atomic radii and Ionic radii - Factors affecting the Atomic radii and Ionic radii.

1.3 Ionisation potential, Electron affinity and Electronegativity - Factors affecting the Ionisation potential, Electron affinity and Electronegativity – Pauling scale – Mulliken electronegativity scale – Applications of Electronegativity regarding the Bonding nature.

UNIT- II CHEMICAL BONDING

2.1 Ionic bond - Conditions for the formation of ionic bond - General properties – Energetics of formation of NaCl from Na^+ and Cl^- - Hydration energy, Lattice energy and their applications – Born-Haber cycle - Fajan's rule - Characteristics of Electrovalent compounds.

2.2 Valence Bond Theory - Conditions for the formation of covalent bond - General properties - Polarity of bonds - Orbital overlap - Bond lengths and Bond energies - Hybridisation - Sigma and Pi bonds - VSEPR theory - Geometries of BF_3 , NH_3 , H_2O, PCl_5 and SF_6 molecules - Partial ionic character of covalent bond - Percentage of ionic character.

2.3 Molecular Orbital theory – Bonding and Anti-bonding orbitals - Relative order of Energies of molecular orbitals - MO diagram of H_2, He_2, O_2, N_2, F_2 and CO - Bond Order - Stability and Magnetic properties of the molecules - Comparison of VB and MO theories.

UNIT- III BASIC CONCEPTS OF ORGANIC CHEMISTRY

3.1 Classification of Organic Compounds – Nomenclature of Organic Compounds – Functional Groups - Homologous Series - IUPAC Recommendations for Naming Simple Aliphatic and Alicyclic Compounds.

3.2 Basic concepts of bonding in organic chemistry - Hybridisation – Definition – Geometry of Molecules - Methane, Ethane, Ethylene, Acetylene and Benzene - Electron displacement effects - Inductive - Inductomeric - Electromeric – Mesomeric Effect - Resonance - Hyperconjugation and Steric Effects.

3.3 Cleavage of bonds - Homolytic and Heterolytic fission of carbon-carbon bond – Methods to determine the Reaction Mechanism - Reaction intermediates - Structure and Stability of Carbocations, Carbanions and Free radicals.

UNIT-IV STATES OF MATTER

4.1 Gaseous state - Kinetic gas equation - Derivation - Gas laws from the kinetic gas equation - Kinds of velocities - Mean, RMS, Most Probable Velocities - Calculation of molecular velocities - Maxwell's distribution of Molecular Velocities (No derivation) - Effect of Temperature on velocity distribution - Equipartition of energy - Heat capacity on molecular basis - Virial equation of state - Boyle temperature - Coefficient of Compressibility and Thermal expansion.

4.2 Liquid state - Density – Diffusion - Viscosity – Evaporation - Surface tension - Effect of temperature on surface tension - Parachor - Definition and Applications only - Coefficient of Viscosity - Effect of Temperature and Pressure - Liquid crystals - Classification and Molecular arrangements.

4.3 Solid State - Crystal lattices - Laws of Crystallography - Symmetry elements in crystals - Seven crystal systems - Unit cell - Space lattice - Bravais lattices - Law of Rational Indices - Miller indices.

UNIT-V PRINCIPLES OF VOLUMETRIC ANALYSIS

5.1 Definitions of Molarity, Molality, Normality and Mole Fraction - Their Calculations - Definition and Examples for Primary and Secondary standards - Calculation of Equivalent Weight of Acid, Base, Oxidising Agent, Reducing Agent and Salts.

5.2 Principles of Volumetric Analysis - Theories of Acid- Base, Redox, Complexometric Iodometric and Iodimetric titrations.

5.3 Theories of indicators - Acid-base indicators - Choice of indicators - Redox, Metal ion and Adsorption indicators.

ALLIED

1. PHYSICS - I

UNIT – I: PROPERTIES OF MATTER

Elasticity : Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula .

Surface Tension: Surface Tension – Surface Tension and interfacial surface tension by the method of drops.

UNIT – II: HEAT

Heat: Specific heat – Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power.
Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Super conductors. Type I and II – Meisner Effect – Helium I and II.

UNIT – III: ELECTRICITY AND MAGNETISM

Electricity: Potentiometer – Principle – Calibration of low range voltmeter – Measurement of internal resistance of cell – measurement of an unknown resistance.

Magnetism – Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer in Tan C position and the vibration magnetometer.

UNIT – IV: SOUND AND ACOUSTICS OF BUILDING

Sound: Transverse vibration of strings – Velocity and frequency of vibrations of a stretched string – laws – sonometer – A.C. Frequency – Steel Wire – Brass wire.

Ultrasonics – Production by Piezo – electric method – properties and uses.
Acoustics of buildings: Reverberation – Reverberation time – Sabine's formula (definition only) – Sound absorption co-efficient of surface – conditions for the perfect acoustics.

UNIT – V: OPTICS

Interference: Air Wedge – Description – Test for optical flatness of glass plate – Determination of diameter of a thin wire by air wedge.

Diffraction: Theory of transmission grating – Normal Incidence – Determination of Wavelength of monochromatic source and Wavelength of mercury line using a grating by normal Incidence.

Fibre optics: principle-classification of optical fibres-fibre optic communication system block diagram.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Introduction to Fibre optics- K.Thyagarajan and Ajay Ghatak,Cambridge,University Press(1999).

ALLIED

3. ZOOLOGY I

Objective:

To acquire knownledge about different kinds of animal species.

To study the systematic and fuctional morphology of invertebrates and chordates.

UNIT – I:
Type study includes life history.

Protozoa - Entamoeba, **Porifera** - Sycon. **Coelenterata** - Obelia geniculata. **Platyhelminthes** - Teania solium.

UNIT - II

Annelida - Earthworm, **Arthropoda** - Prawn, **Mollusca** - Fresh water mussel, **Echinodermata** - Sea star.

UNIT – III:
Type study includes Morphology, digestive system, respiratory system, circulatory system and urinogenital system of Chordate.

Chordata - Genaral charters, **Prochordata:** Morphology of Amphioxus. **Vertebrates: Pisces** - Shark.

UNIT - IV

Amphibia: Frog, **Reptiles:** Calotes

UNIT - V

Aves: Pigeon, **Mammalia:** Rabbit.

REFERENCES:

1. Ayyar, E.K. and T.N. Ananthakrishnan. 1992. Manual of Zoology. Vol I & II, S. Viswanathan (printers and publishers) Pvt. Ltd., Madras, 891 p.

2. Kotpal series, 1998 - 1992. Rastogi Publications, Meerut.

3. Jordan E.L. and P.S. Verma. 1993. Invertebrate Zoology 12th edition, S. Chand & Co., Ltd., New Delhi.

4. Jordan, E.L., and P.S. Verma. 1995. Chordate Zoology and Elements of Animal Physiology, S. Chand & Co., Ltd., New Delhi.

4. BIOCHEMISTRY I

UNIT-I: Chemistry of Carbohydrates

Definition and Classification of carbohydrate. Monosaccharides - occurrence, structure; physical and chemical properties, linear and ring forms (Haworth formula) for glucose and fructose. Disaccharides - occurrence, structure; physical and chemical properties of sucrose and lactose. Polysaccharides - occurrence, structure, physical and chemical properties of starch.

UNIT-II: Chemistry of amino acids

Definition and classification of amino acids. Reaction with ninhydrin, common properties of amino acids, amphoteric nature, isoelectric point, isoelectric pH and Zwitter ion.

UNIT-III: Chemistry of Proteins

Classification based on solubility, shape and size. Physical properties: salting in and salting out, denaturation, peptide bond. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT-IV: Chemistry of Lipids

Definition, classification and functions of lipids. Occurrence, chemistry and biological functions of simple lipids, compound lipids (e.g. phospholipids) and derived lipids: steroids (e.g. cholesterol). Physical property-emulsification. Chemical property-saponification. Functions of bile acids and bile salts.

UNIT-V: Chemistry of Nucleic acids

Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNA and its biological functions. Structure, types and functions of RNA: tRNA, mRNA and rRNA. Differences between DNA and RNA.

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan , MJP Publishers, Chennai - 5.

5. MATHEMATICS – I*

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ.

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates-Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.
3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

SEMESTER II

PAPER – 2

GENERAL CHEMISTRY - II

OBJECTIVES:

- Basic knowledge on s- and p- Block Elements, Group Study, Hydrocarbons, Cycloalkanes, Dienes, Quantum Chemistry, Thermochemistry, First Law of Thermodynamics, Derivation of Equations, Related Problems, Reaction Mechanism and Applications wherever necessary are to be taught for II- Semester.

UNIT-I s- and p- Block Elements

1.1 Alkali metals - Li, Na, K, Rb and Cs - Occurrence - Comparative study of Elements with respect to Oxides, Halides, Hydroxides and Carbonates - Exceptional property of Lithium - Diagonal Relationship of Li with Mg.

1.2 Alkaline earth metals - Be, Mg, Ca, Sr and Ba - Occurrence - Comparative study of the elements with respect to Oxides, Hydroxides, Halides, Sulphates and Carbonates - Exceptional property of Beryllium - Diagonal relationship of Be with Al - Comparison of Alkaline Earth Metals with Alkali Metals - Magnesium acting as bridge element between II A and II B groups - Magnesium resembles Zinc.

1.3 p- Block elements - Boron family - Group discussion - Anomalous behaviour of Boron - Diagonal Relationship between Boron and Silicon - Electron deficiency and Electron acceptor behaviour of Boron trihalides - Bonding in Diborane (Hydrogen-bridge structure) - Preparation, Properties, structure and Uses of Borazine - $NaBH_4$ - Preparation and Uses.

UNIT-II HYDROCARBONS

2.1 Alkanes - Methods of preparation of alkanes - Wurtz method, Kolbe's method and Reduction of alkyl halides - Physical and Chemical Properties of alkanes - Mechanism of Free Radical Substitution in alkanes – Halogenation and Reactivity.

2.2 Alkenes - Properties of alkenes – Electrophilic and Free radical addition - Addition reactions of Alkenes with mechanism - Addition of Hydrogen, Halogens, Hydrogen Halide (Markownikoff''s rule) - Hydrogen bromide (Peroxide effect) - Sulphuric Acid, Water, BH_3, Ozonolysis, Hydroxylation with $KMnO_4$ - Allylic substitution by NBS.

2.3 Alkynes - Acidity of alkynes - Addition of hydrogen - Hydroboration - Hydrohalogenation - Addition of hypohalous acid, Hydration - Addition of water with $HgSO_4$ catalyst - Oxidation with $KMnO_4$ – Ozonolysis - Formation of Acetylides.

UNIT-III DIENES AND CYCLOALKANES

3.1 Dienes – Classification - Conjugated, Isolated and Cumulative Dienes - Stability of Dienes - 1, 2- and 1, 4- Addition reactions of H_2 and HX with mechanisms – Synthesis of dienes – 1, 3 - Butadiene, Isoprene and Chloroprene - Diels-Alder reaction.

3.2 Cycloalkanes - Preparation using Wurtz's reaction, Dieckmann's ring closure and Reduction of aromatic hydrocarbons - Substitution and Ring opening reactions.

3.3 Stability of Alkanes, Alkenes and Cycloalkanes - Bayer's strain theory - Theory of Strainless rings.

UNIT-IV QUANTUM CHEMISTRY AND THERMOCHEMISTRY

4.1 Planck's Quantum theory of radiation - Photoelectric Effect - Compton Effect - Wave mechanical concept of the atom - de Broglie's relationship – Davisson and Germer experiment - Wave nature of electron - Heisenberg's Uncertainty Principle.

4.2 Schrodinger wave equation (Without derivation) - Significance of wave functions ψ and ψ^2 - Shapes of s, p and d- orbitals.

4.3 Thermodynamics - Definition and Explanation of terms - System, Boundary, Surroundings - Homogeneous and Heterogeneous systems - Isolated system - Closed system - Open system - Intensive and Extensive properties - State of a system - Independent state variables - Dependent state variables - Thermodynamic functions - State and Path functions.

UNIT-V THERMODYNAMICS

5.1 Thermodynamic processes - Types of processes - Cyclic - Reversible – Irreversible - Isothermal – Adiabatic Process - Exact and Inexact Differentials - Concept of Heat and Work - Zeroth Law of Thermodynamics.

5.2 First law of Thermodynamics - Statement and Equation – C_p and C_v Relationship - Calculation of W, Q, ΔE and ΔH for the Expansion of Ideal Gases under Reversible, Isothermal and Adiabatic Conditions.

5.3 Thermochemistry - Heat of a reaction - Exothermic and Endothermic reactions - Calculation of ΔH from ΔE and vice versa - Thermochemical equations - Bond dissociation energy - Calculation from thermochemical data - Variation of Heat of a reaction with temperature - Kirchoff's Equation and Its significance.

CORE PRACTICAL

Paper – 1

VOLUMETRIC ANALYSIS

Acidimetry

1. Estimation of Borax - Standard Sodium Carbonate

2. Estimation of Sodium Hydroxide - Standard Sodium Carbonate

3. Estimation of HCl – Standard Oxalic Acid.

Iodometry

4. Estimation of Copper - Standard Copper Sulphate

5. Estimation of Potassium Dichromate - Standard Potassium Dichromate

Complexometry

6. Estimation of Magnesium using EDTA.

7. Estimation of Zinc using EDTA

Dichrometry

8. Estimation of Ferrous Iron using Diphenyl amine / N- pPhenylanthranillic acid as indicator.

Precipitation titration

9. Estimation of Chloride in neutral medium (Demonstration experiment).

Permanganometry

10. Estimation of Ferrous Sulphate – Standard FAS.

11. Estimation of Oxalic Acid – Standard Oxalic Acid.

- Students must write Short Procedure for the given estimation in Ten Minutes during the examination and submit the Paper for Evaluation.

ALLIED – 2

1. PHYSICS II

UNIT – I: WAVE MECHANICS

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

UNIT – II : NUCLEAR PHYSICS

Particle accelerators – cyclotron, particle detectors – GM Counter Artificial Transmutation – Rutherford's Experiment – The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions.

Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy – Conservation of Parity – Quantities conserved and quantities not conserved in a nuclear reaction.

UNIT – III : ENERGY PHYSICS

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

UNIT – IV: CRYSTALLOGRAPHY

Crystallography : The crystal structure – Unit Cell –Bravais lattice- structures of simple cubic-BCC and FCC- co ordination number, packing factor calculation for the above structures –Hexogonal closed packed(HCP) structure -Miller indices – concept of Reciprocal Vectors.

UNIT – V: ELECTRONICS

Electronics: Transistor characteristics in common base and common emitter mode- Transistor single stage amplifier- Expression for input impedence, output impedence and current gain.
Digital Electronics : NAND and NOR as universal building blocks- De Morgan's theorem –statement and proof- Fabrication of diodes and transistors using Monolithic technology– limitations.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
9. Introduction to Solid State Physics – C. Kittel, 5^{th} Edition Wiley Eastern Ltd.
10. Renewable & Sustainable energy sources – Agarwal.

3. ZOOLOGY II

Objective:

To study the principles of cell biology, genetics, developmental biology, physiology, ecology and evolution.

UNIT - I

Cell Biology - structure of animal cell, **Genetics:** molecular structure of gene - gene function, sex linked inheritance. Genetic Engineering and its application.

UNIT - II

Embryology - cleavage and gastrulation of Amphioxus.

Human Physiology: Digestion, Circulation - blood components, structure of heart, heart function.

UNIT - III

Diseases of Circulatory system - blood pressure, heart disease - Ischemia, Myocardial Infarction, Rheumatic heart disease, stroke.

Excretion - structure of kidney and mechanism of urine formation.

UNIT - IV

Environmental Biology - Biotic factors and Abiotic factors, food chain and food web. Pollution - Environmental degradation, (Air, Water and Land) - Green house effect - Bioremediation, Biodegradation - Global warming - acid rain.

UNIT - V

Evolution: Theories of Lamarkism & Darwinism.

REFERENCES:

1. Ekambaranatha Ayyar, and Ananthakrishnan, T.N. 1993. Outlines of Zoology, Vol I & II, Viswanathan and Co, Madras.
2. Sambasiviah, I, Kamalakara Rao, A.P., Augustine Chellappa, S. 1983. Text book of Animal Physiology, S. Chand & Co., New Delhi.
3. Verma and Agarwal. 1983. Text book of animal Ecology, S. Chand & Co., New Delhi.
4. Verma and Agarwal and Tyagi. 1991. Chordate Embryology, S. Chand & Co., New Delhi.
5. Rastogi and Jayaraj. 2000. Text book of Genetics. Rastogi publications, Meerut.
6. Verma and Agarwal. 2000. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Co., New Delhi.

4. BIOCHEMISTRY II

UNIT-I: Metabolism

Glycolysis, TCA cycle and its energetics, HMP shunt pathway. Deamination, transamination reaction, transaminase enzymes, Urea cycle.

UNIT-II: Metabolic Disorders

Diabetes mellitus, Glycogen storage diseases, Glycosuria, Ketosis, Jaundice, Phenyl ketonuria, Alkaptonuria. Dehydration: definition, causes, symptom and prevention.

UNIT-III: Enzymes

Definition, classification of enzymes with one example. Mechanism of enzyme action - Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Enzyme inhibition: competitive, uncompetitive and non competitive. Biological functions of enzymes.

UNIT-IV: Molecular Biology

Central dogma of molecular biology. DNA and RNA act as genetic material. Replication: Definition, types, mode of action of replication, mechanism of replication. General mechanism of transcription and translation. Genetic code.

UNIT-V: Vitamins

A brief outline of source, requirement, biological function and deficiency of Vitamins (fat soluble and water soluble vitamins).

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Robert K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan, MJP Publishers, Chennai-5.

5. MATHEMATICS – II*

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume -Fourier series for functions in $(0,2\pi)$ and $(-\pi, \pi)$.

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Guass, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

ALLIED PRACTICAL

1. PHYSICS

(Any 15 Experiments)

1. Young's modulus – non uniform bending – pin and microscope.
2. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
3. Ridigity modulus – Torsional oscillation method (without symmetric masses).
4. Determination of Co-efficient of Viscosity – Graduated Burette.
5. Surface Tension and Interfacial Tension – By drop weight method.
6. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
7. Sonometer – Determining A.C. Frequency. (Screw Gauge is given).
8. Sonometer – frequency of tuning fork.
9. Newton's Rings – Radius of Curvature.
10. Air Wedge – Determination of thickness of thin wire.
11. Spectrometer Grating – Minimum Deviation – Mercury Lines.
12. Spectrometer – Refractive Index of a liquid – Hollow Prism.
13. Potentiometer – Calibration of High Range Ammeter.
14. Potentiometer – Calibration of Low Range Voltmeter.
15. Determination of M and B_H using Deflection Magnetometer in Tan C position and vibration magnetometer.
16. Figure of merit and voltage sensitiveness of table galvanometer.
17. Construction of AND, OR gates using diodes and NOT by transistors.
18. Zener diode – Voltage Regulation.
19. NAND / NOR as universal gate.
20. Demorgan's theorem verification.

3. ZOOLOGY

I - MAJOR PRACTICAL

DISSECTIONS

Cockroach: Digestive and nervous system

Prawn: Nervous system

II - MINOR PRACTICAL

MOUNTING

1. Mouth parts of **Mosquito** and **Honey bee**

2. **Earthworm** - Body setae

3. Placoid scales of **shark**

III - SPOTTERS

Entamoeba, Sycon, Obelia, Taenia solium (entire, scolex) earthworm (entire, Pineal setae) Prawn (entire), Fresh water mussel, Sea star, Amphioxus - Entire, Amphioxus - T.S. through pharynx, Shark, Frog, Calotes, Pigeon, feathers of pigeon and Rabbit.

Sphygnomanometer, Stethoscope, Rain gauge.

REFERENCES:

1. Verma. P.S. 2011. A manual of practical Zoology - INVERTEBRATES. Chand & Co., Ltd., Ram Nagar, New Delhi.
2. Verma. P.S. 2011. A manual of practical Zoology - CHORDATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

ALLIED PRACTICAL

4. BIOCHEMISTRY I & II

PRACTICAL I

Volumetric Estimation

1. Estimation of HCl using Na2CO3 as link and NaOH as primary standard.

2. Estimation of Iron in Ferrous Ammonium Sulphate using potassium permanganate as link solution and oxalic acid as primary standard.

3. Estimation of Glucose by Benedict's method.

4. Estimation of Glycine by formal titration.

5. Estimation of Ascorbic acid.

SEMESTER – III

PAPER – 3

GENERAL CHEMISTRY – III

OBJECTIVE:

Basic concepts regarding the Principles of Inorganic Analysis and Applications of Qualitative Analysis, Types of Solvents, p- Block Elements, Group Study, Aromaticity, Electrophilic and Nucleophilic Substitution Reactions, Elimination Reactions, Reaction Mechanism, Second Law of Thermodynamics, Derivation of Equations, Related Problems and Applications wherever necessary are to be taught for III semester.

UNIT-I

1.1 Semimicro Techniques - Principles of Acid-Base Equilibria - Common ion effect - Solubility Product and its Applications in Qualitative Analysis - Principles of Inorganic Analysis.

1.2 Reactions involved in the Separation and Identification of Cations and Anions in Qualitative analysis - Spot test reagents - Aluminon, Cupferon, DMG, Thiourea, Magneson, Alizarin and Nessler's reagent.

1.3 Types of solvents - Protic and Aprotic solvents - Amphiprotic / Amphoteric solvents - Aqueous and Non-aqueous solvents - Liquid Ammonia as a solvent.

UNIT-II

2.1 Carbon family – Group study - Comparative study of Elements with respect to Valency, Oxides, Halides, Hydrides and Oxyacids - Catenation - Comparison of Properties of Carbon and Silicon – Silicates - Classification and Structure - Silicones- Preparation, Properties and Uses.

2.2 Nitrogen family - Group study - Comparative study of N, P, As, Sb and Bi with respect to Oxides, Oxyacids, Halides and Hydrides – Hydrazine and Hydroxylamine - Preparation, Properties, Structure and Uses.

2.3 Oxygen family - Group study - Comparative study of O, S, Se and Te with respect to Catenation, Oxides, Halides, Hydrides and Oxyacids - Anomalous Behaviour of Oxygen - Oxyacids of Sulphur (Structure only) - Peracids of Sulphur - Preparation, Properties and Structure - Differences Between Permonosulphuric Acid and Perdisulphuric Acid.

UNIT-III

3.1 Aromaticity - Modern Theory of Aromaticity - Huckel's (4n +2) Rule and Its Simple Applications to Benzenoid and Non- benzenoid Compounds.

3.2 Electrophilic substitution reactions in Aromatic Compounds - Mechanisms of Nitration, Halogenations, Sulphonation, Friedel-Crafts Acylation and Alkylation.

3.3 Directive influence - Orientation - Ortho/Para ratio - Nuclear and Side chain Halogenation.

UNIT-IV

4.1 Aliphatic Nucleophilic Substitutions - Mechanisms of S_N1, S_N2 and S_Ni Reactions – Effect of Structure of Substrate, Solvent, Nucleophile and Leaving Group.

4.2 Elimination reactions - Mechanism of E1 and E2 reactions - Hoffmann and Saytzeff''s rules - Cis and Trans Eliminations.

4.3 Aromatic Nucleophilic Substitutions - Unimolecular Nucleophilic Substitution, Bimolecular Nucleophilic Substitution and their Mechanism.

UNIT-V

5.1 Second Law of Thermodynamics - Need for the II Law of Thermodynamics - Spontaneous Process – Criteria of Spontaneity - Different Forms of Statements of the Second Law – Cyclic Process – Definition - Heat Engines.

5.2 Carnot's cycle - Efficiency - Carnot's theorem (Statement only) - Concept of Entropy - Definition and Mathematical Statement - Randomness and Entropy – Standard Entropy - Derivation of Entropy from Carnot Cycle.

5.3 Entropy change of an Ideal Gas during Isothermal Process - Entropy changes in Cyclic, Reversible and Irreversible Processes - Entropy Changes in Physical Transformations - Calculation of Entropy Changes with Changes in T, V and P - Entropy of Mixing of Ideal Gases – Physical Significance of Entropy.

ALLIED

1. PHYSICS - I

UNIT – I: PROPERTIES OF MATTER

Elasticity : Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula .

Surface Tension: Surface Tension – Surface Tension and interfacial surface tension by the method of drops.

UNIT – II: HEAT

Heat: Specific heat – Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power.
Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Super conductors. Type I and II – Meisner Effect – Helium I and II.

UNIT – III: ELECTRICITY AND MAGNETISM

Electricity: Potentiometer – Principle – Calibration of low range voltmeter – Measurement of internal resistance of cell – measurement of an unknown resistance.

Magnetism – Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer in Tan C position and the vibration magnetometer.

UNIT – IV: SOUND AND ACOUSTICS OF BUILDING

Sound: Transverse vibration of strings – Velocity and frequency of vibrations of a stretched string – laws – sonometer – A.C. Frequency – Steel Wire – Brass wire.

Ultrasonics – Production by Piezo – electric method – properties and uses.
Acoustics of buildings: Reverberation – Reverberation time – Sabine's formula (definition only) – Sound absorption co-efficient of surface – conditions for the perfect acoustics.

UNIT – V: OPTICS

Interference: Air Wedge – Description – Test for optical flatness of glass plate – Determination of diameter of a thin wire by air wedge.

Diffraction: Theory of transmission grating – Normal Incidence – Determination of Wavelength of monochromatic source and Wavelength of mercury line using a grating by normal Incidence.

Fibre optics: principle-classification of optical fibres-fibre optic communication system block diagram.

Books for Study & Reference

9. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
10. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
11. Allied Physics – Prof. Dhanalakshmi and others.
12. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
13. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
14. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
15. Modern Physics – R. Murugesan S. Chand & Co. (2004).
16. Introduction to Fibre optics- K.Thyagarajan and Ajay Ghatak,Cambridge,University Press(1999).

ALLIED

3.ZOOLOGY I

Objective:

To acquire knownledge about different kinds of animal species.

To study the systematic and fuctional morphology of invertebrates and chordates.

UNIT – I:
Type study includes life history.

Protozoa - Entamoeba, **Porifera** - Sycon. **Coelenterata** - Obelia geniculata. **Platyhelminthes** - Teania solium.

UNIT - II

Annelida - Earthworm, **Arthropoda** - Prawn, **Mollusca** - Fresh water mussel, **Echinodermata** - Sea star.

UNIT – III:
Type study includes Morphology, digestive system, respiratory system, circulatory system and urinogenital system of Chordate.

Chordata - Genaral charters, **Prochordata:** Morphology of Amphioxus. **Vertebrates: Pisces** - Shark.

UNIT - IV

Amphibia: Frog, **Reptiles:** Calotes

UNIT - V

Aves: Pigeon, **Mammalia:** Rabbit.

REFERENCES:

1. Ayyar, E.K. and T.N. Ananthakrishnan. 1992. Manual of Zoology. Vol I & II, S. Viswanathan (printers and publishers) Pvt. Ltd., Madras, 891 p.

2. Kotpal series, 1998 - 1992. Rastogi Publications, Meerut.

3. Jordan E.L. and P.S. Verma. 1993. Invertebrate Zoology 12th edition, S. Chand & Co., Ltd., New Delhi.

4. Jordan, E.L., and P.S. Verma. 1995. Chordate Zoology and Elements of Animal Physiology, S. Chand & Co., Ltd., New Delhi.

4. BIOCHEMISTRY I

UNIT-I: Chemistry of Carbohydrates

Definition and Classification of carbohydrate. Monosaccharides - occurrence, structure; physical and chemical properties, linear and ring forms (Haworth formula) for glucose and fructose. Disaccharides - occurrence, structure; physical and chemical properties of sucrose and lactose. Polysaccharides - occurrence, structure, physical and chemical properties of starch.

UNIT-II: Chemistry of amino acids

Definition and classification of amino acids. Reaction with ninhydrin, common properties of amino acids, amphoteric nature, isoelectric point, isoelectric pH and Zwitter ion.

UNIT-III: Chemistry of Proteins

Classification based on solubility, shape and size. Physical properties: salting in and salting out, denaturation, peptide bond. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT-IV: Chemistry of Lipids

Definition, classification and functions of lipids. Occurrence, chemistry and biological functions of simple lipids, compound lipids (e.g. phospholipids) and derived lipids: steroids (e.g. cholesterol). Physical property-emulsification. Chemical property-saponification. Functions of bile acids and bile salts.

UNIT-V: Chemistry of Nucleic acids

Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNA and its biological functions. Structure, types and functions of RNA: tRNA, mRNA and rRNA. Differences between DNA and RNA.

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan , MJP Publishers, Chennai - 5.

5.MATHEMATICS – I*

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ.

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates-Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

6. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
7. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.
8. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai
9. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
10. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

SKILL BASED SUBJECT

PAPER – 1

WATER TREATMENT AND ANALYSIS

Objective:

- To impart knowledge about the various methods of Water Analysis and Treatment of Water.

UNIT-I

1.1 Introduction - Characteristics of water - Alkalinity - Hardness - Unit of hardness – Total solids - Oxidation - Transparency - Silica content.

1.2 Purification of Water for drinking purpose - Potability of water – Clarification - Coagulation - Contact and Electrochemical Coagulation.

1.3 Sterilisation and Disinfection of water - Precipitation - Aeration - Ozonisation - Chlorination.

UNIT-II

2.1 Water Softening Methods - Clark's process - Lime soda process - Modified lime soda process - Permutit or Zeolite process - Ion exchange process - Demineralisation of water.

2.2 Determination of Hardness of water - Titration method - Complexometric method using EDTA - Expressing Hardness.

2.3 Equivalents of Calcium Carbonate - Problems to determine Temporary and Permanent Hardness.

UNIT-III

3.1 Hard water and Industries - Industrial water treatment - Boiler feed water method of Softening - Prevention of plumbo solvency - Scales in boilers - Consequences - Internal conditioning methods.

3.2 Desalination of Brackish water - Elecrodiaysis - Reverse osmosis - Removal of Fe, Mn and Silicic acid.

3.3 Effluent Treatment of Water from Paper Industry, Petrochemicals, Fertilizer industry and Power station.

UNIT-IV

4.1 Water analysis - Sampling of Water for analysis - Chemical Substances affecting Potability - Colour, Turbidity, Odour, Taste, Temperature, pH and Electrical Conductivity.

4.2 Analysis of Solids present in water - Suspended Solids - Dissolved Solids - Total Acidity - Alkalinity - Free CO_2 - Free Chlorine - Ca, Mg, Fe, Mn, Ag and Zn.

4.3 Water in Industry – Pollution of Water by Fertilisers, Detergents, Pesticides and Industrial wastes.

UNIT-V

5.1 Analysis of Chemical Substances Affecting Health - NH_3, Nitrate, Nitrite, Cyanide, Sulphate, Sulphide, Chloride and Fluoride.

5.2 Measurement of Toxic Chemical Substances - Analysis of Chemical Substances indicative of Pollution - Dissolved oxygen - Biochemical Oxygen Demand (BOD) - Chemical Oxygen Demand (COD)

5.3 Bacteriological Examination of Water - Total Count Test - E. coli test - E. coli index - Most Probable Number method - Biological Examination of Water - Physical Examination of Water - Radioactivity of Water - Methods of removing Radioactivity from Water.

Reference Books

1. Industrial Chemistry (Including Chemical - Engineering) - B. K. Sharma - Goel Publishing House, Meerut (1987).

2. Pollution Control in Process Industries - S. P. Mahajan - Tata McGraw Hill Publishing Company Ltd., New Delhi (1991).

3. Water Pollution and Management - C. K. Varashney - Wiley Eastern Ltd., Chennai -20 (1991).

NON-MAJOR ELECTIVE

PAPER – 1

MEDICINAL CHEMISTRY

Objectives:

- To learn the basic idea of Drugs and Names of Common Drugs, Blood, Blood Pressure, Diabetes, AIDS, Vitamins, Indian Medicinal Plants and First Aid.

UNIT-I

1.1 Clinical Health and Biochemical Analysis - Definition of Health - WHO standard.

1.2 Sterilisation of Surgical Instruments - Biochemical Analysis of Urine and Serum.

1.3 Blood – Composition of Blood - Blood grouping and Rh factor.

UNIT-II

2.1 Common Drugs - Antibiotics, Antipyretics and Analgesics - Examples, Uses and Side effects.

2.2 Anti-inflammatory agents, Sedatives, Antiseptics and Antihistamines - Examples, Uses and Side effects.

2.3 Tranquilizers, Hypnotics and Antidepressant drugs - Definition, Examples, Uses and Side effects.

UNIT-III

3.1 Vital Ailments and Treatment - Blood pressure - Hypertension and Hypotension.

3.2 Diabetes, Cancer, AIDS - Causes, Symptoms and Treatment.

3.3 Vitamins – Classification of Vitamins – Sources and Deficiency diseases caused by Vitamins.

UNIT-IV

4.1 Indian Medicinal Plants - Palak, Vallarai, Kizhanelli and Thumbai - Chemical Constituents and Medicinal Uses.

4.2 Hibiscus, Adadodai, Thoothuvalai – Chemical Constituents and Medicinal Uses.

4.3 Nochi, Thulasi, Aloe Vera - Chemical Constituents and Medicinal Uses.

UNIT- V

5.1 First Aid and Safety - Treatment of Shock, Haemorrage, Cuts and Wounds.

5.2 Burns - Classification - First Aid.

5.3 Asbestos, Silica, Lead Paints, Cement, Welding fumes and Gases - Hazard alert and Precautions for Safety.

Reference Books

1. Applied Chemistry, Jayashree Ghosh - S. Chand and Company Ltd., 2006

2. Biochemistry, S. C. Rastogi - Tata McGraw Hill Publishing Co., 1993.

3. Medicinal Plants of India, Rasheeduz Zafar - CBS Publishers and Distributors, 2000.

4. Hawk's Physiological Chemistry, B. L. Oser - Tata-McGraw Hill Publishing Co. Ltd.

5. Practical Pharmaceutical Chemistry, A. H. Beckett and J. B. Stenlake - Vol. I - CBS Publishers and Distributors, 2000.

SEMESTER – IV

PAPER – 4

GENERAL CHEMISTRY – IV

OBJECTIVE:

Noble gases, Carboxylic Acids, Amines, Alcohols, Phenols, Naphthols, Important Name Reactions, Mechanism, Thermodynamics, Derivation of Equations, Partial Molar Properties, Chemical Potential, Related Problems and Applications are to be taught for IV semester.

UNIT-I

1.1 Noble gases - Electronic Configurations – Position of Noble Gases in the Periodic Table - Chemical inertness of Noble gases – Reason.

1.2 Compounds of Xenon - Hybridization and Geometry of XeF_2, XeF_4, XeF_6 and $XeOF_4$ (Preparation, Properties – Not necessary).

1.3 Clathrates - Definition and Applications - Uses of Noble gases.

UNIT-II

2.1 Monocarboxylic acids – Acetic acid and Benzoic acid – Preparation by Grignard method – Conversion of Acids to their derivatives – Amide, Ester, Anhydride and Acid Chloride – Strength of Carboxylic Acids – Effect of Substituents on the Strength of Acids.

2.2 Dicarboxylic acids – Oxalic acid, Malonic acid, Succinic acid, Glutaric acid and Adipic acid - Preparation – Properties – Action of Heat on Dicarboxylic acids.

2.3 Amines – Ethylamine and Aniline – Preparation – Basicity of Amines – Effect of Substituents on Basicity - Reactivity of Amines – Distinction between Primary, Secondary and Tertiary Amines.

UNIT-III

3.1 Alcohols – Preparation by Grignard method – Oxidation of alcohols – Difference between Primary, Secondary and Tertiary alcohols – Preparation and Properties of Allyl alcohol.

3.2 Phenols - Acidic character of phenols - Kolbe's reaction, Reimer-Tiemann reaction, Gattermann , Lederer-Manasse, Houben-Hoesh, Friedel-Crafts, Schotten-Baumann and Liebermann's Nitroso Reaction.

3.3 Preparation, Properties and Uses of Alpha- and Beta- Naphthols.

UNIT-IV

4.1 Free energy and Work function - Gibbs free energy – Helmholtz free energy – Relationship between Gibbs free energy and Helmholtz free energy – Their variations with Temperature, Pressure and Volume – Free energy change as criteria for Equilibrium and Spontaneity.

4.2 Maxwell's Relations – Thermodynamic Equation of State.

4.3 Gibbs-Helmholtz equation - Derivation and Applications - Clausius-Clapeyron equation - Derivation and Applications.

UNIT-V

5.1 Third Law of Thermodynamics - Entropy at Absolute Zero - Nernst Heat Theorem – Statement of III law of thermodynamics – Planck's formulation of III law of thermodynamics.

5.2 Evaluation of Absolute Entropy from Heat Capacity Measurements - Exceptions to III law – Applications of III law.

5.3 Partial molar properties - Chemical Potential – Definition - Effect of Temperature and Pressure on Chemical Potential - Gibbs-Duhem equation.

CORE PRACTICAL

PAPER – 2

INORGANIC QUALITATIVE ANALYSIS AND PREPARATION

Analysis of mixture containing two cations and two anions (One will be an interfering anion). Semimicro methods using the conventional scheme are to be adopted.

Cations to be studied

Lead, Copper, Bismuth, Cadmium, Iron, Aluminium, Zinc, Manganese, Cobalt, Nickel, Barium, Calcium, Strontium, Magnesium and Ammonium.

Anions to be studied

Carbonate, Sulphide, Sulphate, Nitrate, Chloride, Bromide, Fluoride, Borate, Oxalate and Phosphate.

Preparation of Inorganic compounds

- Tetraamminecopper(II) Sulphate
- Tris(thiourea)copper(I) Chloride
- Potassium trioxalatoferrate(II)
- Ferrous Ammonium Sulphate
- Microcosmic Salt
- Manganese(II) Sulphate

References

- Vogel's Text Book of Quantitative Chemical Analysis, 5th Edition, ELBS/ Longman, England, 1989.
- Inorganic Semimicro Qualitative Analysis, V. V. Ramanujam.

ALLIED – 4

1.PHYSICS II

UNIT – I: WAVE MECHANICS

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

UNIT – II : NUCLEAR PHYSICS

Particle accelerators – cyclotron, particle detectors – GM Counter Artificial Transmutation – Rutherford's Experiment – The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions.

Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy – Conservation of Parity – Quantities conserved and quantities not conserved in a nuclear reaction.

UNIT – III : ENERGY PHYSICS

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

UNIT – IV: CRYSTALLOGRAPHY

Crystallography : The crystal structure – Unit Cell –Bravais lattice- structures of simple cubic-BCC and FCC- co ordination number, packing factor calculation for the above structures –Hexogonal closed packed(HCP) structure -Miller indices – concept of Reciprocal Vectors.

UNIT – V: ELECTRONICS

Electronics: Transistor characteristics in common base and common emitter mode- Transistor single stage amplifier- Expression for input impedence, output impedence and current gain.
Digital Electronics : NAND and NOR as universal building blocks- De Morgan's theorem –statement and proof- Fabrication of diodes and transistors using Monolithic technology– limitations.

Books for Study & Reference

11. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
12. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
13. Allied Physics – Prof. Dhanalakshmi and others.
14. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
15. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
16. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
17. Modern Physics – R. Murugesan S. Chand & Co. (2004).
18. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
19. Introduction to Solid State Physics – C. Kittel, 5^{th} Edition Wiley Eastern Ltd.
20. Renewable & Sustainable energy sources – Agarwal.

3. ZOOLOGY II

Objective:

To study the principles of cell biology, genetics, developmental biology, physiology, ecology and evolution.

UNIT - I

Cell Biology - structure of animal cell, **Genetics:** molecular structure of gene - gene function, sex linked inheritance. Genetic Engineering and its application.

UNIT - II

Embryology - cleavage and gastrulation of Amphioxus.

Human Physiology: Digestion, Circulation - blood components, structure of heart, heart function.

UNIT - III

Diseases of Circulatory system - blood pressure, heart disease - Ischemia, Myocardial Infarction, Rheumatic heart disease, stroke.

Excretion - structure of kidney and mechanism of urine formation.

UNIT - IV

Environmental Biology - Biotic factors and Abiotic factors, food chain and food web. Pollution - Environmental degradation, (Air, Water and Land) - Green house effect - Bioremediation, Biodegradation - Global warming - acid rain.

UNIT - V

Evolution: Theories of Lamarkism & Darwinism.

REFERENCES:

7. Ekambaranatha Ayyar, and Ananthakrishnan, T.N. 1993. Outlines of Zoology, Vol I & II, Viswanathan and Co, Madras.
8. Sambasiviah, I, Kamalakara Rao, A.P., Augustine Chellappa, S. 1983. Text book of Animal Physiology, S. Chand & Co., New Delhi.
9. Verma and Agarwal. 1983. Text book of animal Ecology, S. Chand & Co., New Delhi.
10. Verma and Agarwal and Tyagi. 1991. Chordate Embryology, S. Chand & Co., New Delhi.
11. Rastogi and Jayaraj. 2000. Text book of Genetics. Rastogi publications, Meerut.
12. Verma and Agarwal. 2000. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Co., New Delhi.

4.BIOCHEMISTRY II

UNIT-I: Metabolism

Glycolysis, TCA cycle and its energetics, HMP shunt pathway. Deamination, transamination reaction, transaminase enzymes, Urea cycle.

UNIT-II: Metabolic Disorders

Diabetes mellitus, Glycogen storage diseases, Glycosuria, Ketosis, Jaundice, Phenyl ketonuria, Alkaptonuria. Dehydration: definition, causes, symptom and prevention.

UNIT-III: Enzymes

Definition, classification of enzymes with one example. Mechanism of enzyme action - Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Enzyme inhibition: competitive, uncompetitive and non competitive. Biological functions of enzymes.

UNIT-IV: Molecular Biology

Central dogma of molecular biology. DNA and RNA act as genetic material. Replication: Definition, types, mode of action of replication, mechanism of replication. General mechanism of transcription and translation. Genetic code.

UNIT-V: Vitamins

A brief outline of source, requirement, biological function and deficiency of Vitamins (fat soluble and water soluble vitamins).

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Robert K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan, MJP Publishers, Chennai-5.

5.MATHEMATICS – II*

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume -Fourier series for functions in $(0,2\pi)$ and $(-\pi, \pi)$.

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Guass, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

6. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
7. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
8. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
9. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
10. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

ALLIED PRACTICAL - 2

1.PHYSICS

(Any 15 Experiments)

21. Young's modulus – non uniform bending – pin and microscope.
22. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
23. Ridigity modulus – Torsional oscillation method (without symmetric masses).
24. Determination of Co-efficient of Viscosity – Graduated Burette.
25. Surface Tension and Interfacial Tension – By drop weight method.
26. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
27. Sonometer – Determining A.C. Frequency. (Screw Gauge is given).
28. Sonometer – frequency of tuning fork.
29. Newton's Rings – Radius of Curvature.
30. Air Wedge – Determination of thickness of thin wire.
31. Spectrometer Grating – Minimum Deviation – Mercury Lines.
32. Spectrometer – Refractive Index of a liquid – Hollow Prism.
33. Potentiometer – Calibration of High Range Ammeter.
34. Potentiometer – Calibration of Low Range Voltmeter.
35. Determination of M and B_H using Deflection Magnetometer in Tan C position and vibration magnetometer.
36. Figure of merit and voltage sensitiveness of table galvanometer.
37. Construction of AND, OR gates using diodes and NOT by transistors.
38. Zener diode – Voltage Regulation.
39. NAND / NOR as universal gate.
40. Demorgan's theorem verification.

Allied Practical
3. ZOOLOGY

I - MAJOR PRACTICAL

DISSECTIONS

Cockroach: Digestive and nervous system

Prawn: Nervous system

II - MINOR PRACTICAL

MOUNTING

1. Mouth parts of **Mosquito** and **Honey bee**

2. **Earthworm** - Body setae

3. Placoid scales of **shark**

III - SPOTTERS

Entamoeba, Sycon, Obelia, Taenia solium (entire, scolex) earthworm (entire, Pineal setae) Prawn (entire), Fresh water mussel, Sea star, Amphioxus - Entire, Amphioxus - T.S. through pharynx, Shark, Frog, Calotes, Pigeon, feathers of pigeon and Rabbit.

Sphygnomanometer, Stethoscope, Rain gauge.

REFERENCES:

3. Verma. P.S. 2011. A manual of practical Zoology - INVERTEBRATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

4. Verma. P.S. 2011. A manual of practical Zoology - CHORDATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

ALLIED PRACTICAL

4. BIOCHEMISTRY I & II

PRACTICAL I

Volumetric Estimation

1. Estimation of HCl using Na2CO3 as link and NaOH as primary standard.

2. Estimation of Iron in Ferrous Ammonium Sulphate using potassium permanganate as link solution and oxalic acid as primary standard.

3. Estimation of Glucose by Benedict's method.

4. Estimation of Glycine by formal titration.

5. Estimation of Ascorbic acid.

SKILL BASED SUBJECT

PAPER – 2

FOOD CHEMISTRY

Objective:

- To impart knowledge about Different Foods, Their Nutritive Values and Food Preservation.

UNIT-I

1.1 Cereals - Definition – Classification - Processing - Structure of Cereals - Composition and Nutritive value – Pulses - Definition - Classification - Processing - Structure of Pulses - Composition and Nutritive Value - Toxic Constituents in Pulses - Medicinal value of Cereals and Pulses.

1.2 Sugar - Structure and Properties - Nutritive value - Sugar composition in different food items.

1.3 Sugar related products - Classification and Nutritive value - Artificial sweeteners – Examples – Saccharin and Cyclamate - Advantages and Disadvantages.

UNIT-II

2.1 Vegetables and Fruits - Classification - Composition and Nutritive values.

2.2 Fungi and Algae as food - Enzymatic Browning and Non- enzymatic Browning.

2.3 Nutritive value of some common foods - Milk, Egg and Soyabeans.

UNIT-III

3.1 Beverages - Definition - Examples – Classification.

3.2 Fruit Beverages - Milk Based Beverages - Malted Beverages - Examples – Alcoholic and Non-Alcoholic Beverages – Examples.

3.3 Appetizers - Definition - Classification - Examples - Water - Functions and Deficiency.

UNIT-IV

4.1 Food Preservatives - Definition - Classification - Food Spoilage - Definition - Prevention.

4.2 Methods of Preservation - Classification - Low and High temperature – Preservatives – Examples.

4.3 Dehydration - Osmotic pressure - Food irradiation.

UNIT-V

5.1 Food Additives - Definition – Artificial sweeteners – Saccharin and Cyclamate - Classification - Their functions - Chemical substances.

5.2 Packaging of Foods – Classification - Materials used for Packaging.

5.3 Food Colours – Restricted use – Spurious Colours – Taste Enhancers – MSG – Vinegar.

Reference Books

- Food Science – B. Srilakshmi, III Edition, New Age International Publishers, 2005.
- Food Chemistry - Lilian Hoagland Meyer, CBS Publishers & Distributors, 2004.
- Food Science, Nutrition and Health – Brian A. Fox, Allan G. Cameron, Edward Arnold, London.
- Fundamentals of Foods and Nutrition - Mudambi R. Sumathi, and Rajagopal, M. V., - Wiley Eastern Ltd., Madras.
- Handbook of Food and Nutrition - M. Swaminathan - Bangalore Printing and Publishing Co. Ltd., Bangalore.

NON – MAJOR ELECTIVE

PAPER – 2

CHEMISTRY IN EVERY DAY LIFE

Objectives:

- To know the basics of Chemistry in our life
- To know about the Food Colours, Plastics, Drugs etc.,

UNIT- I

1.1 General Survey of Chemicals used in everyday life.

1.2 Cosmetics - Talcum Powder, Tooth pastes, Shampoos, Nail Polish and Perfumes - General formulation - Preparation - Hazards of Cosmetic use.

1.3 Soaps and Detergents – Types - Preparation and Uses.

UNIT-II

2.1 Food and Nutrition - Carbohydrates, Proteins, Fats and Minerals – Examples.

2.2 Vitamins – Definitions – Classification - Sources and their Physiological importance - Balanced diet.

2.3 Adulterants in Milk, Ghee, Oil, Coffee Powder, Tea, Asafoetida, Chilli Powder, Pulses and Turmeric Powder - Identification.

UNIT-III

3.1Food colours used in food - Soft drinks and its Health hazards.

3.2 Food Preservatives – Definition – Examples - Methods of preservation - Low and High temperature.

3.3 Dehydration - Osmotic pressure - Food irradiation.

UNIT-IV

4.1 Plastics, Polythene, PVC, Bakelite, Polyesters, Resins and their Applications.

4.2 Natural Rubber - Synthetic rubbers - Vulcanisation - Preparation and its Applications.

4.3 Antipyretics, Analgesics, Anaesthetics, Sedatives – Definition - Examples and Uses.

UNIT-V

5.1 Gobar gas – Production – Feasibility and Importance of Biogas with special reference to Rural India.

5.2 Fertilizers – Definition – Classification - Urea, NPK and Super phosphates - Need - Uses and Hazards.

5.3 Sweetening agents – Sucrose and Glucose – Artificial Sweetening agents – Saccharin – Cyclamate – Advantages and Disadvantages.

Reference Books

1. Chemical Process Industries - Norris Shreve Joseph A. Brine .Jr.

2. Perfumes, Cosmetics and Soaps - W. A. Poucher (Vol 3).

3. Environmental Chemistry - A. K. DE.

4. Industrial Chemistry, B. K. Sharma- Goel publishing house Meerut.

5. Food Science - B. Srilakshmi - III Edition - New Age International Publishers, 2005.

6. Food Chemistry, Lillian Hoagland Meyer - CBS publishers & distributors, 2004.

7. Fundamental Concepts of Applied Chemistry - Jayashree Ghosh, S. Chand & Co

Ltd., New Delhi – 2010.

8. Applied chemistry - K. Bagavathi Sundari - MJP Publishers (2006).

SEMESTER – V
PAPER – 5
INORGANIC CHEMISTRY – I

Objectives:

- To study about the Halogens and Related compounds.
- To give students a firm grounding in Co-ordination chemistry and Solid state Chemistry.

UNIT-I

1.1 Halogens – Group discussion - Comparative study of F, Cl, Br, I and At - Reactivities – Comparison of Fluorine with Oxygen.

1.2 Classification of Halides - Exceptional properties of Fluorine - Oxyacids of Halogens (Structure only).

1.3 Interhalogen compounds - Preparation, Properties and Geometry of AX, AX_3, AX_5 and AX_7 type of Compounds – Pseudohalogens - Cyanogen and Thiocyanogen – Comparison of Pseudohalogens and Halogens - Basic Properties of Iodine - Evidences.

UNIT-II

2.1 Coordination compounds - Definition of terms used - Classification of Ligands - Chelation and Effect of Chelation - Applications of Complexes - Coordination Number and Stereochemistry of Complexes.

2.2 IUPAC Nomenclature of Complexes - Isomerism in Complexes - Ionisation isomerism, Hydrate Isomerism, Linkage Iomerism, Ligand Isomerism, Coordination Isomerism and Polymerisation Isomerism.

2.3 Geometrical and Optical Isomerism in 4- and 6- Coordinated Complexes – Werner's theory of Coordination Compounds.

UNIT-III

3.1 Sidgwick's Theory - EAN rule - Theory of Bonding - Valence Bond Theory – Postulates of VBT – Hybridisation, Geometry and Magnetic properties - Failure of VBT.

3.2 Crystal field theory - Spectrochemical series - Splitting of d - orbitals in Octahedral, Tetrahedral and Square Planar Complexes - Crystal Field Stabilisation Energy - Calculation of CFSE In Octahedral and Tetrahedral Complexes.

3.3 Low Spin and High Spin Complexes – Explanation of Magnetic Properties, Colour and Geometry Using CFT.

UNIT-IV

4.1 Comparison of VBT and CFT.

4.2 Applications of Coordination Compounds in Qualitative and Quantitative Analysis - Estimation of Nickel using DMG and Aluminium using Oxine – Detection of Potassium ion – Separation of Copper and Cadmium ions.

4.3 Bonding, Hybridization and Structure of Carbonyls of Ni, Cr, Fe, Co, Mn, W and V.

UNIT-V

5.1 The nature of the Solid State – Amorphous and Crystalline – Differences - Close Packing in Crystals – Examples for Cubic, BCC and FCC Lattices - Bragg's law – Application of XRD to Crystal studies – Structure of NaCl, CsCl, CaF_2 and ZnS.

5.2 Band theory of Solids, Metals, Semiconductors and Insulators.

5.3 Defects in solids – Scottky Defect and Frenkel Defect – Metal Excess and Metal Deficiency Defects - Conductors in Ionic Solids – Electrical and Magnetic properties.

PAPER – 6

ORGANIC CHEMISTRY – I

Objectives:

- To effectively impart knowledge about Carbohydrates, Stereochemistry, Conformational Analysis, Nitroalkanes and Heterocyclic chemistry.
- To make the students more inquisitive in learning the Mechanistic details in Organic Chemistry through the teaching of the named reactions.

UNIT- I

1.1 Carbohydrates - Classification – Aldoses and Ketoses, Reducing and Non-reducing Sugars - Reactions of Glucose and Fructose - Osazone formation, Mutarotation and their Mechanism - Structural elucidation of Glucose and Fructose - Pyranose and Furanose forms – Haworth's method.

1.2 Determination of Ring Size- Haworth Projection Formula - Configuration of Glucose and Fructose - Epimerization - Chain lengthening and chain shortening of Aldoses - Inter conversion of Aldoses and Ketoses – Uses of Glucose.

1.3 Disaccharides and Polysaccharides - Reactions and Structural elucidation of Sucrose and Maltose - Properties, Structure and Uses of Starch and Cellulose.

UNIT- II

2.1 Stereoisomerism – Definition - Classification into Optical and Geometrical isomerism. Conditions for Optical Activity – Asymmetric centre – Chirality – Achiral molecules - Meaning of (+) and (-) and D- and L- notations – Elements of symmetry - Projection formulae - Fischer, Flying Wedge, Sawhorse and Newmann projection formulae - Notation

of optical isomers - Cahn - Ingold - Prelog rules - R, S notation of Optical isomers with one Asymmetric carbon atoms – Erythro and Threo representations.

2.2 Optical activities in Compounds not containing Asymmetric Carbon Atoms - Biphenyl, Allenes and Spiranes - Racemisation - Methods of Racemisation (By substitution and Tautomerism) – Resolution - Methods of Resolution (Mechanical, Biochemical and Conversion To Diastereomers) - Asymmetric Synthesis (Partial and Absolute Synthesis) - Walden inversion.

2.3 Geometrical isomerism - Cis - Trans, Syn - Anti and E-Z Notations - Geometrical Isomerism In Maleic and Fumaric Acids and Unsymmetrical Ketoximes - Methods of Distinguishing Geometrical Isomers using Melting Points, Dipole Moment, Dehydration, Cyclisation, Heat of Hydrogenation and Combustion.

UNIT- III

3.1 Conformational analysis - Introduction of terms - Conformations, Configuration, Dihedral Angle, Torsional Strain - Differences between Conformational isomers and Configurational isomers.

3.2 Conformational analysis of Ethane and n-Butane including energy diagrams.

3.3 Conformations of Cyclohexane (Chair, Boat and Twist-Boat forms) - Axial and Equatorial bonds - Ring flipping showing Axial and Equatorial bonds Interconversions – Conformations of Methyl Cyclohexane, Dimethyl Cyclohexane and their stability - 1,2 and 1,3 - Interactions.

UNIT- IV

4.1 Nitroalkanes – Preparation – Properties – Structure – Nitro-Acinitro Tautomerism – Uses of Nitroalkanes – Differences between Primary, Secondary and Tertiary Nitroalkanes.

4.2 Reagents and their Applications in Organic Chemistry – Anhydrous $AlCl_3$, P_2O_5, H_2/ Pd- $BaSO_4$, Zn/ Hg- HCl and Ag_2O.

4.3 Mechanism of Aldol, Perkin and Benzoin condensations - Knoevenagel, Claisen, Wittig, Cannizzaro, Reformatsky and Michael addition reactions.

UNIT- V

5.1 Heterocyclic compounds - Huckel's rule – Aromaticity of Heterocyclic compounds - Preparation, Properties, Structure and Uses of Furan, Pyrrole and Thiophene.

5.2 Preparation and properties of Pyridine and Piperidine - Comparative study of Basicity of Pyrrole, Pyridine and Piperidine with Amines – Nucleophilic and Electrophilic substitution reactions of Pyridine.

5.3 Condensed Five and Six Membered Heterocyclic Compounds - Preparation of Indole, Quinoline and Isoquinoline – Fischer-Indole synthesis, Skraup Quinoline synthesis and Bischler-Napieralski synthesis - Electrophilic substitution reactions.

PAPER- 7

PHYSICAL CHEMISTRY – I

Credits: 4 **Hours/ Week: 4**

Objectives:

- To impart knowledge about the Solutions, Phase Rule and its Applications, Colligative properties, Chemical Equilibrium, Phase Rule and its Applications, Electrochemistry and its Applications.

Unit-I Solutions

1.1 Solutions of liquids in liquids - Raoult's law – Vapour pressure of ideal solutions – Activity of a component in an ideal solution – Gibbs-Duhem-Margules equation – Thermodynamics of Ideal Solutions.

1.2 Vapour pressure of Non-ideal solutions – Fractional distillation of Binary liquid solutions – Azeotropic mixtures - Distillation of immiscible liquids - Partially miscible liquids - Phenol - Water, Triethylamine – Water and Nicotine – Water systems.

1.3 Nernst distribution law – Definition - Thermodynamic derivation – Applications.

Unit-II Phase rule

2.1 Definition of the terms - Phase, Components and Degrees of freedom – Derivation of Gibbs phase rule

2.2 Applications of phase rule - One component system - Water and Sulphur system – Reduced phase rule - Two components system - Simple eutectic system – Lead-silver system, KI-water system - Freezing mixtures.

2.3 Thermal analysis and cooling curves, Compound formation with congruent melting point – Zn-Mg, $FeCl_3$- Water system - Compound formation with incongruent melting point - Na-K System.

Unit-III Colligative properties and Chemical Equilibrium

3.1 Colligative properties - Lowering of vapour pressure - Osmosis and osmotic pressure - Thermodynamic Derivation of Elevation of boiling point and Depression of freezing point – Determination of molar mass – Van't Hoff factor.

3.2 Chemical Equilibrium - Law of Chemical Equilibrium - Thermodynamic derivation of Law of Chemical Equilibrium.

3.3 Van't Hoff Reaction Isotherm - Temperature Dependence of Equilibrium Constant – Van't Hoff Isochore - Le Chatelier's Principle and Its Applications.

UNIT-IV Electrochemistry - I

4.1 Specific conductance and Equivalent conductance - Measurement of equivalent conductance - Variation of Equivalent Conductance and Specific Conductance with Dilution – Ostwald's Dilution Law and Its Limitations.

4.2 Debye-Huckel's theory of Strong Electrolytes - Onsagar equation (No derivation) - Verification and Limitations - Kohlrausch law and its Applications.

4.3 Migration of ions - Ionic Mobility - Ionic Conductance - Transport Number and its determination – Hittorff's method and Moving Boundary method.

UNIT- V Electrochemistry - II

5.1 Applications of Conductometric Measurements - Determination of Degree of Dissociation of Weak Electrolytes, Ionic Product of water - Solubility Product of sparingly soluble salt - Conductometric Titrations.

5.2 Concept of pH - Buffer solutions, Buffer action - Henderson equation - Applications of Buffer Solutions.

5.3 Hydrolysis of Salts - Expressions for Hydrolysis Constant, Degree of Hydrolysis and pH of aqueous salt solutions.

ELECTIVE

PAPER – 1

A. ANALYTICAL CHEMISTRY – 1

Objective:

- To impart knowledge about Data Analysis, Purification of organic compounds, Different Spectroscopic Techniques and their Application.

UNIT – I

1.1. Data analysis – Types of errors – Correction of determinate errors - Idea of Significant Figures and their Importance with examples – Precision and Accuracy – Methods of expressing Accuracy.

1.2. Error analysis – Minimising errors – Methods of expressing Precision – Average deviation – Standard Deviation and Confidence Limit.

1.3. Purification of Solid Organic Compounds – Solvent extraction – Recrystalisation - Use of immiscible solvents – Soxhlet extraction – Crystallisation – Use of miscible solvents – Fractional Crystallisation and Sublimation.

UNIT – II

2.1 Purification of liquids – Experimental Techniques of Distillation – Fractional Distillation – Vacuum Distillation – Steam Distillation – Tests of Purity.

2.2 Gravimetric Analysis – Characteristics of Precipitating Agents – Condition of Precipitation – Types of Precipitants – Purity of Precipitate – Co-precipitation and Post precipitation – Precipitation from Homogeneous Solution – Digestion and Washing of precipitate – Ignition of precipitate – Uses of Sequestering Agents.

2.3 Definition of spectrum – Electromagnetic radiation – Quantization of different forms of energies in molecules (Translational, Rotational, Vibrational and Electronic) – Born-Oppenheimer approximation – Condition of energy of absorption of various types of spectra.

.**UNIT – III**

3.1 Microwave Spectroscopy – Theory of Microwave Spectroscopy – Selection Rule – Calculation of Moment of Inertia and Bond Lengths of Diatomic molecules – Effect of Isotopic Substitution.

3.2 UV – Visible Spectroscopy – Absorption laws - Calculations involving Beer- Lambert's law – Instrumentation – Photocalorimeter and Spectrophotometer – Block diagrams with description of components – Theory of Electronic Spectroscopy.

3.3 Types of Electronic Transitions – Chromophore and Auxochromes – Absorption bands and Intensity – Factors influencing Position and Intensity of Absorption Bands - Frank-Condon Principle – Applications.

UNIT – IV

4.1 IR Spectroscopy – Principle – Theory of IR spectra – Vibrational Degrees of Freedom - Modes of Vibration of Diatomic Molecules –Triatomic linear (CO_2) and Non-linear Molecules (H_2O) - Stretching and Bending vibrations – Symmetric and Asymmetric Stretching vibrations - Selection rules.

4.2 Expression for Vibrational Frequency (Derivation not needed) – Calculation of Force constant – Factors influencing Vibrational Frequencies - IR Spectrophotometer - Instrumentation – Source, Monochromator, Cell, Detectors, Recorders and Sampling Techniques.

4.3 Applications of IR Spectroscopy – Identification of Functional Groups - Interpretation of the spectra of Alcohols, Aldehydes, Ketones and Esters (Aliphatic and Aromatic) - Hydrogen bonding.

UNIT – V

5.1 Raman Spectroscopy - Rayleigh and Raman scattering – Selection rule – Raman shift - Stokes and Anti-stokes lines - Differences between Raman and IR Spectroscopy.

5.2 Raman Spectrophotometer - Instrumentation – Block diagram – Components and their Functions – Advantages of using Laser in Raman Spectroscopy – Applications – Structural elucidation in the study of Inorganic and Organic Compounds.

5.3 Rotational-Raman spectra of Non - Centrosymmetric molecules - Mutual exclusion principle (CO_2 and N_2O) - Applications – Structural diagnosis.

Reference Books

- Elements of Analytical Chemistry – R. Gopalan, P. S. Subramanian, K. Rengarajan – S. Chand and sons (1997).
- Fundamentals of Analytical Chemistry – D. A. Skoog and D. M. West, Holt Reinhard and Winstor Publications – IV Edition (1982).
- Principles of Instrumental Methods of Analysis – D. A. Skoog and Saunders, College Publications, III Edition (1985).
- Analytical Chemistry – S. M. Khopkar – New age Insternational Publishers.
- Instrumental Methods of Chemical Analysis – Chatwal - Anand, Himalaya Publishing House (2000).
- Analytical Chemistry – R. Gopalan, Sultan Chand.
- Analytical Chemistry – S. Usharani, Macmillan.
- Instrumental Methods of Analysis – 7^{th} Edition – H. H. Willard, L. L. Merit. J. Dean and F. A. Settle –Wadsworth Publishing Company Limited, Belmont, California, USA, 1988.
- Physico- Chemical Techniques of Analysis – P. B. Janarthanan – Vol. I & II – Asian Publishing.
- Instrumental Methods of Chemical Analysis – B. K. Sharma – Goel Publications.
- Applications of Absorption Spectroscopy of Organic Compounds - Prentice Hall, John R. Dyer.
- Spectroscopic Identification of Organic Compounds – R. M. Silverstein, G. C. Bassler and T. C. Morill – John Wiley and Sons.

PAPER – 1

B. BASICS OF COMPUTER PROGRAMMING IN C AND ITS APPLICATIONS IN CHEMISTRY

Objective:

- To introduce the basics of computers.
- To learn C language and its applications in solving problems in Chemistry.

Unit-I

1.1 Basic Computer Organisation, Processor and Memory – Main Memory, Secondary Storage Devices and Storage Hierarchy.
1.2 Software – Relationship between Hardware and Software – Types of Software.
1.3 Planning the Computer Program – Algorithm and Flowcharts - Basics of Operating Systems.

Unit-II

2.1 Computer Languages – Machine Language, Assembly Language, Assembler, Compiler, Interpreter and Programming Languages.
2.2 C language – Introduction - C Compiler - Operating Systems and Preprocessor Directives.
2.3 Variables, Constants, Operators, Input and Output Functions.

Unit-III

Control Structures – Conditional, Looping, Goto, Break, Switch and Continue Statements, Functions, Arrays And Pointers.

Unit-IV

4.1 Applications in Chemistry – Calculation of the Radius of the first Bohr orbit for an Electron.

4.2 Calculation of Half-life Time for an integral order reaction - Calculation of Molarity, Molality and Normality of a solution.

4.3 Calculation of Pressure of Ideal Gases and Van der Waal's gases - Calculation of Electronegativity of an Element using Pauling's relation.

Unit-V

5.1 Applications in Chemistry - Calculation of Empirical Formulae of Hydrocarbons - Calculation of Reduced Mass of a few Diatomic Molecules.

5.2 Determination of the Wave Numbers of Spectral lines of Hydrogen atom - Calculation of Work of Expansion in Adiabatic Process.

5.3 Calculation of pH, Solubility Product and Bond Energy using Born-Lande equation - Calculation of Standard Deviation and Correlation Coefficient.

Reference Books

- Computers in Chemistry, K. V. Raman, 8th Edition, Tata McGraw Hill Publishers, 2005.
- Programming with C, Venugopal and Prasad, 11th Edition, 1971. .
- Programming in C, E. Balaguruswamy, 2nd Edition, 1989.

PAPER – 1

C. ORGANIC SYNTHESIS

Objectives

- To know the Basics of Retrosynthesis.
- To impart knowledge about the Ring Synthesis.

UNIT-I

DISCONNECTION APPROACH

1.1 An introduction to Synthons and Synthetic Equivalent.

1.2 Disconnection Approach - Functional Group Interconversions.

1.3 The importance of the Order of Events in Organic Synthesis - One group C-X and Two group C-X disconnections – Chemoselectivity - Reversal of Polarity.

UNIT-II

PROTECTING GROUPS

2.1 Principle of Protection of Alcoholic group and Amino group.

2.2 Principle of Protection of Carbonyl group and Carboxyl group.

2.3 Activation of Functional Groups.

UNIT-III

ONE GROUP C-C DISCONNECTIONS

3.1 Alcohols and Carbonyl Compounds.

3.2 Regioselectivity and Alkene Synthesis.

3.3 Uses of Acetylenes and Aliphatic Nitro Compounds in Organic Synthesis.

UNIT-IV

TWO GROUP C-C DISCONNECTIONS

4.1 Diels-Alder Reaction - 1, 3 - Difunctionalised Compounds.

4.2 α, β- Unsaturated Carbonyl Compounds - Control in Carbonyl Condensations.

4.3 1, 5 - Difunctionalised Compounds - Michael Addition and Robinson Annulation reactions.

UNIT-V

RING SYNTHESIS

5.1 Saturated Heterocyclic Compounds.

5.2 Synthesis of 3-, 4- and 6- Membered Rings Aromatic Heterocycles in Organic Synthesis.

5.3 Application of the above in the Synthesis of Camphor, Longifoline, Cortisone and Reserpine.

Reference Books

- Some Modern Methods of Organic Synthesis, W. Carruthers, Cambridge University Press, UK.
- Advanced Organic Chemistry, F. A. Carey and R. J. Sundberg, Part- B, Plenium Press.
- Modern Synthetic Reactions. H. O. House and W. A. Benjamin,

ELECTIVE

PAPER – 2

A. PHARMACEUTICAL CHEMISTRY

Objective:

- To effectively impart knowledge about Various Diseases and Their Treatment, Importance of Indian Medicinal Plants and Different Types of Drugs. Preparation, Synthesis and Structural Determination are not required for the Compounds mentioned.

UNIT-I

1.1 Definition of the following terms - Drug, Pharmacophore, Pharmacology, Pharmacopoeia, Bacteria, Virus, Chemotherapy and Vaccine.

1.2 Causes, Symptoms and Treatment for Jaundice, Cholera, Malaria and Filaria - First Aid for Accidents - Antidotes for Poisoning.

1.3 Organic Pharmaceutical Aids - Their Role as Preservatives, Antioxidants, Colouring, Flavouring and Sweetening agents – Examples.

UNIT-II

2.1 Causes, Detection and Control of Anaemia and Diabetes - Diagnostic tests for Sugar, Salt and Cholesterol in Serum and Urine.

2.2 Blood - Composition of Blood and Blood Plasma – RBC – Structure and Functions - Functions of Haemoglobin – WBC - Structure and Functions - Rh Factor – Blood Coagulation – Identification and Estimation of Cholesterol in Blood - Blood Pressure – Hypertension and Hypotension - Normal, High and Low to Control.

2.3 Indian Medicinal Plants and Their Uses - Tulasi, Neem, Kizhanelli, Mango, Semparuthi, Adadodai and Thoothuvelai.

UNIT-III

3.1 Antibacterials - Sulpha drugs – Sulphanilamide Derivatives – Mode of action of Sulpha drugs - Examples - Prontosil, Sulphathiazole and Sulphafurazole – Uses - Antibiotics - Definition – Gram positive and Gram negative bacteria - Uses of Ampicillin, Streptomycin and Tetracyclines.

3.2 Antiseptics and Disinfectants - Definition and Distinction - Phenolic compounds, Chloro compounds and Cationic surfactants.

3.3 Vitamins – Definition – Classification of Vitamins – Sources and Uses – Deficiency Diseases caused by Vitamins.

UNIT-IV

4.1 Analgesics – Definition - Classification - Narcotic and Non- narcotic – Antipyretic analgesics – Mechanism of action - Morphine and its derivatives - Pethedine and Methadone - Salicylic acid derivatives – Antipyretics and Antiinflammatory Agents - Definition and Actions – Aspirin, Paracetamol, Ibuprofen - Disadvantages and Uses.

4.2 Anaesthetics – Definition – Classification - Local and General – Volatile – Uses of volatile liquids as Inhalation Anaesthetics – Chloroform - Gaseous Anaesthetics - Nitrous Oxide, Ether and Cyclopropane - Uses and Disadvantages – Intravenous Anaesthetic Agents – Thiopental sodium, Methohexitol and Propanidid.

4.3 Drugs affecting CNS - Definition, Distinction and Examples for Tranquilizers, Sedatives (Phenobarbital, Diazepam) - Hypnotics, Psychedelic Drugs – LSD, Hashish- Their effects.

UNIT-V

5.1 Antineoplastic Drugs - Causes and Types of Cancer - Treatment of Cancer – Antineoplastic Agents – Antimetabolites - AIDS - AZT, DDC.

5.2 Hormones – Definition - Classification – Physiological Functions of Insulin, Adrenaline, Thyroxin and Oxytacin.

5.3 Sex hormones – Androsterone, Testosterone, Progesterone and Estrogen - Biological functions – Disorders of Hyposecretion and Hypersecretion of Hormones.

Reference Books

1. A Text Book of Pharmaceutical Chemistry - Jayashree Ghosh - S. Chand Company Ltd, 2015.
2. Pharmaceutical Chemistry - S. Lakshmi - Sultan Chand, 2011.
3. Pharmacology and Pharmatherapeutics - R. S. Satoskar - Popular Prakashan - Vol.I and Vol. II.
4. Medicinal Chemistry - Asuthosh Kar - New Age International Publishers, 2007.
5. A Text Book of Synthetic Drugs - O. D. Tyagi - Ammol Publications.
6. Introduction to Biological Chemistry - J. Awapara, Prentice Hall.
7. A Text Book of Biochemistry - Ambika.S.
8. Biochemistry - A. L. Leninger, II Edition, Kalyani Publishers, Ludhiana, 1998.
9. Essentials of Biological Chemistry - James Fanley - East West Press.
10. Medicinal Chemistry - Gurdeep Chatwal – Himalaya Publishers House, 2012.
11. Medicinal Chemistry - Ahluwalia – Ane Books, 2008.
12. A Text Book of Pharmaceutical Chemistry – Viva Books Private Ltd., New Delhi, 2009.
13. Medicinal Plants of India – Rasheeduz Zafar – CBS Publishers and Distributors, 2000.

ELECTIVE

PAPER – 2

B. POLYMER CHEMISTRY

Objective:

- To impart Knowledge about the Types of Polymers, Polymerization Techniques, Commercial Polymers and their Applications.

UNIT-I

1.1 Introduction to Polymers – Monomers, Oligomers, Polymers and their Characteristics - Classification of Polymers – Addition and Condensation Polymers – Natural and synthetic – Linear, Branched, Cross-Linked and Network – Plastics – Elastomers – Fibres – Homopolymers and Copolymers.

1.2 Bonding in Polymers – Primary and Secondary bond forces in Polymers – Cohesive energy and Decomposition of Polymers.

1.3 Chain Growth Polymerisation – Cationic, Anionic and Free radical polymerisation – Stereoregular polymers – Ziegler Natta polymers – Step Growth Polymers.

UNIT-II

2.1 Polymerization Techniques - Bulk, Solution, Suspension and Emulsion Polymerisation - Melt Polycondensation - Polymer Processing – Calendering - Die Casting and Rotational Casting.

2.2 Molecular weight of polymers – Number average – Weight average – Sedimentation and Viscosity – Average molecular weight - Molecular weight and Degree of Polymerisation – Methods of determination of Molecular Weight – Gel permeation chromatography – Ultracentrifugation.

2.3 Reactions – Hydrolysis – Hydrogenation –Addition – Substitution –Cross linking – Vulcanisation – Cyclisation.

UNIT-III

3.1 Plastics and Resins – Definitions – Thermoplastic and Thermosetting Resins – Constituents of Plastic Fibres – Dyes, Pigments, Plasticisers, Lubricants and Catalysts.

3.2 Important Thermoplastic Resins – Acrylics, Polyvinyl and Cellulose Derivatives - Important Thermosetting Resins – Phenolic resins – Epoxy resins.

3.3 Adhesives – Shellac resins – Vegetable glues and Animal glues.

UNIT-IV

4.1 Chemistry of Commercial Polymers - General methods of Preparation and Uses of the following - Teflon, Polyethylene, PTFE, Polystyrene, Polycarbonates and PVC.

4.2 Textile fibres – Definition and Polymer requirement for fibres – Polyamides – Nylon 66 - Nylon 6 – Polyesters – Terylene – Cellulose acetate – Viscose rayon.

4.3 Natural and Synthetic Rubber – Constitution of Natural rubber – Natural Rubber – Isoprene – Synthetic Rubber - Butyl, Buna, Buna- S, SBR, Thiocol, Neoprene, Polyurethane and Silicone Rubber – Ebonite.

UNIT-V

5.1 Advances in Polymers - Biopolymers, Biomaterials, Polymers in Medical Field, High temperature and Fire Resistant Polymers – Applications of Silicones.

5.2 Conducting Polymers – Elementary idea – Examples – Polysulphur Nitriles,

Polyparaphenylene, Polypyrrole, Polythiophene, Polyaniline and Polyacetylene.

5.3 Acrylic polymers – Polmers of Acrylic Acid, Methacrylic Acid and Polyacrylates.

Reference Books

1. Text Book of Polymer Science, F. W. Bill Meyer, Jr. John, Wiley & Sons - 1984.
2. Polymer Science – V, R. Gowarikar, N. V. Viswanathan, Jayader Sreedhar - Wiley Eastern Ltd., New Delhi - 2005
3. Polymer Chemistry, B. K. Sharma - Goel Publishing House, Meerut - 1989.
5. Polymer Chemistry – M. G. Arora, M. S. Vadar - Anmol Publications (p) Ltd., New Delhi -1998.
6. Polymer Chemistry - An introduction - M. P. Stevens, Oxford - 2002.

ELECTIVE

PAPER – 2

C. GREEN CHEMISTRY

Objective:

- To impart knowledge about Green Solvents, Green Techniques, Green Catalysts and Green Reactions.

UNIT-I Green Chemistry – Introduction

1.1 Need for Green Chemistry – Principles of Green Chemistry – Atom economy – Definition with example (Ibuprofen synthesis) – Green oxidants – Hydrogen peroxide.

1.2 Green synthesis – Evaluation of the type of the reaction – Rearrangements (100 % Atom economic) - Addition reaction (100 % Atom economic).

1.3 Organic reactions by Sonication method – Apparatus required – Examples of Sonochemical Reactions (Heck, Hundsdiecker and Wittig reactions).

UNIT-II Green Solvents

2.1 Selection of Solvents – Aqueous Phase Reactions - Diels-Alder reaction in water – Catalysis in water (Aerobic Oxidation of Alcohols catalysed by Pd (II) / Bathophenanthroline).

2.2 Reactions in ionic liquids - Simple preparation – Types – Properties and Applications – Ionic liquids in Organic Reactions (Heck reaction, Suzuki reactions, Epoxidation), Industrial (Battery) and Analytical Chemistry (Matrices for MALDI-TOF MS, Gas Chromatography Stationary Phases) – Advantages and Disadvantages.

2.3 Solid Supported Synthesis - Supercritical CO_2 – Preparation, Properties and Applications (Decaffeination, Dry cleaning) – Environmental impact.

UNIT-III Green Techniques

3.1 Microwave and Ultrasound Assisted Green Synthesis – Apparatus required – Examples

of MAOS (Synthesis of Fused Anthroquinones, Leukart reductive Amination of Ketones) – Advantages and Disadvantages of MAOS – Aldol condensation – Cannizzaro condensation - Diel's-Alder reaction – Strecker's synthesis.

3.2 Photochemical reactions using Sunlight – Photoreduction of Benzophenone to Benzopinacol using Sunlight - Photochemical alternative to Friedel- Crafts reaction.

3.3 Nanoparticles - Introduction – Types of Nanoparticles – Techniques to prepare Nanoparticles – Top down and Bottom up approaches – Common growth methods.

UNIT-IV Green Catalysis

4.1 Green Catalysis - Heterogeneous catalysis – Uses of Zeolites, Silica, Alumina, Clay supported catalysis – Biocatalysis – Enzymes and Microbes.

4.2 Phase Transfer Catalysis (PTC) – Principles, Catalysts and Lipophility of ions – Two phase systems – Solid-Liquid, Liquid-Liquid, Gas-Liquid – Triphase systems – Inverted PTC – Applications in Synthesis.

4.3 Micellar Catalysis, Surfactants and Synthesis in water – Principles, Materials and Synthetic Applications.

UNIT- V Green Reactions

5.1 Acetylation of Primary Amine, Base catalysed Aldol condensation (Synthesis of Dibenzalpropanone), Halogen addition to C = C bond (Bromination of Trans- Stilbene), [4+2] Cycloaddition reaction (Diels-Alder reaction between Furan and Maleic acid).

5.2 Rearrangement reaction (Benzil- Benzilic acid rearrangement), Coenzyme catalyzed Benzoin condensation (Thiamine hydrochloride catalysed synthesis of Benzoin), Pechmann condensation for Coumarin synthesis (Clay catalysed Solid State Synthesis of 7- Hydroxy- 4- methylcoumarin).

5.3 Electrophilic Aromatic Substitution Reactions (Nitration of phenol, Bromination of Acetanilide) – Green oxidation reactions (Synthesis of adipic acid, Preparation of Manganese (III) acetylacetonate) – Zeolite catalyzed Friedel-Crafts acylation.

Books for Study

- Green Chemistry: Environmental Friendly Alternatives, Rs. Sanghi and M. M. Srinivatava, Narosa Publishing House, New Delhi.
- Green Chemistry, V. Ahluwalia, Narosa, New Delhi (2011).
- Nanotechnology, S. Shanmugam, MJP Publishers, Chennai. (2010).
- A Handbook on Nanochemistry, Patrick Salomon, Dominant Publishers and Distributers, New Delhi.
- Nanobiotechnology, S. Balaji, MJP Publishers, Chennai (2010).
- Nano: The Essentials, T. Pradeep, Tata Mc-Graw Hill, New Delhi (2007).

Books for Reference

- Methods and Reagents for Green Chemistry, P. Tundo, A. Perosa and F. Zechini, John Wiley & Sons Inc., New Jercy, (2007).
- The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).
- Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).
- Nanochemistry, G. B. Segreev, Elsevier, Science, New York, (2006)

SKILL BASED SUBJECT

PAPER – 3

APPLIED CHEMISTRY

Objective:

- To impart Knowledge about Petrochemicals, Paper Technology, Sugar Industry, Explosives, Photography and Diary Chemistry,

UNIT I

1.1 Petroleum - Origin – Composition of Petroleum - Inorganic, Engler and Modern theories – Classification – Refining (Simple Refinery) – Cracking – Thermal and Catalytic – Knocking – Octane Rating – Antiknock Compounds – Cetane Rating – Synthetic Petrol – LPG.

1.2 Gobar Gas – Production – Feasibility and Importance of Biogas with special reference to Rural India.

1.3 Petrochemicals – Elementary study – Definition - Chemicals from Natural Gas, Petroleum, Light naphtha and Kerosene – Origin – Composition - Synthetic Gasoline.

UNIT II

2.1 Paper technology – Introduction – Manufacture of pulp – Various raw materials used for the preparation of pulp - Preparation of Sulphite pulp, Soda pulp and Rag pulp.

2.2 Various processes - Beating, Refining, Filling, Sizing and Colouring.

2.3 Manufacture of Paper – Calendering – Uses.

UNIT III

3.1 Sugar industry - Sugar industries in India – Sugarcane and sugar beet - Manufacture of cane sugar – Extraction of juice – Concentration – Separation of crystals.

3.2 Recovery of Glucose from Molasses – Defection – Sulphitation – Carbonation – Testing and Estimation of Sugar – Double Sulphitation Process.

3.3 Preparation of Bagasse – Use of Bagasse for Manufacture of Paper and Electricity -

Preparation of Alcohol from Molasses - Preparation of Absolute Alcohol - Manufacture of Wine, Beer, Methylated Spirit and Power Alcohol.

UNIT IV

4.1 Explosives – Primary, Low and High Explosives – Single compound explosives - Binary explosives – Plastic explosives – Dynamites – Blasting explosives - Preparation and Uses of Lead Azide, Nitroglycerine, Nitrocellulose, TNT, Cordite, Picric Acid and Gun Powder – Introduction to Rocket Propellants.

4.2 Photography – Chemical Principle – Preparation of Sensitive Emulsion – Exposure – Developing – Fixing and Printing – Colour photography – Xerographic copying.

4.3 Coal – Classification by rank – Proximate and Ultimate analysis – Low and High Temperature Carbonisation – Otto-Hoffmann's by-product - Distillation of Coal Tar.

UNIT V

5.1 Milk – Definition – Physico-Chemical properties of milk - Constituents of milk and Their Physico-chemical Properties.

5.2 Chemical change taking place in Milk due to Processing Parameters - Boiling, Pasteurisation, Sterilisation and Homogenisation.

5.3 Definition and Composition of Creams, Butter, Ghee and Ice Creams - Milk Powder - Definition, Need for making powder - Principles involved in Drying process - Spray drying and Drum drying.

Reference Books

1. Fundamental Concepts of Applied Chemistry - Jayashree Ghosh - 1st Edition, S. Chand & Co. Ltd, New Delhi, 2006.
2. Milk and Milk Products - Clarence Henry Eckles, Willes Barnes Combs, Harold Macy - 4th Edition, Tata McGraw Hill Publishing Company Ltd, Reprint 2002.
3. Industrial Chemistry - B. K. Sharma - 13th Edition, Goel Publishing House, 2008.

SEMESTER – VI
PAPER – 8
INORGANIC CHEMISTRY – II

Objectives:

- To impart knowledge about Nuclear chemistry, Radioactivity, Metallurgy, Chemistry of f- Block Elements, Organometallic Compounds and Bio-inorganic Chemistry.

UNIT-I NUCLEAR CHEMISTRY

1.1 Introduction - Composition of Nucleus – Fundamental Particles of Nucleus - Nuclear Forces operating between the Nucleons - N/P ratio – Nuclear Stability - The whole number rule and Packing fraction.

1.2 Isotopes, Isobars and Isotones – Detection and Separation of isotopes

1.3 Nuclear Binding Energy - Mass defect - Simple calculations involving Mass Defect and Binding Energy per Nucleon - Magic Numbers – Liquid drop model - Shell model.

UNIT-II RADIOACTIVITY

2.1 Natural Radioactivity – Properties of Alpha, Beta and Gamma rays - Detection and measurement of Radioactivity - Radioactive series including Neptunium series – Soddy's Group Displacement Law.

2.2 Rate of disintegration and Half - Life period – Derivation - Average life period - Artificial Radioactivity - Induced Radioactivity - Uses of Radioisotopes - Hazards of radiations.

2.3 Nuclear fission - Nuclear energy - Nuclear reactors - Nuclear fusion -Thermonuclear reactions - Energy source of the Sun and Stars – Comparison of Nuclear Fission and Nuclear Fusion.

UNIT-III METALLURGY

3.1 General metallurgy and Metallurgical processes – Methods of Concentration – Gravity separation, Froth floatation process, Magnetic separation – Reduction methods – Smelting, Calcination, Goldschmidt Aluminothermic process - Purification methods – Zone refining, Van Arkel method and Electrolytic refining.

3.2 Comparative study of Ti, V, Cr, Mn and Fe group elements with special reference to Occurrence, Oxidation States, Magnetic Properties and Colour.

3.3 Ocurrence and Extraction of Ti, Mo, W and Co - Preparation and Uses of Ammonium Molybdate and $V_2 O_5$.

UNIT-IV INNER TRANSITION ELEMENTS

4.1 General Characteristics of f- Block elements – Position of Lanthanides in the periodic table – Separation of Lanthanides (Ion exchange method).

4.2 Comparative study of Lanthanides and Actinides - Occurrence, Oxidation states, Magnetic properties, Colour and Spectra.

4.3 Lanthanide Contraction – Causes and Consequences - Comparison between Lanthanides and Actinides – Positon of Actinides in the periodic table – Extraction of Thorium and Uranium

UNIT-V ORGANOMETALLIC COMPOUNDS AND BIOINORGANIC CHEMISTRY

5.1 Organometallic Compounds - Definition - Nomenclature – Classification – Organo-Lithium and Organo-Boron Compounds - Preparation, Properties, Structure and Uses.

5.2 Biological Functions of Iron, Copper and Zinc – Biologically Important Compounds – Myoglobin, Cytochrome, Haemoglobin and Ferritin.

5.3 Binary Metallic Compounds – Hydrides, Borides, Carbides and Nitrides – Classification - Preparation, Properties, Structure and Uses.

CORE PRACTICAL

PAPER – 3

GRAVIMETRIC ESTIMATION

1. Estimation of Sulphate as Barium Sulphate.
2. Estimation of Barium as Barium Sulphate.
3. Estimation of Barium as Barium Chromate.
4. Estimation of Lead as Lead Chromate.
5. Estimation of Calcium as Calcium Oxalate Monohydrate.

References

- Qualitative Inorganic Analysis, A.I. Vogel – 7th Edition, Prentice Hall.
- Quantitative Chemical Analysis, A.I. Vogel – 6th Edition, Prentice Hall.

PAPER - 9

ORGANIC CHEMISTRY – II

Objectives:

- To kindle interest in students in learning Bio-organic chemistry through the introduction of topics such as Proteins, Nucleic acids, Terpenes, Alkaloids etc.
- To generate Keen Interest and Thinking in Understanding the Mechanisms of Molecular Rearrangements and Synthetic Applications of Acetoacetic Ester, Benzene Diazonium Chloride, Grignard Reagents and Diazomethane.

UNIT- I Molecular rearrangements

1.1 Rearrangements - Classification – Anionotrpic, Cationotropic and Free Radical Rearrangements - Intermolecular and Intramolecular Rearrangements – Examples – Cross over experiment – Differences between Intermolecular and Intramolecular rearrangements.

1.2 Mechanisms, Evidences, Migratory Aptitude, Intermolecular or Intramolecular nature of the following rearrangements - Pinacol-Pinacolone, Benzil-Benzilic acid and Beckmann rearrangement.

1.3 Mechanism of Hoffmann, Curtius, Baeyer-Villiger, Claisen (Sigmatropic), Fries rearrangement, Cope and Oxy-Cope rearrangements.

UNIT-II Amino acids and Polypeptides

2.1 Amino acids – Classification - Essential and Non- Essential amino acids – Acidic, Basic and Neutral Amino Acids – Alpha, Beta and Gamma- Amino acids - Preparation of alpha amino acids – Gabriel's Phthalimide synthesis, Strecker synthesis and Erlenmeyer Azlactone synthesis - Glycine, Alanine and Tryptophan.

2.2 General properties of Amino acids - Reactions of Amino acids due to Amino group and Carboxyl group - Zwitterions - Isoelectric point.

2.3 Peptides - Synthesis - Bergmann Method - Structural Determination of Polypeptides - End Group Analysis – N-Terminal and C-Terminal Amino Acids Determination.

UNIT- III Proteins and Nucleic Acids

3.1 Proteins - Definition - Classification based on Physical Properties, Chemical Properties and Physiological Functions - Primary and Secondary Structure of Proteins - Helical and Beta Sheet Structures (Elementary Treatment Only) – Denaturation of Proteins.

3.2 Nucleic acids – Nucleoproteins - Definition - Types of Nucleic Acids – RNA and DNA - Nucleoside, Nucleotide, Degradation of Nucleotide Chain - Components of RNA and DNA.

3.3 Differences between DNA and RNA - Structures of Ribose and 2- Deoxyribose – Double Helical Structure of DNA - Biological functions of Nucleic Acids - Elementary ideas on Replication and Protein Synthesis.

UNIT-IV Chemistry of Natural Products

4.1 Antibiotics – Definition – Structural elucidation of Penicillin and Chloramphenicol – Uses of Penicillin and Chloramphenicol.

4.2 Alkaloids – Classification – Isolation of alkaloids – General methods of Determination of structure of Alkaloids - Synthesis and Structural Elucidation of Piperine, Coniine and Nicotine.

4.3 Terpenoids – Definition - Classification - Isoprene rule - Synthesis and Structural elucidation of Citral, Menthol and Alpha- pinene.

UNIT- V Organo-Synthetic Reagents

5.1 Acetoacetic ester – Preparation by Claisen ester condensation – Reactions – Synthetic Applications.

5.2 Benzene diazonium chloride – Preparation from aniline – Synthetic Applications – Coupling reactions.

5.3 Grignard Reagents – Preparation – Synthetic Applications – Diazomethane – Preparation by Von-Pechmann method – Synthetic Applications.

CORE PRACTICAL

PAPER – 4

ORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS

Analysis of organic compounds containing one functional group and characterisation with a derivative.

Reactions of the following Functional Groups:

Aldehyde, Ketone, Carboxylic Acid (Mono and Di), Ester, Carbohydrate (Reducing and Non-Reducing), Phenol, Aromatic Primary Amine, Amide, Nitro Compounds, Diamide and Anilide.

Organic Preparations

Acylation

1. Acetylation of Salicylic acid or Aniline.
2. Benzoylation of Aniline or Phenol.

Nitration

3. Preparation of m- Dinitrobenzene
4. Preparation of p- Nitroacetanilide

Halogenation

5. Preparation of p- Bromoacetanilide
6. Preparation of 2,4,6-Tribromophenol

Diazotisation /Coupling

7. Preparation of Methyl Orange

Oxidation

8. Preparation of Benzoic Acid from Toluene or Benzaldehyde.

Hydrolysis

9. Hydrolysis of Ethyl Benzoate (Or) Methyl Salicylate (Or) Benzamide.

Reference Books

- Vogel's Text Book of Chemical Analysis
- Practical Chemistry - A. O. Thomas - Scientific Book Center, Cannanore.
- Practical Chemistry - 3 Volumes - S. Sundaram and others.
- Text Book of Practical Organic Chemistry – A. I. Vogel, A. R. Tatchell, B. S. Furnis, A. J. Hannaford and P.W. G. Smith – 5^{th} Edition - 1996.
- Comprehensive Practical Organic Chemistry - Preparation and Quantitative Analysis - V. K. Ahluwalia, Renu Agarwal – Universities Press – 2013.

PAPER- 10

PHYSICAL CHEMISTRY – II

Objectives:

- To impart Knowledge about Electrochemistry, Surface Chemistry, Photochemistry, Chemical Kinetics and Theories of reaction rates.

UNIT- I Electrochemistry - III

1.1 Galvanic cells - Daniel cell - Reversible and Irreversible Cells – EMF of a Cell and its Measurement - Standard Weston Cadmium Cell – Evaluation of Thermodynamic Quantities.

1.2 Derivation of Nernst equation for Electrode Potential and Cell emf –Types of reversible electrodes - Electrode reactions - Electrode potentials.

1.3 Reference electrodes - Standard Hydrogen Electrode - Standard Electrode Potential - Sign conventions - Electrochemical Series and its Applications.

UNIT- II Electrochemistry - IV

2.1 Liquid Junction Potential - Concentration cells With Transference and Without Transference.

2.2 Applications of Concentration cells - Valency of ions, Solubility and Solubility Product - Activity Coefficient of electrolytes - Determination of pH using Hydrogen, Quinhydrone and Glass electrodes – Potentiometric titrations.

2.3 Polarisation - Overvoltage – Storage Cells - Decomposition potential - Lead Storage Battery - Fuel Cells (H_2-O_2 Cell) - Mechanism of Discharging and Recharging Fuel Cells.

UNIT- III Chemical Kinetics

3.1 Definitions of the terms – Order and Molecularity – Rate of the reaction - Derivations of expressions for Zero, First, Second and Third order rate equations - Study of kinetics by Volumetric, Polarimetric and Spectrophotometric methods - Methods of Determination of Order of a reaction.

3.2 Effect of Temperature on reaction rate - Arrhenius equation - Theories of reaction rates – Bimolecular Collision Theory – Lindmann's theory of Unimolecular Reactions.

3.3 ARRT - Thermodynamic treatment of ARRT – Eyring equation - Comparison of Collision Theory and ARRT.

UNIT- IV Surface Chemistry

4.1 Adsorption – Characteristics of adsorption – Physisorption and Chemisorption – Differences between Physical and Chemical Adsorption - Applications of Adsorption – Adsorption of Gases by Solids – Different Types of Isotherms - Freundlich adsorption isotherm - Langmuir theory of adsorption – Derivation.

4.2 Catalysis – Definition - General Characteristics of Catalytic Reactions – Acid-Base catalysis – Enzyme catalysis – Michaelis-Menton Equation – Effect of Temperature and pH on Enzyme Catalysis.

4.3 Homogeneous catalysis – Function of a catalyst in terms of Gibb's free energy of activation - Heterogeneous catalysis - Kinetics of Unicellular Surface Reactions.

UNIT- V Photochemistry

5.1 Laws of photochemistry - Grothus-Draper law, Stark-Einstein's law – Primary and Secondary processes – Quantum yield and its determination.

5.2 Qualitative description of Fluorescence, Phosphorescence, Luminescence, Chemiluminescence, Bioluminescence and Photosensitized Reactions.

5.3 Kinetics of Photochemical Reactions - H_2-Cl_2 and H_2-Br_2 reactions - Photodimerisation of Anthracene

REFERENCE BOOKS

INORGANIC CHEMISTRY

1. Inorganic Chemistry – P. L. Soni - Sultan Chand (2006).
2. Principles of Inorganic Chemistry - B. R. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications (2013).
3. Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
4. Inorganic Chemistry: Principles of Structure and Reactivity - J. E. Huheey, E. A. Keiter, R. I. Keiter and O. K. Medhi – 2006.
5. Concise Inorganic Chemistry - J. D. Lee - III edition - Von Nostrand.
6. Industrial Chemistry - B. K. Sharma - Goel Publications (1983).
7. Industrial Chemistry R. K. Das - Kalyani Publications, New Delhi (1982).
8. Coordination Chemistry - S. F. A. Kettle - ELBS (1973).
9. Coordination Chemistry - K. Burger - Butterworthy (1973).
10. Vogel's Handbook of Quantitative Inorganic Analysis - Longman.
11. Text Book of Qualitative Inorganic Analysis - A. I. Vogel - III edition (1976).
12. Source Book on Atomic Energy – S. Glasstone- East-West Press Pvt. Ltd. (1967).
13. Nuclear and Radiochemistry - John Wiley and Sons (1964).
14. Nuclear Chemistry - H. J. Arnikar - Wiley Eastern Co., - II edition (1987).
15. Advanced Inorganic Chemistry - Cotton and Wilkinson - V Edition - Wiley and Sons (1988).
16. Text Book of Inorganic Chemistry – R. Gopalan – Universities Press – 2012.
17. Modern Inorganic Chemistry – R. D. Madan - S. Chand Publications, Reprint, 2014.

ORGANIC CHEMISTRY

1. Organic Chemistry - R. T. Morrison and Boyd – Pearson – 2010.
2. Organic Chemistry - I. L. Finar - Volume I and II - Pearson Education.
3. Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
4. Advanced Organic Chemistry - Bahl and Arun Bahl - S. Chand and Co. Ltd. – 2012.

5. Stereochemistry, Conformations and Mechanisms - Kalsi – 2nd Edition, Wiley Eastern Ltd., Chennai – 1993.
6. Organic Chemistry of Natural Products - Volume I and II - O. P. Agarwal - Goel Publishing House
7. A Guide Book to Mechanisms in Organic Chemistry - Peter Sykes - Pearson Education - 2006.
8. Stereochemistry of Organic Compounds - D. Nasipuri - New Age International Publishers..
9. Chemistry of Natural Products - Gurdeep Chatwal- Himalaya Publishing House.
10. Reactions and Reagents - O. P. Agarwal- Goel Publishing House.
11. Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
12. A Text Book of Organic Chemistry, K. S. Tewari, N. K. Vishnoi, S. N. Mehrotra - Vikas Publishing House - 2011.
13. Modern Organic Chemistry- M. K. Jain and S. C. Sharma- Vishnoi Publications, 2014.
14. Reaction, Mechanism and Structure - Jerry March - John Wiley and Sons, NY -1992.
15. Organic Chemistry - Bruice - Pearson Education.
16. Text Book of Organic Chemistry – C. N. Pillai – Universities Press – 2009.
17. Organic Reaction Mechanisms - Parmar and Chawla – S. Chand & Co.
18. Organic Chemistry – I. L. Finar - 6th Edition, Pearson Education, 2008.
19. A Guide Book to Mechanisms in Organic Chemistry – Peter Sykes - Pearson Education, 2006
20. Stereochemistry of Carbon Compounds- E. I. Eliel – Tata Mcgrow Hill Education – 2000.
21. Organic Chemistry - T. W. Graham Solomon, C. B. Fryhle – S. A. Dnyder – John Wiley & Sons – 2014.
22. Advanced Organic Reaction Mechanism (Problems and Solutions) – N. Tewari – Books and Allied (P) Ltd – 2005.
23. Advanced Organic Stereochemistry (Problems and Solutions) – N Tewari - Books and Allied (P) Ltd – 2010.

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1. Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishnal Publishing Co., - 2013.
2. Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha and U. N Dash - Sultan Chand & Co., – 2006.
3. Physical Chemistry - Negi and Anand – Eastern Wiley Pvt.Ltd..
4. Physical Chemistry - Kundu and Jain - S. Chand & Co.
5. Physical Chemistry - K. L. Kapoor - Macmillan - 4 volumes.
6. Elements of Physical Chemistry - Glasstone and Lewis - Macmillan.
7. Text book of Physical Chemistry - S. Glasstone - Macmillan (India) Ltd.
8. Fundamentals of Physical Chemistry - Maron and Landor - Colier - Macmillan.
9. Physical Chemistry - G. W. Castellan - Narosa publishing house - 2004.
10. Physical Chemistry - Walter J. Moore - Orient Longman – 1972.
11. Numerical Problems on Physical Chemistry, Gashal - Books and Allied (P) Ltd.,
12. Universal General Chemistry, C.N.R. Rao, Macmillan.
13. Group Theory and its Chemical Applications - P. K. Bhattacharya - Himalaya Publishing House.
14. Text book of Physical Chemistry – M. V. Sangaranarayanan, V. Mahadevan, Universities Press - 2011.
15. General and Physical Chemistry – Dr. A. Arunabhasan, Books of Allied (P) Ltd., - Ghosal – 2009.

CORE PRACTICAL

PAPER – 5

PHYSICAL CHEMISTRY EXPERIMENTS

1. Kinetics

Determination of the Order of the following reactions

a) Acid catalysed Hydrolysis of an Ester (Methyl or Ethyl acetate)

b) Saponification of an Ester (Methyl or Ethyl Acetate)

c) Iodination of Acetone.

2. Molecular weight of a solute - Rast's method using Naphthalene or Diphenyl as Solvents.

3. Heterogeneous equilibria

a) *Phenol-Water system – CST

b) Effect of impurity – 2 % NaCl or Succinic acid solutions on Phenol -Water system - Determination of the Concentration of the given solution

4. **Determination of the Transition Temperature** of the given salt hydrate. $Na_2S_2O_3.5H_2O$, $CH_3COONa.3H_2O$, $SrCl_2.6H_2O$, $MnCl_2.4H_2O$

5. **Electrochemistry**

Conductivity

a) Determination of Cell Constant and Equivalent Conductivities ofthe solutions of two different concentrations.
b) Conductometric titration of a Strong Acid against a Strong Base.

6. Potentiometric titration of a Strong Acid against a Strong Base.

7. Colorimetry- Determination of unknown concentration using Photoelectric colorimeter.

8. Determination of pKa of acetic acid using pH Meter.

***Need not be given in examination.**

Students must write Short Procedure / Formula with explanation in Ten Minutes for evaluation during the university practical examination.

ELECTIVE

PAPER – 3

A. ANALYTICAL CHEMISTRY – II

Objective:

- To impart knowledge about Different Chromatographic and Spectroscopic Techniques.

UNIT – I

1.1Chromatography – Principles and Techniques of Column, Paper and Thin Layer Chromatography – Column Chromatography – Preparation of Column - Adsorption - Adsorbents – Elution – Recovery of Substances.

1.2 TLC - Choice of Adsorbent and Solvents – Preparation of Chromatogram and Applications - R_f value - Paper Chromatography – Solvents used – Factors affecting R_f value – Separation of Amino Acid Mixtures – Radial Paper Chromatography - Applications.

1.3 lon exchange chromatography – Principle – Experimental Techniques – Types of Resins – Reqirement of a Good Resin – Action of Ion Exchange Resins – Experimental Techniques and Applications – Separation of Zinc- Magnesium, Cobalt - Nickel and Cadmium - Zinc ions.

UNIT – II

2.1 High Pressure Liquid Chromatography and Gas Chromatography – Principle and Applications.

2.2 Gas Chromatography – Mass Spectrophotometer (GC-MS) - Liquid Chromatography - Mass Spectrophotometer (LC-MS) - Principle and Applications.

2.3 Polarography – Principle – DME – Advantages and Disadvantages – Ilkovic equation and its significance (No Derivation) - Polarography as an Analytical tool in Quantitative and Qualitative Analysis – Amperometric Titrations.

UNIT – III

3.1 NMR Spectroscopy – Principle of Nuclear Magnetic Resonance – Basic Instrumentation.

3.2 Number of Signals – Chemical Shift – Shielding and Deshielding – Factors influencing Chemical Shift - Spin-Spin Coulpling and Coupling constants - TMS as NMR standard.

3.3 Splitting of Signals – NMR Spectra of simple Organic Molecules – Applications in Structural Elucidation.

UNIT – IV

4.1 Mass Spectroscopy – Basic principles of Mass Spectrum - Instrumentation – Molecular ion peak- Base peak - Metastable peak - Isotopic peak and their Uses.

4.2 Fragmentation – Factors affecting Cleavage Patterns - Nitrogen rule – Ring rule – McLafferty rearrangement - Determination of Molecular Formulae with examples.

4.3 Mass spectrum of simple organic compounds – Identification – Alcohols, Aldehydes and Aromatic hydrocarbons.

UNIT – V

5.1 ESR Spectroscopy – Condition – Selection Rule for Transition - Theory of ESR Spectra – Basic Instrumentation - ESR Spectrometer – Components and their Functions - Hyperfine splitting – ESR Spectra of simple radicals – CH_3, CD_3, Naphthalene radical ions only – Applications in structural elucidation.

5.2 Thermoanalytical methods – Principle involved in Thermogravimetric analysis (TGA) and Differential Thermal Analysis (DTA) – Instrumentation- Discussion of Various Components with Block Diagram.

5.3 Characteristics of TGA ($CaC_2O_4.H_2O$, $CuSO_4.5H_2O$) and DTA curves – Factors Affecting TGA and DTA Curves – Thermometric Titrations – Principle and Applications.

Reference Books

1. Analytical Chemistry – S. M. Khopkar – New Age International Publishers – 1998.
2. Analytical Chemistry – R. Gopalan – Sultan Chand & Sons – 2002.
3. Chemical Analysis: An Instrumental Approach – A. K. Srivastava and P. C. Jain.
4. Spectroscopic Identification of Organic Compounds – R. M. Silverstein, G. C. Basseler & T. C. Morill.
5. Organic Spectroscopy – W. Kemp.
6. Spectroscopic Methods in Organic Chemistry – D. Williams & I. Fleming.
7. Fundamentals of Moleculars Spectroscopy – 4th Edition, C. N. Banwell and E. M. McCash – Tata McGrow Hill Publishers, New Delhi - 2006.
8. Applications of Absorption Spectroscopy of Organic Compounds – John R. Dyer.
9. Introduction to Molecular Spectroscopy – Barrow.
10. Spectroscopy of Orgnic Compounds - P. S. Kalsi.
11. Instrumental Methods of Chemical Analysis – B. K. Sharma – Goel Publications – 2000.
12. Fundamentals of Analytical Chemistry: An introduction – D. A. Skoog, D. M. West – Thomson – 2004.
13. Analytical Chemistry: Theory and Practice – U. N. Dash.
14. Vibrational Spectroscopy - D. N. Sathyanarayanan – New Age International Publishers – 2000.
15. Fundamentals of Spectroscopy – Y. R. Sharma – S. Chand – 2008.
16. Fundamentals of Molecular Spectroscopy – 4^{th} Edition – C. N. Banwell and E. M. McCash – Tata McGrow Hill, New Delhi – 2006.
17. Elementary Organic Spectroscopy – Principles and Chemical Applications – Y. R. Sharma, S. Chand & Company Private Limited, V Revised Edition – 2013.

ELECTIVE PAPER – 2

B. TEXTILE CHEMISTRY

Objective:

- To impart knowledge about the Production, Properties and Applications of Natural and Synthetic Fibres, Colour and Constitution, Classification of Dyes and Concept of Dyeing in Textile Industry.

UNIT – I

1.1 General Classification of Fibres – Chemical structure – Production – Properties – Count, Denier, Tex, Staple Length, Spinning Properties, Strength, Elasticity and Creep.

1.2 Applications of the following Natural Cellulose Fibres (Cotton and Jute).

1.3 Natural Protein Fibres (Wool and Silk) – General characteristics.

UNIT – II

2.1 Chemical Structure, Production and properties of the following Synthetic Fibres - Man-made Cellulose Fibres (Rayon and Modified cellulose fibres).

2.2 Polyamide Fibres (Different types of Nylons) - Preparation – Nylon degradation – Polyester Fibres – Preparation - Degradation – Polyacrylonitrile fibre - Preparation and Properties – Viscose fibre - Preparation and Properties.

2.3 Identification tests for Cellulose, Cotton, Wool, Silk, Rayon, Acrylic, Viscose, Polyamide and Polyester Fibres.

UNIT – III

3.1 Impurities in Raw Cotton and Grey Cloth, Wool and Silk.

3.2 General principles of the Removal, Scouring - Purpose, Alkali Scouring and Acid Scouring – Bleaching (Methods - Hypochlorite, Peroxide and Bleaching Powder) - Desizing (Hydrolytic and Enzymatic), Kier Boiling and Chemicking.

3.3 Dyeing of Polyester and Blends – Functions of Dispersing agents - Fibre swelling – Carrier dyeing - High temperature dyeing - Selection of dyestuff.

UNIT – IV

4.1 Colour and Constitution – A general treatment – Chromophores – Auxochromes - Bathochromes and Hypsochromes.

4.2 Classification of dyes – Acidic, Basic, Direct, Mordant, Azoic, Ingrain, Vat and Reactive Dyes - Classification as per Chemical constitution – Azo dyes – Triphenyl Methane Dyes, Phthalein Dyes, Indigo and Anthraquinone Dyes.

4.3 Structure, Preparation and Uses – Methyl Orange, Phenolphthalein and Malachite Green.

UNIT – V

5.1 Dyeing - Dyeing of Wool and Silk – Fastness properties of dyed materials.

5.2 Dyeing of Nylon, Terylene and other Synthetic Fibres – Finishing – Finishes given to Fabrics – Mechanical finishes on Cotton, Wool and Silk.

5.3 Method used in process of Mercerizing – Anticrease and Antishrink finishes – Water Proofing.

References

- Chemical Technology of Fibrous Materials - F. Sadov, M. Horchagin and A. Matetshy, Mir Publishers.
- The Identification of Textile Fibres - Bruno Nuntak.
- Introduction to Textile Science - 3rd edition, Maryory L. Joseph.
- Textile Chemistry – Vol. II, R. H. Peters, Elsevier, Amsterdam.
- Dyeing and Chemical Technology of Textile Fibres – 5th Edition, E. R. Trotman, Charles Griffin &Co Ltd.
- Chemistry of dyes & Principles of Dyeing – V. A. Shenai, Sevak Publications.
- Scouring and Bleaching, E. R. Trotman, Charles Griffin & Co Ltd.
- Text Book of Applied Chemistry - K. Kapur.
- A Students Text Book of Textile Science – A. J. Hall.

ELECTIVE

PAPER – 3

C. NANO CHEMISTRY

Objectives:

- To introduce the Basics of Nanotechnology.
- To learn the Instrumental Techniques used in Characterisation of Nanomaterials.

UNIT-I Basics of Nanochemistry

Introduction – Definition – Length scales – Importance of Nanoscale and its Technology – Self Assembly of Materials – Self Assembly of Molecules – Porous solids, Nanowires, Nanomachines and Quantum Dots.

UNIT-II Nanoparticles

Introduction – Types of Nanoparticles – Preparation, Properties and Uses of Gold, Silicon, Silver, Zinc Oxide, Iron Oxide, Alumina and Titania Nanoparticles.

UNIT-III Synthetic Techniques

Techniques to Synthesise Nanoparticles – Top down and Bottom up Approaches – Common Growth Methods – Characterisation of Nanoparticles – Applications and Toxic effects of Nanomaterials.

UNIT-IV Nanomaterials

Preparation, Properties and Applications of Carbon Nanotubes, Nanorods, Nanofibres and Nanoclays.

UNIT-V Instrumental Techniques

Electron Microscopes – Scanning Electron Microscopes (SEM) – Transmission Electron Microscopes (TEM) – Scanning Probe Microscopy – Atomic Force Microscopy (AFM) – Scanning Tunneling Electron Microscope (STEM) – Basic Principles only.

Books for Study

- Nanotechnology, S. Shanmugam, MJP Publishers, Chennai (2010).
- A Handbook on Nanochemistry, Patrick Salomon, Dominant Publishers and Distributers, New Delhi.
- Nanobiotechnology, S. Balaji, MJP Publishers, Chennai (2010).

Books for Reference

- The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).
- Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).
- Nanochemistry, G. B. Segreev, Elsevier, Science, New York, (2006).
- Nano: The Essentials, T. Pradeep, Tata Mc-Graw Hil Publishers, New Delhi (2007).
- Text Book of Nanoscience and NanoTechnology, P. Shankar Baldev Raj, B. B. Rath and James Murday – 2014.

SKILL BASED SUBJECT

PAPER – 4

AGRICULTURE AND LEATHER CHEMISTRY

OBJECTIVE:

- To learn about Soil fertility and Productivity, Soil Chemistry, Insecticides, Leather Industry and Treatment of Tannery Effluents.

Unit-I Soil Chemistry

1.1 Soil – Introduction - Classification - Properties of Soil – Physical properties – Components – Structure and Texture - Soil-Water, Soil-Air and Soil-Temperature.

1.2 Chemical properties - Soil Minerals, Soil Colloids, Soil Reaction and Buffering – Analysis of Soil - Soil pH – Determination of Soil pH – Effect of pH on Plants – Buffering of soil - Soil acidity, Soil salinity and Soil alkalinity.

1.3 Soil Fertility – Carbon and Nitrogen cycle - Acid, Alkaline and Saline soils – Their Formation - Reclamation – Liming agents.

UNIT-II Fertilisers and Manures

2.1 Fertilisers – Definition - Classification – Requirements of a Good fertiliser - Nitrogen fertiliser – Urea – Preparation and Uses – Potash fertiliser – KCl, K_2SO_4 and KNO_2 - Preparation and Uses – Phosphorus fertiliser – Phosphatic slag, Superphophate of lime and Triple Superphosphate - Preparation and Uses- NPK fertiliser - Advantages– Role of Micronutrients.

2.2 Manures – Compost – Composting - Methods of Composting - Farmyard Manure, Vermicompost, Composted Coconut Coir Pith, Press mud and Poultry manure – Applications.

2.3 Types of pollutions caused by Fertilisers - Ill effects of Fertilisers and their Control.

UNIT-III Insecticides and Fungicides

3.1 Insecticides – Definition - Classification of Insecticides - Stomach poisons - Contact poisons and Fumigants - Insecticides - Organic Insecticides - DDT - Gammexane - Malathion – Parathion.

3.2 Fungicides – Inorganic Fungicides – Sulphur compounds – Copper compounds – Mercuric compounds – Organic Fungicides – Dithiocarbamates – Dithane M – Bordeaux mixture.

3.3 Herbicides - Rodenticides - Pesticides in India - Adverse Environmental Effects of Pesticides.

UNIT- IV Leather Chemistry

4.1 Introduction - Constituents of Animal Skin - Preparing Skins and Hides – Leather processing – Process before Tannage – Flaying, Curing, Drying, Pickling, Cleaning and Soaking - Liming and Degreasing.

4.2 Manufacture of Leather - Leather Tanning methods - Vegetable Tanning – Chemistry of Chrome Tanning and Mineral Tanning – Deliming.

4.3 Dyeing of Leather and Fat Liquoring - Leather Finishing - Oil Tanning - By products.

UNIT- V Tannery Effluents

5.1 Tannery effluents - Pollution and its control - Water pollution and Air pollution - Waste Management.

5.2 Treatment of Tannery Effluents - Primary, Secondary and Tertiary treatment - Pollution Prevention.

5.3 Effect of Tannery Effluents on Agriculture – Organic Amendments - Reclamation of Tannery Effluents Affected Soil.

Reference Books

- Industrial Chemistry by B. K. Sharma - Goel Publishing House, Meerut.
- Applied Chemistry by K. Bagavathi Sundari, MJP Publishers, 2006.
- Fundamental Concept of Applied Chemistry by Jayashree Ghosh, S. Chand & Company Ltd.,
- The Nature and Properties of Soils - IX Edition - Nyle. C. Bready - S. Chand.
- Soils and Soil Fertility - Louis M. Thompson - and Frederick. R. Troch - Tata Mc Graw Hill Publishing Co.
- Text Book of Soil Science - T. D. Biswas and S. K. Mukerjee - II Edition.
- Soil Science - A. Sankara.
- Fundamentals of Leather Science - Wood roffe Publications of CLRI - Chennai.
- Nature and Properties of Soils - Harry, O. Buckman.

SCHEME OF VALUATION FOR PRACTICAL EXAMINATIONS

PRACTICAL – I

VOLUMETRIC ANALYSIS

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 marks

Record: 15 Marks

Procedure: 10 Marks

Error upto 2 % : 50

2.1 – 3 % : 40

3.1 – 4 % : 30

4.1 – 5 % : 20

>5 % : 10

For incomplete or wrong calculation deduct 20 % of total marks scored.

For no calculation deduct 40 % of total marks scored.

For each arithmetic error deduct 1 mark.

CORE PRACTICAL – II

INORGANIC QUALITATIVE ANALYSIS AND PREPARATION

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 marks

Record: 15 Marks

Preparation: 20 (Quantity- 15 Marks; Quality- 5 marks)

Analysis: 40 Marks.

Each radical with procedure: 10 Marks

(Spotting for each radical - 5 Marks; Fixing the group - 5 Marks)

PRACTICAL - III

GRAVIMETRIC ANALYSIS

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 marks

Record: 15 Marks

Procedure: 10 Marks

Error upto 2 % : 50

2.1 – 3 % : 40

3.1 – 4 % : 30

4.1 – 5 % : 20

>5 % : 10

a. Among the duplicate results, the value more favorable to the candidate must be taken.

b. When no duplicate result is given deduct 5 marks.

c. If the two results differ by more than 2 % deduct 5 marks.

d. For each independent arithmetical error deduct 1 mark.

e. For incomplete or wrong calculation deduct 20 %.

f. For no calculation deduct 40 %.

g. If the experiment is not completed due to an accident, award 5 marks.

PRACTICAL - IV

ORGANIC ANALYSIS

Internal assessment: 25 Marks

External assessment: 75 marks

Total: 100 marks

Record: 15 Marks

Preparation: 15 (quantity: 10 & quality: 5)

Analysis: 45

Preliminary reaction: 4

Aliphatic/ Aromatic: 4

Saturated/ Unsaturated: 4

Tests for elements: 9

Functional groups: 10

Confirmatory tests: 10

Derivative/Coloured reaction: 4

PHYSICAL CHEMISTRY PRACTICALS

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 Marks

Record: 15 Marks

Experiment: 45 Marks

Manipulation, Tabulation and Calculation: 15 Marks

1) **Kinetics**

Graph	: 10 Marks
Below a factor of 10	: 35
By a factor of 10	: 25
More than a factor of 10	: 15

2) <u>Molecular weight</u>

Error upto 10 %: 45

20 %: 35

30 %: 25

> 30 %: 15

3) <u>Effect of electrolyte on CST</u>

Graph: 10

Error upto 10 %: 35

20 %: 25

30 %: 15

> 30: 10

4) <u>Transition temperature</u>

Graph: 10

Error upto 2^{o}C difference: 35

7^{o}C difference: 25

> 7^{o}C difference: 15

5) <u>Conductance</u>

<u>Equivalent conductance: 25 marks</u>		**<u>Cell constant : 20 marks</u>**	
Error upto 10 %	: 25	Error upto 10 %	: 20
Upto 15 %	: 15	Upto 15 %	: 15
>15 %	: 10	>15 %	: 10

6) <u>Conductometric titration</u>

Graph: 10

Upto 2 % : 35

2.1 to 3 % : 30

3.1 to 4 % : 25

4.1 to 5 % : 20

> 5% : 15

THIRUVALLUVAR UNIVERSITY

B.Sc. COMPUTER SCIENCE

DEGREE COURSE

CBCS PATTERN

(With effect from 2017 - 2018)

The Course of Study and the Scheme of Examinations

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper - 1	6	6	Digital Logic & Programming in C	25	75	100
4	III	Core Practical	Practical-1	3	2	Programming in C Lab	25	75	100
5	III	ALLIED 1	Paper-1	7	4	**(to choose any one)** 1. Mathematics I 2. Mathematical Foundations I	25	75	100
6	IV	Environ. Studies		2	2	Environmental Studies	25	75	100
				30	**22**		**150**	**450**	**600**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
7	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8	II	English	Paper-2	4	4	English	25	75	100
9	III	Core Theory	Paper-2	6	6	C++& Data Structures	25	75	100
10	III	Core Practical	Practical-2	3	2	C++ and Data Structure lab	25	75	100
11	III	Allied 1	Paper-2	7	6	**(to choose any one)** 1. Mathematics II 2. Mathematical Foundations II	25	75	100
12	IV	Soft skill		2	1	Soft skill	25	75	100

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
13	IV	Value Education		2	2	Value Education	25	75	100
				30	**25**		**175**	**525**	**700**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
14	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
15	II	English	Paper-3	6	4	English	25	75	100
16	III	Core Theory	Paper-3	3	3	Java Programming	25	75	100
17	III	Core Practical	Practical-3	3	3	Java Programming Lab	25	75	100
18	III	Allied II	Paper-3	4	4	**(to choose any one)** 1. Physics I 2. Statistical Methods and their Applications	25	75	100
19	III	Allied II	Practical	3	0	Physics / Statistics Practical	0	0	0
20	IV	Skill Based Subject I	Paper-1	3	3	Design & Analysis of Algorithm	25	75	100
21	IV	Non-Major Elective I	Paper-1	2	2	Introduction to Information Technology	25	75	100
				30	**23**		**175**	**525**	**700**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
22	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
23	II	English	Paper-4	6	4	English	25	75	100
24	III	Core Theory	Paper-4	3	3	Database Management Systems	25	75	100
25	III	Core Practical	Practial-4	3	3	RDBMS Lab	25	75	100
26	III	Allied II	Paper-4	4	4	**(to choose any one)** 1. Physics II	25	75	100

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title							
						2. Statistical Methods and their Applications II			
27	III	Allied Practical	Practical	3	2	Physics / Statistics practicals	25	75	100
28	IV	Skill Based Subject II	Paper-2	3	3	Computer Organisation and Architecture	25	75	100
29	IV	Non-Major Elective II	Paper-2	2	2	Internet and its Applications	25	75	100
				30	**25**		**200**	**600**	**800**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
30	III	Core Theory	Paper-5	6	3	Mobile Application Development	25	75	100
31	III	Core Theory	Paper-6	6	3	Operating System	25	75	100
32	III	Core Theory	Paper – 7	4	2	Data Communication & Network	25	75	100
33	III	Core Practical	Practical-5	4	3	Mobile Applications Development - Lab	25	75	100
34	III	Core Practical	Practical-6	4	3	Operating System - Lab	25	75	100
35	III	Elective I	Paper-1	3	3	1. Data Mining 2. Computer Graphics 3. Information Security	25	75	100
36	IV	Skill Based Subject III	Paper-3	3	3	Software Engineering	25	75	100
				30	**20**		**175**	**525**	**700**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
37	III	Core Theory	Paper-8	7	5	Cloud Computing	25	75	100
38	III	Core Theory	Paper-9	6	4	Open Source Programming	25	75	100
39	III	Core	Practical-	4	3	ASP .NET Lab	25	75	100

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title							
		Practical	7						
40	III	Core Practical	Practical-8	4	3	Open Source Programming - Lab	25	75	100
41	III	Elective II	Paper-2	3	3	1. Software Testing 2. Mobile Computing 3. Microprocessor	25	75	100
42	III	Elective III	Paper-3	3	3	1. Internet of Things 2. System Software 3. Multimedia Systems	25	75	100
43	IV	Skill Based Subject IV	Paper-4	3	3	ASP .NET	25	75	100
44	V	Extension Activities		0	1		100	0	100
				30	**25**		**275**	**525**	**800**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	4	8	100+100 (I + III SEM)	200
	Allied (Even Semester)	2	6+4	10	100+100 (II + IV SEM)	200
	Allied Practical	1	2	2	100	100
	Electives	3	3	9	100	300
	Core	9	(3-6)	35	100	900
	Core Practical	8	(2-3)	22	100	800
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**43**		**140**		**4300**

THIRUVALLUVAR UNIVERSITY

B.Sc. COMPUTER SCIENCE

SYLLABUS
UNDER CBCS
(with effect from 2017 - 2018)

SEMESTER I

PAPER – 1
Digital Logic & Programming in C

Objective:

Provide basic knowledge on Digital Electronics to understand the working principles of Digital computer and to develop programming skill using C language.

UNIT I: Number systems and Boolean algebra

Number Systems - Decimal, Binary, Octal, Hexadecimal and their inter conversions, - Binary Arithmetic -1's complement, 2's complement and 9's complement .Binary codes - BCD, Excess-3, Graycode.

Boolean Algebra: Boolean Laws - Simplification of Boolean Functions - Logic gates and Truth Table – Universal Gates (NAND and NOR) - The K-map method up to five variables, don't care conditions, POS & SOP forms.

UNIT-II: Combinational and Sequential Circuits

Combinational Logic: Half/Full adder/subtractor, code conversion, Multiplexers, de multiplexers, encoders, decoders, Combinational design using MUX & DEMUX. BCD adder, magnitude comparator.

Sequential logic: Flip flops (RS, Clocked RS, D, JK, JK Master Slave)-Counters & types Synchronous and Asynchronous counters- Registers, Shift registers and their types.

UNIT –III: C Basics and Control constructs

C fundamentals- Operators- Constants- Expression – Library functions- Decision making and branching- Switch- FOR,WHILE, DO WHILE loops-continue-break

Unit IV: Arrays, Functions and Structures

Arrays-Multi dimensional arrays- User defines functions- Call by Value and reference-Recursion- Storage classes- Structures and Union –Self referential structures

Unit – V: Pointers and Files

Pointers- Pointer operations and Arithmetic- File management in C : File opening and closing- - I/O operations on files - Error handling during I/O operations - Random access to files - Command line arguments

Text Book:

1. Morris Mono M. "**Digital Logic and Computer Design**",PHI Latest Pub. Ed. (Unit I and 2)
2. ReemaThareja,**" Programming in C "** Oxford University Press 2014

Reference Book

1. Albert Paul Malvino, Donald P Leach, **Digital principles and applications** TMH, 1996.
2. Balagurusamy," Programming in C" TMH

CORE PRACTICAL – I

PROGRAMMING IN C - LAB

1. Summation of Series: Sin(x) (Compare with built in functions)
2. Summation of Series Cos(x) (Compare with built in functions)
3. Counting the no. of vowels, consonants, words, white spaces in a line of text
4. Reverse a string & check for palindrome without built in string function
5. ${}^{n}P_{r}$, ${}^{n}C_{r}$ in a single program using function
6. Matrix Addison, subtraction and multiplication
7. Linear Search of a number in an array
8. Sorting an array in ascending and descending order
9. Finding maximum and minimum of list of numbers
10. Call by value and call by reference of functions
11. Employee pay bill using structure
12. Preparing an EB bill using file

ALLIED

1. MATHEMATICS – I

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ.

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians - Concepts of polar co-ordinates - Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.
3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

2. MATHEMATICAL FOUNDATIONS - I

Objectives

To know about Logical operators, validity of arguments, set theory and set operations, relations and functions, Binary operations, Binary algebra, Permutations & Combinations, Differentiation, Straight lines, pair of straight lines, Circles, Parabola, Ellipse, Hyperbola.

UNIT-I: SYMBOLIC LOGIC

Proposition, Logical operators, conjunction, disjunction, negation, conditional and bi-conditional operators, converse, Inverse, Contra Positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

UNIT-II: SET THEORY

Sets, set operations, venndiagram, Properties of sets, number of elements in a set, Cartesian product, relations & functions,

Relations : Equivalence relation. Equivalence class, Partially and Totally Ordered sets,

Functions: Types of Functions, Composition of Functions.

UNIT-III: BINARY OPERATIONS

Types of Binary Operations: Commutative, Associative, Distributive and identity, Boolean algebra: simple properties. Permutations and Combinations.

UNIT-IV: DIFFERENTIATION

Simple problems using standard limits,

$\lim_{x \to a} \frac{x^n - a^n}{x - a}$, $\lim_{x \to 0} \frac{\sin x}{x}$, $\lim_{x \to 0} \frac{\tan x}{x}$, $\lim_{x \to 0} \frac{e^x - 1}{x}$, $\lim_{n \to \infty} (1+1/n)^n$, $\lim_{n \to 0} (1+n)^{1/n}$

Differentiation, successive differentiation, Leibnitz theorem, partial differentiation, Applications of differentiation, Tangent and normal, angle between two curves.

UNIT-V: TWO DIMENSIONAL ANALYTICAL GEOMETRY

Straight Lines - Pair Straight Lines

Text Book.

P.R. Vittal, Mathematical Foundations – Maragham Publication,

Chennai.

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V.Sundaram& Others, Dircrete Mathematical Foundation - A.P.Publication, sirkali.
3. P.Duraipandian& Others, Analytical Geometry 2 Dimension - Emerald publication 1992 Reprint.
4. Manicavachagompillay&Natarajan. Analytical Geometry part I - Two Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

SEMESTER II

CORE THEORY PAPER – 2

C++ AND DATA STRUCTURE

Objective: To develop Object oriented programming skills using C++ and to introduce data structure concepts.

UNIT-I: Object Oriented Concepts and C++

C++ Fundamentals - Operators, Expressions and Control Structures: If,If..Else, Switch - Repetitive Statements- for,while,do..while - Input and Output in C++ - manipulators-manipulators with parameters. - Pointers and arrays

UNIT-II: Functions and Classes

Functions in C++ - Main Function - Function Prototyping - Parameters Passing in Functions - Values Return by Functions - inline Functions - Function Overloading.
Classes and Objects; Constructors and Destructors; and Operator Overloading - Type of Constructors

UNIT – III: Inheritance, Polymorphism & Files

Inheritance : Single Inheritance - Multilevel inheritance - Multiple inheritance - Hierarchical Inheritance - Hybrid Inheritance - Polymorphism - Working with Files : Classes for File Stream Operations - Opening and Closing a File - End-of-File Detection - Updating a File - Error Handling during File Operations .

UNIT-IV: Fundamental Data Structures

Definition of a Data structure - primitive and composite Data Types, Stacks (Array) - Operations –Linked Stack-Operations- Applications of Stack (Infix to Postfix Conversion).

Queue (Array)- operations-Linked Queue- Operations- - Singly Linked List - Operations, Application of List (Polynomial Addition)-. Doubly Linked List - Operations.

UNIT-V : Trees and Graphs

Trees: Binary Trees –Binary Search Tree- Operations - Recursive Tree Traversals-Recursion. Graph - Definition, Types of Graphs, Graph Traversal –Dijkstras shortest path- DFS and BFS.

Text Books

1. Mastering in C++, K.R.Venugopal, Raj Kumar, T.Ravisankar – McGraw Hill, 2011.
2. C++ Plus Data Structure by Nell Dale, Narosa Publications, 2000

Reference Books:

1. Reema Thareja, Object Oriented Programming with C++, Oxford University Press, 2015
2. Balagurusamy, C++ programming, TMH.
3. Fundamentals of Data Structures in C++ by Ellis Horowitz, Sartaj Sahni and Dinesh Mehtha, Second Edition, University Press
4. Data Structures using C++ by Varsha H.Patil. Oxford University Press, 2012

PRACTICAL – II

C++ & DATA STRUCTURE - LAB

1. Implementing classes, object, constructors and member functions for calculating area and perimeter of a circle.
2. Implementing function overloading (Find area/volume of rectangle, circle, sphere, cylinder, cone etc).
3. Implementing operator over loading(Addition, subtraction, multiplication of matrices)
4. Implementing single, multiple, hierarchical inheritance.
5. Implementing sequential file operations using error handling functions.
6. Implementing PUSH, POP operations of stack using Arrays.
7. Implementing add, delete operations of a queue using Arrays.
8. Implementing Infix to postfix conversion of an expression using stack
9. Implementing Binary search tree recursive traversals (in-order, pre-order, post-order).
10. Implementing Polynomial addition using linked list.

ALLIED - 2

1. MATHEMATICS – II

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume - Fourier series for functions in $(0,2\pi)$ and $(-\pi, \pi)$.

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Guass, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

2. MATHEMATICAL FOUNDATIONS II

Objectives

To know about Matrix Operations, Symmetric, Skew-Symmetric, Hermitian, Skew-Hermitian, Orthogonal, Unitary Matrices. Rank of a Matrix Solutions of linear equations Consistency and Inconsistency, Characteristic roots and Characteristics Vectors, Cayley - Hamilton Theorem, Integration of rational functions, Integration by parts, Reduction formulae, Area and volume using integration, Planes, Straight lines, Spheres, Curves, Cylinders.

UNIT-I: MATRICES

Multiplication of matrices, Singular and Non-Singular matrices, Adjoint of a Matrix, Inverse of a matrix Symmetric and Skew-Symmetric, Hermitian and Skew-Hermition, Orthogonal and unitary matrices, Rank of a matrix, Solution of Simultaneous Linear equations by

(i) Cramer's rule.

(ii) Matrix Inversion Method.

UNIT-II: MATRICES

Test for Consistency and Inconsistency of linear equations, (Rank Method), characteristic roots and characteristic vectors, Cayley - Hamilton theorem, matrix of linear transformations: reflection about the x, y axes and the line y=x, rotation about the origin through an angle, expansion or compression, shears, translation.

UNIT-III

Integration Simple problems, integration of rational function involving algebraic expressions of the form

$$\frac{1}{\sqrt{ax^2+bx+c}}, \frac{1}{\sqrt{ax^2+bx+c}\sqrt{ax^2+bx+c}}, \frac{px+q}{\sqrt{ax^2+bx+c}}, \frac{px+q}{\sqrt{ax^2+bx+c}\sqrt{ax^2+bx+c}}, \sqrt{px+q}$$

integrations using simple substitutions integrations involving trigonometric functions of the form

$$\frac{1}{a+b\cos x}, \frac{1}{a^2\sin^2 x+b^2\cos^2 x},$$ Integration by parts.

UNIT-IV

Properties of definite integrals. Reduction formulae for

$\int x^n e^{ax} dx$, $\int \sin^n x dx$, $\int \cos^n x dx$, $\int x^m (1-x)^n dx$, applications of integration for (i) Area under plane caurves, (ii) Volume of solid of revolution.

UNIT-V: ANALYTICAL GEOMETRY OF THREE DIMENSION

Planes, straight lines.

Text Book.

P.R.Vittal, Mathematical Foundations - Margham Publication, Chennai.

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V.Sundaram& Others, Dircrete Mathematical Foundation - A.P.Publication, sirkali.
3. P.Duraipandian& Others, Analytical Geometry 3 Dimension – Emerald publication 1992 Reprint.
4. Manicavachagompillay&Natarajan. Analytical Geometry part II - three Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

SEMESTER III

CORE THEORY PAPER – 3

JAVA Programming

Objectives:

To improve Object Oriented Programming gathered already through an independent platform.

Unit – I: BASICS, ESSENTIALS, CONTROL STATEMENT AND CLASSES & OBJECTS

Computer and its Languages – Stage, Origin and Features for Java - JDK–OOP; Java Essentials: Program – API - Variables& Literals - Data Types - String Class – Operators - Type conversion - Constants - Scope – Comments - Keyboard Input; Control Statements: Conditional Statements – Looping Statements - Break and Continue Statements; Classes and Objects: Modifiers - Arguments - Constructors - Packages and import - Static Class - Overloaded Methods and Constructors - Returning Objects – to String() - this reference –Enumeration - Garbage Collection.

Unit – II: ARRAYS, INHERITANCE, INTERFACES AND PACKAGES

Arrays - Three or More Dimensions; Inheritance: Basics - Calling the Super class Constructor - Overriding Super class Methods - Inheritance from Subclasses – Polymorphism -Abstract Classes and Methods - Interfaces: Fields - Multiple inheritance - Interface inheritance; Packages: Creating packages – Accessing package from other packages- Access Specifier.

Unit – III: STRING HANDLING, EXCEPTION HANDLING AND MULTI THREADING

String Handling: Basics - Operations –String Methods - String Buffer class - String Builder – to String method -String Tokenizer class. Exception Basics: try and catch block - Multiple catch block - Nested try - throws keyword - Throw vs Throws - Final Vs Finally Vs Finalize - Method Overriding - Custom Exception - Multithreading: Life Cycle - Methods in Thread - thread application – Thread priority – Synchronization - Inter-thread communication - Suspending, Resuming, and Stopping Threads;

Unit – IV: APPLET AND GUI APPLICATION

Applets: Basis - Lifecycle - Applet classes - Application – Graphics; AWT-I: GUI Programming - AWT classes - Windows fundamentals- Creating Windows - Dialog Boxes - Layout Managers - Radio Buttons and Check Boxes – Borders- Swing

Unit – V: JAVA DATABASE CONNECTIVITY

JDBC - Types of Drivers- Architecture- Classes and Interfaces - Developing JDBC Application - New Database and Table with JDBC - Working with Database Metadata.

Text Book

1. S.Sagayaraj, R.Denis, P.Karthik & D.Gajalakshmi, "Java Programming", Universities Press, 2017

References

1. Patrick Naughton and Herbert Schildt. "The Complete Reference JAVA 2". 3rd Edition. Tata McGraw-Hill Edition, 1999.
2. Muthu C. "Programming with JAVA". 2nd Edition. Vijay Nicole Imprints, 2011.
3. Ken Arnold Gosling and Davis Holmen. "The Java Programming Language". 3rd Edition. Addition Wesley Publication.

Core Practical

Practical 3- JAVA Programming LAB

List of Practical's

1. Implementing Package, inheritances and interfaces
2. Implementing Flow, Border and Grid Layouts
3. Implementing Dialogs , Menu and Frame
4. Implementing User defined Exception Handling
5. Implementing Multithreading
6. Implementing I/O Stream File handling
7. Implementing a Calculator using Swing
8. CRUD operation Using JDBC
9. Client Server using TCP and UDP Socket
10. GUI application with JDBC

ALLIED - 3

1. PHYSICS - I

UNIT – I: PROPERTIES OF MATTER

Elasticity : Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula .

Surface Tension: Surface Tension – Surface Tension and interfacial surface tension by the method of drops.

UNIT – II: HEAT

Heat: Specific heat – Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power.
Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Super conductors. Type I and II – Meisner Effect – Helium I and II.

UNIT – III: ELECTRICITY AND MAGNETISM

Electricity: Potentiometer – Principle – Calibration of low range voltmeter – Measurement of internal resistance of cell – measurement of an unknown resistance.

Magnetism – Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer in Tan C position and the vibration magnetometer.

UNIT – IV: SOUND AND ACOUSTICS OF BUILDING

Sound: Transverse vibration of strings – Velocity and frequency of vibrations of a stretched string – laws – sonometer – A.C. Frequency – Steel Wire – Brass wire.

Ultrasonics – Production by Piezo – electric method – properties and uses.
Acoustics of buildings: Reverberation – Reverberation time – Sabine's formula (definition only) – Sound absorption co-efficient of surface – conditions for the perfect acoustics.

UNIT – V: OPTICS

Interference: Air Wedge – Description – Test for optical flatness of glass plate – Determination of diameter of a thin wire by air wedge.

Diffraction: Theory of transmission grating – Normal Incidence – Determination of Wavelength of monochromatic source and Wavelength of mercury line using a grating by normal Incidence.

Fibre optics: principle-classification of optical fibres-fibre optic communication system block diagram.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Introduction to Fibre optics- K.Thyagarajan and Ajay Ghatak,Cambridge,University Press(1999).

ALLIED

2. STATISTICAL METHODS AND THEIR APPLICATIONS I

Objective
To understand and computing statistical Methods by which to develop the programming Skills.

UNIT-I
Introduction - scope and limitations of statistical methods - classification of data - Tabulation of
data - Diagrammatic and Graphical representation of data - Graphical determination of Quartiles ,Deciles and Percentiles.

UNIT-II
Measures of location : Arithmetic mean, median, mode, geometric mean and Harmonic mean and their properties.

UNIT-III
Measures of dispersion : Range, Quartile deviation, mean deviation, Standard deviation, combined Standard deviation, and their relative measures.

UNIT-IV
Measures of Skewness Karl Pearson's, Bowley's, and kelly's and co-efficient of Skewness and kurtosis based on moments.

UNIT-V
Correlation - Karl Pearson - Spearman's Rank correlation - concurrent deviation methods.
Regression Analysis: Simple Regression Equations.

Note : The proportion between theory and problems shall be 20:80

Books for Reference:
1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII
3. Elements of Statistics - Mode . E.B. - Prentice Hall
4. Statistical Methods - Dr. S.P. Gupta - Sultan Chand & Sons

Skill Based Subject –Paper 1

DESIGN AND ANALYSIS OF ALGORITHMS

Objective: To build a solid foundation of the most important fundamental subject in computer science. Creative thinking is essential to algorithm design and mathematical acumen and programming skills.

UNIT -I: ALGORITHM AND ANALYSIS

What is an Algorithm? - Algorithm Specification- Performance Analysis- Randomized Algorithms.

UNIT - II: DIVIDE AND CONQUER

General Method - Binary Search - Finding the Maximum and Minimum-Merge Sort - Quick Sort - Selection Sort- Stassen's Matrix Multiplications.

UNIT - III: THE GREEDY METHOD

The General Method - Knapsack Problem – Tree Vertex Splitting - Job Sequencing with Deadlines - Minimum Cost Spanning Trees - Optimal Storage on Tapes - Optimal Merge Pattern - Single Source Shortest Paths.

UNIT - IV: DYNAMIC POGRAMMING

The General Method – Multistage Graphs - All pair shortest path - String Editing - 0/1 Knapsack – Reliability Design - The Traveling Salesperson Problem

UNIT - V: TRAVERSAL, SEARCHING & BACKTRACKING

Techniques for Binary Trees- Techniques for Graphs - The General Method - The 8-Queens Problem – Sum of Subsets- Graph Colouring- Hamiltonian Cycles

TEXT BOOK

Fundamentals of Computer Algorithms, Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Galgotia Publications, 2015.

REFERENCE BOOKS:

1. Introduction to Algorithms ,Coremen T.H.,Leiserson C.E. and Rivest R.L., PHI 1998.

2. Introduction to the Design and Analysis of Algorithms, AnanyLevitin, Pearson Education, 2nd Edition.

Non- Major Elective-1 Paper-1

Introduction to Information Technology

Objectives:

To enable the student to be proficient with Information Technology with a better knowledge of Computer

UNIT – I Introduction to Computers:

Definition - Characteristics of a Computer - Classification of Computers - Basic Anatomy of the Computer - Applications / Uses of Computers in different fields

UNIT – II Input and Output Devices:

Input Devices - Output Devices - Data Representation - Programming Languages / Computer Languages - Software: System Software - Application Software

UNIT – III Data Communication and Computer Networks:

Data Communication - Computer Network - The Uses of a Network - Types of Networks - Network Topologies- Transmission Media: Guided Transmission Media - Wireless Transmission

UNIT – IV Internet and its Applications:

History of Internet - Uses of Internet - Advantages of Internet - ISP - Internet Services - IP Address - Web Browser - URL - DNS - Internet Explorer - Types of internet connections - E-mail - Search Engine.

UNIT – V Operating System:

Evolution of operating systems - Function of Operating System - Classification of Operating –System - Example of Operating System – DOS –Windows – UNIX - Linux

TEXT BOOKS:

1. Alexis Leon and Mathews Leon, "Fundamentals of Information Technology", Vikas Publishing House Pvt. Ltd.
2. Introduction to Information Technology, P.Rizwan Ahmed, Second Edition, Margham Publications, 2016
3. Introduction to Information Technology, PelinAksoy, Laura DeNardis, Cengage Learning India Private Limited.

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SEMESTER IV

CORE THEORY PAPER – 4

DATABASE MANAGEMENT SYSTEM

Objective: To incorporate a strong knowledge on databases to students

UNIT - I Database Basics

Introduction: Flat File – Database System – Database – Actionable for DBA. The Entity – Relationship Model: Introduction – The Entity Relationship Model. Data Models: Introduction – Relational Approach – The Hierarchical Approach – The Network Approach.

UNIT – II Relational Algebra

Structure of Relational Databases – Fundamental Relational Algebra Operations – Additional Relational Algebra Opearations - Extended Relational Algebra Operations - Null Values - Modification of the Database - The Tuple Relational Calculus – The Domain Relational Calculus

UNIT – III Normalization

Normalization: Introduction - Normalization – Definition of Functional Dependence (FD) – Normal Forms: 1NF, 2NF, 3NF and BCNF.

UNIT – IV Structured Query Language

Structured Query Language: Features of SQL – Select SQL Operations – Grouping the Output of the Query – Querying from Multiple Tables – Retrieval Using Set operators – Nested Queries. T-SQL – Triggers and Dynamic Execution: Transact-SQL..

UNIT – V Procedural Language

Procedural Language- SQL: PL/SQL Block Structure – PL/SQL Tables. Cursor Management and Advanced PL/SQL: Opening and Closing a Cursor – Processing Explicit Cursor – Implicit Cursor – Exception Handlers – Sub Programs in PL/SQL – Functions – Precaution While Using PL/SQL Functions – Stored Procedure – Object Oriented Technology.

Text Book

1. Rajesh Narang, "Database Management Systems", PHI Learning Private Limited, New Delhi, sixth printing, 2010.

Reference

1. S.K. Singh, "Database Systems – Concepts, Design and Appplications", Dorling Kindersley (India) Pvt. Ltd., Second Impression, 2008

2. Database System Concepts , Abraham Silberchatz, Henry F Korth , S.Sudarshan, McGraw-Hill - 5th Edition - 2006.

Core Practical

Practical 4- RDBMS LAB

1. Table creation and simple Queries
2. Queries using Aggregate Function and Set Operations
3. Table creation with various Joins
4. Nested Sub queries and correlated Sub queries
5. View creation and manipulation
6. PL/SQL program for cursor
7. PL/SQL program for packages
8. PL/SQL program for triggers and its type
9. PL/SQL program for procedures and functions

ALLIED - 2

1. PHYSICS II

UNIT – I: WAVE MECHANICS

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

UNIT – II : NUCLEAR PHYSICS

Particle accelerators – cyclotron, particle detectors – GM Counter Artificial Transmutation – Rutherford's Experiment – The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions.

Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy – Conservation of Parity – Quantities conserved and quantities not conserved in a nuclear reaction.

UNIT – III : ENERGY PHYSICS

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

UNIT – IV: CRYSTALLOGRAPHY

Crystallography : The crystal structure – Unit Cell –Bravais lattice- structures of simple cubic-BCC and FCC- co ordination number, packing factor calculation for the above structures –Hexogonal closed packed(HCP) structure -Miller indices – concept of Reciprocal Vectors.

UNIT – V: ELECTRONICS

Electronics: Transistor characteristics in common base and common emitter mode- Transistor single stage amplifier- Expression for input impedence, output impedence and current gain.
Digital Electronics : NAND and NOR as universal building blocks- De Morgan's theorem –statement and proof- Fabrication of diodes and transistors using Monolithic technology–limitations.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
9. Introduction to Solid State Physics – C. Kittel, 5^{th} Edition Wiley Eastern Ltd.
10. Renewable & Sustainable energy sources – Agarwal.

ALLIED

2. STATISTICAL METHODS AND THEIR APPLICATIONS II

Objective
To understand and computing statistical Methods by which to develop the programming Skills.

UNIT-I
Curve fitting by the methods of least squares -
$Y = a x + b$, $Y = a x^2 + b x + c$, $Y = a x^b$, $Y = a e^{bx}$

UNIT-II
Sample Space - events - probability - Addition and Multiplication Theorem - conditional probability -Baye's Theorem. Mathematical expectation Addition and Multiplication theorem, Chebychev's Inequality.

UNIT-III
Standard distributions - Binomial, Poisson, Normal distribution and fitting of these distributions.

UNIT-IV
Test of Significance- small sample and large sample test based on mean, S.D. correlation and
proportion - confidence interval.

UNIT-V
Analysis of variance - One and Two way classifications - Basic principle of design of Experiments - Randomisation, Replication and Local control - C.R.D., R.B.D. and L.S.D.

Books for Reference:
1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Fundamental of Applied Statistics - S.C. Gupta & V.K. Kapoor – Sultan Chand
3. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII
4. Elements of Statistics - Mode . E.B. – Prentice Hall

ALLIED PRACTICAL

1. PHYSICS
(Any 15 Experiments)

1. Young's modulus – non uniform bending – pin and microscope.
2. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
3. Ridigity modulus – Torsional oscillation method (without symmetric masses).
4. Determination of Co-efficient of Viscosity – Graduated Burette.
5. Surface Tension and Interfacial Tension – By drop weight method.
6. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
7. Sonometer – Determining A.C. Frequency. (Screw Gauge is given).
8. Sonometer – frequency of tuning fork.
9. Newton's Rings – Radius of Curvature.
10. Air Wedge – Determination of thickness of thin wire.
11. Spectrometer Grating – Minimum Deviation – Mercury Lines.
12. Spectrometer – Refractive Index of a liquid – Hollow Prism.
13. Potentiometer – Calibration of High Range Ammeter.
14. Potentiometer – Calibration of Low Range Voltmeter.
15. Determination of M and B_H using Deflection Magnetometer in Tan C position and vibration magnetometer.
16. Figure of merit and voltage sensitiveness of table galvanometer.
17. Construction of AND, OR gates using diodes and NOT by transistors.
18. Zener diode – Voltage Regulation.
19. NAND / NOR as universal gate.
20. Demorgan's theorem verification.

ALLIED PRACTICAL

2. STATISTICAL METHODS AND THEIR APPLICATIONS - Practical

ALLIED PRACTICAL

1. Formation of uni-variate and bi-variate frequency distribution
2. Diagrams and Graphs
3. Measures of Location
4. Measures of Dispersion
5. Skewness and Kurtosis
6. Correlation and Regression
7. Curve Fitting : $y = ax+b$, $y=ax^2+bx+c$, $y=ax^b$, $y=ae^{bx}$
8. Fitting of distributions - Binomial, Poisson, Normal
9. Test of significance small sample and large sample tests
10. Analysis of Variance: one way classification, Two way classification and Design of Experiments - C.R.D, R.B.D & L.S.D

BOOKS FOR REFERENCE:

1. Statistical Methods by S.P. Gupta, Sultan chand & Sons
2. Fundamental of Applied Statistics - S.C. Gupta & V.K. Kapoor

Note:
Use of Scientific Calculator shall be permitted for Practical Examination. Statistical Table may be provided to the students at the Examination Hall.

Skill Based Subject II –Paper 2

Computer Organisation and Architecture

Objective: To enable the student to have a better understanding of architecture of computer and prepare the student for higher level of programming

UNIT - I

Instruction Codes – Computer Registers – Computer Instructions – Timing and Control – Instruction Cycle – Memory Reference Instructions – Input-Output and Interrupts.

UNIT - II

Control Memory – Address Sequencing – Micro program Examples – Design of Control Unit.

UNIT - III

Introduction – General Register Organization – Instruction Formats – Addressing Modes.

UNIT – IV

Peripheral Devices – I/O interface – Asynchronous Data Transfer – Modes of Transfer - Direct Memory Access – Input Output Processor (Excluding IBM and Intel IOPs).

UNIT - V

Auxiliary Memory – Main Memory – Auxiliary Memory - Associative Memory – Cache Memory -Virtual Memory.

TEXT BOOK

1. Morris Mano M. Computer System Architecture. New Delhi **:**Prentice Hall of India Private Limited, 2011

REFERENCES

1. William Stallings . Computer Organization and Architecture. 8th edition. Pearson publication, 2010
2. Morris Mano. Digital Login and Computer Design. New Delhi :Prentice Hall of India Private Limited, 2001

NON MAJOR ELECTIVE II PAPER II

INTERNET AND ITS APPLICATIONS

Objective: To equip students to basics of Internet usage and prepare them for digital world

UNIT - I Internet Basics

Introduction to Computers Programming Language types History of Internet Personal computers History of World Wide Web- Micro software .NET Java-Web resources.

UNIT - II Web Browsers

Web Browsers - Internet Explorer - connecting to Internet Features of Internet explorer6 Searching the Internet- online help and tutorials - File Transmission Protocol (FTP) Browser settings.

UNIT - III E-Mail

Attaching a file, Electronic mail creating an E-mail id sending and Receiving mails - attaching a file - Instance messaging - other web browsers.

UNIT - IV HTML

Introduction to HTML headers – Linking - Images-special characters and line breaks unordered lists- simple HTML programs.

UNIT - V Digital Cash

E-marketing consumer tracking Electronic advertising search engine – CRM - credit card payments Digital cash and e-wallets micro payments- smart card

Text book

Internet and World Wide Web Third edition H.M.Deitel, P.J. Deitel and A.B.Goldberg - PHI Reference

The Internet- Complete Reference Harley hahn, Tata McGraw Hill

SEMESTER V

CORE THEORY PAPER – 5

MOBILE APPLICATIONS DEVELOPMENT

Objective:

This course aims to provide the students with a detailed knowledge on Mobile Application and Development and covers Android programming from fundamentals to building mobile applications for smart gadgets.

UNIT I Introduction to Mobile Applications:

Native and web applications - Mobile operating systems and applications - Mobile Databases. Android: History of Android - Android Features – OSS – OHA - Android Versions and compatibility - Android devices - Prerequisites to learn Android -– Setting up software – IDE - XML. Android Architecture: Android Stack - Linux Kernel - Android Runtime - Dalvik VM - Application Framework - Android emulator - Android applications.

UNIT II Android development:

Java - Android Studio – Eclipse – Virtualization – APIs and Android tools – Debugging with DDMS – Android File system – Working with emulator and smart devices - A Basic Android Application - Deployment. Android Activities: The Activity Lifecycle – Lifecycle methods – Creating Activity. Intents – Intent Filters – Activity stack.

UNIT III Android Services:

Simple services – Binding and Querying the service – Executing services.- Broadcast Receivers: Creating and managing receivers – Receiver intents – ordered broadcasts. Content Providers: Creating and using content providers – Content resolver. Working with databases: SQLite – coding for SQLite using Android – Sample database applications – Data analysis.

UNIT IV Android User Interface:

Android Layouts – Attributes – Layout styles - Linear – Relative – Table – Grid – Frame. Menus: Option menu – context menu - pop-up menu – Lists and Notifications: creation and display. Input Controls: Buttons-Text Fields-Checkboxes-alert dialogs-Spinners-rating bar-progress bar.

UNIT V Publishing and Internationalizing mobile applications :

Live mobile application development: Game, Clock, Calendar, Convertor, Phone book. App Deployment and Testing: Doodlz app – Tip calculator app – Weather viewer app.

Text Books

Barry Burd, "Android Application Development – All-in-one for Dummies", 2nd Edition, Wiley India, 2016.

Reference:

1. Paul Deitel, Harvey Deitel, Alexander Wald, " Android 6 for Programmers – An App-driven Approach", 3rd edition, Pearson education, 2016.
2. Jerome (J. F) DiMarzio, "Android – A Programmer"s Guide", McGraw Hill Education, 8th reprint, 2015.
3. http://www.developer.android.com

CORE THEORY PAPER - 6

OPERATING SYSTEM

Objective: Enable the student to get sufficient knowledge on various system resources.

Unit – I Operating System Basics

Basic Concepts of Operating System - Services of Operating System-Classification of Operating System- Architecture and Design of an Operating System-Process Management -Introduction to Process-Process State -PCB - Process Scheduling - Interprocess Communication

Unit –II Operating System Scheduling

CPU Scheduling**:** Introduction - Types of CPU Scheduler - Scheduling Criteria - Scheduling Algorithms - FCFS Scheduling – SJF Scheduling;-Priority Scheduling - Round-Robin Scheduling- Multilevel Queue Scheduling - Deadlock - Basic Concept of Deadlock- Deadlock Prevention - Deadlock Avoidance- Deadlock - Detection and Recovery

Unit- III Memory management

Memory Management - Basic Concept of Memory - Address Binding; Logical and Physical Address Space- Memory Partitioning - Memory Allocation-Protection-Fragmentation and Compaction

Unit – IV Swapping

Swapping- Using Bitmaps - Using Linked Lists- Paging-Mapping of Pages to Frames - Hierarchical Page Tables- Segmentation - Virtual Memory - Basic Concept of Virtual Memory- Demand Paging - Transaction Look aside Buffer (TLB) - Inverted Page Table-Page Replacement Algorithms

Unit –V File Management

File Management - Basic Concept of File-Directory Structure-File Protection-Allocation Methods – Various Disk Scheduling algorithms

Text Books:

Abraham Silberschatz Peter B. Galvin, G. Gagne, “Operating System Concepts”, Sixth Edition, Addison Wesley Publishing Co., 2003.

Reference

1. Operating systems - Internals and Design Principles, W. Stallings, 6th Edition, Pearson
2. Willam-Stalling “Operating System” Fourth Edition, Pearson Education, 2003.

CORE THEORY PAPER – 7

DATA COMMUNICATION & NETWORKS

Objective:

To equip students to basics of Data Communication and prepare them for better computer networking

UNIT I

Introductory Concepts - Network hardware - Network software – Network Architecture - Physical layer - Guided transmission media - Cable television.

UNIT II

Data Link Layer - Design issues - Channel allocation problem - Multiple access protocols - Ethernet - Wireless LAN - 802.11 architecture.

UNIT III

Network Layer : Design issues, Routing Algorithms, Shortest path routing, Flooding, Broadcast & Multicast routing congestion, Control & internetworking.

UNIT IV

Transport Layer - Transport service - Elements of transport protocols - User Datagram Protocol - Transmission Control Protocol.

UNIT V

Application Layer - DNS - Electronic mail - World Wide Web - Multimedia - Network security.

TEXT BOOK

1. Tannenbaum, A.S., 2003 : Computer Networks, Prentice Hall.

REFERENCES

1. Stallings, William, 2008: Local and Metropolution Area Networks: An Introduction, Macmillian Publishing Co.
2. Black: Data Network, Prentice Hall of India.
3. W. Stallings, "Data and Computer Communication", Pearson Education, Fifth Edition, 2001

Core Practical – 5

Mobile Applications Development – Lab

1. Intent and Activity
2. Using Controls
3. Alert Dialogs
4. List View
5. Options Menu
6. Seek Bars
7. Shared Preferences
8. Status Bar Notifications
9. Tab Widgets Talking Clock.
10. Tween Animation
11. Grid View
12. Internal Storage - Files
13. SQlite - Database
14. Google Map
15. Permissions

Core Practical – 6

Operating System Lab

1. Implementing the Process system calls.
2. Implementing I/O system calls.
3. Implementing IPC using message queues.
4. Implementing CPU& scheduling algorithm for first come first serve scheduling.
5. Implementing CPU scheduling algorithm for shortest job first scheduling.
6. Implementing perform priority scheduling.
7. Implementing CPU scheduling for Round Robin Scheduling.
8. Implementing pipe processing.
9. Implementing first fit, best fit algorithm for memory management.
10. A program to simulate producer-consumer problem using semaphores.
11. A Shell Program to find factorial of a given number
12. A shell program to generate Fibonacci number

Elective – 1 Paper – 1

A. DATA MINING

Objective: Enable the student to get sufficient knowledge on various system resources.

UNIT - I: Data Mining Basics

Introduction: Definition of data mining - data mining vs. query tools - machine learning - steps in data mining process - overview of data mining techniques.

UNIT - II: Data Models

Multidimensional Data Model - Data Cube - Dimension Modeling - OLAP Operations - Meta Data - Types of Meta Data.

UNIT - III: Data Editing

Data Pre-Processing and Characterization: Data Cleaning - Data Integration and Transformation - Data Reduction - Data Mining Query Language - Generalization - Summarization - Association Rule Mining

UNIT - IV: Classification

Classification: Classification - Decision Tree Induction - Bayesian Classification - Prediction - Back Propagation - Cluster Analysis - Hierarchical Method - Density Based Method - Grid Based Method - Outlier Analysis.

UNIT - V: Analysis

Cluster analysis: Types of data - Clustering Methods - Partitioning methods - Model based clustering methods - outlier analysis. Advanced topics: Web Mining - Web Content Mining - Structure and Usage Mining - Spatial Mining - Time Series and Sequence Mining.

TEXT BOOKS:

1. PaulrajPonnaiah, “Data Warehousing Fundamentals”, Wiley Publishers, 2001.

2. Jiawei Han, MichelineKamber, “Data Mining: Concepts and Techniques”,Morgan Kaufman Publishers, 2006.

REFERENCES:

1. Usama M. Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth Ramasamy Uthurusamy, "Advances in Knowledge Discover and Data Mining", the M.I.T. Press, 2007.
2. Ralph Kimball, Margy Ross, The Data Warehouse Toolkit, John Wiley and Sons Inc., 2002
3. Alex Berson, Stephen Smith, Kurt Thearling, "Building Data Mining Applications for CRM", Tata McGraw Hill, 2000.
4. Margaret Dunham, "Data Mining: Introductory and Advanced Topics", Prentice Hall, 2002.
5. Daniel T. Larose John Wiley & Sons, Hoboken, "Discovering Knowledge in Data: An Introduction to Data Mining", New Jersey, 2004

B. COMPUTER GRAPHICS

Objectives: To equip students to basics of computer drawing and prepare them for computer modelling of objects

UNIT – I : OVERVIEW OF GRAPHICS SYSTEMS AND OUTPUT PRIMITIVES

Video Display Devices- Raster Scan System- Random Scan Systems- Hard Copy Deices- Graphic Software- Line Drawing Algorithms: DDA- Bresenham's Line -Circle Generating Algorithms

UNIT – II : ATTRIBUTES AND TWO DIMESIONAL TRANSFORMATIONS

Line Attributes- Curve Attributes-Color And Gray Scale Level- Area Fill Attributes- Character Attributes- Inquiry Functions- Basic Transformations - Composite Transformation – Other transformation

UNIT – III : TWO DIMENSIONAL VIEWING AND CLIPPING

The Viewing Pipeline- Window To Viewport Transformation –Clipping Operations- Point Clipping- Line Clipping: Cohen Sutherland- Liang Barsky-Sutherland Hodgeman Polygon Clipping- Text Clipping- Exterior Clipping- Logical Classification Of Input Devices- Interactive Picture Construction

UNIT – IV : THREE DIMENSION TRANSFORMATION, VIEWING AND CLIPPING

Translation-Rotation-Scaling-Viewing Pipeline- Viewing Coordinates- Projections -View Volumes and General Projection Transformation- Clipping -

UNIT – V : VISIBLE SURFACE DETECTION METHODS

Classification of Visible Surface Detection Algorithms - Back Face Detection - Depth Buffer Method - A Buffer Method - Scan Line Method - Depth Sorting Method- BSP Tree Method -Area Sub Division Method - Octree Methods - Ray Casting Method

TEXT BOOK:

Computer Graphics(C version) , Donald Hearn and M.Pauline Baker, Pearson- 2nd Edit. 2012.

REFERENCE BOOKS:

1. Interactive Computer Graphics–A top down approach using Open GL, Edward Angel , Pearson, 5th Edition.

2. Computer Graphics, Peter Shirley, Steve Marschner, Cengage Learning, Indian Edition,2009

C. INFORMATION SECURITY

Objective: To enable the student to understand various methodology available for securing information

UNIT I Information Security Basics

INTRODUCTION -History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II Security Investigation

SECURITY INVESTIGATION - Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

UNIT III Security Analysis

SECURITY ANALYSIS-Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV Security Models

LOGICAL DESIGN-Blueprint for Security, Information Security Poicy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V Security Physical Design

PHYSICAL DESIGN-Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

Text Book

1. Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, Vikas Publishing House, New Delhi, 2003

Reference

1. Micki Krause, Harold F. Tipton, “ Handbook of Information Security Management”, Vol 1-3 CRC Press LLC, 2004.
2. Stuart McClure, Joel Scrambray, George Kurtz, “Hacking Exposed”, Tata McGraw-Hill, 2003
3. Matt Bishop, “Computer Security Art and Science”, Pearson/PHI, 2002.

Skill Based Subject 3 Paper – 3

SOFTWARE ENGINEERING

Objective:
This course introduces the concepts and methods required for the construction of large software intensive systems.

UNIT-I:
Introduction - Evolving Role of Software - Changing Nature of Software – Software Myths; A Generic View of Process: Layered Technology - Process Models: Waterfall Model - Evolutionary Process Models.

UNIT-II:
Requirements Engineering: Tasks - Initiating the Requirements Engineering Process - Eliciting Requirements - Building the Analysis Model - Requirements Analysis - Data Modelling Concepts.

UNIT-III:
Data Engineering: Design Process and Design Quality - Design Concepts - The Design Model Creating an Architectural Design: Software Architecture - Data Design - Architectural Design - Mapping Data Flow into Software Architecture; Performing User Interface Design: Golden Rules.

UNIT-IV:
Testing Strategies: Strategic Approach to Software Testing- Test Strategies for Conventional and Object Oriented Software - Validation Testing - System Testing -Art of Debugging. Testing Tactics: Fundamentals - White Box- Basis Path - Control Structure - Black Box Testing Methods

UNIT-V:
Project Management: Management Spectrum - People - Product - Process - Project. Estimation: Project Planning Process - Resources - Software Project Estimation - Project Scheduling - Quality Concepts - Software Quality Assurance - Formal Technical Reviews.

TEXT BOOK:
Roger S Pressman, ”Software Engineering - A Practitioner’s Approach”, Sixth Edition, McGraw Hill International Edition, New York: 2005.

REFERENCES:

1. Ian Somerville, “Software Engineering”, 7th Edition, Pearson Education, 2006.
2. Mall Rajib,” Software Engineering”, 2/E, PHI, 2006.

SEMESTER VI

CORE THEORY PAPER – 8

CLOUD COMPUTING

Objective:

To enable the students to learn the basic functions, principles and concepts of cloud Systems.

UNIT I: UNDERSTANDING CLOUD COMPUTING

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Cloud Services.

UNIT II: DEVELOPING CLOUD SERVICES

Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

UNIT III: CLOUD COMPUTING FOR EVERYONE

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events.

UNIT IV: PROGRAMMING MODEL

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Aneka, CloudSim.

UNIT V: SECURITY IN THE CLOUD

Security Overview - Cloud Security Challenges and Risks - Software-as-a-Service Security- Security Governance - Risk Management - Security Monitoring - Security Architecture Design - Data Security - Application Security - Virtual Machine Security - Identity Management and Access Control - Autonomic Security.

TEXT BOOK:

1. Michael Miller, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, August 2008.

REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.

4. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India, 2011.

5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly

CORE THEORY PAPER – 9

OPEN SOURCE PROGRAMMING

Objective:
To discuss techniques that can be effectively applied in practice about HTML5, JavaScript, PHP, CSS and Linux

UNIT I: INTRODUCTION TO HTML 5, JAVA SCRIPT, PHP AND CSS
Introduction to Dynamic Web content- HTTP and HTML- Request and Response Procedure- The Benefits of PHP, JAVA Script, CSS, and HTML5- Introduction to HTML5- The Canvas -The HTML5 Canvas- HTML5 Audio and Video- Introduction to CSS- CSS Rules-Style Types- CSS Selectors- CSS Colors.

UNIT-II: LINUX

Introduction : Linux Essential Commands – File system Concept – Standard Files – The Linux Security Model – Vi Editor – Partitions Creation – Shell Introduction – String Processing – Investigation and Managing Processes – Network Clients – Installing Application.

UNI- III: MYSQL

Introduction to MY SQL – The show Databases and Table – The USE command – Create Database and Tables – Describe Table – Select, Insert, Update, and Delete statement – Some Administrative detail – Table Joins – Loading and Dumping a Database.

UNIT-IV: PHP

PHP Introduction – General Syntactic Characteristics – PHP Scripting – Commenting your code – Primitives, Operations and Expressions – PHP Variables – Operations and Expressions Control -statement – Array – Functions.

UNIT – V PHP

Basic Form Processing – File and Folder Access – Cooking – Sessions – Database Access with PHP – MySQL - MySQL Functions – Inserting Records – Selecting Records – Deleting Records – Update Records.

Text Books

1. "Learning PHP, MySQL, Java Script, CSS and HTML5", Robin Nixon, O'Reilly Publications, 3rd Edition, 2014.
2. Steven Holzner, "HTML Black Book", Dreamtech Press &Paraglyph Press Publishers, 2007

Reference Books

Open Source Software, P.Rizwan Ahmed, Margham Publication, Chennai, 2015

Core Practical

PRACTICAL – VII

ASP.NET Lab

1. Implement Validation Controls
2. Write a Program to implement ad rotator control
3. Write a Program to implement state management techniques
4. Write a Program to implement view State and Session State.
5. Write a Program to displaying data with the grid view
6. Write a Program to implement ASP.Net Server Side Controls.
7. Write a Program to implement ASP.Net Master Pages, Themes and Skins.
8. Write a Program working with forms using ASP.Net
9. Write a Program working with pages using ASP.Net.
10. Write a Program to access data sources through ADO.NET

Core Practical

PRACTICAL – VIII

Open Source Programming Lab

1. Create a web page with Frames and Tables.
2. Create a web page incorporating CSS (Cascading Style Sheets)
3. Write a shell program to find the factorial of an integer positive number
4. Write a shell program for checking whether a given string is a palindrome or not.
5. Create a simple calculator in Java script.
6. Write a JavaScript program to scroll your name in the scroll bar.
7. Develop a program and check message passing mechanism between pages.
8. Develop a program and check file system functions, date &time functions.
9. Create a student database table in MYSQL and manipulate records (insert, delete, update) records in a web browser.
10. Develop a program using cookies and session.

Elective II PAPER – 2

(A) SOFTWARE TESTING

Objective: To make the student more proficient with error free software development

UNIT-I PRINCIPLES OF TESTING

A test in time - The cat and the saint - Test the tests first - The Policemen on the bridge - Phase of software project - Quality, Quality Assurance and Quality Control - Testing, Verification and Validation -Process model to represent different phases - Life cycle models.

UNIT-II BLACK BOX AND WHITE BOX TESTING

White box testing - Challenges - Static testing - Structural testing - Black box testing.

UNIT-III INTEGRATION, SYSTEM AND ACCEPTANCE TESTING

Integration testing - Types - Phase of testing - Scenario testing - Defect bash - System and Acceptance testing: Overview - Functional vs. Non-Functional testing - Functional system testing - Non-functional testing-Acceptance testing.

UNIT-IV PERFORMANCE AND REGRESSION TESTING

Introduction - Factors Governing - Methodology for Performance testing - Tools and Process for Performance Testing - Regression Testing - Types of Regression testing - How to do Regression Testing?

UNIT-V INTERNATIONALIZATION AND ADHOC TESTING

Introduction to Internationalization - Primer on Internationalization - Test phases for Internationalization testing - Enabling testing - Locale testing - Internationalization Validation- Fake language testing - Language testing - Localization testing - Tools used for Internationalization - Challenges and Issues - Overview of Ad Hoc testing - Buddy, Pair, Exploratory, Iterative, Agile and Extreme Testing - Defect Seeding.

TEXT BOOK:

1. Srinivasan Desikan, Gopalaswamy Ramesh, “Software Testing: Principles and Practices”, Pearson Publications, 2006.

REFERENCES:

1. Renu Rajani, Pradeep Oak, “Software Testing- Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2004.
2. Boris Beizer, “Software Testing Techniques”, Dream Tech Press, Second Edition, 2003.

(B) MOBILE COMPUTING

Objective: To impart good knowledge of wireless communication to students

UNIT I :WIRELESS COMMUNICATION FUNDAMENTALS

Cellular systems- Frequency Management and Channel Assignment- types of handoff and their characteristics, dropped call rates & their evaluation -MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.

UNIT II :TELE COMMUNICATION NETWORKS & WIRLESS LAN

Telecommunication systems – GSM – GPRS - Satellite Networks ,Wireless LAN – IEEE 802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a -802.11b standards – HIPERLAN – Blue Tooth.

UNIT III: MOBILE NETWORK LAYER & TRANSPORT LAYER

Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR – Alternative Metrics. Traditional TCP, Mobile TCP

UNIT IV: APPLICATION LAYER

WAP Model- Mobile Location based services -WAP Gateway –WAP protocols – WAP user agent profile- caching model-wireless bearers for WAP - WML – WML Scripts

UNIT V: DATABASE ISSUES

Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2002.

REFERENCE BOOKS:

1. KavehPahlavan, PrasanthKrishnamoorthy, “Principles of Wireless Networks”, PHI/Pearson Education, 2003.

2. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003..

(C) MICROPROCESSORS AND ITS APPLICATIONS

Objective:
To learn the architecture, programming, interfacing and rudiments of system design of microprocessors.

Unit-I: 8085 MICROPROCESSOR AND ARCHITECTURE
Microprocessors - Memory - I/O Devices - Memory Mapped I/O - Pin diagram and internal architecture of 8085 - Registers, ALU, Control & Status Registers - Instruction and Machine Cycles. Interrupts

Unit II: PROGRAMMING THE 8085
Introduction to 8085 Assembly language programming - 8085 instructions - Programming techniques with Additional instructions - Counters and Time Delays - Stack and Subroutines - Code Conversions

Unit-III: 8086 MICROPROCESSOR AND ARCHITECTURE
Pin Details and Internal Architecture of 8086 - Register organization, Bus interface unit, Execution unit, Memory addressing, Memory segmentation. Operating modes - Hardware and Software interrupts - Addressing Modes.

Unit-IV: PROGRAMMING THE 8086
8086 Assembly Language Programming - Implementing Standard Program Structures - String - Procedure and Macros. Instruction Description and Assembler Directives

Unit-V: INTERFACING PERIPHERALS
8255 PPI , 8253/8254 PIT, 8237 DMAC,8259 PIC, 8251 USART.

TEXT BOOK

1. Microprocessor Architecture, Programming and Aplications with 8085, Ramesh S. Gaonkar, Penram International Publishing (India) Pvt. Ltd. 4th Ed. (for Units I,II and V)
2. Microprocessors and Interfacing, Douglas V. Hall, Tata McGraw Hill, 2nd Ed. (for Units III and IV)

REFERENCE BOOKS:

1. Assembly Language Programming the IBM PC ,Alan R. Miller, SubexInc, 1987.
2. Advanced Microprocessors and Peripherals, Ray A K ,Bhurchandi K M , TMH.

Elective III PAPER – 3

(A) Internet of Things

Objective: To prepare the student for better application of internet technology.

Unit – I IoT Introduction

Introduction to Internet of Things: Definition – Characteristics of IOT – Physical Design of IoT – Things in IoT – IoT Protocols – Logical Design of IoT – Iot Functional Blocks – IoT Communication Models – IoT Communication APIs – IoT Enabling Technologies

Unit – II Domain Specific IoT - 1

Domain Specific IoT – I : Smart Lighting – Smart Appliances – Intrusion Detection – Smoke / Gas Detection – Smart Parking – Smart Roads – Structural Health Monitoring – Surveillance – Emergency Response – Weather Monitoring –

Unit – III Domain Specific IoT II

Domain Specific IoT – II : Air Pollution Monitoring – Noise Pollution Monitoring – Forest Fire Detection – River Flood Detection – Smart Grids- Smart Vending Machines – Route Generation & Scheduling – Fleet Tracking – Shipment Monitoring –

Unit – IV Domain Specific IoT III

Domain Specific IoT – III: Remote Vehicle Diagnostics – Smart Irrigation - Green House Control – Machine Diagnosis & Prognosis – Indoor Air Quality Monitoring – Health & Fitness Monitoring – Wearable Electronics

Unit – V IoT and M2M

IoT And M2M: M2M – Difference Between Iot And M2M – SDN And NFV For IoT – IoT System Management With NETCONF – YANG : Need For Iot Systems Management – SNMP- Network Operator Requirements – NETCONF – YANG-IoT Systems Management With NETCONF - YANG

Text Books:

1. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam

Dunkels, Morgan Kuffmann.

Reference

1. Internet of Things, P.Rizwan Ahmed, Margham Publications, Chennai.

2. Designing the Internet of Things, Adrian McEwen (Author), Hakim Cassimally

(B) System Software

Objective: To make the student to become more proficient with system programming

Unit – I LANGUAGE PROCESSORS

Language Processing Activities – Fundamentals of Language Processing – Fundamentals of Language Specification – Language Processor Development Tools.

UNIT II ASSEMBLERS AND MACRO

Elements of Assembly Language Programming – Overview of Assembly Process - Design of a Two – Pass Assembler - Macro Definition and Call – Macro Expansion – Nested Macro Calls.

UNIT III COMPILER I

Scanning: Finite State Automate – Regular Expressions – Building DFA – Performing Semantic Action – Writing a Scanner – Parsing: Parse Tree and Abstract Syntax Trees – Top Down Parsing – Bottom-Up Parsing.

UNIT IV COMPILER II AND INTERPRERTERS

Aspects of Compilation –Memory Allocation - Compilation of Expressions-Compilation of Control Structure-Code Optimization - Interpreters.

UNIT V LINKERS

Relocation and Linking Concepts – Design of a Linker – Self-Relocating Programs – Linking for Overlays - Loader.

TEXT BOOK

D.M. Dhamdhere, “System Programming And Operating Systems”, New Delhi: Tata McGraw-Hill Publishing Company Limited, 1993.

(C) Multimedia Systems

Objective :

This course presents the Introduction to Multimedia, Images & Animation and enable the students to learn the concepts of Multimedia.

UNIT I Introduction to Multimedia:

Introduction to Multimedia PCs – Components of Multimedia – Multimedia Tools Sound and Graphics : Digital Sound – Editing and Mixing sound files – MIDI creation – Tracking Procedure – Interactive and Non Interactive Graphics – High Resolution Graphics – Difference between TV and Computer Display.

UNIT II Video and Animation:

Digital Image concepts – Video Capturing – Scanning Images – Digital Filters Morphing and Warping – Two Dimensional and Three dimensional animation – Animation Tools – Layering technique – Blue Screen technique – Latest movie technologies – Motion Tracking System – Motion Capturing System.

UNIT III Creating Presentation:

Script Writing and creating interactive and non-interactive presentation – Linear and Non Linear Editing – Authoring Tools – File Formates SOUND, VIDEO, ANIMATION, Presentation Images. Multimedia Programming: Text Links – Hyper Text system – Form Creation – File storing - Error Trapping.

UNIT IV Sound Links:

Multimedia interfaces – MCI- API- High Level Multimedia Functions – WAVE, MIDI file processing. Animation: Color Palette – Events – ROPs.

UNIT V Imaging Special Visual Effects:

Bitmap – Brushes – Dissolve –Hotspot Editor – Scorlling. Media Control Interface: Simple Commands – API functions – CD Player – Video Capturing – Form – AVI Play Form.

Text Books :

1. Kaliyaperumal Karthikeyan,“Introduction to Multimedia System”, LAP Lambert Academic Publishing, 2011
2. TayVaughan,“Multimedia Making It Work Eighth Edition”,Tata McGraw-Hill Publishing Company, 2011
3. ParagHavaldarand Gerald Medioni,“Multimedia Systems”, Cengage Learning, 2011
4. S. K. Bansal,“Multimedia Systems”,Aph Publishing Corporation, 2011

Skilled Based Subject IV

ASP .NET

UNIT I : ASP.NET Basics

Introduction to ASP.NET: .NET Framework (CLR, CLI, BCL), ASP.NET Basics, ASP.NET Page Structure, Page Life Cycle. Controls: HTML Server Controls, Web Server Controls, Web User Controls, Validation Controls, Custom Web Controls.

UNIT II: Form

Form validation: Client side validation, Server side validation, Validation Controls: Required Field Comparison Range, Calendar Control, Ad rotator Control, Internet Explorer Control. State Management: View State, Control State, Hidden Fields, Cookies, Query Strings, Application State, Session State.

UNIT III: ADO.NET

Architecture of ADO .NET, Connected and Disconnected Database, Create Database, Create connection Using ADO.NET Object model, Connection Class, Command Class, Data Adapter Class, Dataset Class, Display data on data bound controls and Data Grid.

UNIT IV: Database accessing

Database accessing on Web Applications: Data Binding Concept with web, Creating Data Grid, Binding standard web server controls, Display data on web form using Data Bound Controls.

UNIT V: XML

Writing Datasets to XML, Reading datasets with XML. WEB services: Remote method call using XML, SOAP, Web service description language, Building and Consuming a web service, Web Application deployment.

Textbook:

Professional ASP.NET 1.1 Bill Evjen , Devin Rader , Farhan Muhammad, Scott Hanselman , Srivakumar

REFERENCE BOOKS:

1. Introducing Microsoft ASP .NET 2.0 Esposito PHI
2. Professional ADO.NET BipinJoshi,Donny Mack, Doug Seven , Fabio Claudio Ferracchiati, Jan D NarkiewiezWrox
3. Special Edition Using ASP.NET Richard Leineker Person Education
4. The Complete Reference ASP.NET Matthew MacDonald TMH
5. ASP.NET Black Book Dream Tech

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. PHYSICS

DEGREE COURSE
CBCS PATTERN

(With effect from 2017 – 2018)

The Course of Study and the Scheme of Examinations

S. NO.	Part	Study Components Course Title		Ins. Hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper-1	6	6	Properties of Matter and Acoustics	25	75	100
	III	Core Practical	Practical-1	3	0		0	0	0
4	III	Allied-1	Paper-1	4	4	Chemistry I or Biochemistry I	25	75	100
	IV	Allied Practical	Practical-1	3	0		0	0	0
5	IV	Environmental Studies		2	2	Environmental Studies	25	75	100
				30	**20**		**125**	**375**	**500**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English	Paper-2	4	4	English	25	75	100
10	III	Core Theory	Paper-2	6	5	Thermal Physics and Statistical Methods	25	75	100
11	III	Core Practical	Practical-1	3	3	Any 16 Experiments given in syllabus	25	75	100
12	III	Allied-1	Paper-2	4	4	Chemistry II or Biochemistry II	25	75	100
13	IV	Allied Practical	Practical-1	3	2		25	75	100
14	IV	Value Education		2	2	Value Education	25	75	100
15	IV	Soft Skill		2	1	Soft Skills	25	75	100
				30	**25**		**200**	**600**	**800**

S. NO.	Part	Study Components / Course Title		Ins. Hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
16	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
17	II	English	Paper-3	6	4	English	25	75	100
18	III	Core Theory	Paper-3	3	3	Electricity and magnetism	25	75	100
19	III	Core Practical	Practical-2	3	0		0	0	0
20	III	Allied-2	Paper-3	7	4	Mathematics I	25	75	100
22	IV	Skill Based Subject	Paper-1	3	3	Electrical Appliances	25	75	100
23	IV	Non-Major Elective	Paper-1	2	2	Renewable Energy Sources	25	75	100
				30	**20**		**150**	**450**	**600**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
24	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
25	II	English	Paper-4	6	4	English	25	75	100
26	III	Core Theory	Paper-4	3	3	Mechanics	25	75	100
27	III	Core Practical	Practical-2	3	3	Any 16 Experiments given in syllabus	25	75	100
28	III	Allied-2	Paper-4	7	6	Mathematics II	25	75	100
30	IV	Skill Based Subject	Paper-2	3	3	Electronics Appliances	25	75	100
31	IV	Non-Major Elective	Paper-2	2	2	Basic Physics	25	75	100
				30	**25**		**175**	**525**	**700**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
32	III	Core Theory	Paper-5	6	6	Optics	25	75	100
33	III	Core Theory	Paper-6	6	5	Atomic Physics and Spectroscopy	25	75	100
34	III	Core Theory	Paper-7	6	5	Basic Electronics	25	75	100
35	III	Core Practical	Practical-3	3	0	General	0	0	0
36	III	Core Practical	Practical-4	3	0	Electronics	0	0	0
38	III	Elective I	Paper-1	3	3	Group (A) or (B) or (C)	25	75	100
39	IV	Skill Based Subject III	Paper - 3	3	3	Astro Physics	25	75	100
				30	**22**		**125**	**375**	**500**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
34	III	Core Theory	Paper-8	5	4	Nuclear Physics and Radiation Physics	25	75	100

S. NO.	Part	Study Components / Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
	III	Core Theory	Paper-9	5	4	Relativity, Quantum Mechanics and Mathematical Physics	25	75	100
35	III	Core Theory	Paper-10	5	4	Solid State Physics	25	75	100
36	III	Core Practical	Practical-3	6	3	Any 20 Experiments given in syllabus	25	75	100
37	III	Core Practical	Practical-4		3	Electronics	25	75	100
40	III	Elective	Paper-2	3	3	Group (A) or (B) or (C)	25	75	100
	III	Elective	Paper-3	3	3	Group (A) or (B) or (C)	25	75	100
	IV	Skill based Subject	Paper-4	3	3	Instrumentation Techniques	25	75	100
	V	Extension Activities		-	1		100	-	100
		TOTAL		**30**	**28**		**300**	**600**	**900**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	4	8	?00	200
	Allied (Even Semester)	2	4	10	?00	200
	Allied Practical	1	2	2	100	100
	Electives	3	3	9	100	300
	Core Theory	10	(3-7)	45	100	1000
	Core Practical	4	3	12	100	400
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**40**		**140**		**4000**

ELECTIVE SUBJECTS

Students can choose any one of the groups (Elective I, II & III)

GROUP A

Elective 1: Digital Electronics
Elective 2: Applied Electronics
Elective 3: Microprocessor and its Applications – 8085

GROUP B

Elective 1: Materials Science
Elective 2: Applied Electronics
Elective 3: Laser and Fibre Optic Communication

GROUP C

Elective 1: Fundamentals of Nano Materials and its Characterization
Elective 2: Applied Electronics
Elective 3: Medical Physics

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. PHYSICS

SYLLABUS
UNDER CBCS
(With effect from 2017 - 2018)

SEMESTER I

PAPER – 1

PROPERTIES OF MATTER AND ACOUSTICS

UNIT – I: ELASTICITY

Hooke's law – Stress-strain diagram – Elastic moduli – Relation between elastic constants – Poisson's Ratio – Expression for Poisson's ratio in terms of elastic constants – Work done in stretching and work done in twisting a wire – Twisting couple on a cylinder – Determination of Rigidity modulus by static torsion – Torsional pendulum – Determination of Rigidity modulus and moment of inertia and q, n, σ by Searles method.

UNIT – II: BENDING OF BEAMS

Bending of beams – Expression for bending moment – Cantilever – Expression for depression at the loaded end – oscillations of a Cantilever – Expression for time period – Determination of Young's modulus by cantilever oscillations Non-uniform bending – Determination of young's modulus by Koenig's method – Uniform bending – Expression for elevation – Experiment to determine young's modulus using pin and microscope method.

UNIT – III : FLUIDS

Surface Tension: Synclastic and anticlastic surface – Excess of pressure – Application to spherical and cylindrical drops and bubbles – variation of surface tension with temperature – Jaegar's method-Applications of surface tension.

Viscosity : Viscosity – Rate flow of liquid in a capillary tube – Poiseuille's formula – Determination of coefficient of viscosity of a liquid – Variations of viscosity of a liquid with temperature- lubrication- Applications of viscosity.

SOUND

UNIT – IV : WAVES AND OSCILLATIONS

Simple harmonic motion – free, damped, forced vibrations and resonance – Fourier's Theorem – Application to saw tooth wave and square wave – Intensity and loudness of sound – Decibels – Intensity levels – musical notes – musical scale.

Acoustics of buildings : Reverberation and time of reverberation – Absorption coefficient – Sabine's Formula – measurement of reverberation time – Acoustic aspects of halls and auditoria.

UNIT – V: ULTRASONICS

Ultrasonic waves – Production – Piezo electric crystal method – Magnetostriction Method – Properties – Deductions – Attenuation – Diffraction – Acoustic Grating – Velocity of ultrosonics in liquids – application of ultrasonics – Medical, Industrial and Scientific – Non destructive testing (NDT) – Classification of ultrasonic testing – Pulse echo method – Sources of ultrasound – clinical applications of different scans.

Books for study:

1. Properties of matter by Murugeshan R, S Chand & Co. Pvt. Ltd., New Delhi.
2. Properties of matter by Brij Lal & Subramaniam, N Eurasia Publishing Co., New Delhi, 1989.
3. Text book of sound by Brij Lal & Subramaniam, N Vikas Publishing House, New Delhi, 1982.
4. Text book of sound by M N Srinivasan – Himalaya Publications (1991).
5. Science and Technology of Ultrasonics by Baldevraj, Narosa [2004].

Books for reference:

1. Elements of Properties of Matter by Mathur D S, Shymlal Charitable Trust, New Delhi, 1993.
2. Fundamentals of General Properties of Matter by Gulati H R, R Chand & Co. New Delhi, 1982.
3. Waves & Oscillations by Subrahmanyam N & Brij Lal, Vikas Publishing House Pvt. Ltd., New Delhi, 1994.
4. A Textbook of Sound by Khanna D R & Bedi R S, Atma Ram & Sons, Jew Delhi 1985.
5. Fundamentals of Physics, 6^{th} Edition by D Halliday, R Resnick and J Walker, Wiley NY 2001.
6. Physics, 4^{th} Edition vols, I, II & II Extended by D Halliday, R Resnick and K S Krane, Wiley NY 1994.
7. CRC Handbook of Physics & Chemistry, 80^{th} ED., CR5 Press, NY, 1999.
8. The Feynman Lectures on Physics, Vols. I, II and III, by R P Feynman, RB Leighton and M Sands, Narosa, New Delhi, 1998.

ALLIED

PAPER – 1

CHEMISTRY – I

OBJECTIVE:

- Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications wherever necessary are to be taught for I- Semester.

UNIT – I

1.1General Metallurgy - Extraction of Metals - Minerals and Ores- Difference between Minerals and Ores – Minerals of Iron, Aluminum and Copper - Ore Dressing or Concentration of Ores - Types of Ore Dressing- Froth Floatation process, Gravity separation and Magnetic separation.

1.2 Calcination, Smelting, Roasting, Fux, Slag - Definition - Reduction methods - Goldschmidt Aluminothermic process and Carbon Reduction method - Refining of Metals - Electrolytic, Van Arkel and Zone Refining.

1.3 Ores of Titanium and Cobalt - Extraction of Titanium and Cobalt.

UNIT – II

2.1 Cycloalkanes - Preparation – Wurtz reaction and Dieckmann's condensation - Properties of Cycloalkanes – Substitution and Ring opening reactions.

2.2 Polarisation - Inductive effect, Mesomeric effect and Steric effect (Acid and Base Strength).

2.3Stereoisomerism – Types - Cause of Optical Activity – Enantiomers - Diastereomers - Meso form - Optical Activity of Lactic acid and Tartaric acid - Racemisation and Resolution – Definition and Methods - Geometrical isomerism – Definition and example - Maleic and Fumaric acid – Differences.

UNIT – III

3.1 Chemical Kinetics – Rate of a reaction – Definition of Order and Molecularity – Distinction between Order and Molecularity - Derivation of First order rate equation - Half Life Period of first order reaction.

3.2 Catalysis - Catalyst - Autocatalyst - Enzyme catalyst - Promoters - Catalytic poisons – Active Centre - Differences between Homogeneous and Heterogeneous Catalysis - Industrial Applications of Catalysts.

3.3 Photochemistry – Grothus-Draper's law – Stark-Einstein's law - Quantum yield – Photosynthesis - Phosphorescence – Fluorescence.

UNIT – IV

4.1 VSEPR Theory – Hybridisation and Shapes of simple molecules BF_3, PCl_5, SF_6 and XeF_6.

4.2 Fuels – Classification of Fuels - Calorific value of Fuels – Water gas, Carbureted Water gas and Producer gas – Composition and Uses - Non-Conventional fuels - Need of Solar Energy - Applications - Biofuels – Oil gas, Natural gas and LPG – Uses.

4.3 Osmosis - Osmotic pressure - Reverse osmosis – Definition - Desalination of Sea water.

UNIT – V

5.1Nuclear Chemistry – Atomic number, Mass number - Isotopes, Isobars and Isotones – Definition and Examples - Definition of Half life period - Nuclear Binding Energy, Mass Defect and N/P ratio - Nuclear Fission and Nuclear Fusion (Elementary idea) - Applications of Radioisotopes in Medicine, Agriculture and Industries – Carbon Dating.

5.2 Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking – Naphthalene – Preparation – Haworth's method – Properties – Oxidation, Reduction and Uses of Naphthalene - Structure of Naphthalene (Structural elucidation not necessary).

5.3 Conductors, Insulators, Semiconductors, N- and P- Type Semiconductors – Definitions and Examples.

ALLIED - 1

PAPER - 1

BIOCHEMISTRY I

UNIT-I: Chemistry of Carbohydrates

Definition and Classification of carbohydrate. Monosaccharides - occurrence, structure; physical and chemical properties, linear and ring forms (Haworth formula) for glucose and fructose. Disaccharides - occurrence, structure; physical and chemical properties of sucrose and lactose. Polysaccharides - occurrence, structure, physical and chemical properties of starch.

UNIT-II: Chemistry of amino acids

Definition and classification of amino acids. Reaction with ninhydrin, common properties of amino acids, amphoteric nature, isoelectric point, isoelectric pH and Zwitter ion.

UNIT-III: Chemistry of Proteins

Classification based on solubility, shape and size. Physical properties: salting in and salting out, denaturation, peptide bond. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT-IV: Chemistry of Lipids

Definition, classification and functions of lipids. Occurrence, chemistry and biological functions of simple lipids, compound lipids (e.g. phospholipids) and derived lipids: steroids (e.g. cholesterol). Physical property-emulsification. Chemical property-saponification. Functions of bile acids and bile salts.

UNIT-V: Chemistry of Nucleic acids

Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNA and its biological functions. Structure, types and functions of RNA: tRNA, mRNA and rRNA. Differences between DNA and RNA.

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan , MJP Publishers,Chennai-5.

SEMESTER II

PAPER – 2

THERMAL AND STATISTICAL PHYSICS

UNIT – I : TRANSMISSION OF HEAT

Conduction in solids : Thermal conduction – thermal conductivity of a good conductor – theory and determination – Forbe's method – thermal conductivity of a poor conductor – theory and determination – Lee's disc method – Derivation of Wiedmann – Franz law and its limitations – practical applications of conduction of heat.

Black body radiation : Stefan – Boltzmann law – determination of Stefan's constant – laboratory method – distribution of energy in the spectrum of a black body – results – Planck's quantum theory of radiation – solar constant – temperature of the Sun – Solar Spectrum.

UNIT – II: LOW TEMPERATURE PHYSICS

Joule – Kelvin effect – liquefaction of hydrogen – liquefaction of helium – Kammerling – Onne's method – Helium I and II – Lambda point – production of low temperatures – adiabatic demagnetization – practical applications of low temperature – refrigerators and air-conditioning machines – super fluidity – application of super fluidity – elementary ideas and applications – Superconductivity – Type I and II superconductors – Meissner effect – applications of superconductors – superconducting magnets.

UNIT – III: THERMODYNAMICS I

Thermodynamics Potentials – Zeroth law, First and Second law of thermodynamics – Carnot's theorem – thermodynamic scale of temperature – Perfect gas scale of temperature – internal combustion engines – Otto engine and Diesel engine – working and efficiency.

UNIT - IV: THERMODYNAMICS II

First latent heat equation (Clausius-Clapeyron equation) – effect of pressure on melting point and boiling point – second latent heat equation – Third law of thermodynamics – concepts of entropy – temperature entropy diagram – entropy of perfect gas – Maxwell's thermo dynamical relations – derivation – applications – i) Clausius – Clapeyron equation, ii) Specific heat Relation.

UNIT – V: STATISTICAL PHYSICS

Phase space, Micro and Macro – canonical – Ensembles – Different types of ensembles – Definition of Probability – Relation between entropy & probability – Degrees of Freedom – Statement of theorem of equipartition of energy – Classical Statistics – Group Velocity and Phase velocity – Maxwell – Boltzmann law-distribution of velocity-Quantum statistics-Fermi-Dirac distribution law-Bose-Einstein distribution law-comparison of three statistics.

Books for study:

1. Heat and thermodynamics – Brijlal and Subramaniyam, S Chand & Co.
2. Heat and thermodynamics – J B Rajam, S Chand & Co., New Delhi.
3. Thermal Physics – R Murugeshan and Kiruthiga Sivaprasad, S Chand & Co., New Delhi.

Books for Reference:

1. Heat and thermodynamics – D S Mathur, S Chand & Co., New Delhi
2. Elements of Statistical Mechanics – Gupta and Kumar, Pragati Prakashan, Meerut.
3. Statistical Mechanics – Sathya Prakash and J P Agarwal, Kedar Nath & Ram Nath & Co., Meerut.
4. Introduction to Solid State Physics – C Kittel, Prentice Hall of India.

CORE PRACTICAL – I

(Any 16 Experiments)

1. Youngs modulus – non uniform bending – pin and microscope.
2. Youngs modulus – non uniform bending – optic lever.
3. Young's modulus cantilever – depression – dynamic method – Mirror Scale and Telescope.
4. Rigidity modulus – torsional pendulum – without masses.
5. Rigidity modulus and moment of inertia – torsional pendulum – with identical masses.
6. Surface tension and interfacial surface tension – drop weight method.
7. Coefficient of viscosity of liquid – graduated burette – Radius of capillary tube by mercy pellet method.
8. Comparison of viscosities – (η_1/η_2).
9. q, n, σ by Searle's method.
10. Rigidity modulus – Static torision – Mirror scale and telescope.
11. Compound Pendulum – Determination of 'g' and 'k'.
12. Thermal conductivity of a bad conductor – Lee's disc method.
13. Thermal conductivity of a good conductor-Forbe's method.
14. Specific heat of liquid – Newtons law of cooling.
15. Sonometer – frequency of tuning fork.
16. Sonometer – RD of a solid and liquid.
17. Focal length – R and μ of a long focus convex lens.
    i Auto collimination method
    ii Auxillary Lens Method
18. Focal length – R and μ of a concave lens.
    i Combination Method
    ii Auxillary Lens Method
19. Spectrometer – solid prism- μ of material of prism.
20. Spectrometer- Hollow prism - μ of a liquid.
21. Potentiometer – Calibration of low range voltmeter.
22. Potentiometer – Internal resistance.
23. Post office box – temperature coefficient of resistance.

ALLIED

PAPER – 2

CHEMISTRY – II

OBJECTIVE:

- Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins, Medicinal Chemistry, Corrosion and Applications wherever necessary are to be taught for II- semester.

UNIT – I

1.1 Coordination Chemistry - Nomenclature of Coordination Compounds - Ligands, Central Metal Ion and Complex Ion – Definition and Examples – Coordination Number - Werner's Theory of Coordination Compounds - Chelates - Functions and Structure of Haemoglobin and Chlorophyll.

1.2 Industrial Chemistry - Fertilisers and Manures – Biofertilisers - Organic Manures and their importance - Role of NPK in plants - Preparation and Uses of Urea, Ammonium Nitrate, Potassium Nitrite and Super Phosphate of Lime.

1.3 Contents in Match Sticks and Match Box - Industrial making of Safety Matches – Preparation and Uses of Chloroform, DDT, Gammexane and Freons.

UNIT – II

2.1 Carbohydrates - Definition and Examples - Classification – Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate.

2.2 Amino Acids – Definition and Examples - Classification of Amino Acids - Preparation - Gabriel Phthalimide Synthesis – Properties – zwitterion and Isoelectric point - Structure of Glycine.

2.3 Proteins – Definition - Classification of Proteins based on Physical properties and Biologcal functions - Primary and Secondary Structure of Proteins (Elementary Treatment only) – Composition of RNA and DNA and their Biological role - Tanning of Leather - Alum (Aluminum chloride tanning) - Vegetable tanning – Chrome Tanning.

UNIT – III

3.1 Electrochemistry - Electrolytes – Definition and Examples – Classification - Specific and Equivalent Conductance - their determination – Variation of Specific and Equivalent conductance with Dilution – Ostwald's Dilution Law and its Limitations.

3.2 Kohlrausch's Law - Determination of Dissociation Constant of weak Electrolytes using Conductance measurement - Conductometric titrations.

3.3 pH – Definition and pH determination by indicator method - Buffer solutions - Buffer action - Importance of buffers in the living systems.

UNIT – IV

4.1Paints - Components of Paint – Requisites of a Good Paint - Pigments – Classification of Pigments on the basis of Colour – Examples - Dyes – Definition – Chromophores and Auxochromes – Examples - Colour and Dyes - Classification based on Constitution and Application – Examples.

4.2 Vitamins – Definition – Classification – Water Soluble and Fat Soluble – Occurrence - Biological Activities and Deficiency Diseases caused by Vitamin A, B, C, D, E and K - Hormones – Definition and Examples – Biological Functions of Insulin and Adrenaline.

4.3 Chromatography - Principles and Applications of Column and Paper chromatography- R_f value.

UNIT – V

5.1 Drugs - Sulpha Drugs – Preparation and Uses of Sulphapyridine and Sulphadiazine - Mode of Action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicol and Streptomycin - Drug Abuse and Their Implication - Alcohol – LSD.

5.2 Anaesthetics - General and Local Anaesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS.

5.3 Electrochemical Corrosion and its Prevention – Electroplating – Applications.

ALLIED

PAPER - 2

BIOCHEMISTRY II

UNIT-I: Metabolism

Glycolysis, TCA cycle and its energetics, HMP shunt pathway. Deamination, transamination reaction, transaminase enzymes, Urea cycle.

UNIT-II: Metabolic Disorders

Diabetes mellitus, Glycogen storage diseases, Glycosuria, Ketosis, Jaundice, Phenyl ketonuria, Alkaptonuria. Dehydration: definition, causes, symptom and prevention.

UNIT-III: Enzymes

Definition, classification of enzymes with one example. Mechanism of enzyme action - Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Enzyme inhibition: competitive, uncompetitive and non competitive. Biological functions of enzymes.

UNIT-IV: Molecular Biology

Central dogma of molecular biology. DNA and RNA act as genetic material. Replication: Definition, types, mode of action of replication, mechanism of replication. General mechanism of transcription and translation. Genetic code.

UNIT-V: Vitamins

A brief outline of source, requirement, biological function and deficiency of Vitamins (fat soluble and water soluble vitamins).

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Robert K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan, MJP Publishers, Chennai-5.

SEMESTER III
PAPER – 3

ELECTRICITY AND MAGNETISM

UNIT – I : ELECTROSTATICS

Gauss' Law – Electric Field due to uniformly charged sphere – Electric Intensity - Electrostatic potential – electric potential as line integral of electric field – relation between electric potential and electric field in vector form – capacitance – capacitance of a spherical and cylindrical capacitor – energy of a charged capacitor – loss of energy due to sharing of charges - Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics - Parallel plate capacitor completely filled with dielectric.

UNIT – II : CURRENT ELECTRICITY & TRANSIENT CURRENT

Carey Foster bridge – theory – determination of temperature coefficient of resistance – calibration of ammeter and voltmeter using a potentiometer.
Growth and decay of current in a circuit containing resistance and inductance. Growth and decay of charge in circuit containing resistance and capacitor – measurement of high resistance by leakage – growth and decay of charge in a LCR circuit – condition for the discharge to be oscillatory – frequency of oscillation.

UNIT – III : THERMO ELECTRICITY

Seeback, Peltier and Thomson effects – laws of thermoelectric circuits – Peltier coefficient – Thomson coefficient – application of thermodynamics to a thermocouple and expressions for Peltier and Thomson coefficients - thermo electric power and thermo electric diagrams.

UNIT – IV : ELECTRO MAGNETIC INDUCTION

Faraday's laws of electromagnetic induction in vector form – Lenz'z law - determination of self-inductance by Anderson's bridge method and absolute mutual inductance by BG – Ruhmkorff's induction coil – induction coil and its uses – Coefficeint of coupling – Earth inductor - Eddy Currents - Energy stored in a magnetic field.

UNIT – V : MAGNETISM

Magnetostatics: Biot-Savart's law & its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law.
Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para- and ferro-magnetic materials.

Books for study:

1. R Murugeshan – Electricity and magnetism, 8th Edn, 2006, S Chand & Co., New Delhi.
2. M Narayanamurthy & N Nagarathnam, Electricity & Magnetism 4th Edn, National Publishing Co., Meerut.
3. Duggal and Chhabra, Electricity and Magnetism.
4. Brijlal, N Subramanyan and Jivan Seshan, Mechanics and Electrodynamics [2005], Eurasia Publishing House [Pvt.] Ltd., New Delhi.

Books for reference:

1. Sehgal D L, Chopra K L, Sehgal N K – Electricity and Magnetism, Sultan Chand & Sons, New Delhi. Brijlal and Subramanian, Electricity and Magnetism, 6th Edn., Ratan & Prakash, Agra.
2. David J Griffiths, Introduction to Electrodynamics, 2nd Edn. 1997, Prentice Hall of India pvt. Ltd., New Delhi.
3. Electricity & Magnetism by K K Tewari, S Chand & Co., 3rd Edition, 2001.

ALLIED

MATHEMATICS – I

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ.

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates-Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.
3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

SKILLED BASED SUBJECT

PAPER – 1

ELECTRICAL APPLIANCES

UNIT – I

Resistance and its types – capacitance and its types – Colour codes-inductance and its units – Transformers – Electrical Charge – Current – Electrical Potential

UNIT - II

Ohm's law – Galvanometer, Ammeter, Voltmeter and Multimeter Analog and Digital - Electrical Energy – Power – Watt – kWh – Consumption and electrical power.

UNIT – III

AC and DC – Single phase and three phase connections – RMS and peak values, House wiring – Star and delta connection – overloading – earthing – short circuiting – Fuses – Colour code for insulation wires

UNIT - IV

Inverter – UPS – generator and motor – types – different types of windings – circuit breaker-Electrical switches and its types.

UNIT – V

Electrical bulbs – Fluorescent lamps – Street Lighting – Flood lighting – Electrical Fans – Wet Grinder – Mixer – Water Heater – Storage and Instant types, electric iron box, microwave oven – Stabilizer, fridge.

Books for study:

1. A text book in Electrical Technology – B L Theraja – S chand & Co.
2. A text book in Electrical Technology – A K Theraja.
3. Performance and design of AC machines – M G Say ElBS Edn.

NON – MAJOR ELECTIVE

PAPER – 1

RENEWABLE ENERGY SOURCES

Unit - I: Conventional Energy Sources

The fossil fuels - commercial energy sources and their availability – various forms of energy – renewable and conventional energy system – comparison – Coal, oil and natural gas – applications– Merits and Demerits – fuel cells.

Unit - II: Solar Energy

Renewable energy sources – solar energy – nature and solar radiation – components – solar heaters – crop dryers – solar cookers – water desalination (block diagram) Photovoltaic generation – merits and demerits

Unit - III: Biomass energy fundamentals

Biomass energy – classification – photosynthesis – Biomass conversion process

Unit - IV: Biomass Utilization

Gobar gas plants – wood gasification – advantages & disadvantages of biomass as energy source

Unit - V: Other forms of energy sources

Geothermal energy – wind energy – Ocean thermal energy conversion – energy from waves and tides (basic ideas)

Books for Study:

"Renewable energy sources and emerging Technologies", by D.P. Kothari, K.C. Singal & Rakesh Ranjan, Prentice Hall of India pvt. Ltd., New Delhi (2008)

Books for Reference:

"Renewable Energy sources and their environmental impact" – S.A. Abbasi and Nasema Abbasi PHI Learning Pvt. Ltd., New Delhi (2008).

SEMESTER IV

PAPER – 4

MECHANICS

UNIT – I : DYNAMICS

Rigid body – moment of inertia – radius of gyration – moment of inertia of a solid cylinder, cylindrical shell, solid sphere, spherical shell - Compound pendulum – theory – equivalent simple pendulum – reversibility of centers of suspension and oscillation

UNIT – II : STATICS AND HYDROSTATICS

Centre of pressure – centre of pressure of a vertical rectangular lamina and vertical triangular lamina- laws of floatation- meta centre and metacentric height of a ship- production of low pressure- rotary pump- diffusion pump- pirani gauge

UNIT – III : ROCKETS AND SATELLITES

Rockets and Satellites – Basic Principles of rocket motion – Rocket Equation, thrust and acceleration – Escape velocity multistage rockets – liquid, solid and cryogenic – propellant rockets
– space shuttle - Orbital velocity – launching of a satellite, types of satellite orbits.

UNIT – IV : CLASSICAL MECHANICS I

Lagrangian formulation of classical mechanics – Mechanics for a system of particles – Generalised co-ordinates – transformation equations – configuration space – Principles of virtual work – D'Alembert's principle – Lagrange's equation – Applications of Lagrange's equation – Simple pendulum.

UNIT – V : CLASSICAL MECHANICS II

Hamiltonian formulation of classical mechanics – phase space – Hamiltonian function – Hamilton's canonical equations of motion – Applications of Hamilton's equations of motion – Simple pendulum.

Books for study:

1. Mechanics and mathematical methods by R Murugeshn, S Chand. Elements of mechanics by Gupta.
2. Dynamics by Naranamurthi, National Publishing Company, Chennai. Classical Mechanics by Gupta Kumar and Sharma.
3. Classical Mechanics by B D Gupta and Sathya Prakash, Kedar Nath Ram Nath & Co.,

Books for Reference:

1. Mechanics by D S Mathur.
2. Classical Mechanics by Goldstein, Narosa.
3. Mechanics and Properties of Matter, C.L. Arora, S. Chand & Co.

CORE PRACTICAL – II

(Any 16 Experiments)

1. Young's modulus uniform bending Pin and microscope.
2. Young's modulus uniform bending Scale and Telescope.
3. Sonometer – AC frequency – steel and brass wires.
4. Melde's String – Frequency of the vibrator – Both modes.
5. Spectometer – μ of a prism – i-d curve.
6. Spectometer – grating – N and **λ** – Normal incidence method.
7. Spectometer – grating – N and **λ** – Minimum deviation method.
8. Air wedge – thickness of a thin wire.
9. Carey Foster's bridge – Temperature coefficient of resistance.
10. Potentiometer – Calibration of high range ammeter.
11. Potentiometer – resistance and specific resistance of a wire.
12. Figure of merit of a galvanometer – Table Galvanometer.
13. BG – Figure of merit – Charge sensitiveness.
14. BG – Comparison of capacitances.
15. BG – Comparison of emf of two cells.
16. m and B_H – Tan C – deflection magnetometer and vibration magnetometer.
17. Low range power pack – using two diodes.
18. Transistor Characteristics – CE / CB modes.
19. Zener diode as a Voltage regulator.
20. IC Voltage regulator using 7805.

ALLIED

MATHEMATICS – II

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume -Fourier series for functions in (0,2□) and (-□, □).

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types , Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient ,divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Guass, Stoke's and Green's theorems(without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

SKILL BASED SUBJECT

PAPER – 2

ELECTRONIC APPLIANCES

UNIT – I

Passive devices – Resistors – types – characteristics – colour coding – capacitors – type – characteristics – colour coding star and delta connection of a resistors and capacitors.

UNIT - II

chokes – Transformers – testing of diodes, transistors and ICs – CRO – Waveforms and Lissajoue's figures – A/F and R/F oscillators – usage of bread board.

UNIT – III

Semiconductor diode – Zener diode – Transistor – Transistor configurations – diode rectifier – half wave and full wave – Bridge retifier – Diode voltage doublers and multiplier.

UNIT – IV

Regulated power supply, Zener diode voltage regulator (Series and Shunt type) IC Voltage regultors: fixed positive – fixed negative – adjustable.

UNIT – V

Basic concepts of radio transmitter and receiver – Basic concepts of TV Transmitter and receiver – TV antennas: Resonance antennas and their characteristics – Dipole Antenna – Folded dipole – Yagi antenna – Yagi antenna design – Dish Antenna – DTH system – Mobile communication system - MODEM.

Books for study:

1. Principles of Electronics by V K Metha, S Chnd & Co., 5th edition 2001.
2. Functional Electronics by Ramanan.
3. Elements of Electronics by Bagde and Singh.
4. Monochrome and Colour TV by Gulati.
5. Basic Electronics, 6th Edition by B Grob, McGraw Hill NY 1989.

NON MAJOR ELECTIVE

PAPER – 2

BASIC PHYSICS

UNIT – I: MECHANICS

Force – Weight – Work – Energy – Power – Horsepower – Centrifuge – Washing Machine.

UNIT – II: HEAT

Variation of boiling point with pressure – Pressure cooker – Refrigerator – Air Conditioner – Principle and their capacities – Bernoulli Principle – Aero plane.

UNIT – III: SOUND AND OPTICS

Sound waves – Doppler effect – Power of lens – Long sight and short sight – Microscope – Telescope – Binocular - Camera.

UNIT – IV: GEO PHYSICS AND MEDICAL PHYSICS

Earthquake – Richter scale – thunder and lightning – Lightning arrestors – Cosmic showers – X-rays– Ultrasound scan – CT scan – MRI scan.

UNIT – V: SPACE SCIENCE AND COMMUNICATION

Newton's law of gravitation – Weather forecasting and communication satellites – Indian Satellites– Electromagnetic spectrum – Radio Waves – AM and FM transmission and reception.

Books for study:

1. The Learner's Series – Everyday Science – Published by INFINITY BOOKS, New Delhi.
2. The Hindu speaks on Science, Vol I & II, Kasturi & Sons, Chennai.

Books for Reference:

1. Fundamentals of Physics by D. Hallidy, R. Rensick and J. Walker, 6^{th} Edition, Wiley, NY (2001).
2. Physics, Vols I, II, III by D. Halliday, R. Rensick and K.S. Krane, 4^{th} Edition, Wiley, New York (1994).
3. The Feymann Lectures on Physics Vols, I, II, III by R.P. Feynmann, R.B. Leighton & M. Sands, Narosa, New Delhi (1998).

SEMESTER V

PAPER – 5

OPTICS

UNIT – I : GEOMETRICAL OPTICS

Spherical aberration in lenses – Methods of minimizing sphericl aberration – Condition for minimum spherical aberration in the case of two lenses separated by a distance – Chromatic aberration in lenses – Condition for achromtism of two thin lenses (in contact and out of contact)
– coma – astigmatism – Ramsden's and Huygen's eyepieces – Constant deviation spectrometer – Calculation of characteristic wave number of spectral lines.

UNIT – II : INTERFERENCE

Theory of thin films – Air wedge – Determination of diameter of a thin wire by air wedge – Michelson's Interferometer – Theory – Applications – wave length, thickness of thin transparent material and resolution of spectral lines – Brewster's fringes – Refractive index of gases – Jamin's & Rayleigh's Interferometers.

UNIT – III : DIFFRACTION

Fresnel's diffraction – Diffraction at circular aperture, straight edge and single slit – Plane diffraction grating – theory and experiment to determine wavelength – normal incidence – oblique incidence – Fraunhofer's diffraction – Missing orders – Overlapping spectra Rayleigh's criteria – Resolving power of telescope, prism, microscope and grating.

UNIT – IV : POLARIZATION

Introduction to polarisation – Double refraction – Huygen's explanation of double refraction in uniaxial crystal – Dichroism – Polaroids and their uses Plane, elliptically and circularly polarized light – Production and detection – Optical Activity – Fresnel's explanation of optical activity – Specific Rotatory Power – Determination using Laurent's Half Shade Polarimeter – Kerr effect and Faraday effect.

UNIT – V : FIBRE OPTICS

Introduction – Structure of an optical fibre - Classification of fibres based on Refractive index and number of modes of transmission – Theory of transmission of electromagnetic wave through fibres – Acceptance angle - Numerical aperture – absorbtion and scattering losses – optical fibre communication system - Application of optical fibres as wave guide and sensors.

Books for study:

1. Optics by Subramaniam N & Brij Lal, S Chand & Co. Pvt. Ltd., New Delhi, 1990.
2. Optics by Khnna D R & Gulati H R, R Chand & Co. Pvt. Ltd., New Delhi, 1979.
3. Optics and Spectroscopy by Murugeshn, S Chand & Co. Pvt. Ltd., New Delhi.
4. Optical fiber communications –Principles and Practice by John M Senior, Second edition, Prentice Hall, Pearson New Delhi.
5. Optical fiber communications by Gerd Keiser, Second edition, McGraw Hill

Books for Reference:

1. Fundamentals of Optics by Jenkins Francis and White E Harvey, McGraw Hill Inc., New Delhi, 1976.
2. Optical Physics by Lipson. S G, Lipson H and Tannhauser D S, Cambridge University Press (1995).
3. Fundamental of Optics by Raj M G, Anmol Publications Pvt. Ltd., (1996), New Delhi.
4. Fundamentals of Physics, 6^{th} Edition, by D Halliday, R Resnick and J Walker. Wiley NY 2001.
5. Physics, 4^{th} Edition Vols I, II & II Extended by D Halliday, R Resnick and K S Krane, Wiley, Ny, 1994.
6. CRC Handbook of Physics & Chemistry, 80^{th} Ed., CRS Press, Ny, 1999.
7. The Feynman Lectures on Physics, Vols. I, II and III by R P Feynman, R B Leighton and M Sands, Narosa, New Delhi 1998.
8. Fibre Optic Communication System, Govind P. Agarwal, John –Willey & Sons.

PAPER – 6

ATOMIC PHYSICS AND SPECTORSCOPY

UNIT – I : DISCHARGE PHENOMENON THROUGH GASES

Moving of a charge in transverse electric and magnetic fields – specific charge of an electron – Dunnington's method – Magnetron method – Positive rays – Thomson prabola method – Aston and Dempster's mass spectrograph.

UNIT – II : ATOMIC STRUCTURE

Vector atom model – Pauli's exclusion principle – explanation of periodic table – various quantum numbers – angular momentum and magnetic moment – coupling schemes – LS and JJ coupling – spatial quantisation – Bohr magnetron – Stern and Gerlach experiment.

Spectral terms and notations – selection rules – intensity rule and interval rule – fine structure of sodium D lines – alkali spectra – fine structure of alkali spectra – spectrum of Helium.

UNIT – III : IONISATION POTENTIAL AND SPLITTING OF ENERGY LEVELS

Excitation and ionization potential – Davis and Goucher's method – Zeeman effect – Larmor's theorem – Debye's explanation of normal Zeeman effect – Anamalous Zeeman effect – theoretical explanation. Lande's 'g' factor and explanation of splitting of D_1 and D_2 lines of sodium – Paschen back effect-theory – Stark effect (qualitative treatment only).

UNIT-IV: INFRARED AND RAMAN SPECTROSCOPY

The energy of a Diatomic molecule - The simple harmonic oscillator - The Diatomic vibrating rotator - The vibration - rotation spectrum of carbon monoxide - Techniques and Instrumentation (outline).

Quantum theory of Raman effect - Molecular Polarizability - Pure rotational Raman spectra of linear molecules - Vibrational Raman spectra - Structured determination from Raman and Infrared spectroscopy - Techniques and Instrumentation (outline).

UNIT V: LASER PHYSICS

Lasers: Population inversion, Laser pumping, Resonators - Vibrational modes of resonators, number of modes/unit volume - Open resonators, Control resonators, Q Factor, Losses in the cavity, Threshold condition, Quantumyield. Ruby Laser – 3 level system, Pumping power, Spiking U^{3+} in CaF_2 laser, four level laser, Neodymium laser - Nd:YAG, Applications of Lasers in Industry, Medicine & Communication.

Books for study:

1. Modern physics by R Murugesan, S Chand & Co., New Delhi - 2004.
2. Atomic and Nuclear physics by N Subramanian and Brij Lal, S Chand & Co. - 2000.
3. Atomic physics by J B Rajam.
4. Spectroscopy by Gupta & Kumar
5. Spectroscopy by Banewell
6. Laser Fundamentals, by William T. Silfvast , Cambridge University Press,

Books for Reference:

1. Atomic physics by A B Gupta and Dipak Ghosh – Books and Allied Publishers.
2. Modern physics by J H Hamilton and Yang, McGraw Hill Publication 1996.
3. Concepts of Modern physics by A Beiser, Tata McGraw Hill, New Delhi 1997.
4. Fundamentals of physics, 6^{th} edition, by D Halliday, R Resnick and J Walker, Wiley NY 2001.
5. Laser and Non Linear Optics by B.B.Laud, New Age international.
6. Laser systems and applications by Niyanad Choudhary and Richa Verma, PHI,New Delhi

PAPER – 7

BASIC ELECTRONICS

UNIT – I : SEMICONDUCTOR THEORY DEVICES AND CHARACTERISTICS

Classification of solids in terms of forbidden energy gap Fermi level – Fermi-Dirac function – Carrier concentration intrinsic and extrinsic semi conductors – effect of temperature on Fermi level – PN junction diode – Zener diode – Tunnel diode – photo diode – PIN – APD – Photo transistor – JFET construction and working – types of JFET – biasing – V-I characteristics in common source mode – JFET as amplifier.

UNIT – II : RECTIFIERS AND AMPLIFIERS

Half-wave, Full-wave and bridge rectifier – Two port representation of a transistor – ***h***-parameters– AC equivalent circuit using ***h***-parameters – analysis of an amplifier using h-parameters – Expressions for current gain, voltage gain input impedance, output impedance and power gain for common emitter only. RC coupled amplifier – frequency response curve – classification of amplifiers – class A power amplifier – Push-pull, class B power amplifier – Darlington pair - Emitter follower.

UNIT – III : FEEDBACK OSCILLATORS

Voltage gain of a feedbck amplifier – Barkhausen criterion – Hartley, Colpitt's, phase shift and Weinbridge oscillators – expressions for frequency of oscillations and condition for sustained oscillations in each case – crystal oscillator – frequency stability.

UNIT – IV : WAVE SHAPING CIRCUITS AND MULTI VIBRATORS

Clipping and clamping circuits – biased clipper – integrating and differentiating circuits.

Multivibrators – Astable – Mono stable and bi-stable multivibrators-Schmitt trigger.

UNIT – V : RADIO COMMUNICATION AND TELEVISION

Principles of transmission and reception – Modulation – types of modulation – amplitude modulation – frequency modulation and phase modulation – theory and mathematical analysis for AM, FM and PM – detector – AM Detector – FM Discriminator – AM and FM transmitter and receiver – RADAR – Range equation – Applications of RADAR.

Books for study:

1. Principles of electronics by V K Mehta, S Chand & Co., 5th edition 2001. Elements of electronics by Bagde and S P Singh.
2. Functional electronics by Ramanan. Monochrome and Colour TV by Gulati.
3. Basic and applied electronics by M Arul Thalapathi, Comptek, Publishers, Chennai 2005.
4. Electronic Communication systems, by George Kennedy, Bernard Davis , S R M Prasanna, 5th edn, Tata McGraw Hill, India

Books for reference:

1. Electronic principles by Malvino.
2. Electronic devices and circuits by Allen Mottershed.
3. Monochrome and colour TV Gulati.
4. Basic Television and videosystems by B Grob.
5. Solid State Electronics by Manna, Tata McGraw Hill.
6. Basic electronics, 6th Edition by B Grob, McGraw Hill, NY 1989.
7. Introduction to Radar systems, by Merrill I Skolnik, McGraw Hill.

SKILL BASED SUBJECT

PAPER – 3

ASTRO PHYSICS

UNIT – I: ASTRONOMICAL INSTRUMENTS

Optical telescope - reflecting telescope - types of reflecting telescope - advantages of reflecting telescopes - radio telescope - astronomical spectrographs - photographic photometry - photoelectric spectrometry- detectors and image processing.

UNIT – II : SPACE

Introduction – Hubble's Law – Big bang theory – Shape of Universe – Expanding universe in space – Galaxies – Types of Galaxies – Spiral, Elliptical and Irregular Galaxies – Clusters of Galaxies – Milky Way – Quasars.

UNIT – III : STARS

Birth of Stars – Colour and Age – Life of Stars – Red giant stars – With dwarf star – Neutron Star – Black hole – Supernovae – Constellations - Zodiac.

UNIT – IV : SOLAR SYSTEM

Introduction – Sun – Structure of Sun – Nuclear reactions in sun – Sun spot and solar flares – Earth – Structure of earth – Atmosphere – Moon and its structure – Inner planets – Outer planets – Asteroids – Meteors – Meteorites - Comets.

UNIT – V : SPACE DISTANCE, UNITS AND CO-ORDINATES

Cislunar space – Translunar space – Inter planetary distance – Interesteller space – Inter galactic space – Light Year – Astronomical Unit – Astronomical Map. Astronomical Systems – Astronomical co-ordinates – Celestial Sphere – Celestial Equators – Celestial Poles - Celestic.

Books for study:

1. BaidyanathBasu / An introduction to Astrophysics / second printing, Prentice Hall of India Private limited New Delhi – 2001
2. Hewish. A / Physics of the universe / CSIR publication, New Delhi, 1992.
3. Biman Basu / Inside Stars / CSIR Publication, New Delhi, 1992.
4. Biman Basu / Cosmic Vistas / National Book Trust of India, 2002.
5. Krishnasamy K.S. / Astro Physics a modern perspective / New Age International / New Delhi.
6. Murugesan. R / Modern Physics / S. Chand & Co. / New Delhi, 2003.

Books for reference:

1. Mohan Sundara Rajan / Space today / National Book Trust of Indi, 2000.
2. William K. Hartmann / The Cosmic Voyage through time and space / Wads worth Publishing company, Californi, 1990.

SEMESTER VI

PAPER – 8
NUCLEAR AND RADIATION PHYSICS

UNIT – I : NUCLEAR STRUCTURE

Nuclear spin – determination of magnetic dipole moment, electric quadruple moment, parity of nuclei, isospin, theories of nuclear composition, proton and electron hypothesis, proton – neutron hypothesis, nuclear forces – meson theory of nuclear forces.

Liquid drop model – Bethe – Weizacker's mass formula – application to alpha decay – Bohr – Wheeler theory – Shell model – evidences – theory o energy level diagram – spin orbit interaction
– magic numbers – nuclear stability.

UNIT – II : NUCLEAR DECAY

Radioactive disintegration – law of successive disintegration – transient and secular equilibrium – radioactive series – Geiger – Nuttal law – Age of earth – alpha particle disintegration energy – alpha particle spectra – theory of alpha decay (qualitative treatment). Beta ray spectra – origin – neutrino theory of beta decay – electron capture – gamma rays – determination of wavelength by Dumond – crystal spectrometer – nuclear isomerism.

UNIT – III : PARTICLE ACCELERATORS AND DETECTORS

Cyclotron – synchrocyclotron – Betatron – electron synchrotron – proton synchrotron (Bevatron) GM counter – ionization chamber – bubble chamber – scintillation counter – photographic emulsion techniques.

UNIT – IV : RADIATION PHYSICS

Nuclear fission – Chain reaction – four-factor formula – reactor theory – critical size of a reactor – general aspect of reactor design – reactor shielding – reactor control – classification of reactors – pressurized heavy water reactor – fast breeder reactor – Radiation hazards – biological effects of radiation – radiation sickness – radiation units and operational limits – radiation survey meters – pocket dosimeter – control of radiation hazards – radiation therapy – radioisotopes used for therapy – nuclear medicine – industrial applications – food preservatives.

UNIT – V : ELEMENTARY PARTICLES

Classification – types of interaction – symmetry and conservation laws – hadrons – leptons – baryons – mesons – strangeness – hyperons – antiparticles – antimatter – basic ideas about quarks – types of quarks.

Books for study:

1. Modern physics by R Murugeshan S Chand & Co.
2. Introduction to Modern Physics by Rich Meyer, Kennard, Coop Tata McGraw Hill Publishing Co.
3. Atomic and nuclear physics by Littlefeld & Thorley.
4. Modern physics by R Murugeshan & Kiruthiga, Sivaprasath S Chand & Co. (2006).

Books for reference:

1. Nuclear Physics S N Ghoshal – S Chand & Co. Edition 2003.
2. Nuclear Physics D G Tayal – Himalayan Publishing House.
3. Elements of Nucler Physics – M L Pandya & R P S Yadav Kedar Nath Ram Nath (2000).
4. Nuclear Physics – Irving Keplan.
5. Nuclear Physics – J B Rajam, S Chand Publishing Co.

PAPER – 9

RELATIVITY, QUANTUM MECHANICS & MATHEMATICAL PHYSICS

UNIT – I : RELATIVITY

Frames of reference – Michelson – Morley experiment – Significance of negative result – postulates of special theory of relativity – Lorentz transformation equations – Length contraction – Time dilation – Relativity of simultaneity – Law of addition of velocities – variation of mass with velocity – relativistic kinetic energy equations – postulates of general theory of relativity – gravitational red shift.

UNIT – II : WAVE MECHANICS

Matter waves – de Broglie wavelength – wave velocity and group velocity – Heisenberg's Uncertainty principle – proof of Uncertainty principle for one dimensional wave packet – Postulates of wave mechanics – properties of wave functions – operator formalism – eigen functions – eigen values – expectation values.

UNIT – III : SCHRODINGER EQUATIONS AND ITS APPLICATIONS

Schrodinger equation – time dependent and time independent – application of Schrodinger equations – linear harmonic oscillator – zero point energy – particle in a one dimensional box – barrier penetration and tunnelling effect – rigid rotator – hydrogen atom.

UNIT – IV : MATHEMATICAL PHYSICS

Gauss divergence theorem – Stoke's theorem – Green's theorem – applications of vectors to hydrodynamics.

Orthogonal curvilinear coordinates – spherical polar coordinates – differential operators in terms of orthogonal curvilinear coordinates – expressions for gradient, div, curl and $\tilde{\mathbf{N}}^2$ in Cartesian, spherical and cylindrical coordinates.

UNIT – V : SPECIAL FUNCTIONS

Beta and gamma functions – problems – relation between beta and gamma functions – Bessel's differential equations – Legendre's differential equations – Hermite's differential equations – Laguerre's differential equations – series solutions – Dirac delta functions - properties.

Books for study:

1. Quantum Mechanics by V. Devanathan, Narosa, Chennai, 2005.
2. Modern Physics by R Murugeshan, Kiruthiga, Sivaprasath S Chand & Co. (2007).
3. Quantum Mechanics by V K Thangappan, Wiley Eastern.
4. A Text Book of Quantum Mechanics by P M Mathews and Venkatesan, McGraw Hill. Mathematical Physical by Sathya Prakash.
5. Mechanics and Mathematical Methods by Murugeshan, S Chand Publishing & Co.

Books for reference:

1. Mathematical Physics by B D Gupta.
2. Quantum Mechanics by Ghatak and Loganathan, McMillan.
3. Basic Quantum Mechanics by A Ghatak, McMillan India (2002).

PAPER – 10

SOLID STATE PHYSICS

Unit - I

Crystallography: Distinction between crystalline and amorphous solids – Different features of the crystal – Crystal lattice – Basis – Primitive and Unit cell – Number of lattice points per unit cell - Seven Classes of Crystals - Bravais lattices – Miller indices – Elements of Symmetry – Structure of KCl and NaCl crystal - Diamond Structure – Atomic Packing – Atomic radius –-Lattice constant and density- Crystal structure (sc; hcp; fcc;bcc.)

Unit - II

Types of Bonding in Crystals - Ionic, Valence, Metallic, vanderwaal's and Hydrogen Bonding – Optical properties of solids – Specific heat capacity of solids – Dulong and Pettit's law – Einstein's and Debye's theory – Explanation for the Occurrence of Super Conductivity - General Properties of Superconductors - Types of Superconductors – Meissner effect -Application of Superconductors.

Unit - III

Diffraction of x-Rays by Crystals - Bragg's Law In one Dimension - Experimental Method in x- Ray Diffraction - Laue Method, Rotating Crystal Method - Powder Photograph Method - von Laue's equations. Point Defects, Line Defects - Surface Defects - Volume Defects - effects of Crystal Imperfections.

Unit - IV

Different Type of Magnetic materials - Classical Theory of Diamagnetism (Langevin's Theory) - Langevin's Theory of Paramagnetism - Weiss Theory of Paramagnetism - Qualitative Explanation of Heisenberg's Internal Field and Quantum Theory of Ferromagnetism.

Unit - V

Fundamental Definitions in Dielectrics - Different types of Electric polarization - Frequency and Temperature Effects on Polarization - Dielectric Loss - Local Field on Internal Field Clausius-Mosotti Relation - Determination of Dielectric Constant Dielectric Breakdown - Properties of Different Types of Insulating Materials.

Books for Study:

1. Solid State Physics Gupta and Kumar
2. Modern Physics R Murugesan
3. Material Science by M. Arumguarn, Anuradha Publishers.
4. Material Science and Engineering by V.Raghavan, PHI
5. Introduction to Solids by Azaroff, TMH.
6. Concepts of Modern Physics by Beiser, Tata Mc.Graw Hill, 5^{th} Edition,1997.

Books for Reference:

1. Introduction to Solid State Physics by Kittel, Wiley and Sons, 7^{th} Edition.
2. Solid State Physics A J Dekker

CORE PRACTICAL – III

(Any 20 Experiments)

1. Bifilar Pendulum – Parallel Threads – Verification of Two Theorems.
2. Young's modulus – Koenig's method - non uniform bending.
3. Young's modulus – Koenig's method - uniform bending.
4. Newton's rings – R_1, R_2 and – μ of material a convex lines.
5. Spectrometer i – I' Curve.
6. Spectrometer – narrow angled prism – angle of deviation – normal incidence and normal emergence – refractive index.
7. Dispersive power of a prism.
8. Dispersive power of a grating.
9. Spectrometer – Cauchy's constants.
10. Lasers – Determination of Numerical aperture of a fiber
11. Lasers - diffraction at a straight wire – determination of thickness of the wire.
12. Field along the axis of circular coil – deflection magnetometer – M and B_H – Null Method.
13. Field along the axis of circular coil – Vibrating magnetic needle - B_H.
14. EMF of a thermocouple – Mirror galvanometer – Direct deflection method.
15. Potentiometer – emf of a thermocouple.
16. Potentiometer – calibration of high range voltmeter.
17. Potentiometer – Conversion of galvanometer into voltmeter.
18. Potentiometer – Conversion of galvanometer into ammeter.
19. BG – absolute capacitance of a capacitor.
20. BG – comparison mutual inductances.
21. BG – High resistance by leakage.
22. BG – internal resistance of a cell.
23. Hartley Oscillator.
24. Colpitt's oscillator.
25. RC Coupled single stage amplifier (without feedback).

CORE PRACTICAL – IV

ELECTRONICS

1. FET – Characteristics.
2. UJT – Characteristics.
3. UJT – Relaxation oscillators.
4. Differentiating and integrating circuits – using op-amp.
5. NAND, NOR as universal gates.
6. Verification of De Morgan's Theorems.
7. Transistor – Phase shift oscillator.
8. Transistor – Wien bridge oscillator.
9. Emitter Follower.
10. Op – Amp – Voltage follower, adder, subtractor, averager (inverting mode).
11. Op – Amp – Inverting amplifier with frequency gain response.
12. Half adder and Full adder – using NAND gate only.
13. Half subtractor and Full subtractor – using NAND gate only.
14. RS, Clocked RS, and D Flip Flops using NAND gate only.
15. Four bit ripple counter – 7473 / 7476.
16. Shift Register – Four bit left / right – 7473 / 7476.
17. Microprocessor – 8 bit addition, Subtraction – using BCD & Hexadecimal.
18. Number conversion – 8 bit – BCD to binary, Binary to BCD, Hex to ASCII using 8085.
19. Square and Square root of Hex numbers – 8 bit – using 8085.
20. Microprocessor – Sum of N elements

SKILL BASED SUBJECT

PAPER – 4

INSTRUMENTATION TECHNIQUES

UNIT – I : ELECTRICAL INSTRUMENTATION

AC bridges – Measurement of Inductance by Maxwell's Inductance Bridge – Measurement of Capacitance by De Sauty's Bridge – Measurement of Mutual Inductance by carry Foster bridge – ac differential voltmeter – dc differential voltmeter – Analog multimeter.

UNIT – II : ELECTRONIC INSTRUMENTATION

Analog to Digital converters – Dual slop ADC and Successive approximation ADC – Digital counter (four bit) – Digital voltmeter – Digital Frequency Meter – Digital Multimeter – Digital Thermometer.

UNIT – III : ANALYTICAL INSTRUMENTATION

CRO – measurement of time period and frequency – Distortion analyzer – Wave analyzer – Spectrum analyzer – IR spectrometer – UV spectrometer – Fast Fourier Transform (FFT) analyzer – Ultrasound scanner.

UNIT – IV : BIO-MEDICAL INSTRUMENTATION

Bioelectric potentials – resting and action potential – Half cell potential – surface needle and micro electrodes – principle, description, function and recording of ECG, EMG and EEG artificial pace maker – simulators – heart lung machine – kidney machine – pH meter – laser blood flow meter.

Strain gauge and measurement of strain – Measurement of pressure using electrical transducer – Measurement of seismic vibration using seismic transducer – Piezo – electric accelerometer – Measurement of temperature using semiconductor device – Radiation measurement by GM counter.

Books for study:

1. Arumugam M / Biomedical instrumention / Anuradha Publications, Kumbakonam / 2011.
2. Sawhney A K / A course in Electrical and Electronics Measuremens and Instrumentation / Dhanpat Rai & Co., Delhi / 2003.
3. Alan S Morris / Measurement & Instrumentation Principles / Elsevier / 2006.
4. Anand M.M.S. / Electronics Instruments and Instrumentation Technology / PHI, New Delhi / 2006.

ELECTIVE SUBJECTS

Students can choose any one of the groups (Elective I, II & III)

GROUP A

Elective 1: Digital Electronics
Elective 2: Applied Electronics
Elective 3: Microprocessor and its Applications – 8085

GROUP B

Elective 1: Materials Science
Elective 2: Applied Electronics
Elective 3: Laser and Fibre Optic Communication

GROUP C

Elective 1: Fundamentals of Nano Materials and its Characterization
Elective 2: Applied Electronics
Elective 3: Medical Physics

ELECTIVE

GROUP A

PAPER – 1

DIGITAL ELECTRONICS

UNIT – I : DIGITAL FUNDAMENTALS AND LOGIC GATES

Number systems – decimal, binary, octal and hexadecimal system – Conversion from one number system to another. Codes – BCD code – Excess 3 code, Gray code – ASCII code - Binary arithmetic –Binary addition – subtraction – unsigned binary numbers – sign magnitude numbers – 1's and 2's complement – Binary multiplications and division - AND, OR circuits using diodes and transistors – NOT using transistors – NAND, NOR and EXOR – functions and truth tables. NAND & NOR as universal gates.

UNIT – II : BOOLEAN ALGEBRA AND SIMPLIFICATION OF LOGIC CIRCUITS

Laws and theorems of Boolean algebra – De Morgan's theorems and their circuit implications - Simplification of Boolean equations – Karnaugh map – pairs, quads, octets – 2,3 and 4 variables - Arithmetic building blocks – Half adder – Full adder – parallel binary adder – Half subtractor – Full subtractor – The adder-subtractor – digital comparator – parity checker / generator.

UNIT – III : DATA PROCESSING CIRCUITS AND SEQUENTIAL LOGICS

Multiplexers – Demultiplexers – Decoders – 1 of 16 decoder BCD to decimal decoder – seven segment decoder – Encoders – Flip Flops – RS Flip Flop – Clocked RS Flip-flop – D flip-flop – JK flip-flop – JK master slave flip-flop – T type flip-flop.

UNIT – IV : SHIFT REGISTERS AND COUNTERS

Types of registers – serial in serial out – serial in parallel out – parallel in serial out – parallel in parallel out – ring counter – asynchronous counter – decoding gates – omitted states – modulus counters –BCD counter – up down counter – synchronous counter – combination counters – decade counter – cascaded counters.

UNIT – V : D/A AND A/D CONVERTERS

Introduction – variable resistor network – binary ladder – D/A converter – D/A accuracy and resolution – A/D converter – simultaneous conversion – A/D accuracy and resolution.

Books for study:

1. Malvino and Leech, (2000), Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi.
2. Millman and Halkias, (1972), Integrated Electronics, International Edition, McGraw Hill, New Delhi.
3. Arul Thalapapathi, Fundamentals of digital computers, Comptek publishers, Chennai, 1995.

Books for Reference:

1. Computer architecture and logic design by T C Bartee, McGraw Hill, 1991.2.
2. Solid state electronics by 1 Agarwal and Anit Agarwal.
3. Digital integrated electronics by Herbert Taub and Donald Schilling, McGraw Hill.
4. Anokh Singh and A K Chhabra, (2005), Fundamentals of Digital Electronics and Microprocessors, 2nd revised and enlarged Ed., S Chand & Co. Ltd., New Delhi.
5. Digital fundamentals – Floyd – Pearson Education 8th Edition 2004 S Chand Publications.

PAPER – 2

APPLIED ELECTRONICS

UNIT – I : SPECIAL DEVICES AND APPLICATIONS

FET – Characteristics – parameter FET as amplifier – FET as VVR – MOSFET – Depletion and enhancement – UJT characteristics – UJT as relaxation oscillator – SCR characteristics – SCR as half wave rectifier and full wave rectifier. SCR as static current switch – Firing of SCR using UJT.

UNIT – II : OPERATIONAL AMPLIFIER AND APPLICATIONS

OPAMP – Parameters – Inverting and Non-inverting amplifier – gain – Miller effect – Virtual ground – Offset voltage – offset current – PSRR – CMRR.

OPAMP – Sign and Scale changer – adder, subtractor and averager – Integrator and differentiator – DC voltage follower – ac voltage follower –

UNIT – III : OTHER APPLICATION OF OPAMP

OP AMP logarithmic amplifier – antilogarthmic amplifier – Logarithmic multiplier – Logarithmic divider. Comparator – Schmitt trigger – astable multivibrator – monostable multivibrator – Bistable multivibrator.

UNIT – IV : 555 TIMER AND PLL

555 block diagram and work monostable operation – Astable operation – Schmitt trigger. Phase – Locked Loops (PLL) : Basic principles – Phase Detector.

Comparator – Analog phase detector – Digital phase detector – voltage controlled oscillator (VCO).

UNIT – V : D/ A AND A/D CONVERTER

Weighted resistor D/A converter – 4-bit R-2R ladder DAC – Analog to Digital converter – Stair case ADC – tracking or servo ADC – Successive approximation ADC – Flash ADC Duel slope ADC.

Books for Study:

1. Basic and Applied Electronics by M. Arul Thalapathi – Comtec Publisher Chennai – 2005.
2. Digital principles and applications – Malvino Leach – 4th Edn. – Tata McGraw Hill 1992.
3. Integrated Electronics by Jacob Millman and Christos C. Halkias – McGraw Hill International 1971.
4. Linear Integrated Circuits by D. Roy Choudhury and Shail Jain – New age international (P) Ltd. OP-AMPS and linear integrated circuits – by Ramakant A. Gayakward – Printice Hall of India 1994.

Books for Reference:

1. Digital Computer electronics by Albert Paul Malvino – TMH Edition 1992.
2. Electronics – Analog and Digital – IJ Jagrath – Prentice – Hall of India – New Delhi – 1999.
3. Operational amplifier and linear integrated circuits – Prentice Hall Inc. N.J. 1977.

PAPER - 3

MICROPROCESSOR AND ITS APPLICATIONS - 8085

UNIT – I : MICROPROCESSOR ARCHITECTURE AND ITS OPERATIONS

Microprocessors – Architecture of 8085 – pin out configurations of 8085 – Bus organization and timings: buses – buffer – address bus, data bus, multiplexing address / data bus and control & status signals – ALU – registers in 8085 – flags – decoding and execution of instruction – Interrupts and its types.

UNIT – II : PROGRAMMING MODEL OF 8085

Classification of instructions and format – 8-bit data transfer, arithmetic, logical and branch instructions – Addressing modes – 16 bit data transfer and memory related instructions – stack and subroutine instructions – comparison of stack and subroutine instructions – Logical rotate and compare instructions – RIM and SIM interrupt instructions – 8-bit code conversion: Binary to BCD, BCD to binary, binary to ASCII, ASCII to binary.

UNIT – III : TIME DELAY, DESIGN OF COUNTERS AND MEMORY INTERFACE

Counters – time delay using one and pair of registers – Instruction timings of 8085 – T-states – delay routines and delay calculations.

Memory interface : 2K x 8, 4K x 6 ROM and RAM interface – timing diagram for memory read and memory write cycles – instructions cycle, machine cycle.

UNIT – IV : INTERFACING I/O DEVICES

Interfacing concepts – peripheral I/O instructions – interfacing input and output using decoders – interface of LED output display for binary data – Memory mapped I/O – LED display of binary data – comparison of peripheral I/O and memory mapped I/O.

UNIT – V : INTERFACING DATA CONVERTERS AND PERIPHERAL DEVICES

Concepts of D/A and A/D converters and circuits – illustration of interfacing 8-bit D/A - successive approximation A/D converters – interfacing of programmable peripheral device 8255 – Programming 8255A MODE zero – interfacing with ports of 8255 with LED’s to run various counters.

Books for study:

1. Microprocessor Architecture, Programming and Applications with the 8085 – R.S. Goankar, 3rd Edn. Prentice Hall.
2. Fundamental of Microprocessor – 8085 – Architecture, Programming and interfacing – V. Vijyendra, S. Viswanathan, Pvt. Ltd., 2003.

Books for reference:

1. Digital computer electronics: an introduction to microcomputers – Malvino, 2nd Edn., Tata McGraw Hill.
2. Fundamental of Microprocessor and Microcomputers – B. Ram.
3. Computer System Architecture – Moris Mano, 3rd Edn., Prentice Hall India.
4. Introduction to Microprocessors : Software, Hardware, Programming – Lance A. Leventhal, Prentice Hall India.

ELECTIVE

GROUP B

PAPER – 1

MATERIALS SCIENCE

UNIT – I : MATERIALS SCIENCE

Classification of materials – Properties of Engineering materials – Materials Structure – Types of Bonds – Bonds Formation – Ionic Bond – Covalent Bond – Metallic Bond – Comparison of Bonds – Secondary Bonds.

UNIT – II : PHASE DIAGRAM AND TRANSFORMATION

Basic terms – Solid Solution – Hume – Rothery's rule – Intermediate Phase – Phase Diagrams – Gibb's Phase Rule – Time – Temperature cooling curves – Construction of Phase Diagrams – The Lever Rule – Equilibrium Binary System – Eutectic System – Mechanism of Phase Transformation.

UNIT – III : VACUUM AND OXIDATION

History of vacuum technology – units of Vaccum – Kinetic aspects of Gases – Application of Vaccum – Gas flow in vaccum systems – production of vaccum – Measurement of vaccum – Thermal conductivity gauges – Penning Gauge – Oxidation – Oxidation Resistant Materials.

UNIT – IV : NON-DESTRUCTIVE TESTING (NDT)

NDT and its advantages – Defects in materials – Selection of the NDT Method – Visual Inspection – Basic Principle – Liquid Penetration Testing – Physical Principle – Magnetic Particle Testing (MPT) – Principle of MPT – Sensitivity – Limitation – Eddy Current Testing (ECT) – Principle – Instrument for ECT – Applications – Limitations – Radiography – Basic Principle – Application – Limitations.

UNIT – V : ELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS

Dielectrics – Polarization – Temperature and frequency effects – Electric Breakdown – Ferroelectric materials – Electrostriction – Piezoelectricity – Uses of Dielectrics – Magnetic Properties – Classification – Magnetostriction – Soft and Hard Magnetic Materials.

Books for study:

1. Materials Science by G.K.Narula, K.S. Narula, V.K. Gupta, Tata McGraw Hill Publishing, 1994.

2. Materials Science and Engineering by V. Raghavan, Prentice Hall of India, 2004.

Books for reference:

1. Practical Non-Destructive Testing by Baldevraj,T. Jayakumar, M. Thanvasimuthu, Narosa Publishing House, Chennai, 2002.

2. Testing of Metallic Materials by A.V.K. Suryanarayana, B.S. Publications, Giriraj lane, Sultan Bazar, Hyderabad – 95, 2003.

PAPER – 2

APPLIED ELECTRONICS

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1. Basic and Applied Electronics by M. Arul Thalapathi – Comtec Publisher Chennai – 2005. Digital principles and applications – Malvino Leach – 4th Edn. – Tata McGraw Hill 1992.
2. Integrated Electronics by Jacob Millman and Christos C. Halkias – McGraw Hill International 1971.
3. Linear Integrated Circuits by D. Roy Choudhury and Shail Jain – New age international (P) Ltd. OP-AMPS and linear integrated circuits – by Ramakant A. Gayakward – Printice Hall of India 1994.

Books for Reference:

1. Digital Computer electronics by Albert Paul Malvino – TMH Edition 1992.
2. Electronics – Analog and Digital – IJ Jagrath – Prentice – Hall of India – New Delhi – 1999.
3. Operational amplifier and linear integrated circuits – Prentice Hall Inc. N.J. 1977.

PAPER – 3

LASER AND FIBRE OPTIC COMMUNICATION

UNIT – I: LASER PHYSICS

Basic Principle of Laser – Einstein Coefficients – Condition for light amplification – Population Inversion – Threshold Condition – Line Shape Function – Optical Resonators – Three level and four level systems.

UNIT – II: TYPES OF LASERS AND OUTPUT MODULATION METHODS

Solid State Lasers – Ruby and Nd-YAG Laser – Gas Lasers – He-Ne and Co2 lasers – semiconductor lasers – Hetero junction Lasers – Liquid Dye Lasers – Q switching and mode locking.

UNIT – III: APPLICATIONS OF LASER

Application of laser in industry – cutting and welding – Drilling – Surface Hardening – Medical applications – Laser as diagnostic and therapeutic tool – Holography – Theory of recording and reconstruction – application of Holography.

UNIT – IV: OPTIC FIBERS

Fiber optic revolution – basic characteristics of optical fiber – acceptance angle – numerical aperture – propagation of light through optical fiber – theory of mode formation – classification of fibers – step index and graded index fibers – single mode and multi mode fibers – losses in fibers – fabrication techniques of fibers.

UNIT – V: FIBER OPTIC COMMUNICATION

Source and detectors for fiber optic communication – Laser and LED – Analog and digital modulation methods – Principle of optical detection – Pin APD photo detectors – Noise – Design consideration of a fiber optic communication system.

Books for study:

1. Laser theory and applications by K. Thyagarajan and Ajoy Ghatak, Cambridge University Press, 1999.
2. Introduction to Fiber optics by K. Thyagarajan and Ajoy Ghatak, Cambridge University Press, 1999.
3. Optical Fiber Communications by John M. Senior, Cambridge University Press, 1996.
4. Fiber-Optic Communication Systems, Govind P. Agarwal, John-Willey & Sons,

Books for Reference:

1. An Introduction to laser : Theory and Applications by M. N. Avadhanulu, S. Chand and Co., New Delhi 2001.
2. P.K. Palanisamy, Physics for Engineering, Scitech Publishing Pvt. Ltd., Chennai

ELECTIVE

GROUP C

PAPER – 1

FUNDAMENTALS OF NANO MATERIALS AND CHARACTERIZATION

UNIT – I : INTRODUCTION TO NANOTECHNOLOGY

Definition of Nanoscale system – Feymann theory of Nanotechnology – types of nanotechnology – Molecular Nanotechnology – Molecular and atomic size – Surface and dimensional space – opportunities at the Nanoscale.

Unit – 2: NANO PROPERTIES

Forces between atoms and molecules, particles and grain boundaries – Vander Waals and electrostatic forces between surface – Nano and Mesopores – size dependent variation in magnetic, electronic transport, resistivity, optical and etc – Misnomers and misconception of Nanotechnology.

Unit – 3 : QUANTUM CONFINEMENT

Quantum confinement in one dimension – Quantum walls – Quantum confinement – In two dimensions – Quantum wires – Quantum confinement in three dimensions – Quantum dots – Super lattices band – Band offsets – Quantum dot layers.

Unit – 4: SYNTHESIS OF NANOMATERIALS AND ITS CHARACTERIZATION

Basic approaches of synthesis nanomaterials – Bottom up and top down process – fundamental of sol – gel process – Sol – Gel synthesis methods for oxides – Mechanical milling – thermal evaporation – XRD with Debye Scherrer formula – SEM- TEM – FTIR – UV.

Unit – 5: APPLICATION OF NANOMATERIALS

Implications of Drug delivery – Polymeric Nanoparticles as Drug carriers and controlled release implant devices – Magnetic Data Storage – Magneto optics and magneto – optic recording – Nano Sensors – Physical sensor and chemical sensors.

Books for Study & Reference:

1. Nanotechnology : Basic Science and Emergic Technologies – Mick Wilson, Kamli Kannangara, Geoff smith , Michelle Simmons, Burkhard Raguse, overseas press (2005)

2. Nanotechnology : A Gentle introduction to the next big idea, Mark A. Rather, Daniel Rather, Mark Rather, prentice Hall PTR; 1st edition (2002)

3. Robert W. Kel Sall, Mark Geoghenan, In W. Hamley, Nano Scale Science and technology, John Wiley and sons, 2005 ISBN 0470850868.

4. Recent advances I the liquid phase synthesis of inorganic nanoparticals Brain L. Cushing, Valdimir L. Kolesnichenko, Charles J. O* Connor, Chem Rev 104 (2004)3893- 3946.

5. Nano composite science and technology, Palical M. Ajayan, Linda S. Schadles, Paul V. Braues, Wiley – VCH Verlag WEileim (2003).

6. ww.eng.vcedu/Ngbeaucag/calsses/XRD/Neutron_diffraction_atLNL.pdf

7. Nano particulates as Dring Carriers , Edited by Vladimir P. Torchilin, Imperiacal college press, North Einstein university, USA (2006), ISBN 1 – 86094 – 630 – 5.

8. Magnetic materials: Fundamental and device applications Nichola. Ann spaldin, Cambridge University press (2003) ISBN 0521016584.

PAPER – 2

APPLIED ELECTRONICS

UNIT – I : SPECIAL DEVICES AND APPLICATIONS

FET – Characteristics – parameter FET as amplifier – FET as VVR – MOSFET – Depletion and enhancement – UJT characteristics – UJT as relaxation oscillator – SCR characteristics – SCR as half wave rectifier and full wave rectifier. SCR as static current switch – Firing of SCR using UJT.

UNIT – II: OPERATIONAL AMPLIFIER AND APPLICATIONS

OPAMP – Parameters – Inverting and Non-inverting amplifier – gain – Miller effect – Virtual ground – Offset voltage – offset current – PSRR – CMRR.

OPAMP – Sign and Scale changer – adder, subtractor and averager – Integrator and differentiator – DC voltage follower – ac voltage follower –

UNIT – III: OTHER APPLICATION OF OPAMP

OP AMP logarithmic amplifier – antilogarthmic amplifier – Logarithmic multiplier – Logarithmic divider. Comparator – Schmitt trigger – astable multivibrator – monostable multivibrator – Bistable multivibrator.

UNIT – IV: 555 TIMER AND PLL

555 block diagram and work monostable operation – Astable operation – Schmitt trigger. Phase – Locked Loops (PLL) : Basic principles – Phase Detector.

Comparator – Analog phase detector – Digital phase detector – voltage controlled oscillator (VCO).

UNIT – V: D/A AND A/D CONVERTER

Weighted resistor D/A converter – 4-bit R-2R ladder DAC – Analog to Digital converter – Stair case ADC – tracking or servo ADC – Successive approximation ADC – Flash ADC Duel slope ADC.

Books for Study:

1. Basic and Applied Electronics by M. Arul Thalapathi – Comtec Publisher Chennai – 2005. Digital principles and applications – Malvino Leach – 4th Edn. – Tata McGraw Hill 1992.
2. Integrated Electronics by Jacob Millman and Christos C. Halkias – McGraw Hill International 1971.
3. Linear Integrated Circuits by D. Roy Choudhury and Shail Jain – New age international (P) Ltd.
4. OP-AMPS and linear integrated circuits – by Ramakant A. Gayakward – Printice Hall of India 1994.

Books for Reference:

1. Digital Computer electronics by Albert Paul Malvino – TMH Edition 1992.
2. Electronics – Analog and Digital – IJ Jagrath – Prentice – Hall of India – New Delhi – 1999.
3. Operational amplifier and linear integrated circuits – Prentice Hall Inc. N.J. 1977.

PAPER – 3

MEDICAL PHYSICS

UNIT – I: X – RAYS

Electromagnetic spectrum – production of x- rays – s-rys spectra – Brehmsstrahlung – Characteristic x-ray – X-ray tubes – Coolidge tube – x-ray tube design – tube cooling – stationary mode – Retting anode x-ray tubes – Tube rating – quality and intensity of x-ray. X-ray generator circuits – half wave and full wave fectification.

UNIT – II: RADIATION PHYSICS

Radiation units – exposure – absorbed dose – rad gray – kera relative biological effectivenss – effective dose – slevert - inverse square law – Interaction of radiation with matter – linear attenuation coefficient. Radiation Detectors.

UNIT – III: MEDICAL IMAGING PHYSICS

Radiological imaging – Radiography – Filters – grids – cassette – X-ray film – film processing – fluoroscopy – computed tomography scanner –principle function display – generations – mammography. Ultrasound imaging – magnetic resonance imaging – thyroid uptake system – Gamma camera [Only Principle, function and display]

UNIT – IV: RADIATION THERAPHY PHYSICS

Radio theraphy – kilo voltage machines – deep theraphy machines – tele-cobalt machines – Medical linear accelerator. Basic of Teletherapy units – deep x-ray, telecobalt units, medical linear accelerator – radiation protection – external beam characteristics – phantom –does maximm and build up – bolus – percentage depth dose – tissue – air ration – back scatter factor.

UNIT – V: RADIATION PROTECTION

Principles of radiation protection – protective materials – radiation effects – somatic, genetic stochastic and deterministic effect, Personal monitoring devices – TLD film badge – pocket dosimeter.

Book for Study:

1. Basic Radiological Physics Dr. K. Thayalan – Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi (2003)

2. Christensen's Physics of Diagnostic Radiology : Curry, Dowdey and Murrey – Lippincot Williams and Wilkins (1990)

3. Physics of Radiation Theraphy : FM Khan – Williamd and Wilkins, Third edition (2003)

4. The essential physics of Medical imaging : Bushberg, Seibert, leidholdt and Boone Lippincot Williams and Wilkins, Second Edition (2002)

5. HE Johns and Cunningham – The Physics of Radiology.

Books for Refernece :

1. Nuclear medicine Physics : Chandra – Lippincot Willams and Wilkins (1998)

2. The Physics of radiology : John R. Gunni ingham and Johns – Charles C Thomas USA (19190)

3. Medical Imaging Physics : William R Hendee – Mosby , 3rd edition (1992)

4. Advanced Medical Radiation Dosimetry : Govindarajan KN Prentice – Hall of India Pvt. Ltd. New Delhi (1992)

5. Erric Hall Radio Biology for the Radiologist – Lippincott Williams & Wilkins.

6. The modern Technology of Radiation oncology – Jake VanDyk – Medical Physics Publishing.

ALLIED

PHYSICS - I

UNIT – I: PROPERTIES OF MATTER

Elasticity : Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula .

Surface Tension: Surface Tension – Surface Tension and interfacial surface tension by the method of drops.

UNIT – II: HEAT

Heat: Specific heat – Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power.
Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Super conductors. Type I and II – Meisner Effect – Helium I and II.

UNIT – III: ELECTRICITY AND MAGNETISM

Electricity: Potentiometer – Principle – Calibration of low range voltmeter – Measurement of internal resistance of cell – measurement of an unknown resistance.

Magnetism – Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer in Tan C position and the vibration magnetometer.

UNIT – IV: SOUND AND ACOUSTICS OF BUILDING

Sound: Transverse vibration of strings – Velocity and frequency of vibrations of a stretched string – laws – sonometer – A.C. Frequency – Steel Wire – Brass wire.

Ultrasonics – Production by Piezo – electric method – properties and uses.
Acoustics of buildings: Reverberation – Reverberation time – Sabine's formula (definition only) – Sound absorption co-efficient of surface – conditions for the perfect acoustics.

UNIT – V: OPTICS

Interference: Air Wedge – Description – Test for optical flatness of glass plate – Determination of diameter of a thin wire by air wedge.

Diffraction: Theory of transmission grating – Normal Incidence – Determination of Wavelength of monochromatic source and Wavelength of mercury line using a grating by normal Incidence.

Fibre optics: principle-classification of optical fibres-fibre optic communication system block diagram.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Introduction to Fibre optics- K.Thyagarajan and Ajay Ghatak,Cambridge,University Press(1999).

ALLIED

PHYSICS II

UNIT – I: WAVE MECHANICS

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

UNIT – II : NUCLEAR PHYSICS

Particle accelerators – cyclotron, particle detectors – GM Counter Artificial Transmutation – Rutherford's Experiment – The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions.

Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy – Conservation of Parity – Quantities conserved and quantities not conserved in a nuclear reaction.

UNIT – III : ENERGY PHYSICS

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

UNIT – IV: CRYSTALLOGRAPHY

Crystallography : The crystal structure – Unit Cell –Bravais lattice- structures of simple cubic-BCC and FCC- co ordination number, packing factor calculation for the above structures –Hexogonal closed packed(HCP) structure -Miller indices – concept of Reciprocal Vectors.

UNIT – V: ELECTRONICS

Electronics: Transistor characteristics in common base and common emitter mode- Transistor single stage amplifier- Expression for input impedence, output impedence and current gain.
Digital Electronics : NAND and NOR as universal building blocks- De Morgan's theorem –statement and proof- Fabrication of diodes and transistors using Monolithic technology– limitations.

Books for Study & Reference

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
9. Introduction to Solid State Physics – C. Kittel, 5^{th} Edition Wiley Eastern Ltd.
10. Renewable & Sustainable energy sources – Agarwal.

ALLIED PRACTICAL

PHYSICS
(Any 15 Experiments)

1. Young's modulus – non uniform bending – pin and microscope.
2. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
3. Ridigity modulus – Torsional oscillation method (without symmetric masses).
4. Determination of Co-efficient of Viscosity – Graduated Burette.
5. Surface Tension and Interfacial Tension – By drop weight method.
6. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
7. Sonometer – Determining A.C. Frequency. (Screw Gauge is given).
8. Sonometer – frequency of tuning fork.
9. Newton's Rings – Radius of Curvature.
10. Air Wedge – Determination of thickness of thin wire.
11. Spectrometer Grating – Minimum Deviation – Mercury Lines.
12. Spectrometer – Refractive Index of a liquid – Hollow Prism.
13. Potentiometer – Calibration of High Range Ammeter.
14. Potentiometer – Calibration of Low Range Voltmeter.
15. Determination of M and B_H using Deflection Magnetometer in Tan C position and vibration magnetometer.
16. Figure of merit and voltage sensitiveness of table galvanometer.
17. Construction of AND, OR gates using diodes and NOT by transistors.
18. Zener diode – Voltage Regulation.
19. NAND / NOR as universal gate.
20. Demorgan's theorem verification.

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THIRUVALLUVAR UNIVERSITY

PART-IV

ENVIRONMENTAL STUDIES

SYLLABUS

(For all UG Degree Courses)

(with effect from 2017-2018)

SEMESTER I

UNIT-I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES :

Environmental Sciences - Relevance - Significance - Public awareness - Forest resources - Water resources - Mineral resources - Food resources - conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies.

UNIT-II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION:

Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem.

Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) and local levels - Hotspots, threats to biodiversity - conservation of biodiversity - Insitu & Exsitu.

UNIT-III: ENVIRONMENTAL POLLUTION AND MANAGEMENT

Environmental Pollution - Causes - Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management - Floods, Earth quake, Cyclone and Land slides. Role of individuals in prevention of pollution - pollution case studies.

UNIT-IV: SOCIAL ISSUES - HUMAN POPULATION

Urban issues - Energy - water conservation - Environmental Ethics - Global warming - Resettlement and Rehabilitation issues - Environmental legislations - Environmental production Act. 1986 - Air, Water, Wildlife and forest conservation Act - Population growth and Explosion - Human rights and Value Education - Environmental Health - HIV/AIDS - Role of IT in Environment and Human Health - Women and child welfare - Public awareness - Case studies.

UNIT-V: FIELD WORK

Visit to a local area / local polluted site / local simple ecosystem - Report submission

REFERENCES

1. KUMARASAMY, K., A.ALAGAPPA MOSES AND M.VASANTHY, 2004. ENVIRONMENTAL STUDIES, BHARATHIDSAN UNIVERSITY PUB, 1, TRICHY

2. RAJAMANNAR, 2004, ENVIRONEMNTAL STUDIES, EVR COLLEGE PUB, TRICHY

3. KALAVATHY,S. (ED.) 2004, ENVIRONMENTAL STUDIES, BISHOP HEBER COLLEGE PUB., TRICHY

THIRUVALLUVAR UNIVERSITY, SERKADU

FOUNDATION ENGLIAH PART II

REVISED SYALLABUS
(w.e.f 2017-2018)

SEMESTER I

UNIT 1-PROSE

1. My greatest Olympic Priize -Jesse Owens
2. The Tree Speaks – Rajagopalachari.C
3. Snake in the Garden – R.K.Narayan
4. Futurology - Aldous Huxley

UNIT 2 -POETRY

1. The River - Parthasarathy
2. Ode to Nightingale – John Keats
3. "O Captain, My Captain - Walt Whitman
4. Paper Boat – Rabindranath Tagore

UNIT 3 -SHORT STORY AND ONE ACT PLAY

1. A Day's Wait – Ernest Miller Hemingway
2. Little Girls Wiser Than Men - Tolstoy

One act play

3. The Bishop's Candlestick – Morman Mckinnel

UNIT- 4 GRAMMAR AND COMPOSITION

1. Correct usage of Words
2. Vocabulary – Synonyms & Antonyms
3. Abbreviations
4. English for Excellence – Parts of Speech -Modern Avenue
5. Functional English: Creative Writing
   College Grammar
   Letter of Application
   Writing a Resume

UNIT-5 COMMUNICATION SKILLS

1. Listening Conversation –(i) Agreeing and Disagreeing..
   (ii) Seeking and giving permission
   (iii) Greetings
   (iv) Introducing Oneself to others

SEMESTER II

UNIT – 1 **PROSE**

1. Ant and Grasshopper - Somerset Maugham
2. Early Influences - A.P.J. Abdul Kalam
3. Forgetting – Robert Lynd
4. The Unity of Indian Culture – Humayan Kabir

UNIT -2 POETRY

1. The Soul's Prayer.- Sarojini Naidu
2. The Lotus - Toru Dutt
3. Nutting – William Wordsworth
4. Ozymandias- P.B.Shelley

UNIT-3 SHORT STORY AND ONE ACT PLAY

4. The Doll's House - Katherine Mansfield
5. Karma - Kushwant Singh

One Act Play

6. Hijack -Charles Wills

UNIT -4 Vocabulary

6. Functional Grammar
7. Functional English

UNIT-5 COMMUNICATION SKILLS

8. Making Request
9. Offering Help
10. Inviting Someone
11. Asking Permission

SEMESTER III

UNIT -1 PROSE

1. The Right to Public Amnesia – Santhosh Desai
2. On saying "Please" – .A.G. Gradiner.
3. With the Photographer – Stephen Leacock
4. Indian Women -Dr.S.Radhakrishnan

UNIT -2 POETRY

1. Time and Love -William Shakespeare
2. Satan's Speech – John Milton
3. Obituary -A.K.Ramunujam
4. The Professor – Nissim Ezekiel

UNIT -3 DRAMA

1. Lady Macbeth soliloquy- Act I scene V
2. Women's Monologue- Antony & Cleopatra Act IV scene ii and Act V scene xiii

BIOGRAPHY

1. Mother Teresa -F.G.Herod

UNIT -4 VOCABULARY

1. Lexical Skills
2. Functional Grammar
3. Functional English

UNIT -5 COMMUNICATION SKILLS

1. Asking for Advice
2. Expressing Gratitude
3. Complementing and Congratulating
4. Complaining

SEMESTER IV

UNIT -1 PROSE

1. What is Courage - J.B.Priestly
2. Travel By Train - J.B.Priestly
3. Nobel Lecture - C.Malala Yousafjai
4. I won"t Let him Go -Mathavan Kutty

UNIT -2 POETRY

1. Stooping by Woods on Snowy Evening – Robert Frost
2. Refugee Mother and Child -Chinua Achebe
3. An Octobere Morning - Jayanta Mahapatra
4. Lyric No.1-XX11 (From Gitanjali) – Rabindranath Tagore

UNIT -3 DRAMA

Selected Scenes from Shakespeare

1. Hamlet (Soliloquy) Act III Scene I
2. Funeral Oration – Julius Caesar Act III Scene II

BIOGRAPHY

1. Rabindranath Tagore – E.M. Carter

UNIT -4 VOCABULARY

1. Lexical Skills
2. Functional Grammar and English Grammar

UNIT -5

1. E-mail
2. Presentation Skills
3. Curriculum Vitae and Covering Letter
4. Facing an Interview

இளநிலைப் பட்டப்படிப்பு

அடித்தளப் படிப்பு : பகுதி - 1 தமிழ்
முதலாமாண்டு - முதற்பருவம்

அலகு - 1 கவிதை

1. பாரதியார் - 1. உறுதிவேண்டும், 2. புதுமைப்பெண்
2. பாரதிதாசன் - புரட்சிக்கவி "பேரன்பு கொண்டவரே" என்ற பாடல் முதல் "கவிஞனுக்கும் காதலிக்கும்" என்ற பாடல் வரை.
3. கவிமணி - ஆசியஜோதி - புத்தரும் ஏழைச் சிறுவனும்
4. கண்ணதாசன் - நீ மணி, நான் ஒலி!
5. கவிஞர் அறிவுமதி - நட்புக் காலம்
6. வைரமுத்து - தமிழுக்கு நிறமுண்டு - கூடு
7. மு. மேத்தா - வாழை மரத்தின் சபதம்
8. செ. அன்னகாமு - நாட்டுப்புறப் பாடல்கள் - தாலாட்டு, ஒப்பாரி
9. அப்துல் ரகுமான் - கனவு நாயகன் - அப்துல் கலாம்

அலகு - 2 உரைநடை

1. உள்ளுணர்வு கனவாக வெளிப்படுகிறது - எம்.எஸ். உதயமூர்த்தி
2. வீழ்ந்த ஆலமரம் - கல்கி
3. ஏழாவது அறிவு (போரின்றி வெற்றி மட்டும்) - வெ. இறையன்பு

அலகு - 3 நாடகம்

1. மாங்கல்யப் பிச்சை - டி.என். சுகி. சுப்பிரமணியம்
2. சாபம் விமோசனம் - மு. இராமசாமி

அலகு - 4 சிறுகதை

1. வளையாத பனைகள் - இரா. நந்தகோபால்
2. ஒரு சிறு இசை - வண்ணதாசன்

அலகு - 5 மொழித்திறன்

1. அகர வரிசைப்படுத்தல்
2. ண-ன-ந, ல-ள-ழ, ர-ற வேறுபாடு அறிதல்
3. தன் விவரக் குறிப்பு தயாரித்தல்
4. கலைச் சொல்லாக்கம்
5. ஒற்றுப்பிழை, தொடர்ப்பிழை நீக்கி எழுதுதல்

இலக்கிய வரலாறு

பாடப்பகுதியை ஒட்டிய இலக்கிய வரலாறு : 20-ஆம் நூற்றாண்டுக் கவிஞர்களும் கவிதைகளும், உரைநடை, நாடகம், சிறுகதை.

இளநிலைப் பட்டப்படிப்பு

அடித்தளப் படிப்பு : பகுதி - 1 தமிழ்
முதலாமாண்டு - இரண்டாம் பருவம்

அலகு - 1

அ. திருஞானசம்பந்தர் - தேவாரம் - திருவீழிமிழலை - வாசிதீரவே (முழுவதும்)

ஆ. மாணிக்கவாசகர் - திருவாசகம் - பிடித்த பத்து (அம்மையே, அருளுடை, ஒப்புனக்கு, பாசவேர், பால்நினைந்து)

இ. திருமூலர் - திருமந்திரம் - (உடம்பினை முன்னம், யாவர்க்குமாம், ஒன்றே குலமும், உள்ளம் பெருங்கோயில், ஆர்க்கும்)

அலகு - 2

அ. ஆண்டாள் - திருப்பாவை (முதல் 5 பாடல்கள்)

ஆ. தொண்டரடிப் பொடியாழ்வார் - திருப்பள்ளியெழுச்சி (முதல் 5 பாடல்கள்)

இ. குலசேகராழ்வார் - பெருமாள் திருமொழி, 4-ஆம் திருமொழி, ஊனேறு செல்வம் ... (முதல் 5 பாடல்கள்)

அலகு - 3

அ. தமிழ்விடுதூது - கண்ணி 69 முதல் 90 வரை

ஆ. திருக்கயிலாய ஞான உலா - 1 முதல் 10 கண்ணிகள் வரை

இ. தஞ்சைவாணன் கோவை - 1 முதல் 5 பாடல்கள்

அலகு - 4

அ. இராமலிங்க அடிகள் - திருவருட்பா - பிள்ளைச் சிறுவிண்ணப்பம்

ஆ. எச்.ஏ. கிருஷ்ணப்பிள்ளை - இரட்சண்ய யாத்திரிகம் - குமாரப்பருவம் - இரட்சணிய சரிதப் படலம்

இ. குணங்குடி மஸ்தான்சாகிபு - மஸ்தான் சாகிபு பாடல்கள் - பராபரக் கண்ணி (1-40 கண்ணிகள்)

ஈ. முத்தொள்ளாயிரம் - 9 பாடல்கள்

அலகு - 5

அ. நேர்காணல்

ஆ. பொதுக்கட்டுரைகள்

இளநிலைப் பட்டப்படிப்பு

அடித்தளப் படிப்பு : பகுதி - 1 தமிழ்

இரண்டாமாண்டு - மூன்றாம் பருவம்

அலகு I **திருக்குறள்**

1. மக்கட்பேறு
2. விருந்தோம்பல்
3. இறைமாட்சி
4. காலமறிதல்
5. நெஞ்சோடு புலத்தல்

அலகு II **சிலப்பதிகாரம்**

மதுரைக்காண்டம் - ஏழாவது காதை
ஆய்ச்சியர் குரவை

மணிமேகலை - பத்தொன்பதாவது காதை
சிறைக்கோட்டம் அறக்கோட்டம் ஆக்கிய காதை.

அலகு III **சீவகசிந்தாமணி**

காந்தருவதத்தையார் இலம்பகம்

கம்பராமாயணம்

கிட்கிந்தா காண்டம் - வாலிவதைப் படலம்

அலகு IV **பெரியபுராணம்** - முதற்காண்டம்
தடுத்தாட்கொண்ட புராணம்

சீறாப்புராணம் - இரண்டாம் காண்டம் -
நுபுவ்வத்துக் காண்டம் - சதைக்கட்டியைப்
பெண்ணுருவமைத்த படலம்

தேம்பாவணி - முதற்காண்டம் - வளன் சனித்த படலம்

அலகு V **மொழித்திறன்**

1. கடிதம் வரைதல்
2. விண்ணப்பம் எழுதுதல்
3. தன் விவரம் எழுதுதல்
4. நிகழ்ச்சி நிரல் (அறிக்கை தயாரித்தல்)

இலக்கிய வரலாறு

பதினெண்கீழ்க்கணக்கு நூல்கள், அற இலக்கியங்கள்,
காப்பிய இலக்கியங்கள்.

இளநிலைப் பட்டப்படிப்பு

அடித்தளப் படிப்பு : பகுதி - 1 தமிழ்

இரண்டாமாண்டு - நான்காம் பருவம்

அலகு I

1. குறுந்தொகை (பாடல்கள் - 7, 8, 58, 94, 103)
2. நற்றிணை (பாடல்கள் - 1, 226, 238, 249, 380)
3. ஐங்குறுநூறு (குரக்குப்பத்து 1-5, சிறுவெண்காக்கைப்பத்து 1-5)

அலகு II

4. புறநானூறு (பாடல்கள் - 10, 18, 206, 212, 278)
5. பதிற்றுப்பத்து (பாடல்கள் - 20, 59)

அலகு III

6. கலித்தொகை (பாடல்கள் - 8, 59, 84, 108, 120)
7. பரிபாடல் திருமால் - 1:36-73
   செவ்வேள் - 5:55-81
   வையை - 6:1-24

அலகு IV

8. பத்துப்பாட்டு - முல்லைப்பாட்டு (முழுவதும்)

அலகு V

9. சங்க இலக்கிய வரலாறு
   (1) எட்டுத்தொகை நூல்கள்
   (2) பத்துப்பாட்டு நூல்கள்

10. மொழிபெயர்ப்பு
    (1) கொடுக்கப்பட்டுள்ள ஆங்கிலப் பகுதியைத் தமிழில் மொழிபெயர்த்தல்.
    (2) அலுவலகக் கடிதம் - தமிழில் மொழி பெயர்த்தல்

THIRUVALLUVAR UNIVERSITY

HUMAN RIGHTS

COMPULSORY PAPER

(For all PG Degree Courses)

(with effect from 2017-2018)

UNIT-I

Definition of Human Rights - Nature, Content, Legitimacy and Priority - Theories on Human Rights - Historical Development of Human Rights.

UNIT-II

International Human Rights - Prescription and Enforcement upto World War II - Human Rights and the U .N .O. - Universal Declaration of Human Rights - International Covenant on Civil and Political Rights - International Convenant on Economic, Social and Cultural Rights and Optional Protocol.

UNIT-III

Human Rights Declarations - U.N. Human Rights Declarations - U.N. Human Commissioner.

UNIT-IV

Amnesty International - Human Rights and Helsinki Process - Regional Developments - European Human Rights System - African Human Rights System - International Human Rights in Domestic courts.

UNIT-V

Contemporary Issues on Human Rights: Children's Rights - Women's Rights -Dalit's Rights - Bonded Labour and Wages - Refugees - Capital Punishment.

Fundamental Rights in the Indian Constitution - Directive Principles of State Policy - Fundamental Duties - National Human Rights Commission.

Books for Reference:

International Bill of Human Rights, Amnesty International Publication, 1988.

Human Rights, Questions and Answers, UNESCO, 1982

Mausice Cranston- What is Human Rights

Desai, A.R. - Violation of Democratic Rights in India

Pandey - Constitutional Law.

Timm. R.W. - Working for Justice and Human Rights.

Human Rights, A Selected Bibliography, USIS.

J.C.Johari - Human Rights and New World Order.

G.S. Bajwa - Human Rights in India.

Amnesty International, Human Rights in India.

P.C.Sinha & - International Encyclopedia of Peace, Security

K. Cheous (Ed) - Social Justice and Human Rights (Vols 1-7).

Devasia, V.V. - Human Rights and Victimology.

Magazines:

The Lawyer, Bombay

Human Rights Today, Columbia University

International Instruments of Human Rights, UN Publication

Human Rights Quarterly, John Hopkins University, U.S.A.

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THIRUVALLUVAR UNIVERSITY

M.A. ENGLISH

SYLLABUS

UNDER CBCS
(with effect from 2017-2018)

Year/ Semester	Subject	Paper	Title of the Paper	Ins. Hrs/ week	Credits	Max. Marks		
						CIA	Uni. Exam	Total
I Year/ I SEMESTER	CORE	1	Chaucer and Elizabethan Literature	6	4	25	75	100
	CORE	2	American Literature	6	4	25	75	100
	CORE	3	Indian Literature in English	6	4	25	75	100
	CORE	4	Modern English Grammar	6	4	25	75	100
	Elective I A		Indian Writing in Translation	6	4	25	75	100
	Elective I B		Classics in World Literature					
	Elective I C		Women's Writing					
				30	20	125	375	500
II SEM	CORE	5	Restoration and Eighteenth Century Literature	5	5	25	75	100
	CORE	6	The Romantic Revival Literature	6	5	25	75	100
	CORE	7	Language and Linguistics	6	5	25	75	100

E S T E R	**CORE**	**8**	**Literary Criticism**	**6**	**5**	**25**	**75**	**100**
	Compulsory Paper		**Human Rights**	**2**	**2**	**25**	**75**	**100**
	Elective II A		**Indian Diaspora Literature**	**5**	**3**	**25**	**75**	**100**
	Elective II B		**Post colonial Studies**					
	Elective II C		**New Literatures in English**					
				30	**25**	**150**	**450**	**600**
III S E M E S T E R	**CORE**	**9**	**Shakespeare Studies**	**6**	**5**	**25**	**75**	**100**
	CORE	**10**	**Victorian Literature**	**6**	**5**	**25**	**75**	**100**
	CORE	**11**	**Contemporary Literary Theory– I**	**6**	**5**	**25**	**75**	**100**
	CORE	**12**	**Research Methodology**	**6**	**4**	**25**	**75**	**100**
	Elective III A		**History of Ideas**	**6**	**3**	**25**	**75**	**100**
	Elective III B		**Literature : Analysis, Approaches and Applications**					
	Elective III C		**Translation Studies**					
				30	**22**	**125**	**375**	**500**
IV S E M E S T E	**CORE**	**13**	**Twentieth Century Literature**	**6**	**5**	**25**	**75**	**100**
	CORE	**14**	**English Language Teaching**	**6**	**5**	**25**	**75**	**100**
	CORE	**15**	**Contemporary Literary Theory–II**	**6**	**5**	**25**	**75**	**100**
	CORE	**16**	**Research Project**	**6**	**5**	**25**	**75**	**100**
	Elective IV A		**Children's Literature**	**6**	**3**	**25**	**75**	**100**

R	**Elective IV B**		**Academic Writing**					
	Elective IV C		**Comprehensive Study of Literature**					
				30	**23**	**125**	**375**	**500**

Subject	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total Marks**
Main	16	4-5	76	100	1600
Elective	4	3	12	100	400
Compulsory Paper	1	2	2	100	100
Total	**21**	**-**	**90**	**-**	**2100**

SEMESTER I

PAPER - 1
CHAUCER AND THE ELIZABETHAN LITERATURE

OBJECTIVES:

- To explore the literary traditions of the Elizabethan period that promoted the indigenization of the European forms such as the sonnet, allegory and the romance poem etc.
- To examine the cultural practices of the age which reflects in the writings and the transition from 11th to the 17th century

UNIT I: POETRY (Detailed)

1. Chaucer : Prologue to the Canterbury Tales: The Knight, The Prioress, The Wife of Bath, The Pardoner, The Monk
2. John Donne : 1.Batter My Heart
   2. Valediction Forbidding Mourning

UNIT II: POETRY (Non-Detailed)

3. Edmund Spenser : Epithalamion
4. Thomas Wyatt : Whoso List to Hunt
5. Earl of Surrey : The Soote Season

UNIT III: PROSE (Detailed)

1. Bacon : Of Truth, of Revenge , Of Friendship, Of Love
2. The Gospel according to St. Mark (MacMillan Annotated Classics)
3. Thomas More : The Utopia – Book I (Non-Detailed)

UNIT IV: DRAMA

1. Thomas Kyd (Detailed) : The Spanish Tragedy

UNIT V: DRAMA (Non-Detailed)

1. Thomas Dekker : The Shoemaker's Holiday
2. Webster : The Duchess of Malfi

BOOKS FOR STUDY AND REFERENCE

1. Fermor, Una Ellis - The Jacobian Drama - London: University Paperback, 1965.
2. Ford, Boris - A guide to English Literature. Vol 1. The Age of Chaucer - London: Penguin, 1961.
3. Grierson H.J.C. - Metaphysical Lyrics and Poems of the Seventeenth Century - Oxford University Press, 1972.
4. Rickert, Edith - Chaucer's World - London: Columbia University Press, 1964.

PAPER - 2

AMERICAN LITERATURE

OBJECTIVES:

- To enable the students to have an overview of major authors who have given significant contributions to the development of American literature.
- The social and political events that have influenced the literary movements can be understood by the study of representative authors

UNIT I: POETRY

(Detailed)

1. Walt Whitman : When the Lilacs last bloom'd
2. Emily Dickinson : I Felt a Funeral in My Brain
3. Robert Frost : Home Burial
4. Adrienne Rich : Diving into the Wreck
5. Elizabeth Bishop : The Fish

(Non-detailed)

1. e.e. Cummings : in Just-
2. Carl Sandburg : Chicago
3. Gwendolyn Brooks : The Mother

UNIT II: PROSE

(Detailed)

1. R.W. Emerson : Self-Reliance
   (Non-detailed)
2. H.D. Thoreau : Walden Where I Lived and What I Lived For

UNIT III: DRAMA

1. Arthur Miller : The Death of a Salesman (Detailed)
2. Edward Albee : The American Dream (Non-detailed)

UNIT IV: SHORT STORIES (Non-detailed)

1. Nathaniel Hawthorne : The Purloined Letter
2. John Updike : The Witness
3. Pearl S. Buck : The Quarrel
4. John Steinbeck : Flight
5. Eudore Welty : Worn Path

UNIT V FICTION (Non-detailed)

1. Ernest Hemingway : The Sun Also Rises
2. Harper Lee : To Kill a Mocking Bird
3. Toni Morrison : The Bluest Eye

BOOKS FOR STUDY AND REFERENCE

1. Donald, Heiney and Lenteil H. Essentials of Contemporary Literature of the Western World, (Vol. 3 & 4). USA: Barron's Educational Series.
2. Gray, Richard. A Brief History of American Literature. UK: Wiley – Blackwell, 2011.
3. Hoffmann, Daniel. ed. Harvard Guide to Contemporary American Writing. London: Oxford University Press, 2004.
4. Massa, Ann. American Literature in Context. London and New York: Methuen & Co. Ltd., 1982.

Web resources

E.E. Cummings -in Just:

1. http://www.english.illinois.edu/maps/poets/a_f/cummings/landles10.html

PAPER - 3

INDIAN LITERATURE IN ENGLISH

OBJECTIVES:

- To help the students appreciate the richness in Indian writing in English.
- To acquaint the students to the eminent Indian writers in English

UNIT I: POETRY

(Detailed)

1. Aurobindo : The Tiger and the Deer
2. Arun Kolatkar : From Jejury: 1.An Old Woman
   2. The Butterfly
3. Rabindranath Tagore : Gitanjali (1-10)
4. Kamala Das : The Old Playhouse

(Non-Detailed)

1. Keki N. Daruvalla : The People
2. Gieve Patel : Servants
3. Adil Jusswala : The Waiters
4. Mamta Kalia : Tribute to Papa

UNIT II: PROSE

(Detailed)

1. Nirad C.Chaudhuri :Autobiography of an Unknown Indian (Book III Education)
2. Ananda Coomarasamy :Dance of Shiva

UNIT III: DRAMA

1. Girish Karnad : Hayavadana (detailed)
2. Mahesh Dattani : Dance Like a Man(Non-detailed)

UNIT IV: SHORT STORIES (Non-Detailed)

1. R.K. Narayan : A Horse and Two Goats
2. Mulk Raj Anand :The Gold Watch
3. V.S. Naipaul : Love, Love, Love Alone
4. Shashi Deshpande : A Wall is Safer
5. Anita Desai : Circus Cat, Alley Cat

UNIT V: FICTION (Non-Detailed)

1. Amitav Ghosh : The Hungry Tide
2. Shashi Tharoor : The Great Indian Novel

BOOKS FOR STUDY AND REFERENCE

1. Karnad, Girish - Collected Plays – Vol. I. New Delhi: Oxford University Press, 2005.
2. Arvind Krishna Mehrotra, ed. - An Illustrated History of Indian Literature in English - New Delhi: Permanent Black, 2003
3. Chakraborty, Kaustav. Indian Drama in English. New Delhi: PHI Learning, 2011.
4. Prasad, Amar Nath and John Peter Joseph. Indian Writing in English. New Delhi: Sarup& Sons, 2006.

PAPER - 4

MODERN ENGLISH GRAMMAR

OBJECTIVES:

- To enable the students to acquire a high proficiency in the use of English
- To enable the students to know the dynamic and analytical aspects of the use of language.

UNIT I: WORDS AND PHRASES

WORDS

Nouns-Pronouns-Adjectives-Determiners-Verbs-Adverbs-Preposition-Conjunctions-Interjections

PHRASES

Noun Phrases-Verb Phrases-Adjective Phrases-Adverb Phrases-Preposition Phrases

WORD FORMATION

Acronyms- Analogy- Back formation- Blending- Borrowing- Clipping- Coining- Compounding- Reduplication- Prefixes and suffixes

UNIT II: SENTENCES AND CLAUSES

THE SENTENCE

Major and minor sentences- Simple and multiple sentences and clauses- Sentence types- Positive and negative sentences- Active and passive sentences

SENTENCE AND CLAUSES

Clause elements -Subject- Predicate -Verb- Object- Complement- Adverbial- Compound and complex sentences- Independent and dependent clauses- Coordination- Subordination- Subordinate clauses- Nominal or noun clause- Adverbial clauses- Relative clauses- Comparative clauses- Finite and non finite clauses- Restrictive and non restrictive clauses- Dangling modifiers- Readability

UNIT III: PUNCTUATION

Apostrophe- Brackets- Capital Letters- Colon- Comma- Dash- Ellipsis- Exclamation mark- Full stop- Hyphen -Paragraph- Question mark- Quotation marks- Semicolon- Slash

UNIT IV: FIGURES OF SPEECH AND LITERARY DEVICES

Allegory -Alliteration- Anacoluthon- Analogy- Anticlimax- Antithesis- Apostrophe- Assonance- Bathos- Catch phrases- Clerihew- Cliché- Colloquialism- Dead Metaphor- Doubles- Epigram- Euphemism- Haiku- Hyperbole- Idiom- Innuendo- Irony- Limerick- Litotes- Malapropism- Meiosis- Metaphor- Metonymy- Metre- Onomatopoeia- Oxymoron- Palindrome- Paradox- Personification- Proverb- Pun- Rhetorical question- Simile- Spoonerism- Syllepsis- Synecdoche- Zeugma.

UNIT V: COMMON ERRORS AND CONFUSIBLES

Exercises for Practice

Prescribed Text:

1. Jarvie, Gordon. Bloomsbury Grammar Guide second Edition, New Delhi.Bloomsbury.2007

Books for Reference:

Eastwood, John. Oxford Guide to English Grammar. India: OPU, 2003.
T.J. Fitikides- Common Mistakes in English - Mumbai, orient Longman,1997
Leech, Geoffrey, Deucher Margeret, Robert Hoogenrad. English Grammar for Today. New York: Palgrave Macmillan, 2011
Palmer, Frank – Grammar - Great Britain: Viney Ltd, 1978

Palmer, Richard. The Good Grammar Guide. London: Routledge, 2005.

ELECTIVE PAPER 1 A

INDIAN WRITING IN TRANSLATION

OBJECTIVES:

- To acquaint the students to the recent translated works from Indian languages to English.
- To appreciate the native literary richness and also to connect and critically respond to the Socio- Cultural reality of India.

UNIT I: POETRY

Kalidasa	: Meghadutam
Mirabai	:I sing for him Joyfully
Amir Khusrau	:Colour me in Colours of Love
Akka Mahadevi	:1. Sunlight Made Visible 2.Show Me Your Way Out 3.O Lord, White As Jasmine 4.How Can You Be Modest 5.Don't Despise Me

UNIT II: PROSE

Meenakshi Mukherjee	: The Anxiety of Indianness Divided by a Common Language

UNIT III: DRAMA

Bhasa	: Urubhangam (The Shattered Thigh)
Indira Parthasarathy	: Nandhan Kathai (Tr. C.T.Indira)

UNIT IV: SHORT STORY

Khushwant Singh	: A Punjab Pastorale
Pudumai Pithan	: The Human Machine
Mahaswetha Devi	: Draupadi
Mahim Bora	: Kathanibarighat

UNIT V: FICTION

U.R. Anandamurthy	:Samskara
Prem Chand	: Godaan
Thakazhi Sivasankara Pillai	: Chemmeen

BOOKS FOR STUDY AND REFERENCE

Mukherjee, Meenakshi - The Perishable Empire - UK: Oxford University Press, 2004.

Sivasankari - Knit India Through Literature – Vol. II & III. Chennai: East West Books Pvt. Ltd, 2004.

Arvind Krishna Mehrotra, ed. - An Illustrated History of Indian Literature in English - New Delhi: Permanent Black, 2003

Kumar, Dilip. D. - Contemporary Tamil Short Fiction - Madras: Manas East West Books, 2005.

Web sources

1.Songs of Kabir Tr by Rabindranath Tagore:
<http://www.sacred-texts.com/hin/sok/index.htm>
Mahim Bora*Kathanibarighat:*
https://indianreview.in/fiction/kathanibarighat-mahim-bora-assamese-short-stories-translated-lalit-saikia/

ELECTIVE PAPER 1 B
CLASSICS IN WORLD LITERATURE

OBJECTIVES:

- To help the students imbibe classical education through translation from the rich source of cultural heritage
- To acquire the knowledge of great literary traditions due to their strong influence on British and American literature

UNIT I: POETRY

Homer : Odyssey Book XI - XII

Thiruvalluvar : Thirukkural Book – Selections

PART I VIRTUE

1.1.4. Assertion of the Strength of Virtue 31- 40

PART II WEALTH:

2.1.5 The Possession of Knowledge 421- 430

PART III. LOVE: 3.2.10. Soliloquy 1241 -50

UNIT II: POETRY

Dante : The Inferno (Canto III)
Omar Khayyam : Rubaiyat I - XXV (Tr. Edward Fitzgerald)
Kahlil Gibran : The Prophet

UNIT III: PROSE

Vyasa : Mahabharatha (retold by C.Rajagopalachari)
Valmiki : Ramayana (retold by R.K.Narayan)

UNIT IV: DRAMA

Sophocles : Oedipus Rex
Anton Chekov : The Cherry Orchard

UNIT V: FICTION

Albert Camus : The Outsider
Herman Hesse : Siddhartha

BOOKS FOR STUDY AND REFERENCE

Homer. The Odyssey, Trans. George Chapman. London: Wordsworth Classics. 2002.

Bloom, Harold. The Rubaiyat of Omar Khayyam. India: Viva Books, 2007.

Croally, Neil and Roy Hyde. Classical Literature. London: Routledge Publications, 2011.

Fischer, Carl - The Myth and Legend of Greece – Geo A, Pflaum, Publisher, Inc, 1968.

Kirk, G.S. The Nature of the Greek Myths. Great Britain: Penguin Books, 1982.

Web sources

Tirukural -<www.**projectmadurai**.**org**/pm_etexts/pdf/pm0153.pdf>

Mahabharatha (retold by C.Rajagopalachari):
<http://www.gita-society.com/section3/mahabharata.pdf>

ELECTIVE PAPER 1 C
WOMEN'S WRITING

UNIT I: POETRY

Sylvia Plath	: Lady Lazarus
E.B. Browning	: A Man's Requirements
Maya Angelou	: Phenomenal Woman
Imtiaz Dharker	: Another Woman

UNIT II: PROSE

Padmini Sen Gupta	: The Position of Women in Ancient India
Vandana Shiva	: Ecofeminism: Masculinization of the Motherland

UNIT III: DRAMA

Caryl Churchill	: Top Girls
Morsha Norman	: night' Mother

UNIT IV: SHORT STORY

Joyce Carol Oates	: The White Cat
Flannery O'Connor	: A Good Man is Hard to Find
Katherine Mansfield	: The Doll House
C. S. Lakshmi	: A Deer in the forest

UNIT V: FICTION

Arundhati Roy	: The God of Small things
Margaret Atwood	: Surfacing
Manju Kapur	: Difficult Daughters

BOOKS FOR STUDY AND REFERENCE

Gilbert, Sandra and Susan Gubar. *The Mad Woman in the Attic: The Woman Writer and the Nineteenth Century Literary Imagination.* Yale : Yale Nota Bene, 2000.

Eagleton, Mary Ed. *Feminist Literary Theory: A Reader.* 2nd edition. Blackwell Publishers: UK, 1994.

Jaidka, Manju. *From Slant to Straight: Recent Trends in Women's Poetry.* New Delhi: Prestige Books, 2000.

Web sources

Encycolpedia of Feminist Literary Theory:

http://www.tandfebooks.com.iproxy.inflibnet.ac.in:2048/action/showBook?doi=10.4324/97802038744

SEMESTER II

PAPER – 5

RESTORATION AND EIGHTEENTH CENTURY LITERATURE

OBJECTIVE:

- To survey the emergence of new models of poetry and drama in this period of high ideals combined with wit and language
- To study the broadening of the literary civilization that included more of the middle class.

UNIT – I: POETRY (Detailed)

John Milton : Paradise Lost Book IX (Lines 48 – 191)
The Sun was sunk, and after him the Starr …
Disturbd not, waiting close th' approach of Morn.

Andrew Marvell : To His Coy Mistress

POETRY (Non-detailed)

Alexander Pope : The Essay On Man: Epistle II (II. 1 - 92)
("Know then thyself….Our greatest evil or great good")

William Cowper : The Castaway

UNIT II – PROSE (Detailed)

Jonathan Swift : The Battle of the Books (Para 10 – 14)
(Things were at this crisis, when a material accident fell out... thus furnishing man-kind with the two noblest of things, which are sweetness and light.)

PROSE (Non-detailed)

Addison and Steele : The Coverley Papers:
1. Sir Roger at the Theatre
2. Sir Roger at Home

UNIT – III: DRAMA (Detailed)

John Dryden : All for Love

UNIT – IV: DRAMA (Non-detailed)

Richard Sheridan : The School for Scandal
Congreve : The Way of the World

UNIT – V: FICTION(Non-detailed)

Daniel Defoe : Robinson Crusoe
Henry Fielding : Tom Jones

BOOKS FOR STUDY AND REFERENCE

Sanders, Andrews. English Literature. India: OUP, 2011.
Tillyard, E.M. Milton. London: Chatto&Windus Ltd, 1966.
Clifford L., James. Ed. Eighteenth Century English Literature. London: OUP, 1977.
Dobree, Bonamy and Wilson F. P. ed. English Literature. London: OUP, 1963.

PAPER – 6

THE ROMANTIC REVIVAL LITERATURE

OBJECTIVES:

- To provide an overview of the transformation of the literary climate where the romantic sensibility finds an authentic voice, touch and intensity.

- To enable the students to appreciate the reformed literary style of the representative writers of the period.

UNIT – I: POETRY (Detailed)

William Wordsworth	: Immortality ode
S.T. Coleridge	: Kubla Khan
P.B. Shelley	: Ode to the West Wind
John Keats	: Ode to a Nightingale

UNIT – II: POETRY (Non-detailed)

William Morris	: Haystack in the Floods
Lord Bryon	: Don Juan - Canto X

UNIT – III: PROSE (Detailed)

Charles Lamb	: From Essays of Elia: 1.Dream Children: A Reverie 2.Old China
Hazlitt	: My First Acquaintance with Poets

UNIT – IV: DRAMA (Non-detailed)

Shelley	: Prometheus Unbound

UNIT – V: FICTION (Non-detailed)

Walter Scott	: Kenilworth
Charlotte Bronte	: Jane Eyre
Jane Austen	: Northanger Abbey

BOOKS FOR STUDY AND REFERENCE

Raymond Wilson Ed., *A Coleridge Selection*. London: Macmillan Ltd., 1988.
Edmund Blunden Ed., *The Poems of John Keats.* New Delhi: Rupa Publication, 2000.
Geoffrey Durant *William Wordsworth* — Cambridge: Cambridge University Press, 1969.
Kelvin Everest, *John Keats* — New Delhi: Atlantic Publication, 2002.

PAPER – 7

LANGUAGE AND LINGUISTICS

OBJECTIVES:

- To enhance the basic knowledge of the structure of English and the theoretical background to phonetics and English Phonology.
- To introduce the students to basic concepts in morphology, syntax, semantics and pragmatics.
- To equip the students with the knowledge of applications of linguistics.

UNIT – I: THE HISTORY OF ENGLISH LANGUAGE

The descent of English language; Old English Period; Middle English; Renaissance & After; Growth of Vocabulary; Change of Meaning; Evolution of Standard English.

From Wood F.T. *An Outline History of the English Language.* Madras.Macmillan, 2001

UNIT – II: PHONOLOGY

Air stream mechanisms - The organs of speech – Classification and description of sounds, Cardinal Vowels, English Vowels, Diphthongs and Consonants, Transcription, Syllable

UNIT – III: PHONOLOGY

Accent, Rhythm and Intonation, Assimilation, Elision, Liaison and Juncture,
Phonetic transcription of dialogues

Connor, J.D.O.', *Better English Pronunciation*. Cambridge : Cambridge University Press, 1980.

Balasubramanian – A Textbook of English Phonetics for Indian Students. Madras Macmillan, 1993.

UNIT – IV: LEVELS OF LINGUISTIC ANALYSIS

Morphology, Phrases Sentence, Grammar, phrases, semantics, Pragmatics, Discourse Analysis

From Geroge Yule.*The Study of Language* Second Edition Cambridge University Press, 1996

UNIT – V

(A) Sociolinguistics

Language varieties, language, society and culture
From George Yule.*The Study of Language* Second Ed. CUP, 1996)

(B) TG Grammar - IC Analysis
From Grammar 3rd edition by Frank Palmer. Penguin

(C) Applications of Linguistics

Verma and Krishnaswamy :Modern Linguistics (Units 42 – 45).

BOOKS FOR STUDY AND REFERENCE

Connor, J.D.O.', *Better English Pronunciation*. Cambridge : Cambridge University Press, 1980.

Wood F.T., *An Outline History of the English Language.* Madras : Macmillan, 2001

Balasubramanian – A textbook of English Phonetics for Indian Students – Madras Macmillan, 1993.

Finch, Geoffrey – Language and Linguistics: An Introduction – Macmillan, 2000

Jones, Daniel – The Pronunciation of English – New Delhi: Universal Book Stall & Cambridge University Press, 1992.

Krishnaswamy N,. S.K. Verma – Modern Linguistics – New Delhi: Oxford University Press, 1989.

Yule, George.*The Study of Language*. Cambridge University Press, 1985.

Web sources

The History of Teaching English as a Foreign Language, from a British and European Perspective A. P. R. Howatt & Richard Smith
http://www.tandfonline.com/doi/pdf/10.1179/1759753614Z.00000000028?needAccess=true

PAPER – 8
LITERARY CRITICISM

OBJECTIVES:

- To examine the representative texts of the seminal literary critics to understand intrinsic and extrinsic criticism.
- To expose the students to the concepts of the historical perceptions over the centuries.

UNIT – I

Introduction to Classical Literary Criticism- Plato, Aristotle, Horace and Longinus
From Nagarajan M.S. – English Literary Criticism and Theory – Hyderabad: Orient Longman, 2006

UNIT – II

Bharatamuni : From Natya and Rasa – Aesthetics of Dramatic Experience
Anandavardhana : Dhvani: Structure of Poetic Meaning from the Dhvanyloka

From Indian Literary Criticism: Theory and Interpretation ed. G.N. Devy, Orient Longman, Hyderabad.

UNIT – III

Wordsworth : Preface to the Lyrical Ballads (Selection)
Alexander Pope : An Essay on Criticism – lines 233 -415
(A perfect Judge will read each work…That in proud dullness joins with Quality)

UNIT – IV

Mathew Arnold : The Study of Poetry
D.H. Lawrence : Why the Novel Matters
William Empson : Seventh Type of Ambiguity

UNIT-V

Northrop Frye : Archetypes of Literature
Roland Barthes : The Death of the Author

BOOKS FOR STUDY AND REFERENCE

Nagarajan M.S. – English Literary Criticism and Theory – Hyderabad: Orient Longman, 2006

Das and Kumar, Bijay - Twentieth Century Literary Criticism -Atlantic Publishers,

Habib, M. A. R. *A History of Literary Criticism*. Black Publishing, USA. 2006

... *Modern Literary Criticism and Theory*. Blackwell Publishing, New Delhi. 2008.

Lodge, David, ed. Modern Criticism and Theory - II edition, New Delhi: Pearson Education, 1998.

Ramaswami and Seturaman V.S. ed. - The English Critical Tradition**:** An Anthologyof English Literary Criticism**:** Vol. 1. - Macmillian, 1986.

Seturaman, ed. – Indian Aesthetics:An Introduction-New Delhi: Macmillan, 2005

ELECTIVE PAPER 2 A

INDIAN DIASPORA LITERATURE

OBJECTIVES:

- To acquaint students with a knowledge of Indian Diaspora writers and their works.
- To help the students have a broad outlook on diaspora literature and to make them understand and estimate the diverse paths, the Indian culture has taken in the era of multiculturalism.

UNIT I: POETRY

Sujata Bhatt	: A Different History
R. Parthasarathy	: Exile, Trial, Homecoming
A. K. Ramanujan	: Relations: Of Mothers, Love Poem for a Wife, Farewells
Meena Alexander	: I Root My Name

UNIT II: DRAMA

Manjula Padmanabhan	: Harvest

UNIT III: ESSAY

Amitav Ghosh	: The Diaspora in Indian Culture
Salman Rushdie	: Imaginary Homelands

UNIT IV: SHORT STORY

V.S.Naipaul	: The Enemy
JhumpaLahiri	: Interpreter of Maladies
Amit Chaudhuri	: Portrait of an Artist
Shauna Singh Baldwin	: English Lessons

UNIT V: FICTION

Kiran Desai	: The Inheritance of Loss
Gita Hariharan	: The Ghosts of Vasumaster
Bharathi Mukherjee	: Jasmine

BOOKS FOR STUDY AND REFERENCE

Bandyopadhyay, Pranab, ed. - Women Poets of India: An Anthology of Indian Poetry - Calcutta: United Writers, 1977.

Batra, Shakti - Modern Indian Literature: Poems and Short Stories: A Critical Study - Delhi: Surjeet Publications, 2006.

De Souza, Eunice, ed. - Nine Indian Women Poets: An Anthology – New Delhi: Oxford University Press, 1997.

King, Bruce - Modern Indian Poetry in English – New Delhi: Oxford University Press, 1987.

Kurup P.K.J. - Contemporary Indian Poetry in English - New Delhi: Atlantic Publishers, 1991.

Arvind Krishna Mehrotra, ed. - An Illustrated History of Indian Literature in English - New Delhi: Permanent Black, 2003..

M.C. Leod A.L.- Commonwealth and American Women's Discourse: Essays in Criticism - New Delhi: Sterling Publishers, 1996.

Mukherjee, Bharati - Indian English Novelists: An Anthology of Critical Essays.

Peeradina, Saleem - Contemporary Indian Poetry in English

Rao Ramakrishna, Adapa and Sivaram Krishna M. - When East meets West: Indian Thought in Anglo Indian and Indo English Fiction

Balachandran,Dr.K-critical Essays on Diasporic Writings-Arise Publishers& Distributers,2008.

ELECTIVE PAPER 2 B

ELECTIVE IIB: POSTCOLONIAL STUDIES

OBJECTIVES:

- To introduce the political and socio-cultural discourse of the developing countries through the study of key authors and poets who cherished the native culture.
- To trace the historical contents laying emphasis on the development of post-colonial literatures and theory.

UNIT I: POETRY

1. P.K. Page : Autumn
2. David Rubadri : An African Thunderstorm
3. Derek Walcott : The Fortunate Traveller
4. Gabriel Okara : The Mystic Drum
5. J.P. Clark : The Casualties

UNIT II: DRAMA

1. Athol Fugard : Sizwe Bansi is Dead
2. Gurucharan Das : Larins Sahib

UNIT III:PROSE I

1. Meenaksi Mukherjee : Interrogating Post Colonialism
2. Bill Ashcroft, Gareth Griffiths and Helen Tiffin : The Empire Writes Back (Introduction)

UNIT IV:PROSE II

1. Homi K. Bhabha : The Location of Culture
2. Ngugi wa Thiong'O : From Decolonising the mind
   I was born …in the lives of Kenyan children

UNIT V: FICTION

1. Salman Rushdie : Midnight's Children
2. Monica Ali : Brick Lane
3. Michael Ondatjje : The English Patient
4. Caryl Phillips : Crossing the River

BOOKS FOR STUDY AND REFERENCE

Das, Gurucharan. Three Enlish Plays. New Delhi: Oxford University Press, 2001.

Ashcroft, Bill. Gareth Griffiths and Helen Tiffin. The EmpireWrites Back. London: Metheun, 1987.

Bhabha, Homi K. The Location of Culture: New York: Routledge 2012.

Contemporary Indian Poetry in English: Ed. By Saleem Peeradina

Ashcroft, Bill, Garreth Griffiths and Helen Tiffin - The Empire Writes Back - London and New York: Roultedge, 1989.

Narasimiah C.D. Anthology of Commonwealth Poetry. Macmillan

Abraham, Taisha. Introducing Postcolonial Theories. New Delhi: Macmillan Publishers India, 2007.

King, Bruce - New National and Postcolonial Literatures - Clarendon Paperbacks.

Nasta, Susheila. Writing Across Worlds. London: Routledge Taylor & Francis Group, 2004.

Patke, Rajeev S. Postcolonial Poetry in English. New Delhi: OUP,2006.

Sarangi, Jaydeep and Binod Mishra. Explorations in Australian Literature. India: Sarup & Sons, 2006

ELECTIVE PAPER 2 C

ELECTIVE IIC: NEW LITERATURES IN ENGLISH

OBJECTIVES:

To introduce to the students the New Literatures apart from the 'traditional' English literature and instill a critical reflection of the colonial experience.

To acquaint students to the literatures introduced in the second half of the twentieth - century and to analyse the characteristics of self-constituted identity and independence in the aftermath of colonialism.

UNIT-I: POETRY

1. Pablo Neruda : Fully Empowered
2. A.D.Hope : Lamp
3. F.R.Scott : The Canadian Authors' Meet
4. Judith Wright : Woman to Man

UNIT–II: PROSE

1. Frantz Fanon : The wretched of the earth:

   Reciprocal Bases of National Culture and the Fight for Freedom
2. Milan Kundra :The Art of the Novel- The Depricated Legacy of the Cervantes (Yet I think…..one is outraged.)

UNIT-III: DRAMA

Lorraine Hansberry : A Raisin in the Sun

UNIT-IV: SHORT STORIES

1. Jorge Luis Borges : Death and the Compass
2. Carlos Fuentes : The Doll Queen
3. Octavio Paz : The Blue Bouquet
4. Gabriel Garca Marquez : Balthazar’s Marvellous Afternoon

UNIT - V: FICTION

1. Amy Tan	: The Joy Luck Club
2. Nayomi Munaweera	: Island of a Thousand Mirrors
3. Chimamanda Ngozi Adichie	: Half of a Yellow Sun
4. Yann Martel	: Life of Pi
5. Orhan Pamuk	: My Name is Red

BOOKS FOR STUDY AND REFERENCE

Kundra, Milan. *The Art of the Novel.* New York: Penguin Books & Faber & Faber, 1986.

Habib M.A.R. Literary criticism from Plato to the Present. An Introduction". U.K. Wiley – Blackwell Publication, 2011.

Ryan, Michael.Literary Theory: A Practical Introduction. Australia: Blackwell Publishing, 2007.

Wyrick, Deborah. Fanon for Beginners. India: Orient. Black Swan, 2008.

Tandon, Neeru; Edt. Feminine psyche: A Post – Modern Critique. New Delhi: Atlantic Publishers, 2008.

Lennard, John. The Poetry Handbook. New York: Oxford, 2005.

Web sources

Frantz Fanon https://www.marxists.org/subject/africa/fanon/national-culture.htm

SEMESTER III

PAPER - 9
SHAKESPEARE STUDIES

OBJECTIVES:

- To enable the students to read the plays in the light of the critical approaches that has emerged prominent.
- To study the plays of Shakespeare in the critical, textual, and theatrical contexts.

UNIT – I: A Midsummer Night's Dream (Detailed)

UNIT – II: Hamlet (Detailed)

UNIT – III: Henry IV Part I (Non-Detailed)

UNIT – IV: Antony and Cleopatra (Non-Detailed)

UNIT – V: Critical Interpretations of Shakespeare's Plays (Non-Detailed)

Structuralism : Roland Barthes – Mythic Signs in Mankiewicz's *Julius Caesar*

Pscholoanalysis : Ernest Jones – Reading the Oedipus Complex in *Hamlet*

Marxism : Karl Marx – *Timon of Athens* and the Power of Money

Feminism : Virginia Woolf - Shakespeare and the Question of Female Authorship

Postcolonial Theory : Wole Soyinka – Antony and Cleopatra by Shakespeare

From Jonathan Gil Harris, *Shakespeare and Theory.* New York: Oxford University Press, 2012.

BOOKS FOR STUDY AND REFERENCE

Dover Wilson, *What Happens in Hamlet.* London: Cambridge University, 1974.
Jonathan Gil Harris, *Shakespeare and Theory.* New York: Oxford University Press, 2012.
Ania Loomba, *Shakespeare, Race and Colonization.* New York: Oxford University Press 2012.
John Russell Prown, *Shakespeare's Antony and Cleopatra.* London: Macmillan Press Ltd., 1977.
Diana Henderson Ed. *Alternative Shakespeare 3.* Oxford: Routledge Abington, 2008.
A.C. Bradley, *Shakespeare Tragedy.* New Delhi: Atlantic Publishers and Distributers Pvt. Ltd., 2010.
Robin Lee, *Shakespeare'sAntony and Cleopatra – Studies in English Literature.* London: Edward Arnold, 1984.

PAPER -10

THE VICTORIAN LITERATURE

OBJECTIVES:

- To study Victorian Literature in the background of the changing views, improvements in technology and the poor conditions of the working class people.

- To analyse Victorian literature as an art that encouraged higher good as righteous and instilled social consciousness.

UNIT – I: POETRY
(Detailed)

1. Mathew Arnold : Dover Beach
2. Alfred Tennyson : Tithonus
3. Robert Browning : My Last Duchess
4. G.M.Hopkins : The Wind Hover

(Non-Detailed)

1. Christina Rossetti : Goblin Market
2. E. B. Browning : Sonnet from the Portuguese: No 14: If thou must love me

UNIT – II: PROSE (Detailed)

Thomas Carlyle : Hero and Hero Worship: Hero as a Poet

UNIT – III: DRAMA (Detailed)

Oscar Wilde : The Importance of Being Earnest

UNIT – IV: FICTION (Non-Detailed)

1. George Eliot : The Mill on the Floss
2. Thomas Hardy : Tess of the D'ubervilles

UNIT – V: FICTION (Non-Detailed)

1. Charles Dickens : David Copperfield
2. Horace Walpole : The Castle of Otronto

BOOKS FOR STUDY AND REFERENCE

1. Charles Lamb, *Essays of Elia*. Bombay: Macmillan, 1895.
2. Charles Dickens, *Oliver Twist*. London: Thomas Nelson & Soni Ltd, 1958.
1. *Critical Essays on the poetry of Tennyson*, Ed by John Killbam, Roritledge & Kegan Paul. London: 1960.
2. Geoffrey H. Hastman, *Hopkins: A Collection of Critical Essays*, Ed by. New Delhi: Prentice-Hall of India Pvt Ltd., 1980.
3. Andrew H. Wright, *Jane Austen's Novels*. A Peregrine Book, Middlesex: Penguin Books Ltd., 1953.
4. Rod Mengham, *Charles Dickens.* New Delhi: Atlantic Publishers, 2001.
5. R.T. Jones, *British Authors, Introductory Critical Studies, George Eliot.* London: Cambridge University Press, 1970.
6. Lance St. John Butler, *Studying Thomas Hardy*. Essex: Longman York Press – 1986.

PAPER – 11

CONTEMPORARY LITERARY THEORY - I

OBJECTIVES:

- To help the students understand literary theory as a system to critically interpret literary texts.
- To enable the students to understand the broad spectrum of thought that is covered by literary theory and also to enhance their literary research.

UNIT I: Introduction

Literary theorising from Aristotle to Leavis - The transition to 'theory'- recurrent ideas in critical theory

Structuralism Structuralism Critical Terms: Signifier, Signified, Langue, Parole, Semiotics.

The scope of structuralism - Structuralist criticism: examples

Unit II: **Stylistics**
Rhetoric to philology - The ambitions of Stylistics - Stylistics: examples

Narratology
Telling stories – Aristotle – Vladimir Propp – Gerard Genette - – Narratology: an example

UNIT III: Post structuralism and deconstruction

Post structuralism and deconstruction: Decentring, Aporia, Difference, Impasse, Binary Opposition.

Theoretical differences between Structuralism and Post-structuralism
Post-structuralism - life on a decentred planet - Structuralism and post-structuralism-practical differences - Deconstruction: an example

UNIT IV: Psychoanalytic criticism

Psychoanalysis Critical Terms: Unconscious, Repression, Sublimation, Ego, Super-ego, Id, Oedipus Complex, Libido, Phallic, Eros, Thanato, Transference, Projection, Defence Mechanism, Screen Memory, Paraprascis, Displacement, Condensation.

Introduction - How Freudian interpretation works - Freud and evidence
Freudian psychoanalytic criticism: examples
Lacan - Lacanian criticism: an example

UNIT V: Feminist Criticism

Feminism Critical Terms: Feminist, Female, Feminine, Gynocriticism, Chora.

Feminism and feminist criticism - Feminist criticism and the role of theory
Feminist criticism: an example

Prescribed Text

Barry, Peter. *Beginning Theory.* Manchester and New York: Manchester University Press, 2002.

BOOKS FOR STUDY AND REFERENCE

Hawkes, Terence. *Srtucturalism and Semiotics.* London and New York: Roultedge, 1977.

Holquist, Michael. *Dialogism.* London and New York: Roultedge, 1990.

Allen, Graham. *Roland Barthes.* London and New York: Roultedge, 2003.

Belsey, Catherine. *Critical Practice.* London and New York: Roultedge, 1980.

Bennett, Tony. *Formalism and Marxism.* London and New York: Roultedge, 1979.

Bertens, Hans. *Literary Theory: the Basics.* London: Routledge, 2001.

Culler, Jonathan Barthes. *A Very Short Introduction.* New York: OUP, 2002.

Fillingham, Lydia Alix and Moushe Susser. *Foucault for Beginners.* India: Orient Longman, 2000.

Iyengar, Srinivasa K.R. *The Adventure of Criticism*. New Delhi: Sterling Publishers, 1985.

Krishnaswamy N. John Varghese and Sunita Mishra. *Contemporary literary Theory: A Student's Companion.* New Delhi: Macmillan, 2001

Hawthorn, Jeremy. A Glossary of Contemporary Literary Theory. Fourth Edition. UK. Hodder Education,2000.

PAPER – 12

RESEARCH METHODOLOGY

OBJECTIVES:

- To facilitate students to gain knowledge to pursue research.
- To enable students to present the research findings through the application of systematic and scientific methods.

Unit I
Selecting a Topic - Compiling a Working Bibliography –Evaluating Sources

Unit II
Taking Notes – Outlining – Writing Drafts – Language and Style -Plagiarism

Unit III
The Mechanics of Writing -The Format of Research Paper –Documentation

Unit IV
Documentation: Citing sources in the text: Parenthetical Documentation and the List of Works Cited

Unit V
Abbreviations: Common Scholarly Abbreviations and Reference words – Symbols and Abbreviations Used in Proofreading and correction –Common Correction Symbols and Abbreviations – Titles of works

Prescribed Text

Gibaldi, Joseph - *M.L.A: Handbook for Writers of Research Papers, 7th Edition* . New Delhi: Affiliated East-West Press Pvt. Ltd., 2003.

Essential reading:

W.R.Owens - Planning , Writing and Presenting a dissertation or Thesis
From DaSousa, Delia Correa and W.R.Owens. *The Handbook to Literary Research*, second Edition. Routledge: Taylor and Francis Group, The Open University Abingdon-Oxon. 2010.

Gabriele Griffin – Research Skills, Methods, and Methodologies (Pg 5 - 7)
From Gabriele Griffin. *Research Methods for English Studies: An Introduction*. UK: Edinburgh University Press, 2005.

BOOKS FOR STUDY AND REFERENCE

George. Watson. *Writing a Thesis: A Guide to Long Essays and Dissertations*. London and New York: Longman, 1987.

Gabriele Griffin. *Research Methods for English Studies: An Introduction*. UK: Edinburgh University Press, 2005.

DaSousa, Delia Correa and W.R.Owens. *The Handbook to Literary Research*, second Edition. Routledge: Taylor and Francis Group, The Open University Abingdon-Oxon. 2010.

Anderson, Janathan, Berry H. Durston and Millicent Poole. *Thesis and Assignment Writing.* New York: Wiley Eastern Limited, 1988.

Kumar, Anand Raju.*American British and Commonwealth*. Chennai: Affiliated East-West Press Ltd, 1990.

Eliot Simon ed. *A Hand Book to Literary Research.* London: Routledge, 1998.

Fabb Nigel and Durant Allan. *How to Write Essays Theses Dissertations in Literary Studies*. London: Longman Publishing, 1993.

Goring Paul. *Studying Literature: The Essential Companion. UK:* Hodder education, 2001.

ELECTIVE PAPER 3 A

HISTORY OF IDEAS

OBJECTIVES:

- To encourages scholarship at the intersection of cultural and intellectual histories of philosophy, of literature and the arts, of the natural and social sciences, of religion, and of political thought.
- To encourage diverse methodological approaches in critical interpretation

UNIT I: ANCIENT

Plato : Republic – 2

Aristotle : On Poetics – Description of Tragedy

UNIT II:

MEDIEVAL

St. Augustine : Confessions –Ch X

SEVENTEENTH CENTURY

John Locke : An Essay Concerning Human Understanding- Introduction

UNIT III: EIGHTEENTH CENTURY

Rousseau : The Social Contract or Principles of Political Right – Book I

Mary Wollstonecraft : A Vindication of the Rights of Woman with Strictures on Political and Moral Subjects

UNIT IV: NINETEENTH CENTURY

Darwin : Survival of the Fittest (Chapter IV)

Marx : The Communist Manifesto – Chapter II

UNIT V: TWENTIETH CENTURY

Sigmund Freud : The Structure of the Unconscious

Simone de Beauvoir : The Second Sex-Introduction

S. Radhakrishnan : Introduction to the Principal *Upanishad*s

BOOKS FOR STUDY AND REFERENCE

Annas, Julia. *Plato, A Very Short Introduction*. New Delhi: Oxford University Press, 2006.

Shields, Christopher. *Aristotle*. Oxon: Routledge, 2007.

Lewens, Tim. *Darwin.* Oxon: Routledge, 2007.

Darwin, Charles. *The Origin of Species.* New Delhi: Peacock Books, 2012.

Dent, Nicholas. *Rousseau*. Oxon: Routledge, 2005.

Stevensen, Leslie & David L. Haberman. *Ten Theories of Human Nature.* Fourth Edition. New Delhi: Oxford University Press, 2006.

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ELECTIVE PAPER 3 B

LITERATURE: ANALYSIS, APPROACHES AND APPLICATIONS

OBJECTIVES:

- To develop the reading and writing skills of the students for professional and academic purposes.
- To enhance the interpretation skills of the students to critically analyse and appreciate literary texts.

UNIT I **Practical Criticism**

Literary Analysis: Interpretation of passages of prose and poetry. Such questions may involve recognition of conventions and genres, allusions and references, meaning and tone, grammatical structures and rhetorical strategies, and literary techniques.

Reference: Stephen, Martin. *English literature*. New York: Longman, 1986.

V.S.Seturaman,C.T.Indira, T.Sriraman. Practical criticism. India, Macmillan.1999.

UNIT II **(a) Book Publication**

ISBN – The International Standard Book Number
ISSN – The International Standard Serial Number
Foreword – Preface

(b) Copy editing

Introduction to copy- editing- making the typescript - Copyright Permission and acknowledgement- making corrections- House Style- Abbreviation - Bias and Parochialism – Capitalization - Cross- References - Dates and Time- Italic - Proper Names – Punctuation – Spelling - Miscellaneous Points - Preliminary Pages

From Butcher,Judith, Drake Caroline, and Leach ,Maurice. *Butcher's Copy-editing: The Cambridge Handbook for Editors,Copy-editorsand Proof readers.*

UNIT III **Journalism and Mass Communication**

Report Writing, Book Review, Film Review and Proofreading

Reference: Mukhopadhyay, Lina *et al. Polyskills: A Course in Communication Skills and Life Skills*. Chennai and New Delhi: Foundation Books CUP, 2012.

UNIT IV Technical Writing

User's Manual, Technical Letters, Flow Charts, Tablets, Writing Instruction

Reference: Pauley, Steven E. and Daniel, G.Riordan. *Technical Report Writing.* New Delhi: A.I.T.B.S. Publishers and Distributors, 2006.

UNIT V Theoretical Approaches to Literature

1. Text-Oriented Approaches
   Philology- Rhetoric and Stylistics - Formalism and Structuralism
   New Criticism- Semiotics and Deconstruction
2. Author-Oriented Approaches
3. Reader-Oriented Approaches
4. Context-Oriented Approaches - New historicism - Feminist literary theory and gender theory
5. Literary Critique or Evaluation

From Theoretical Approaches - Klarer, Mario. An Introduction to Literary Studies. Theoritical Approaches to Literature (pg71-96)

BOOKS FOR STUDY AND REFERENCE

Butcher,Judith,Drake Caroline, And Leach ,Maurice. *Butcher's Copy-editing: The Cambridge Handbook for Editors,Copy-editorsand Proof readers*. Fourth Edition Cambridge University Press, 2007

Stephen, Martin. *English literature*. New York: Longman, 1986.

Klarer, Mario. *An Introduction to Literary Studies*. London: Routledge, 2004.

Leech, Geoffrey, Margaret Deuchar and Robert Hoogenraad. *English Grammar for Today*. New York: Palgrave Macmillan, 2011.

Gerson, Sharon. J. and Steven M. Gerson. *Technical Writing: Process and Product* - III edition. New Delhi: Pearson Education Inc., 2005.

Pauley, Steven E. and Daniel, G.Riordan. *Technical Report Writing.* New Delhi: A.I.T.B.S. Publishers and Distributors, 2006.

ELECTIVE PAPER 3 C
TRANSLATION STUDIES

OBJECTIVES:

- To help the students understand how translation shapes the knowledge of the world in the past and better equips to shape the future
- To understand better the emphasis in cultural aspects and the context within which translation occurs

UNIT I: CENTRAL ISSUES

Language and Culture – Types of Translation – Decoding and Recoding – Problems of Equivalence – Loss and Gain – Untranslatability

From Bassnett, Susan - *Translation Studies,* 3rd Edition – Routledge, New Delhi, 2005.

UNIT II: HISTORY OF TRANSLATION – THEORY I

Problems of "Period Study" – Bible Translation – Education and the Vernacular – Early Theorists – Archaizing

From Bassnett, Susan - *Translation Studies,* 3rd Edition – Routledge, New Delhi, 2005.

UNIT III: HISTORY OF TRANSLATION – THEORY II

The Renaissance – The Seventeenth and the Eighteenth Century – Romanticism and Post Romanticism – The Victorian – The Twentieth Century

From Bassnett, Susan - *Translation Studies,* 3rd Edition – Routledge, New Delhi, 2005.

UNIT IV: COMPARATIVE STUDY OF TRANSLATION

A.K. Ramanujan : On Translating a Tamil Poem

A.K. Ramanujan : Three Hundred Ramayanas: Five Examples and Three Thoughts on Translation

From Dharwadker, Vinay (Ed). *The Collected Essays of A.K. Ramanujan.* New Delhi: Oxford University Press, 2004.

UNIT V: TRANSLATION IN PRACTICE

A field work on any one of the topics given below has to be undertaken by the students to attempt a translation of the same for **internal assessment.**

- Oral stories, songs and traditions of the village
- History of the local or town temple or masque or churches- worship places.
- History of the monuments in the village or town
- Family History
- Life of the ancestors in the village or town
- The origin of the name of the village /town
- Great personalities of the past and present who lived in the village/town
- Extraordinary Historical event.
- The development of the village or town
- The description of special occupation of the village or town
- Typical village festival, its origin and the celebrations.
- The natural treatment and cure of the diseases.
- The Landscape, details of the source of water.
- Food habits of the village or town.
- Inscriptions

BOOKS FOR STUDY AND REFERENCE

Bassnett, Susan and Harish, Trivedi. *Post-Colonial Translation: Theory Practice.* London and New York: Routledge, 1999.

Kumar, Bijay Das. *A Handbook of Translation Studies.* New Delhi: Atlantic Publishers and Distributors, 2005.

Seturaman, ed. *Indian Aesthetics: An Introduction*. New Delhi: Macmillan, 2005.

Mukherjee Sujit. *Translation as Recovery*. Delhi: Pencraft International.

SEMESTER IV

PAPER –13
TWENTIETH CENTURY LITERATURE

OBJECTIVES:

- To help the students to retrace the diversity of the literary schools of this period which were more liberal in outlook and scientific in technique
- To introduce students to the thoroughly competent and literate authors in the traditional mode, who were creatively original

UNIT – I: POETRY (Detailed)

1. W. B .Yeats : Easter 1916
2. T. S Eliot : The Wasteland
3. Wilfred Owen : Anthem of Doomed Youth

POETRY (Non - Detailed)

1. Seamus Heaney : Digging
2. Thom Gunn : On the Move
3. Stephen Spender : The Labourer in the Vineyard
4. Ted Hughes : Crow Alights

UNIT – II: PROSE (Detailed)

1. E.M. Forster : What I Believe
2. C. P. Snow : Two Cultures

UNIT – III: DRAMA
(Detailed)
Beckett : Waiting For Godot
(**Non-Detailed)**
Harold Pinter : The Birthday Party

UNIT – IV: SHORT STORY
1. James Joyce : After the Race
2. Joseph Conrad : The Secret Sharer
3. Sir Arthur Conan Doyle : A Scandal in Bohemia
4. Margaret Drabble : A Day in the Life of the Smiling Woman

UNIT – V: FICTION
1. Graham Greene : The Power and the Glory
2. D. H. Lawrence : Sons and Lovers

BOOKS FOR STUDY AND REFERENCE

A.J. Wilks, *T.S. Eliot : The Waste Land Macmillan Critical Commentaries*. London: Macmillan Education Ltd, 1971.

Harold Bloom Ed, *Samuel Beckett's Waiting for Godot: Viva Modern Critical Interpretations.* New Delhi: First Indian Edition, 2007.

Morries Beja, A. E. Dyson Ed. *James Joyce : Dubliners and A portrait of the Artist as a Young man: A selection of critical essay*s, 1st ed. London: The Macmillan Press Ltd, 1973.

Gamini Salgado, A. E. Dyson Ed., *D.H. Lawrence Sons and Lovers: A selection of Critical Essays.* London: The Macmillan Press Ltd, 1973.

R.D. Draper, *Sons and Lovers by D.H. Lawrence Macmillan Master Guides.* New York: Palgrave Macmillan, 1986.

PAPER – 14
ENGLISH LANGUAGE TEACHING

- To equip students to teach efficiently well at the secondary and tertiary level.
- To train them in the use of new methodologies in teaching English.

UNIT I: History of ELT

The brief history of Language Teaching

English in India – Past, Present and Future

UNIT II: Approaches and Methods

Communicative Language Teaching Method - Total Physical Response -The Silent Way

The nature of Human language – Linguistics, Psychology and English Teaching– Methods – Approach, Method and Technique

UNIT III: Grammar and LSRW Skills

Essential Word – Grammar for teachers – Teaching of vocabulary – Essentials of English Grammar -The Teaching of Grammar – Essentials of English speech – Teaching spoken English: Some Techniques– Reading and Teaching of Reading -Writing and teaching of writing and composition

UNIT IV: Teaching Literature

Teaching Prose – Teaching Poetry – Teaching Drama – Teaching Fiction

UNIT V: Teaching Tools and Assessment

Use of Blackboard and Other Instructional Aids– Study skills and reference skills - Test and Testing– Common Errors and remedial English – Planning and lesson planning

BOOKS FOR STUDY AND REFERENCE

Jack.C.Richards, Theodore.S.Rodgers, *Approaches and Methods in Language Teaching.* UK: Cambridge University Press, 2001.

Martin Parrot, *Tasks for Language Teaching.* New Delhi:CUP, 1993.

Penny Ur, *A Course in Language Teaching: Trainee Book.* UK: First Asian Edition, 1999.

Jerry S. Gabbard and Robert Oporandy, *Language Teaching Awareness.* Chennai: OBS, 2009.

Michael.J.Wallace, *Training Foreign Language Teachers.* New Delhi: CUP, 1991.

Jack C. Richards and Willy A. Renandya ed., *Methodology in Language Teaching: An Anthology of Current Practice.* New Delhi: CUP, 2000.

N. Krishnaswamy and Lalitha Krishnaswamy, *Methods of Teaching English.* Chennai: Macmillan, 2011.

Mario Rinvolucri, *Grammar Games: Cognitive, Affective and Drama Activities for EFL Students.* UK: CUP, 1984.

David Nunan, *Research Methods in Language Learning.* New Delhi: CUP, 1992.

Penny Ur, *A Course in Language Teaching: Practice and Theory.* UK: CUP, 1991.

E. Suresh Kumar and P. Sreehari, *A Handbook for English Language Laboratories.* New Delhi: CUP India Pvt Ltd, 2007.

A. P.R. Howatt and H. G. Widdowson, *A History of English Language Teaching.* New York: OUP, 2004.

S. Kudchekar Ed, *Readings in English Language Teaching in India.* Chennai: Orient Black Swan, 2005.

Penny Ur and Andrew Wright, *Five-Minute Activities: A Resource Book for Language Teachers.* New York: CUP, 1992.

PAPER – 15
CONTEMPORARY LITERARY THEORY – II

Unit I: Marxist Criticism
Marxist Critical terms: Communism, Materialist, Alienation, Reification, Over determinism, Relative Autonomy, Engelsian, Interpellation.

Beginnings and basics of Marxism - Marxist literary criticism
The Present : the influences of Althusser - Marxist criticism: an example

Unit II: New Historicism and Cultural Materialism
New Historicism Critical Terms: Parallel, Thrice-processed**,** Discursive**.**

New historicism - New and old historicisms- differences - New historicism and Foucault - New historicism: an example
Cultural materialism - Cultural materialism: an example

Unit III: Postcolonial Criticism
Postcolonial Criticism Critical Terms: Orientalism, Adept, Adapt.

Background - Postcolonial reading - Postcolonial criticism: an Example

Ecocriticism Critical Terms: Entropy, Symbiosis.
Culture and nature - Ecocriticism: an example.

UNIT IV:Postmodernism
Postmodernism Critical Terms: Narcisssism, Meta narrative, Eclectic, Aleatory, Avant-garde, Simulacrum, Simultion.

Postmodernism (pg 78 -90).

Unit V: Theory after 'Theory'
Theory after 'Theory' Critical Terms: Routinise, Crisis Critique, Presentism, Aestheticism, Affective Fallacy, Congnoscere, Deviance.

Theory after 'Theory' (Pg 287-316)

BOOKS FOR STUDY AND REFERENCE

Bennett, Tony. *Formalism and Marxism.* London and New York: Roultedge, 1979.
Belsey, Catherine. *Critical Practice.* London and New York: Roultedge, 1980.
Bennett, Tony. *Formalism and Marxism.* London and New York: Roultedge, 1979.
Bertens, Hans. *Literary Theory: the Basics.* London: Routledge, 2001.
Culler, Jonathan Barthes. *A Very Short Introduction.* New York: OUP, 2002.
Powell, Jim. *Postmodernism*. Chennai: Orient Longman, 1998
Dobie, Ann B. *Theory into Practise: An Introduction to Literary Criticism*. New Delhi: Cengage Learning, 2012.
Guerin Wilfred L., Earle Labour et al. *A Handbook of Critical Approaches to Literature*. New York: OUP, 1999.

PAPER – 24
RESEARCH PROJECT

Objectives:

- To provide an opportunity for the students to pursue a topic of individual interest to usher into research
- To develop in the students the ability to carry out research projects within a methodological framework through extensive personal study and individual guidance.

Preliminary Requirements:

- Knowledge of the types of Research, Deductive and Inductive Arguments, Critical Approach, Research ethics, Bibliography.
- The research work must be strictly an individual sincere work, the result of ardent study and pursuit of excellence. The work should not exceed 10,000 words and there will be viva- voce by an examiner.
- This module gives the opportunity to undertake supervised work on a dissertation in Literature or English Language Teaching up to 10,000 words, on a topic of one's choice agreed with the Guide/supervisor.
- **It is strongly recommended that the student must be motivated to begin the Preliminary reading and survey of related secondary sources for the dissertation in the first summer term and vacation holidays.**
- The students can be encouraged to present papers in the conferences and to publish in the proposed topic.

Essential Reading

a) Where And How To Find Secondary Literature

b) How to Write a Scholarly Paper

From *An Introduction to Literary Studies*- Mario Klarer Pub. London, Routledge. 2004

c)The Undergraduate Dissertation

From *In Pursuit of English Studies*.Barry,Peter.New Delhi, Bloomsbury.2014

d) Gupta, Suman.The place of theory in literary disciplines

From DaSousa, Delia Correa and W.R.Owens. *The Handbook to Literary Research*, second Edition. Routledge: Taylor and Francis Group, The Open University Abingdon-Oxon. 2010.

Web sources

MLA 7th Edition Quick reference

sites.psu.edu/bee11/wp-content/uploads/sites/16010/.../**MLA**-April-2010-rev1.pdf

ELECTIVE PAPER 4 A
CHILDREN'S LITERATURE

OBJECTIVES:

- To enable the students to evaluate the literary qualities and the popular appeal of Children's Literature
- To help the students to explore the category of Children's Literature and its impact on children

UNIT I: POETRY

William Wordsworth	: To the Cuckoo
Edward Lear	: The Owl and the Pussy Cat
Theodore Roethke	: My Papa's Waltz
Coventry Patmore	: Toys

UNIT II: PROSE

Jawaharlal Nehru	: Letters from a Father to his Daughter: The Book of Nature
Shoba De	: Speed Post:1. Circle of Love 2. Growing up is hard to do

UNIT III: DRAMA

Rabindranth Tagore	: The Post Office

UNIT IV: SHORT STORY

Panchatantra Stories	**:** 1.The Greedy Cobra and the King of Frogs 2. The Story of the Potter 3. The Carpenter's Wife
Hans Anderson	: The Little Mermaid
Richard Burton	: Alibaba and the Forty Thieves
Ruskin Bond	: The Tiger in the Tunnel

UNIT V: FICTION

C.S. Lewis	: The Tale of Narnia : The Lion, The Witch and The Wardrobe
Rudyard Kipling	: The Jungle Book
Roald Dahl	: Matilda

BOOKS FOR STUDY AND REFERENCE

Tiwari, Shubha – Children and Literature – New Delhi: Atlantic Publishers and Distributors, 2006

Winbott S.E. – English Poetry for the Young – Blackie and Sons.

Hans Anderson – Hans Anderson Fairy Tales: India: Wilco Publishing House, 2005.

Nehru, Jawaharlal. Letter from a Father to His Daughter. India: Puffin Books, 2004.

ELECTIVE PAPER 4 B
ACADEMIC WRITING

OBJECTIVES:

- To develop the reading and writing skills for personal and academic purpose.
- To enhance the interpretative ability to critically analyse and appreciate literary texts

UNIT I
Writing a Summary and Response
Writing Practice: Identifying arguments – Summarizing - Forming and expressing a point of view
Editing focus: Paraphrasing - Subject-verb agreement

UNIT II
A) **Writing a Descriptive Essay**
Reading: *Cherries for My Grandma* by Geoffery Canada
Writing practice: Analyzing essay organization - Writing detailed examples as support - Using a summary as an introduction
Editing focus: Adjective clauses - Habitual past: *would* vs. *used to*

B) **Writing a Classification Essay**
Reading: *Some Reflections on the Technology of Eating* (from *The New York Time*)
Writing practice: Determining an organizing principle for categorization - Categorizing and avoiding overlapping - Developing conclusions for classification essays
Editing focus: Pronoun referents

UNIT III
Writing an Advantages–and–Disadvantages Essay
Reading: *You've Got Inappropriate Mail* (from *The New York Time*)
Writing practice: Summarizing and incorporating academic research as support Responding to a quote- More on using a summary as an introduction Using the conclusion to unit an essay
Editing focus: Bibliographies or "Works Cited" lists - Citations for online references - Citations within a text

UNIT IV
A) **Writing a Cause –and-Effect Essay**

Reading: Excerpt from *The Face of Beauty* by Diane Ackerman
Writing practice: Developing different types of support - Writing up research studies Showing cause and effect - Outlining an essay

Editing focus: Adverbial clauses - Causal connectors - Reported speech

B) **Writing a Comparison–and-Contrast Essay**

Reading: "A Holistic Approach to Personality Analysis. The Myers-Briggs Type Indicator"
Writing practice: Developing introductions - Assessing the value of a theory
Editing focus: Clauses for comparison, contrast and concession - Transitional expressions between sentences

UNIT V

A) **Writing a Literary Analysis Essay**
Reading: Excerpt from *The Kite Runner*, by Khaled Hosseini
Writing practice: Analyzing mood - Summarizing a story - Understanding plot devices - Writing about symbols - Organizing an introduction for a literary analysis essay Integrating quotes with text - Integrating simile, metaphor, and personification
Editing focus: Present and past unreal conditions

B) **Writing an Argumentative Essay**
Reading: *Students Shall Not Download. Yeah, Sure.* (from *The New York Time*)
Writing practice: Identifying arguments and counterarguments -Refuting an argument - Organizing an argumentative essay - Synthesizing information to form arguments
Editing focus: Unstated conditionals - Noun clauses

Prescribed Text

Colonna, Mary and Gilbert, Judith. Reason to Write**.** Oxford: Oxford University Press, 2006.• Print.

BOOKS FOR STUDY AND REFERENCE

Bailey, Stephen. Academic Writing:A Handbook for International Students. USA and Canada: Routledge Third edition.2011

Savage, Alice., Effective Academic Writing: Developing Ideas Oxford: Oxford University Press, 2012. Print.

Savage, Alice and Shafiei, Masoud. Effective Academic Writing: The Paragraph. Oxford: Oxford University Press, 2012. Print.

ELECTIVE PAPER 4 C

COMPREHENSIVE STUDY OF LITERATURE

OBJECTIVES:

- To test the student's level of knowledge in the chosen field of study as a whole and to evaluate their mastery.
- To ensure acquisition of a complete knowledge of the coursework and to enable the students to qualify eligibility and competitive examinations

Note for Instructors: This paper covers the entire course undergone by the student through the four semesters. There need not be a formal instruction. The faculty members of the department can offer special lectures and guidance for the preparation on the topics given. The students can be assisted with practice sessions consisting of seminars, assignments and tests.
The final examination objective type questions will cover the whole syllabus of the four semesters. The students can be internally assessed through model tests from the UGC – NET, SET and TRB. Refer to GRE tests.

Methods for study:

- Review names of important writers and their works from each literary period
- Review main characters
- Summarize plots
- Analyze significant themes and conflicts
- Review introductions to each of the following period, genres, movements and categories:

  - British Drama from *Everyman* to the Present Day
  - Twentieth-Century American Drama
  - Indian and Commonwealth Drama
  - Elizabethan and Nineteenth-Century British Fiction
  - The Twentieth-Century American Novel
  - The Indian and Commonwealth Novel
  - British poetry from Chaucer to the Romantics
  - Victorian Poetry
  - Twentieth-Century Poetry
  - Nineteenth and Twentieth-Century American Poetry
  - Commonwealth and Indian Poetry
  - Elizabethan and Nineteenth-Century British Fiction

- The Reflective Essay from Bacon to the Twentieth century
- The British Periodical Essay
- The Satirical Essay
- Literary Theory and Criticism
- Rhetoric and Prosody
- Indian Literature in Translation
- Indian Writing in English
- American and other Non-British Literatures
- European Literature From Classical Age To The 20th Century
- English as a World Language
- Characteristics of Indian English
- Teaching of Indian English at the Tertiary level

Unit I: Ideas, Periods and Movements

Identify the following genres or literary movements, with examples of important works and authors, the eras in which they flourished, the characteristic features and social or intellectual developments that may have shaped the genre or movement:

Aesthetic Movement – Augustan – Elizabethan – Enlightenment -Expressionism Fin de Sicele - Harlem Renaissance – Humanism – Imagism – Impressionism – Jacobean - Magical Realism Modernism – Naturalism – Neoclassicism – Neoplatonism – Platonism – Postmodernism - Pre-Raphaelitism Realism – Reformation – Renaissance – Restoration – Romanticism – Sentimentalism - Surrealism
Symbolist movement – Transcendentalism - Victorian

Note: Unit II, III, IV- Refer to the following terms and how each operates to create meaning in literary works from specific examples of texts and authors. In general, explore a range of functions or issues.

Unit II: Poetry

Accent or beat - Accentual-Syllabic Verse - Accentual Verse – Alexandrine – Anapestic – Alliteration – Ballad - Stanza - Blank Verse – Caesura - Carpe Diem - Confessional Poetry – Dactylic - Dramatic Monologue– Eclogue – Elegy – Enjambment – Epic - Feminine or Double Rhyme – Foot - Free Verse - Heroic Couplet – Hexameter – Iambic - Internal Rhyme - Incremental Repetition – Lyric - Metaphysical Poetry– Ode (nondramatic) – Pastoral – Pentameter – Quatrain – Refrain – Rhyme - Rhyme Scheme – Rhythm - Slant Rhyme - Sonnet (English v.

Italian Forms) - Spenserian Stanza – Spondaic – Stanza - Syllabic Verse – Tercet - Terza Rima – Tetrameter – Trochaic - Verse

Unit III: Drama

Aside – Catharsis – Chorus - Closet Drama – Comedy - Comedy of Humors - Comedy of Manners -Deus ex machina - Dramatic Irony – Epilogue – Farce – Hamartia – Masque – Melodrama – Mime - Morality Play - Mystery Cycle - New Comedy (Greek) - Ode (Greek drama) - Old Comedy (Greek) – Prologue – Protagonist Sentimental Comedy – Soliloquy - Stock Character - Strophe/Antistrophe – Tragedy - Tragicomedy– Unities

Unit IV: Fiction

Bildungsroman - Episodic plot - Epistolary Novel - First Person - Flat Character - Focalizing -Frame Tale - Free Indirect Style or Discourse - Gothic Novel - Interior Monologue – Metafiction – Narrator - Novel of Manners – Omniscient - Picaresque Novel – Plot - Point of View – Polyglossia - Romance (narrative) - Round Character - Stream of Consciousness - Third Person - Unreliable Narrator

(A) Rhetoric & Style

Allusions – Anticlimax – Antithesis – Aphorism – Apostrophe – Bathos – Epic – Epigram – Ethos – Hyperbole - Logos – Metaphor – Metonymy - Mock Heroic – Onomatopoeia – Oxymoron – Paradox – Pathos – Persona – Personification – Rhetoric - Rhetorical Appeal – Satire - Simile and Epic Simile - Symbol

(B)Literary Theory and critical Terms

Archetype - Author Function – Canon – Conventions – Deconstruction – Dialogic – Discourse - Feminist Criticism - Genre – Grotesque – Hermeneutics - Hybridity (postcolonial) - Intentional Fallacy – Intertextuality – Irony - Marxist Criticism – Metanarrative – Mimesis – Myth – Narratology - New Criticism - New Historicism– Orientalism - Pathetic Fallacy – Parody – Pastiche – Postcolonial – Poststructuralism – Psychoalytical Criticism - Queer Theory - Reader-Response Criticism – Semiotics - Signifier/Signified – Simulacra - Speech Act Theory - Structuralism – Subaltern - Verisimilitude

Unit V: History of English Language - English Language Teaching

HISTORY OF THE ENGLISH LANGUAGE

Origin of Language - Place of English in the Indo-European family - General Characteristics of Old and Middle English - The rise and growth of Modern English - Growth of vocabulary– Greek, Latin, French, Italian, Scandinavian and other

foreign influences – Word Formation - Change of Meaning - The Makers of English - The Bible, Spenser, Shakespeare, Milton and Dr.Johnson - American English - Indian English - Characteristics of Modern English - Spelling Reform - The English Lexicon.

LINGUISTICS

Definitions – The Nature and Scope of linguistics, Speech and Writing - Form and Meaning - Words, Clause and Phrase – Concord Government– Sentence Pattern – Phonology – Morphology - Idiolect - Dialect - Transformational Generative Grammar.

ENGLISH LANGUAGE TEACHING

The brief history of Language Teaching - English in India – Past, Present and Future

Approaches and Methods of English Language Teaching

Communicative Language Teaching Method - Total Physical Response – The Silent Way

The nature of Human language – Linguistics, Psychology and English Teaching

Outline of Examination:

- The test consists of approximately 75 objective questions on poetry, drama, biography, the essay, the short story, the novel, criticism, literary theory and the history of the language. The questions may be classified into two groups: factual and analytical.
- The analytical questions test the ability to read a literary text perceptively to answer questions about meaning, form and structure, literary techniques, and various aspects of language.
- The Examination is based on literature in English from the British Isles, the United States and other parts of the world. It also contains a few questions on works, translated from other languages.
- The Examination calls attention to authors, works, genres and movements. The factual questions may require a student to identify characteristics of literary or critical movements, to assign a literary work to the period in which it was written, to identify a writer or work described in a brief critical comment, or to determine the period or author of a work on the basis of the style and content of a short excerpt.

BOOKS FOR STUDY AND REFERENCE

Albert, Edward. A History of English Literature. Oxford: Oxford University Press, 1979.Print.

Chowdhury, Aditi and Rita Goswami. A History of English Literature: Traversing the Centuries. Hyderabad: Orient Blackswan, 2014. Print.

Daiches, David. A Critical History of English Literature. London: Secker & Warburg, 1960. Print.

Sanders, Andrew. The Short Oxford History of English Literature. Oxford, UK: Oxford University Press, 1994. Print

A. P.R. Howatt and H. G. Widdowson, *A History of English Language Teaching.* New York: OUP, 2004.

Jack.C.Richards, Theodore.S.Rodgers, *Approaches and Methods in Language Teaching.* UK: Cambridge University Press, 2001.

Bertens, Hans. *Literary Theory: the Basics.* London: Routledge, 2001.

Barry, Peter. *Beginning Theory.* Manchester and New York: Manchester University Press, 2002.

Wood F.T., *An Outline History of the English Language.* Madras : Macmillan, 2001

Yule, George.*The Study of Language*. Cambridge University Press, 1985.

Web sources

http://english.columbia.edu/graduate/orals-reading-list#Medieval

THIRUVALLUVAR UNIVERSITY

MASTER OF COMMERCE

UNDER CBCS

(with effect from 2017-2018)

The Course of Study and the Scheme of Examination

S.NO.	Study Components / Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I						**CIA**	**Uni. Exam**	**Total**
1	MAIN	Paper-1	6	5	Advanced Financial Management	25	75	100
2	MAIN	Paper-2	6	5	Accounting for Managerial Decisions	25	75	100
3	MAIN	Paper-3	6	4	Global Marketing	25	75	100
4	MAIN	Paper-4	6	4	Advanced Business Statistics	25	75	100
5	ELECTIVE	Paper-1	6	3	(to choose 1 out of 3) A. Managerial Economics B. Computer Applications in Business C. Insurance and Risk Management	25	75	100
			30	**21**		**125**	**375**	**500**
SEMESTER II						**CIA**	**Uni. Exam**	**Total**
6	MAIN	Paper-5	6	5	Corporate Laws	25	75	100
7	MAIN	Paper-6	6	5	Human Resource Management	25	75	100
8	MAIN	Paper-7	5	4	Advanced Accounts	25	75	100
9	MAIN	Paper-8	5	4	Quantitative Techniques for Business Decisions	25	75	100
10	**Compulsory Paper**		2	2	**Human Rights**	25	75	100
11	ELECTIVE	Paper-2	6	3	(to choose 1 out of 3) A. Retail Management B. E -Commerce C. Bank Management	25	75	100
			30	**23**		**150**	**450**	**600**
SEMESTER III						**CIA**	**Uni. Exam**	**Total**
12	MAIN	Paper-9	6	5	General Service Tax (GST)	25	75	100
13	MAIN	Paper-10	6	5	Organizational Behavior	25	75	100
14	MAIN	Paper-11	6	5	Advanced Cost Accounting	25	75	100
15	MAIN	Paper-12	6	5	Research Methodology	25	75	100

16	ELECTIVE	Paper-3	6	3	(to choose 1 out of 3) A. Financial Service B. Computer and office management C. Services Marketing	25	75	100
			30	**23**		**125**	**375**	**500**
SEMESTER IV						**CIA**	**Uni. Exam**	**Total**
17	MAIN	Paper-13	6	5	Direct Taxes	25	75	100
18	MAIN	Paper-14	6	5	Investment Management	25	75	100
		Project/Dissertation * with *viva voce* (or)	12	10		50	150	200
19	MAIN	Paper-15	6	5	Project Development	25	75	100
20	MAIN	Paper-16	6	5	Marketing Research	25	75	100
21	ELECTIVE	Paper-4	6	3	(to choose 1 out of 3) A. Business Environment and Policy B. Introduction to Information Technology C. Sales and Advertising Management	25	75	100
			30	**23**		**125**	**375**	**500**

Subject	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total marks**
MAIN	16	4-5	76	100	1600
ELECTIVE	4	3	12	100	400
COMPULSORY PAPER	1	2	2	100	100
Total	**21**	**-**	**90**	**-**	**2100**

* Students have to choose either Project / Dissertation with *viva voce* or Paper-15 and Paper-16 instead of Project / Dissertation.

Project/Dissertation with viva voce:

Maximum Marks 200 Passing Minimum 100 marks

DISSERTATION : 150 Marks

Viva voce : 50 Marks

There will be a Project / Dissertation during the fourth Semester in lien of theory papers. Teachers may be assigned students based on the total strength of staff and students of the Department. Care should be taken to see that equal no of students are allotted for work assignment among the teachers concerned.

Duration of the Project / Dissertation - IV Semester - December to April

The general regulations will apply for project / dissertation exam / valuation.

There will not be Practicals for the Computer related papers offered as Electives under various groups in the respective Semesters. These Subjects may be handled by the teachers working in the Commerce Department of the affiliated Colleges.

THIRUVALLUVAR UNIVERSITY

MASTER OF COMMERCE

SYLLABUS

UNDER CBCS

(with effect from 2017-2018)

SEMESTER I

PAPER - 1

ADVANCED FINANCIAL MANAGEMENT

UNIT-I

Financial Management - Functions - Goals of Financial Management - Maximization Vs. optimizations - Risk-return trade off.

UNIT-II

Management of funds - Long term sources - shares and Debentures - Convertible securities and Term Loans - Working Capital financing - Sources and approaches- Bank credit-Basic principles and methods of assessment- Other sources of short term finance-Operating environment of working capital

UNIT-III

Capital structure planning: Concepts of cost of capital - cost of equity, debt, retained earning - Weighted average cost of capital - Capital structure theories - Net income, Net operating income, MM and Traditional Theories - Leverage - Types and significance. Dividend policy and practices - Dividend policies - Factors affecting dividend decision - Dividend theories - Graham, Gordon, Walter and MM Theories.

UNIT-IV

Management of fixed assets - Evaluation of capital investment decision: Payback period - ARR - IRR - NPV - CAPM.

UNIT-V

Working capital management-working capital cycle-forecasting of working capital requirements - Factors influencing working capital-Management of inventory, cash and accounts receivables-payables management-credit and collection policies.

Note: The proportion between Theory and Problems shall be 40:60

Reference Books

1. I M Pandey, Financial Management, Vikas Publishing House Pvt Ltd.
2. John H Hampton, Financial Decision Making, Prentice Hall of India Ltd.
3. Prasanna Chandra, Financial Management, Tata McGraw Hill Publishing Company Limited.
4. M.Y.Khan and P.K.Jain, Financial Management, Tata McGraw Hill Publishing Company Limited.
5. P.V.Ratnam, Financial Management Theory, Problems and Solutions, Kitab Mahal.

PAPER - 2

ACCOUNTING FOR MANAGERIAL DECISIONS

UNIT-I

Accounting for Decision making - Scope and Importance - Decision Accounting vs. Financial Accounting and Cost Accounting.

UNIT-II

Financial and Investment analysis - Analysis and Interpretation - Ratio Analysis-Leverage analysis-Budgeting and budgetary control - Functional Budgets- Master Budget - Flexible budgeting - Zero Base Budgeting-

UNIT-III

Understanding Financial statements-Construction and analysis of profit and loss account and balance sheet-Construction and analysis of Fund flow and cash flow statements.

UNIT-IV

Cost Management- Absorption and Marginal Costing - Cost - volume-profit analysis-Applications and techniques.

UNIT-V

Financial decisions-capital structure-dividend decisions (only simple problems).

Note: 80% of the total marks be allotted for problems and 20% for theory

Prescribed Text Book

Management Accounting and Financial Control - S.N.Maheswari, Sultan Chand & sons, New Delhi

Reference books

1. Management Accounting - Man Mohan and Goyal.
2. Management Accounting - Hingorani and Ramanathan.
3. Management Accounting - Charles Horngren.
4. Management Accounting - J.Batty.

PAPER - 3

GLOBAL MARKETING

UNIT-I

Global Marketing - Scope - Importance - Global vs. National Marketing - Global Marketing Environment - Social - Cultural - Political - Legal and Regulatory Environments.

UNIT-II

International infrastructure for global trade promotion - GATT/ WTO - Export Promotion Councils - Services Institutions - IIFT - NCTI - ECGC - EXIM Bank - Export Promotion Council - Directorate General of Shipping - Global pricing - Objectives and Strategies.

UNIT-III

Global Customers - Segmentation, Targeting and Positioning - Global Product Positioning - Product life Cycle in Global Marketing - Global pricing - Objectives and Strategies.

UNIT-IV

Global Marketing Channels and Physical Distribution - Channel Objectives and Constraints - Channel Strategy - Physical Distribution and Logistics - Global Advertising and Branding - Global Promotion.

UNIT-V

Global Trade Procedure - Export Documentation - Processing of Export Procedure - Payment terms and conditions - Letter of Credit - Pre-shipment and Post Shipment finance - Forfeiting - Buyers Credit - Global Trade Assistance.

Reference books

1. Varshney, R.L. and Bhattacharya B: International Marketing Management, Sultan Chand and Sons, New Delhi.
2. Warnen J.Keegan: Global Marketing Management, Prentice Hall of India, New Delhi.
3. Cherian and Jacob: Export Marketing, Himalaya Publishing House, Mumbai.
4. Duby V.K.: Export Marketing, Common Wealth Publishers, New Delhi

PAPER - 4

ADVANCED BUSINESS STATISTICS

Objective

To apply statistical techniques for interpreting and drawing conclusion for business problems.

UNIT-I

Partial correlation-Partial correlation coefficient-Partial correlation in case of four variables- Multiple correlation-Multiple regression.

UNIT-II

Theory of probability-probability rules-Bayes theorem-Probability distribution-Characteristics and application of Binomial, poission and normal distribution

UNIT-III

Sampling- sampling methods- sampling error and standard error- relationship between sample size and standard error. Testing hypothesis- testing of means and proportions-large and small samples- Z test and t test.

UNIT-IV

Chi square distribution- Characteristics and application- test of goodness of fit and test of independence- Test of Homogeneity

UNIT-V

F distribution- testing equality of population variances- Analysis of variance-one way and two way classification.

Note: The proportion between theory and problems shall be 20:80

Reference Books

1. S P Gupta, Statistical methods, Sultan chand & Sons, 2000, New Delhi
2. D C Sancheti and V K Kapoor, Business statistics, Sultan Chand and sons, New Delhi
3. J.K.Sharma, Business Statistics-Pearson Education
4. Richard I Levin and David S. Rubit, Statistics for management, 7th Edition,Pearson education, New Delhi, 2002
5. Business statistics and operations research, Dr D Joseph Anbarasu,Lintech press Trichy

ELECTIVE

PAPER - 1

A. MANAGERIAL ECONOMICS

Objectives

Aims to provide a broader understanding of Managerial Economics and its managerial applications.

UNIT-I

Definition and scope of the subject-fundamental concepts and Methods-firm's objectives and the role of managerial economist.

UNIT-II

Demand analysis and Forecasting for consumer goods and capital goods-use of business indicators- type of elasticity.

UNIT-III

Concept and resources allocation- Cost Analysis- Short run and long run Cost functions-production functions- cost price- Output relations.

UNIT-IV

Economics of size and capacity Utilization - Input-Output analysis- Market Structure-Pricing and output general equilibrium.

UNIT-V

Pricing Objectives- pricing methods and approaches-price discrimination, Product line pricing-profit planning and Cost control- Business cycle and Policies.

Reference Books

1. Peterson, managerial economics, 4th edition - Pearson education - New Delhi.
2. Sampat Mokherjie, Business and Managerial Economics, New Central Book Agency, Calcutta.
3. Spencer M.H.Managerial Economics Text, Problems and short cases, Richard D.Inwin INC.
4. Sankaran.S, Managerial Economics Margham Publications, Chennai.
5. Dwivedi D.N , Managerial Economics, Vikas-New Delhi
6. Mankar & Denkar, Business Economics, Himalaya publishing House, Bombay
7. Joel Dean, Managerial Economics, Prentice Hall of India - New Delhi.
8. R.L. Varshney & K.L. Maheshwari, Managerial Economics-Sultan Chand & Sons, New Delhi.

B. COMPUTER APPLICATIONS IN BUSINESS

UNIT-I : COMPUTER HARDWARE

CPU, Input devices, Output Devices, Communication devices, storage devices Types of Computer system.

UNIT-II : INFORMATION TECHNOLOGY

Basic idea of LAN (Local Area Network), and WAN (Wide Area Net work) E-mail: Internet Technologies, Access Devices, Concept of World Wide Web and Internet browsing.

UNIT-III : WORD PROCESSING

Introducing and working with MS Word in MS-Office - Word Basic Commands, Formatting - Text and documents, Sorting and Tables, Working with graphics, introduction to Mail merge.

UNIT-IV : SPREAD SHEET

Working with EXCEL - Formatting functions, chart features, working with graphics in EXCEL using worksheets as database in accounting, Marketing, finance and personnel areas.

UNIT-V : PRESENTATION WITH POWER POINT

Power Point, basics creating Presentation of easy way: working with graphics in Power Point show time, sound effect and animation effects.

Reference Books

1. Date, C.J: An Introduction to Data base systems, Addison Wesley, Massachusetts.
2. Dienes, Sheih.S: Micro soft Office, Professional for Windows 95: Instant Reference: BPB Publication, New Delhi.
3. Mansfield, Ron: The Compact Guide to Micros soft Office BPB Publicaton, New Delhi.
4. O.Brian...A: Management information System, Tala Mc Graw Hill, Delhi.
5. Ullman, J.O: Principles of Data base System, Galgoia publication, New Delhi.

C. INSURANCE AND RISK MANAGEMENT

UNIT-I

Risk and Risk management process - risk identification - evaluation-risk management techniques-Insurance and risk management techniques-selecting and implementing risk management techniques.

UNIT-II

Commercial risk management applications - property - liability-commercial property insurance - different policies and contracts-business liability and risk management insurance-workers compensation and risk financing.

UNIT-III

Personal risk management - applications-property and liability- risk management for auto owners- Lorry owners- risk management for homeowners.

UNIT-IV

Risk management applications-loss of health - medi-claim-retirement planning and annuities-employee benefits- financial and estate planning.

UNIT-V

Risk management environment - Insurance industry - functions and organization of insurers-Government regulation of insurance sector - IRDA-privatization of insurance business in India-changes in insurance act-Insurance intermediaries-insurance products-pricing-claim valuation-Foreign insurers in India

Reference Books

1. Anand Gangly, Insurance Management, New age International, 2002
2. Arthur C Williams, Risk Management and Insurance, 8th Ed, McGraw Hill Co.
3. Insurance Act - Latest edition.

SEMESTER II

PAPER - 5

CORPORATE LAWS

UNIT-I

Corporate Laws: Importance - objectives. Doctrine of indoor Management. Liability of Misstatement - Mergers and Acquisitions.

UNIT-II

Information Technology Act: Intellectual Property Rights - Patents Act - Foreign Exchange Management Act - 2000 (FEMA) - Competition Act - 2002.

UNIT-III

SEBI ACTSEBI Regulations - Corporate Governance - Transparency and Disclosures - Latest trends. Audit Committee. Nolin Committee

UNIT-IV

ENVIRONMENT PROTECTION ACT - 1986. Power of Government - Air (Prevention and Control of Pollution) Act, 1981. Water (Prevention and Control of Pollution) Act, 1974.

UNIT-V

CONSUMER PROTECTION ACT, 1986-Competition Act 2002-Definitions-Competitive agreements-Abuse of dominant position-combination-regulation of combinations-competition commission of India, duties,Powers and functions of Commission-Competition Appellate Tribunal.

Reference Books

1. N.D. Kapoor, Elements of Company Law, Sultan Chand & sons, New Delhi.
2. Company Acts, 1956 (Acts and Rules).
3. N.D. Kapoor, Elements of Mercantile Law, Sultan Chand & sons, New Delhi.
4. Gulshan, S.S. A Hand book of Corporate Laws, S. Chand & Co, New Delhi.
5. Kuchhal, M.C. Mercantile Law, Vikas Publishing House, New Delhi.
6. Shukla, M.C. a Manual of Mercantile Law, S. Chand & Co.,New Delhi.

PAPER - 6

HUMAN RESOURCE MANAGEMENT

UNIT-I

Humans and other physical resources - development of the human potential - Implications of Behavioral Science theories to HRM - Link between organization planning and HR planning.

UNIT-II

Acquisitions and maintenance of personnel - recruitment and selection - purposes and methods of recruitment and selection - Maintenance of personnel - motivation for increased productivity - Q W L.

UNIT-III

Rewards and incentives - financial and non-financial incentives - Grievance procedure - conflict - process - stress vs. challenge - sources - resolution.

UNIT-IV

Performance appraisal - Ranking, rating scales, critical incident method - MBO as a method of appraisal - Removing subjectivity from evaluation - Criteria for promotions and job enrichment.

UNIT-V

Human development - training - need and importance - methods of training - designing training program - Evaluation of training program - Executive development. - Organization change - change agents - resistance to change - managing the resistance.

Reference Books

1. Dressler- Human Resource management, 8th Ed. Pearson Education, 2002
2. De Cenzo and Robbins, Personnel/Human Resource Management, Prentice Hallof India, 1998.
3. S.K.Chakrabothy, Values and Ethics for Organization, Oxford University Press 1999.
4. Aswathappa, Human Resource and Personnel Management, TataMcGraw Hill, NewDelhi, 2002.
5. A.M. Sheikh, Human Resource Development and Management, S. Chand & Co, New Delhi.

PAPER - 7

ADVANCED ACCOUNTS

Objectives

The primary objective of this subject is to enlighten the students the theoretical aspects of different topics and special attention to chapters like Inflation accounting, Holding Companies, Bank and Insurance Company accounts.

UNIT-I

Accounts of Banking Companies - Legal Provisions - Capital Adequacy Norms - Rebate on Bills Discounted - Asset Classification and Provisioning - Preparation of Final accounts.

UNIT-II

Insurance Company Accounts - Nature of Insurance Business - Distinction between Life and Non Life Insurance - Accounts of Life Insurance Business - Accounts of General Insurance Business - IRDA Regulations Regarding Preparation of Financial Statements.

UNIT-III

Holding Company Accounts - Consolidated Financial Statements - Consolidation of balance Sheets and Profit and Loss Accounts.

UNIT-IV

Inflation accounting - Need - Objections - Adjustments for General Price Changes - Current Purchasing Power Accounting (CPP) - CPP method of preparing financial statements.

UNIT-V

Human Resource Accounting - Need and Development - Importance of Human Resource Accounting - Objections against Human Resource Accounting - Human Resource Accounting in India. Corporate Social Reporting - Concept and objectives of social responsibility.

Reference Books

1. M C Shukla and T S Grewal, Advance accounts, S.Chand & Co New Delhi
2. Anjan Bhattacharya & Subrata Mukerjee, Advanced Practical Accounts, S. Chand & Co., New Delhi.

PAPER - 8

QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS

UNIT-I

Linear programming and net work analysis- PERT and CPM- Simplex method-Application of simplex technique.

UNIT-II

Inventory models- General concepts and definitions-Various cost concepts-The technique of inventory control-EOQ models.

UNIT-III

Transportation model-Definitions-Formulation and solution of Transportation models-North west corner - MMM-VAM.

UNIT-IV

Assignment model - Definitions- Formulation and solution of Assignment models-simplex and Hungarian method.

UNIT-V

Queuing theory-meaning-objectives - Limitations-Elements of queuing system-Queuing models.

Note: The proportion between theory and practice shall be 20:80

Reference Books

1. C.R.Kothari, Quantitative Techniques, Vikas publishing house.
2. P.R.Gupta and man Mohan, Operation Research, Sultan Chand and sons,New Delhi.
3. J.K. Sharma, Mathematical Models in operation research, TMH publishers.
4. Business statistics and operations research, Dr D Joseph anbarasu Lintec Press Trichy.

ELECTIVE

PAPER - 2

RETAIL MANAGEMENT

COURSE OBJECTIVE:

The objective of the course is providing insights on retail operations. This will enable the students to become good retail planners and decision makers and help focus on change and adaption to change

Unit-I

Introduction to retail: retail in India; retail models and theories of retail development; understanding the retail consumers; ethical issues in retailing

Unit-II

Retail marketing strategy; retail franchising; retail store location and site selection; retail store design and visual merchandising; customer relationship management in retailing.

Unit-III

Basics of retail merchandising; the process of retail merchandising; the method of merchandise

Procurement; retail pricing and evaluating merchandise performance; retail communication mix

Unit-IV

Retail store operations; servicing the retail customers; retail human resource management; financial aspects of retail management; retail information system; supply chain management in retailing

Suggested Reading:

1. Pradhan, Swapna; Retaling Management; Tata McGraw Hill; New Delhi
2. Bajaj, Chetan, Tuli, Rajnish and Srivastava, Nidhi; Retail Management; OUP; New Delhi
3. Berman, Barry & Evans, Joel R.; Retail Management – A strategic approach; Pearson

1. Education/Prentice Hall of India; New Delhi

4. Levy, Michael & Weitz, Barton A.; Retailing Management; Tata McGraw Hill; New Delhi
5. Newman, Andrew J. & Cullen, Peter; Retailing – Environment and Operations; Thomson Asia Pvt. Ltd.; New Delhi
6. Dunne, Patrick M., Lusch, Robert F & Griffith, David A.; Retailing; Thomson Asia Pvt. Ltd; ND
7. Lamba, A.J.; The Art of Retailing; Tata McGraw Hill; New Delhi

A. E-COMMERCE

UNIT-I : ELECTRONIC COMMERCE

Meaning - Traditional Commerce - E. Commerce and its application in business. Basic Blocks of E. Commerce. E. Commerce consumer - Anatomy of E. Commerce.

UNIT-II : NETWORK INFRASTRUCTURE

Global Information Distribution Networks - Components of the I - way - Policy issues- Internet terminology - Internet Governance - An overview of Internet Applications.

UNIT-III : NETWORK LAYERS

Internet Protocol (IP) - Transmission Control Protocol (TCP) - Multimedia Concepts - Advantages of Internet. Electronic Data Interchange (EDI) - EDI and E. Commerce - EDI application in Business.

UNIT-IV : NETWORK SECURITY

Client Server Network security - Firewalls and Network Security - data and message Security - encrypted documents and Electronic Mail. Video conferencing.

UNIT-V : DIGITAL DOCUMENTS

Document Library - Types of Digital Documents - Corporate data warehouse - Electronic Payment Scheme - Intra-organizational Electronic Commerce.

References Books

1. David Kosiur, understanding Electronic Commerce, Addison Wesley, 1996.
2. Soka, From EDI to Electronic Commerce, Tata McGraw – Hill, 1995.
3. Saily Chan, Electronic Commerce Management, John Wiley, 1998.
4. Neil Randall, The Internet in a Wee, 2nd Edn. Prentice Hall of India, New Delhi.
5. Kamalesh, K. Balaji and Debjani Nag, "E-Commerce", the cutting edge of business, Tata McGraw – Hill, 2000.
6. Marilyn Greenstein and Todd M. Fein Mann, Electronic Commerce, Security, Risk Management, Irwin McGraw Hill, 2000.

B. BANK MANAGEMENT

UNIT-I

Banking structure in India - banking functions and services - Foreign commercial banks - Private commercial banks - capital adequacy.

UNIT-II

Principles of lending - financial adequacy assessing the borrower - project appraisal - structural and Infrastructural analysis - legal formalities - follow up loans, asset management companies.

UNIT-III

Non Performing Assets (NPAs) - Early Warning Signals - Management of NPAs- Remedies Available - Recent Measures - loan recovery tribunals - Provisions of Revenue Recovery Act

UNIT-IV

Investment management - priorities in allocation of bank funds - investment in governments securities - maturity and yield - quality and diversification, profitability management - profit planning

UNIT-V

Traditional Banking vs. E-Banking - facets of E-Banking - Internet Procurement - E-Banking Transaction - Electronic Delivery Channels - Truncated Cheque - Complete Centralized Solution - Features of CCS - Advances of E-Banking - Constraints in E-Banking - Security Measures.

Reference Books

1. Varshney, PN. Banking Law & Practice, Sultan Chand, New Delhi.
2. S.N.Maheswari, Banking Law & Practice, Ludiana, Kalyani Publications.
3. Vasant Desai, Principles of Bank Management, Mumbai, Himalaya Publications.
4. K.Subramanian, Banking Reforms in India, TMH, New Delhi.
5. Joseph Sinkey, Commercial Bank Financial Bank Financial Management, Pearson Education (Prentice Hall)
6. E.Gordon and Dr. K. Natarajan, Banking Theory Law and Practice – Himalaya Publishing House.

SEMESTER III

PAPER - 9

Basics of GST

Unit I

GST - The Road Begins -Draft Model GST Law - Positives –Negatives- LEVY - Territorial jurisdiction of GST - Taxable Event - Consideration - Levy and collection of GST - Composition levy - PLACE AND TIME OF SUPPLY - Definitions of Goods & Services - Time of supply.

Unit II

VALUATION - Value of taxable goods and services- Valuation Rules -SPECIAL TRANSACTIONS - Job work - Electronic Commerce -INPUT TAX CREDIT - Input tax credit - Input Service Distributor -REFUNDS - Refund -Interest on refund.

Unit III

COMPLIANCES - Registration - Invoices, credit and debit notes - Payment of tax - Tax deducted at source - Returns - Accounts and Records - ASSESSMENT, AUDIT AND INSPECTION - Assessment - Audit - Inspection - INTEREST, PENALTY AND PROSECUTION - Interest - Offences and Penalties – Prosecution.

Unit IV

DEMAND AND APPEALS - Demand - Appeals - CGST - SGST -IGST-ALTERNATE DISPUTE RESOLUTION MECHANISM - Authority of Advance Ruling - Settlement of cases.

Unit V

RECOVERY AND LIABILITY TO PAY TAX - Recovery of tax - Liability to pay tax in specified cases - TRANSITIONAL PROVISIONS -Transitional Provisions.

Author : Nitya Tax Associates ,Taxmann Publications.

PAPER - 10

ORGANISATIONAL BEHAVIOUR

UNIT-I

Organizational Behavior - Fundamental concepts - nature and scope - OB in the new millennium - Foundations of Individual behavior - Personality, Perception, Learning, Values and Attitudes.

UNIT-II

Motivation - Early theories - Contemporary theories - Motivation at work - Designing and Motivating for jobs.

UNIT-III

Group Dynamics - Group Behaviour, - Inter-group relations - Communication and Group - Decision making.

UNIT-IV

Leadership - Trait, behaviour and contingency theories- Power and Politics - Conflict - causes, conflict management, Transactional Analysis (TA) - Work Stress.

UNIT-V

Organizational Structure And Design**:** Organizational changes and development - Organizational culture and climate -Organizational effectiveness.

Reference Books

1. Stephen Robbins, Organisational Behaviour, 0^{th} Ed. Pearson Education, 2001
2. Fred Luthans, Organizational Behavior, McGraw Hill, 1998
3. Wagner, Organizational Behavour, Thomson Learning, 2002.
4. S.S. Khanka, Organisational Behaviour, S.Chand & Co.,,New Delhi Edn,2007
5. Dr. S. Shajahan & Linu shajahan, Organisational Behaviour, New age International Publishers, New Delhi.

PAPER - 11

ADVANCED COST ACCOUNTING

Objectives

The aim of the cost accounting is to acquaint the students with various concepts, methods of costing and decision making

UNIT-I

Nature and significance of cost accounts-Definition of Costing, Scope, Objectives, Functions and limitations of cost accounting-Installation of costing system-Elements of Cost- Cost centre and profit centre-Preparation of Cost sheet, tender of quotations.

UNIT-II

Methods of Costing-Process costing, Treatment of equivalent production- Inter process profit-Joint and by product Costing-Preparation of contract account, Cost plus contract and escalation clause.

UNIT-III

Standard Costing and Variance analysis-Material, Labor and Overheads -reporting of variances

UNIT-IV

Cost controland Cost Reduction-Control over wastages, Scrap, Spoilage and defectives– Methods of cost reduction.

UNIT-V

Activity based costing–Meaning and concept-Characteristics of ABC-Benefits from adoption of ABC-Just in Time Costing (JIT)

Note: The proportion between theory oriented and problem oriented questions in the university examination shall be 20:80

Reference Books

1. S.P. Jain and K.L. Narang-Cost accounting-Kalyani Publishers-New Delhi.
2. B.K. Bhar- Cost Accounting-Academic publishers, Calcutta
3. T.S.Reddy and Y.H. Reddy- Cost and Management Accounting-MargamPublications, Chennai
4. C.T.Horangren-Cost Accounting - A Managerial Emphasis- Pearson education-New Delhi
5. Jawaharlal - Cost Accounting-Tata Mc. Graw Hill
6. Ravi M Kishore Advanced Management Accounting - Taxman's-New Delhi.
7. Robert S. Kaplan-Anthony A. Atkinson- Advanced Management Accounting - Prentice Hall of India-New Delhi
8. Weldon's Cost Accounting and Cost Methods - Mc. Donald and Evens Limited.

PAPER - 12

RESEARCH METHODOLOGY

UNIT-I : INTRODUCTION

Research - definition, characteristics, nature and scope. Various types of research - Formulation of research problem - Major steps in Research – Hypothesis - Research Design - Uses of social research.

UNIT-II : SAMPLING AND DATA COLLECTION

Sampling: Meaning, definition, need and types. Sampling errors - Merits and demerits of Sampling. Data collection: Sources of data; Primary and Secondary data. Procedure for data collection, Tool of data collection - Questionnaire – Interview-Schedule.

UNIT-III : DATA PROCESSING AND ANALYSIS

Processing of data: editing, coding and Tabulation - Problems - use of computer in social research. Analysis of data: Statistical analysis; diagrammatic and graphic representation. Interpretation of results.

UNIT-IV : STATISTICAL APPLICATIONS

Factor Analysis - bivariate and Multivariate Analysis. (Practical problems.)

UNIT-V : RESEARCH REPORTS

Structure and components - Types of Research Report, Good Research Report. Pictures and Graphs. Introduction to SPSS Package.

References Books

1. Wilkinson. T.S. & Bhandarkar. P.L. Methodology and Techniques of Social Research, Himalaya Publishing House, 2000, Mumbai.
2. Panneerselvam. R. Research Methodology, Prentice Hall of India, New Delhi, 2004.
3. Green, P.E., et al., Research for Marketing Decisions, 5th ed., Prentice-Hall of India, New Delhi, 1994.
4. Young, P.V., Scientific Social Survey and Research, Prentice Hall, 1949. New York.
5. Kothari.C.R. Research Methodology - Methods & Technology, New Age International Publisher, New Delhi
6. Gupta, S.P. Statistical Methods, Sultan Chand and sons, 1999, New Delhi
7. Gupta, C.B., An introduction to Statistics Methods, Vikas Publishing House, 1998, New Delhi.

ELECTIVE
PAPER - 3
FINANCIAL SERVICES

UNIT – I : Indian Financial System

Introduction – Structure of the Indian Financial System – Recent Development – Financial Services – Concept – Objectives – Importance – Characteristics – Types of Financial Services – Regulatory Framework – Problems in Financial Services Sector.

UNIT – II : Mutual Funds concept of Regulations

Introduction – Types – Advantages and Disadvantages – Mechanics of Mutual Fund Operations – Asset Management Company (AMC) – Net Asset Value – SEBI's New Regulations to Mutual Funds (1990).

UNIT – III : Capital and Money Markets and Stock Exchanges

Capital Market: Meaning – Functions – Importance – Players in Capital Market – Primary and Secondary Capital Market. Money Market: Definition – Features – Money Market Instruments – Capital Market Versus Money Market etc., NSE – OTCEI.

UNIT – IV : Factoring Services and Consumer Finance

Factoring Services: Introduction – Mechanics of Factoring – Types – Advantages and disadvantages – Players in factoring services – Factoring Vs Bills Discounting – RBI Guidelines for factoring – Constrains of Factoring Services in India – Forfeiting. Consumer Finance: Definition – Types – Credit Cards – Debit Cards – Mechanics of consumer Financing – Sources – Modes.

UNIT – V : Venture Capital and Credit Rating

Venture Capital: Concept – Features – Forms of Venture Capital – Phases – Functions – Advantages – Venture Capital Institutions. Credit Rating: Introduction – Rating Process – Credit Rating Agencies – CRISIL, ICRA, CARE, Credit Rating symbols.

Text Books:

1. Bhatia, B.S and G.S Batra, Management of Financial Service, Deep & Deep Publications, New Delhi, 1996.
2. Cornett, Sauders, Financial Markets and Institutions, 3rd Edition, Tata McGraw Hill, New Delhi, 2007.
3. Sasidharan, Mathews, Financial Services and System, 1st Edition, Tata McGraw Hill, New Delhi, 2008.

Reference Books:

1. Bhalla, V.K. : Management Financial Services, Anmol, New Delhi 2001.
2. Gordan, E and K Natrajan: Emerging Scenario of Financial Services, Himalaya Publishing House, 1997.
3. Saha, T.R and Mondal A: Indian Financial System & Financial Market Operation, New Central Book Agency (P)Ltd., 2004
4. Avadhani V.A Marketing of Financial Services of Markets, 3rd Edition, Himalaya Publishing House, Mumbai, 2007.
5. M.Y. Khan – Financial Services, 4th edition, Tata McGraw Hill, New Delhi, 2007.

A. Computer and Office management

Objectives:

To familiarize the students with the fundamental of computer and to implement the Principles of Computers in the business operations

UNIT-I

History of computers- Types-Generation- Features- Hardware-Software-CPU-Floppy drives- Hard disk-CD Rom- Keyboard- Printer- Magnetic tapes.

UNIT-II

External storage units-Net work attached storage device (NAS)-CD Media-Pen Drive-External Hard Disks-Classification -Applications-Use of computers in various fields

UNIT-III

Flow charting- data communication- LAN-WAN-INTERNET-INTRANET- E mail-Security of data- Anti virus programmes.

UNIT-IV

Word basics-Formatting- Working with Headers-Footers and footnotes-Tab and tables-working with graphics-Macros Mail merge.

UNIT-V

Excel basics-Formatting tips- Function- Chart features-Working with graphics-Excels command Macros using worksheet as data base- Power point Presentation.

Reference Books:

Sanchs H Donald, Computer concepts and applications, Sultan Chand & Sons, New Delhi.

Subash Mehta: Easy Computers, Wheeler Publishing company, New Delhi.

SERVICES MARKETING

UNIT-I

Growth of the Service Sector - Nature and Concept of Service - classification of services - Characteristics of Services and their marketing implications - Essential Elements of marketing mix in Service marketing.

UNIT-II

Marketing strategies for service firms with special reference to information, communication, consultancy, advertising, professional services, after sales service, recruitment training and tourism.

UNIT-III

Product support services - pricing of services - problems of Service quality management - Customer Expectations - innovation in services.

UNIT-IV

Marketing of financial services - nature - types - marketing of insurance - mutual fund - marketing for non - profit firms - Growth of financial services in India.

UNIT-V

CRM - identifying and Satisfying Customer needs - Relationship marketing - Customer Satisfaction - Managing Service Brands.

Reference Books

1. Christopher lovelock, Services Marketing, Pearson Education.
2. E.G. - Bateson, Managing Service marketing - Text and Readings, Dryden press, Hidsdale
3. Philip Kotler and Paul N.Bloom, Marketing professional Services, Prentice hall, New Jersey.
4. Payne, the essence of Service Marketing, New Delhi, prentice Hall.
5. Helen Wood Ruffe, Services Marketing, Macmillan India, New Delhi.
6. Mary Ann pezzallo, Marketing Financial Services, Macmillan.
7. Dr.S.Gurusamy, Financial and Markets Vijay Nicole imprints private limited, Chennai.
8. Dr.B.Balaji, Services, Services Marketing and Management, S.Chand & Company Ltd., New Delhi.

SEMESTER IV

PAPER - 13

DIRECT TAXES

UNIT-I

Basic concepts - Definitions - Assesses - Assessment year - Previous Year - Income - Residential Status - Scope of Total Income - Exempted income - Agricultural income - Capital income and expenditure - Revenue Income and expenditure.

UNIT-II

Heads of Income - Income from Salaries - Income from House property - Income from Business or Profession - Depreciation.

UNIT-III

Income under the head capital gains - Income from other sources - Deductions from Gross Total Income.

UNIT-IV

Computation of Total Income - Individual - Firm - Companies - MAT - Tax Deducted at Source - Advance Tax - Interest payable - Set off and Carry forward of losses - PAN - Rates of Tax.

UNIT-V

Assessment Procedure - Income tax Authorities - Penalties - Assessment of Fringe Benefit Tax - An outline of Wealth Tax - Computation of Net wealth.

Note: The ratio between theory and problems shall be 40:60.

Reference Books

1. Jayakumar A. & C.Dhanapal - Income Tax Theory, Law and Practice – Learnetech Press, Trichy,
2. Gaur V.P & Narang K.L, Income Tax Law and Practice, Kalyani Publishers, New Delhi.
3. Dr. Vinod Sighania, Direct Taxes, Tax Man Publications, New Delhi.
4. Dinkar Pagare, Income Tax Law and Practice, Sultan Chand & Sons, New Delhi.

PAPER - 14

INVESTMENT MANAGEMENT

UNIT-I

Properties of financial assets - Financial Markets - Investments - Types - Characteristics - Objectives - Types of investors - Investment vs. Gambling, Speculation, Speculation Vs. Gambling.

UNIT-II

Nature and Scope of Security Analysis - Concept of Risk and Return - Measurement of Risk

UNIT-III

Fundamental analysis-Economic analysis, Industry Analysis and company Analysis-Technical analysis- Trend indications- Indices and moving average applied in technical analysis.

UNIT-IV

Valuation of Securities - Equity shares - Preference shares - Debentures - Bonds

UNIT-V

Efficient market Hypothesis - Random Walk Theory - Markowitz Theory - Sharpe's optimization solution - Dow Theory - CAPM model - SML, CML.

Note: Only theory questions.

Reference Books

1. Dr.Raganatham m & Madhumathi R. Investment analysis 7 Portfolio management. Person Education, New Delhi.
2. Dr.Bhalla V.K.Investment Management, S.Chand and Company, New Delhi.
3. Fisher & Jordan, Security analysis and portfolio management, Prentice Hall of India, New Delhi.
4. Sharpe, William and Gordon, Investments – Prentice hall of India, New Delhi.
5. Rustagi R.P, Investments Analysis and Portfolio management, Sultan Chand & Sons, New Delhi

PAPER - 15

PROJECT DEVELOPMENT

UNIT-I: PROJECT

Meaning and overview - Project Development Cycle - Capital Expenditure Decisions - Importance and Difficulties.

UNIT-II : PROJECT APPRAISAL

Aspects of Appraisal - Market Appraisal - Technical Appraisal - Financial Appraisal - Economic Appraisal. Project formulation. Feasibility Report.

UNIT-III : PROJECT COST AND MEANS OF FINANCE

Project cost - Social Cost and Social Benefit. Term Loans - Loans from Development banks - Assistance from Indian finance Corporations and international finance Corporations. External commercial borrowing.

UNIT-IV : PROJECT SELECTION

Selection of a suitable project - Programming - scheduling and Controlling Mechanism.

UNIT-V : PROJECT CONTROL

Time and cost control - Budgetary control - corrective and preventive actions. Risk Management functions.

References Books

1. Prasanna Chandra, Projects - Preparation, Appraisal, Budgeting and Implementation, 3rd ed. Tata McGraw- Hill Publishing Company Limited, New Delhi.
2. Dr. Gupta, C.B. & Dr. Srinivasan, N.P. Entrepreneurial Development, Sultan Chand & sons, New Delhi.
3. Bryce, M.D. Industrial Development: A Guide for Accelerating Economic Growth, McGraw- Hill, 1960 New York.
4. Varma, M.L. Foreign Trade Management in India, Vikas Publishing House, 1993, New Delhi.
5. Jeevanandam, C. Foreign Exchange, Sultan Chand & sons, 1994, New Delhi.

PAPER - 16

MARKETING RESEARCH

Objectives

The aim of the subject is to impart knowledge to the students on Market Research and the method of conducting such research.

UNIT-I

Marketing research-Nature, Scope and importance-Research proposal- Steps in marketing research.

UNIT-II

Research design- Exploratory research-Descriptive research-survey research.

UNIT-III

Data collection-Secondary data- primary data-types, merits and Limitations-Methods of collection- Processing of collected data-Management Information System.

UNIT-IV

Ethics in marketing research-Treatment of respondents, buyer and Researchers-International code of marketing research practice.

UNIT-V

Application of marketing research-product research-motivation Research-presentation of research project - Future of Marketing Research in India.

Reference Books

1. Philip Kotler-Marketing Management and Control-Asian perspectives-Prentice Hall of India1999 (The Millennium Edition).
2. Boyd Harper W. and Ralph Westfall-marketing research-text and cases-Richard D. Irwin Inc. Indian Edition.
3. Schreir Fredric T. Modern Marketing research, World wide publishing company.Inc.
4. Dr.D.D Sharma - Marketing research-Sulthan Chand &Sons, New Delhi.
5. Donald Tull and Deli Hawkins, Marketing research, Macmillan.

ELECTIVE

PAPER - 4

A. BUSINESS ENVIRONMENT AND POLICY

UNIT-I

Business Environment**:** Cultural, social, political, technological, economic and legal environment - scanning - techniques of environmental forecasting - SWOT - Internal environment - their impact on policy formulation.

UNIT-II

Economic reforms in India - Liberalization - privatization and globalization - Competitive Strength of Indian industry - Impact of liberalization policy on different sectors - Foreign Investments policy in India.

UNIT-III

Multi-national corporations - Their participation in India - Their strategies, competitive strengths policies and performance.

UNIT-IV

Business policy and corporate strategy: Policies; Strategies and Tactics; Policies and procedures - Corporate strategy: alternatives - variations - Strategic choice, implementation.

UNIT-V

Business ethics and social responsibilities - relationship between business and society - Corporate power social accountability - Ethical issues and values in business - Corporate Social policies - issues and challenges - Ecological and environmental issues.

Reference Books

1. Wheelen, Concepts of Strategic Management and Business policy, 8th Ed. Pearson Education, New Delhi, 2002.
2. William Gluck & L R Jauch, Business Policy & Strategic Management,McGraw-Hill 2001.
3. Kazhmi Azhar , Business Policy, TMH,2002.
4. Gupta, Liberalisation - its impact on Indian Economy, Macmillan, 2002.

B. INTRODUCTION TO INFORMATION TECHNOLOGY

UNIT-I : INFORMATION TECHNOLOGY

Meaning - Definition - Types of Information System - Computer net works: Goals and uses of networks. Network Hardware and Software - Types of Networks - Protocols - Knowledge Management.

UNIT-II : ELECTRONIC BUSINESS

Computers - Internet business - Definition - Online Business - E.Business Categories - preparing to online business - Ethics of information technology. E. Business Applications - Business to Business (B2B) - Business to Customers (B2C) - Electronic Shopping.

UNIT-III : PAYMENT SYSTEM

Paying in the net: The Payment Business - Post-paid System - Instant-paid payment System - Pre-paid Payments System. The Open source Projects - Introduction to open hardware.

UNIT-IV : STORAGE AND DATA BASE

Foundation for interactivity - Multimedia and Knowledge storage Capacity - Compression and Decompression. Secondary Storage Devices Diskettes - Hard disks - Optical Disks - Magnetic tape.

UNIT-V : DATA BASE MANAGEMENT SYSTEM (DBMS)

Introduction to data base approach - objectives of data base and data base languages - Ethics of using Databases - Concerns about accuracy and privacy.

Reference Books

1. Saily Chan, Electronic Commerce Management, John Wiley, 1998.
2. Neil Randall, The Internet in a Wee, 2nd Edn. Prentice Hall of India, New Delhi.
3. Marilyn Greenstein and Todd M. Fein Mann, Electronic Commerce, Security, Risk Management, Irwin McGraw Hill, 2000.
4. David Kosiur, understanding Electronic Commerce, Addison Wesley, 1996.

C. SALES AND ADVERTISING MANAGEMENT

UNIT-I

Sales management-Meaning and Scope-Functions Sales and Planning-Sales policy-Sales organization-Sales Territories-Sales Quota-Selling process-Responsibilities of Sales manager

UNIT-II

Need for sales force- Recruitment and Selection of sales force-Training of salesmen-Qualities of a Good salesman

UNIT-III

Advertising-Scope and Function- Need for Advertising classification-Advertisement Planning and Organization-Ethical Issues in Advertising

UNIT-IV

Advertising Media- Role of Media-Types of Media-Merits and Demerits- Media Research- Evaluation and Effectiveness of Advertising.

UNIT-V

The Advertising budget-Advertising Agencies- Types of Legal framework of advertising-Self regulation of Advertising.

Reference Books

1. Ramasamy : V S Marketing Management, Macmillan
2. Davar: Salesmanship and Advertising
3. Pillai and Bagavathi: Salesmanship.
4. Richard R Still and Edward W Gundiff- Sales management- Prentice Hall

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THIRUVALLUVAR UNIVERSITY

MASTER OF SCIENCE

DEGREE COURSE

M.Sc. APPLIED MICROBIOLOGY

UNDER CBCS

(with effect from 2017-2018)

The Course of Study and the Scheme of Examinations

S.NO.	Study Components / Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
	SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	MAIN	Paper-1	5	5	General Microbiology and Microbial Physiology	25	75	100
2	MAIN	Paper-2	5	5	Food, Agriculture and Environmental Microbiology	25	75	100
3	MAIN	Paper-3	5	5	Immunotechnology	25	75	100
4	MAIN	Paper-4	4	4	Human anatomy and physiology	25	75	100
5	MAIN PRACTICAL	Paper-1	4	0	(Subjects covering Paper 1, 2 and 3)	-	-	-
6	MAIN PRACTICAL	Paper-2	4	0	(Subjects covering Paper 4, 5 and 6)	-	-	-
7	ELECTIVE	Paper-1	3	3	(to choose 1 out of 3) A. Biofertilizer Technology B. Fundamentals in Biology C. Microbial Biotechnology	25	75	100
			30	**18**		**125**	**375**	**500**
	SEMESTER II					**CIA**	**Uni. Exam**	**Total**
8	MAIN	Paper-5	5	5	Medical Microbiology	25	75	100
9	MAIN	Paper-6	5	4	Microbial Pharmacology	25	75	100
10	MAIN	Paper-7	5	4	Bioinformatics and Biostatistics	25	75	100
11	MAIN PRACTICAL	Paper-1	5	5	(Subjects covering Paper 1, 2 and 3)	25	75	100
12	MAIN PRACTICAL	Paper-2	5	5	(Subjects covering Paper 4, 5 and 6)	25	75	100

13	**Compulsory Paper**		2	2	**Human Rights**	25	75	100
14	ELECTIVE	Paper-2	3	3	(to choose 1 out of 3) A. Food analysis and quality control B. Genetic Engineering C. Microbial Bio nanotechnology	25	75	100
			30	**28**		**175**	**525**	**700**
SEMESTER III						**CIA**	**Uni. Exam**	**Total**
15	MAIN	Paper-8	6	5	Microbial Genetics and Molecular Biology	25	75	100
16	MAIN	Paper-9	6	5	Recombinant DNA Technology	25	75	100
17	MAIN	Paper-10	5	5	Industrial Biotechnology	25	75	100
18	MAIN PRACTICAL	Paper-3	5	-	(subjects covering Paper 7, 8 and 9)	-	-	-
19	MAIN PRACTICAL	Paper-4	5	-	(subjects covering Paper 10)	-	-	-
20	ELECTIVE	Paper-3	3	3	(to choose 1 out of 3) A. Biological Techniques B. Herbal Technology C. Vaccine Biotechnology	25	75	100
			30	**18**		**100**	**300**	**400**
SEMESTER IV						**CIA**	**Uni. Exam**	**Total**
21	MAIN	Paper-11	6	4	Research Methodology	25	75	100
22	MAIN	Paper-12	5	5	Project / Dissertation with *viva voce*	50	150	200
23	MAIN PRACTICAL	Paper-3	5	5	(subjects covering Paper 7, 8 and 9)	25	75	100
24	MAIN PRACTICAL	Paper-4	5	5	(subjects covering Paper 10)	25	75	100
25	ELECTIVE	Paper-4	3	3	(to choose 1 out of 3) **A.** Bioremediation **B.** Marine Microbiology **C.** Clinic Microbiology	25	75	100
			30	**26**		**150**	**450**	**600**

Subject	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total marks**
MAIN	12	4-5	56	100	1300
MAIN PRACTICAL	4	5	20	400	400
ELECTIVE	4	3	12	100	400
COMPULSORY PAPER	1	2	2	100	100
Total	**21**	**-**	**90**	**-**	**2200**

THIRUVALLUVAR UNIVERSITY
M.Sc. APPLIED MICROBIOLOGY
SYLLABUS
UNDER CBCS
(with effect from 2017-2018)
SEMESTER I

PAPER – 1
GENERAL MICROBIOLOGY AND MICROBIAL PHYSIOLOGY

OBJECTIVES

To enable the students to understand the basic knowledge in Microbiology and Microbial diversity.

UNIT-I

Discovery of Microbial world. Controversy over spontaneous generation. Evolutions of Microbiology with its recent developments in Medicine. Modern trends in microbial taxonomy.

UNIT-II

Microscopy - Its principles and applications. Simple - Compound, Dark field, phase contrast, Fluorescent and Electron Microscopes - SEM, TEM. Principles, Operation and maintenance of autoclaves, Ovens, Centrifuges - refrigerated & ultra speed, calorimeters, spectrophotometers, lyophilizers, deep freezer. Staining methods - Gram, Acid Fast, metachromatic, granules, nuclear staining, capsule, silver impregnation, flagella and other special staining methods. Sterilization and disinfection methods and their quality control.

UNIT-III

Bacterial morphology, structure and characterization - cellular components of bacteria - sporulation and its mechanics - growth and nutrition - Nutritional requirements - Autotrophs, heterotrophs - enrichment culture - growth curve - Kinetics of Growth - Mathematical expression of exponential growth phase; Measurement of growth and growth yields - Batch Culture - Synchronous growth - Techniques of pure culture.

UNIT-IV

Classification of bacteria and salient features according to Bergey's manual of determinative Bacteriology. Microbial diversity in different ecosystems. Structure and function of viruses - classification of viruses - replication of viruses - bacteriophages, plant viruses- TMV, CMV, Alfalfa mosaic virus and animal viruses. Specialized somatic Structure and Classification of fungi. Reproduction in fungi - Life cycles of fungi. Structure and Classification of Algae - ultrastructure and life histories of microalgae belonging to various algal classes. Cyanobacteria.

UNIT-V

Basic concepts of metabolism. Carbohydrate metabolism - Glycolysis - HMD, TCA & ED and other pathways. Aerobic and anaerobic respirations - Generation of energy - substrate level and oxidation phosphorylation - Electron transport chain - Lipid metabolism - Beta oxidation - proteins - primary, secondary, tertiary and quaternary structures - Enzymes nomenclatures, classification and general properties - factors affecting enzyme synthesis and activities - Allosteric enzymes - photosynthesis - cyclic and non -cyclic photophosphorylation - Bioluminescence.

TEXT BOOKS:

1. Rajan. S and Selvi Christy (2015). Essentials of Microbiology, Anjanaa Book House Publishers, Chennai.

2. Ananthanarayan and Panikers (2013) Textbook Microbiology 9th edition, Universities Press (India) Private Ltd.

3. Chandar Sbekar, C.N. (2006). Manipal Manual of Physiology, CBS Publishers and distributors Pvt. Ltd., Chennai.

4. Rafi, M.D. (2014). Textbook of Biochemistry. 2nd edition, Universities Press (India) Private Ltd.

5. Channarayappa (2015). Molecular Biology, Universities Press (India) Private Ltd.

6. Dubey RC and Maheswari DK (2005). A text book of Microbiology, Revised Multicolour edition, S.Chand Publishers, New Delhi.

7. Purohit SS (2005). Microbiology - Fundamentals and Applications. Student Edition Publishers, Jodhpur.

8. Pelczar & Kreig (2006). Microbiology5th edition. Tata McGraw Hill, New Delhi

9. Powar & daginawala (2005). General Microbiology Vol.I & II 8th Edition, Himalaya Publishing House, Mumbai.

10. Salle, AJ (2001). Fundamentals & Principles of Bacteriology. 7th edition. Tata McGraw-Hill, Davis,

11. Chandar Sbekar, C.N. (2006). Manipal Manual of Physiology, CBS Publishers and distributors Pvt. Ltd., Chennai.

12. Pal, G.K and Pravathi Pal. (2016) A text book of Practical Physiology, 4th Edition Universities Press (India) Pvt Ltd,

REFERENCE BOOKS:

1. Delbecco, Eisen & Ginsburg (1990) Microbiology 5th Edition Harper & raw, New York

2. Gerhardt, Murray, Wood and Kreig 1994. Methods for General and Molecular Bacteriology, ASM Press, Washington.

3. Alexopoulus CJ and C W. Mims.(1993).Introductory Mycology (3rd edition) Wiley Eastern Ltd, New Delhi.

4. Elizabeth Moore-Landecker. (1996). Fundamentals of the fungi. (4th edition). Prentice Hall International, Inc, London.

5. Conrat HF, Kimball PC and Levy JA. (1988). Virology. II edition. Prentice Hall, Englewood Cliff, New Jersey.

6. Roger Hull (2002). Mathews' Plant Virology. (4thEdition).Academic press-A Harcourt Science and technology company, New York.

7. Nelson D.L. and Cox, M.M. (2001). Lehninger Principles of Biochemistry, 3rd edition, Mac Millan Eworth Publishers.

8. Raaman, N. 2006. Phytochemical Techniques. New India Publishing Agency, New Delhi

Stryer L (1995). Biochemistry. W.H. Freeman and Company.

9. Voet D. and Voet J (1995) Biochemistry, 2nd edition, John Wiley and Sons Inc.

PAPER-2

FOOD, AGRICULTURE AND ENVIRONMENTAL MICROBIOLOGY

OBJECTIVES

To enable students to understand the various microbes involved in food, agriculture and environment.

UNIT-I

Importance of studying food and dairy microbiology. Primary sources of microorganisms in foods. Factors influencing microbial growth in foods - extrinsic and intrinsic. Principles of food preservation - preservation methods - irradations - drying, heat processing, chilling and freezing, high pressure, modification of atmosphere and chemical preservatives. Nutritional value of fermented foods. SCP and their uses - contamination, preservation and spoilage of fruits vegetables, meat and poultry products.

UNIT-II

Microbiology of fermented milk - fermented milk products - Food sanitation in food manufacture and in the retail trade - Food control agencies and its regulations, HACCP Methods. Bacterial pathogens such as Brucella, Clostridium, Bacillus, E. coli, Listeria, Salmonella, Staphylococcus, Vibrio and Yersinia.

UNIT-III

Distribution of soil microorganisms in soil. Factors influencing the soil microflora - Role of microorganisms in soil fertility. Interactions among microorganisms, mutualisms, comensalism, competition, amensalism, parasitism, predation - Interactions between microbes and plants - rhizosphere, phyllosphere, mycorrhizae. Microbial interactions in animals-Rument microbiology - Microbial contribution to food digestion.

UNIT-IV

Biogeochemical - carbon cycle - role of microbes in carbon cycle - trophic relationships - mobilization and immobiilisation of carbon with rhizosphere. Nitrogen cycle - mechanism of biological nitrogen fixation - ammonification - nitrification - denitrificatioin and microorganisms involved in such processes. Phosphorous cycle - Sulphur cycle. Biofertilizer for sustainable agriculture *Rhizobium Azospirillium, Azotobacter,Azolla,* BGA -mass production methods - applications methods of biofertilizers - significance of biofertilizers.

UNIT-V

Air pollution - sources, major pollutants, adverse effect on living organisms -acid rain and its impact on ecosystem-gaseous emission - Green house effect -Global warming - Ozone layer depletion and its effect - Droplet neuclei -Aerosol - Assessment of air quality - Airbone disesases, their symptoms and preventive measures. Types of wastes, characterization of solid and liquid waste. Solid waste treatment - saccharification - pyrolysis - composting. Water pollution - sources and nature of pollutants in water - Sewage - industrial effluent - agrochemicals - Eutrophication - waterborne diseases. Potable water. Assessment of microbiological quality of water. Brief account on bioterrorism.

TEXT BOOKS:

1. Adams MR and Moss MO. (1995). Food Microbiology, The Royal Society of Chemistry, Cambridge.

2. Alexander M. (1977) Introduction to soil microbiology. John Wiley & Sons, Inc., New York.

3. Rajan. S and Selvi Christy (2015). Essentials of Microbiology, Anjanaa Book House Publishers, Chennai.

4. Andrews AT, Varley J. (1994) Biochemistry of milk products. Royal Society of Chemistry.

5. Banwart GJ. (1989), Basic food microbiology, Chapman & Hall, New York.

6. Ec Eldowney S, Hardman DJ, Waite DJ, Waite S. (1993). Pollution: Ecology and Biotreatment – Longman Scientific Technical.

7. Frazier WC and Westhoff DC. (1988) Food microbiology, TATA McGraw Hill Publishing Company Ltd. New Delhi.

8. Grant WD, Long PL. (1981) Environmental Microbiology. Blackie Glasgow and London.

9. Hobbs BC and Roberts D. (1993) Food poisoning and food hygiene, Edward Arnold (A division of Hodder and Stoughton), London.

10. Jay JM. (1987) Modern food microbiology, CBS Publishers and distributors, New Delhi.

11. Robinson RK. (1990) The microbiology of milk. Elsevier Applied Science, London.

12. Robinson RK. (1990) Dairy Microbiology, Elsevier Applied Science, London.

13. Rogers JE and Writman WB (1991) Microbial production and consumption and green house gases: Methane: Nitrogen oxides and Halomethanes. American Society for Microbiology, Washington DC.

14. Dirk J, Elas V, Trevors JT, Wellington, EMH (1997) Modern Soil Microbiology, Marcel Dekker INC, New York.

15. Ramanathan, and Muthukaruppan SM (2005) Environmental Microbiology. Om Sakthi Pathipagam, Annamalai Nagar.

PAPER-3
IMMUNOTECHNOLOGY

OBJECTIVES

To enable the students to understand the immunity and immune system.

UNIT-I

Introduction: Infection, immunity, types of immunity - innate and adaptive, phagocytosis and extracellular killing, immunity to specific infection, milestones in immunology - evolution of immunology.

Immune Systems: Anatomy of the lympho - reticular system, primary lymphoid organs - bone marrow & thymus, Secondary lymphoid tissues - spleen, lymph nodes & gut associated lymphoid tissue, immuno reactive cells - T and B lymphocytes, macrophages, granulocyte and NK cells.

UNIT-II

Antigens and Immunogenicity: Terminologies and definitions - antigen, immunogen, haptens, superantigens, tolerogen, epitope, paratope and antigenic determinants. Features associated with antigenicity and immunogenicity. Basis of antigen specificity.

Antigen receptors: Cell surface proteins of Major Histocompatibility Complex (MHC): types, - class I, II and III distribution and function, MHC in relation to transplantation and HLA typing. T cell receptor complex (TCR).

UNIT-III

Antibodies - B cell receptors. Three dimensional structure of immunoglobulin molecule - Types of immunoglobulins. Biological and chemical properties of immunoglobulin. Antigen, antibody attraction - forces, affinity, avidity and specificity. Monoclonal antibody production - Hybridoma technology.

Complement system: Basics of complement protein - different pathways of complement activation - the pathway of membrane attack (common pathway), classical and alternate.

UNIT-IV

Acquired immune response: Humoral immune response - various phases of humoral immune response. Cell mediated immune response - cell mediated cytotoxicity, delayed type hypersensitivity.

Immune regulation: Immune response - various events in induction of immune response. Means of immunosuppression - physical, chemical and biological. Tolerance - auto and acquired. Immunopotentiation - specific and non specific potentiations (adjuvants). Cytokines, Lymphokines and Chemokines.

UNIT-V

Prophylaxis: Vaccines - heat killed, attenuated, rDNA vaccine, synthetic peptide vaccine, plasma derived vaccine, anti - idiotypic vaccine and DNA vaccine. Active immunization - vaccines & toxoids – bacterial and viral. Passive immunization - antitoxins, immuno-globulin, specific immuno-globulin, hyper immuno-gamma globulin. Immuno Pathology - A brief account: Immunology of infectious diseases. Immunodeficiency disorders - primary and secondary. Autoimmune diseases.

TEXT BOOKS:

1. Sudha Gangal and Shubhangi Sontakke (2013) Textbook of Basic and Clinical Immunology, Universities Press (India) Private Ltd.
2. Ajoy Paul (2016). Text Book of Immunology, Books and Allied (P) Ltd, Kolkatha.
3. Ananthanarayan and Panikers (2013) Textbook Microbiology 9th edition, Universities Press (India) Private Ltd.
4. Chapel H and Halbey M (1986) Essentials of Clinical Immunology, ELBS.
5. Donal M. Weir, John Steward. (1993). Immunology VII edition. ELBS, London
6. Ivan M. Roit. (1994) Essential Immunology - Blackwell Scientific Publications, Oxford.

REFERENCE BOOKS

1. Jacqucline S, Williams and Wilkins A. (1998) Basic Immunology - Warerly Company.
2. Janeway Travers. (1997). Immuno biology - The immuno system in health and Disease. 3rd edition Current Biology Ltd., London, New York.
3. Lydyard P, Whelan A and Fanzer MW (2000) Instant notes in Immunology, Edited By Hames BD, Viva Books Private Ltd.
4. Mark Reakman Diego Vergani. Basic and clinical immunology, Longman Asia Ltd., Hong kong.
5. Paul (1998) Fundamental Immunology. III Edition.
6. Peter J. Delves, Ivan M. Roit (eds) (1998) Academic Press - Encyclopedia of Immunology - 2nd edition.
7. Richard M. Hyde. (1995). Immunology III edition. National Medical series, Williams and Wilkins, Harward Publishing Company.
8. Clark WR (1991). The experimental foundations of modern immunology, John Wiley and Sons Inc. New York.

PAPER-4

HUMAN ANATOMY AND PHYSIOLOGY

OBJECTIVES

To enable the students to understand the importance of human anatomy

UNIT-I: Respiratory System (RS) and Special Sensory Organs (SSS)

Introduction to applied human anatomy and physiology.

Respiratory System (RS): Different organs of the Respiratory System. Functions of the different organs of the Respiratory System.

Special Sensory Organs (SSS): Introduction to special sensory organs. Function and functions of eye, ear, nose, tongue, and skin.

UNIT-II: Gastro Intestinal (GI) System and Lympho-reticular System (LRS)

Gastro Intestinal (GI) System: Different organs associated with the Gastro Intestinal system: (Salivary glands, Pancreas, Liver and Gall bladder and others).

Lympho-reticular System (LRS): Different organs of LRS (Lymph, Lymphatic vessels and Lymph nodes), Functions of the different organs of Lympho-reticular system.

UNIT-III: Musculoskeletal System (MSS), Skin and Nervous System (NS)

Musculoskeletal System (MSS) and Skin: Introduction of musculo-skeleton system. Different parts of involved in skeleton system. Function of muscular system. Parts and function of skin.

Nervous System (NS): Introduction to nervous system. Central nervous system (CNS) and peripheral nervous system PNS and related to infection

UNIT-IV: Circulatory System (CS) and Endocrine System (ES)

Circulatory System (CS): Blood: Site of formation, composition, functions of blood cells, Different parts of the circulatory system and its function.

Endocrine System (ES): Introduction to endocrine system, Different organs and Functions of endocrine system.

UNIT-V: Reproductive System (RS) and Urinary System (US)

Reproductive System (RS): Introduction Male reproductive system – physiological anatomy, spermatogenesis and its regulation, testicular hormones, composition of semen Female reproductive system – menstrual cycle, pregnancy and parturition, lactation and family planning.

Urinary System (US): Different organs and Functions of Urinary System. Mechanism of urine formation and composition of urine.

TEXT BOOKS:

1. Sampath Madhyastha, (2016) Manipal Manual of Anatomy, 3rd Edition, CBS Publishers and Distributors Pvt Ltd. Chennai.
2. Chandar Sbekar, C.N. (2006). Manipal Manual of Physiology, CBS Publishers and distributors Pvt Ltd., Chennai.
3. Chaurasia, B.D, (2005) Handbook of Human anatomy 3rd Edition, CBS Publishers and Distributors Pvt Ltd. Chennai.
4. Human physiology, 2nd edition- BJ Mejer, HS Meij, AC Meyer, AITBs publishers abd distributers.

REFERENCES BOOKS:

1. Srivastava, (2013), Text book of Anatomy, Books and Allied (P) Ltd, Kolkatha.
2. Suresh.R, (2012), Essentials of Human Physiology, Books and Allied (P) Ltd, Kolkatha.
3. Asis Das (2006), Medical Physiology, Books and Allied (P) Ltd, Kolkatha.
4. Cell physiology by Giese, 5th edition, W.B Saunders Company, Tokyo, Japan.
5. A text book of animal physiology, KA Goel, KV Sastri, Rastogi publications Meerut.
6. Animal physiology and Biochemistry- RA Agarval, Anil. K, Srivastava, Kausshal Kumar, S. Chand & Co.
7. A Hand Book of Basic Human physiology- K. Saradha subramanyam, S. Chand & Co., Ltd.
8. Guide to physiology- Y. Rajakshmi, S. Chand & Co., Ltd. Cathleen JW Wilson OBE Anne Wangh: Anatomy and physiology in Health and illness. Churchill Livingstone Publication, UK, NK, 1996.
9. Waugh A., Grant, A Ross and Wilson's Anatomy and Physiology in Health and Illness, 9th Edition, Churchill Livingston, London.2001.
10. Guyton AC and Hall JE. Guyton Human Physiology and Mechanisms of Disease. Hartcourt Publishers, Limited, 1996.
11. Williams PL (Ed). Gray' anatomy, Churchill Livingstone, London.

ELECTIVE
PAPER-1
(to choose 1 out of 3)
BIOFERTILIZER TECHNOLOGY

OBJECTIVES

To make the students to understand the microorganisms as potential biofertilizer, the technology of inoculums production and to make the students entrepreneurs.

UNIT-I

Introduction to biofertilizers - Structure and characteristic features of the following biofertilizer organisms: Bacteria: *Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium* and *Frankia.* Cyanobacteria: *Anabaena, Nostoc, Hapalosiphon*. Fungi: *Glomus, Gigaspora, Sclerocystis, Amanita, Laccaria*.

UNIT-II

Biofertilization processes - Decomposition of organic matter and soil fertility and vermicomposting. Mechanism of phosphate solubilization and phosphate mobilization. Nitrogen fixation - Free living and symbiotic nitrogen fixation. Biotechnological application in nitrogen fixation.

UNIT-III

Nitrogenous Biofertilizers I: Bacteria - Isolation and purification of *Azospirillum* and *Azotobacter*, mass multiplication of *Azospirillum* and *Azotobacter*, formulation of inoculum of *Azospirillum* and *Azotobacter*, application of inoculants of *Azospirillum* and *Azotobacter*. Isolation and purification of *Rhizobium*, mass multiplication and inoculum production of *Rhizobium*, Methods of application of *Rhizobium* inoculants.

UNIT-IV

Isolation and purification of Cyanobacteria. Mass multiplication of cyanobacterial bioinoculants - Trough or Tank method, Pit method, Field method; methods of application of cyanobacterial inoculum. *Azolla* - mass cultivation and application in rice fields.

UNIT-V

Mycorrhizae - Ecto and endomycorrhizae and their importance in agriculture. Isolation of AM fungi - Wet sieving method and sucrose gradient method. Mass production of AM inoculants and field applications. Isolation and Purification of phosphate solubilizers. Mass multiplication and field applications of phosphate solubilizer (*Pseudomonas striata*). Biofertilizers - Storage, shelf life, quality control and marketing.

TEXT BOOKS:

1. Bagyaraj, D.J. and A. Manjunath. 1990. Mycorrhizal symbiosis and plant growth, Univ. of Agricultural Sciences, Bangalore, India.

2. Purohit, S.S., P.R. Kothari and S.K. Mathur, 1993. Basic and Agricultural Biotechnology, Agro Botanical Pub. India.

3. Subba Rao, N. S. 1988. Biological nitrogen fixation: recent developments, Mohan Primlani for Oxford and IBH Pub. Co. (P) Ltd., India.

4. Subba Rao, N.S., G.S. Venkataraman and S. Kannaiyan 1993. Biological nitrogen fixation, ICAR Pub., New Delhi.

5. Somani, L.L., S.C. Bhandari, K.K. Vyas and S.N. Saxena. 1990. Biofertilizers, Scientific Publishers - Jodhpur.

6. Tilak, K.V.B. 1991. Bacterial Biofertilizers, ICAR Pub., New Delhi.

PAPER-1
B. FUNDAMENTALS IN BIOLOGY

OBJECTIVES

Students completing this paper should be able to understand concepts of fundamentals in biology.

UNIT-I

Biology of cells: Cells as a unit of life, structure of prokaryotic and eukaryotic cells. An overview of organelles (Mitochondria, chloroplasts, ER, Golgi, ribosomes, lysosomes and peroxysomes, nucleus and nucleolus). Differences and similarities in plant and animal cells. Cellular membrane: structure, transport, channels, carriers, receptors, endocytosis, membrane potentials.

UNIT-II

DNA replication; Transcription and Translation.

Cell-cell interactions and signal transductions: Intercellular junctions, signaling by hormones and neurotransmitters; receptors, G-proteins, protein kinases and second messengers. Protein traffic in cells.

UNIT-III

Cell Cycle and regulation - Mitosis, Meiosis.

Mutation - Types of mutations, types of mutagenic agents and their molecular mechanism; DNA repair; Chromosomal types and structure; Mechanism by which genome undergoes changes, recombination, mutation, inversion, duplication, and transposition.

UNIT-IV

Molecules of Life: Introduction to carbohydrates-Monosaccharide and their derivatives, Disaccharides, Polysaccharides.

Proteins - Structure of amino acids, Different levels of organization-Primary, secondary tertiary and quaternary structures.

Nucleic acids - Purines, pyrimidines, Nucleosides and Nucleotides, Different structural form of DNA, denaturation and renaturation of DNA

Lipids-Structure and function of Fatty acids, Triacylglycerols, sphingolipids, steroids and glycerophospholipids.

Water, small molecules-Alkaloids, glycosides, phenols, oligopeptides, Flavonoids, and terpenoids.

UNIT-V

Enzymes: Units of Activity,coenzymes and metal cofactors, temperature and pH effects, Michaelis - Menten kinetics, inhibitors and activators, active site and mechanism of enzyme action, Isoenzymes, allosteric enzymes.

Metabolism of glucose: glycolysis, TCA cycle, glycogenesis, glycogenolysis and gluconeogenesis, pentophosphate shunt, ETC. Digestion of protein and protein metabolism, nitrogen balance: transamination, oxidative deamination and urea cycle. Lipid metabolism: beta oxidation. Interconnection of pathways, metabolic regulations.

TEXT BOOKS:

1. Rafi, M.D. 2014. Textbook of Biochemistry. 2nd edition, Universities Press (India) Private Ltd.

2. Channarayappa 2010. Cell Biology, Universities Press (India) Private Ltd.

3. Ajoy Paul (2007). Textbook of Cell and Molecular Biology, Books and Allied (P) Ltd, Kolkatha.

4. Lehninger, A. L. 1984. Principles of Biochemistry. CBS publishers and distributors, New Delhi, India

5. Horton, Moran, Ochs, Rawn, Scrimgeour Principles of Biochemistry Prentice Hall Publishers.

6. David. E. Sadava Cell Biology: Organelle Structure and Function Jones & Bartlett publishers.

7. Shanmughavel, P. 2005. Principles of Bioinformatics, Pointer Publishers, Jaipur, India.

PAPER-1
C. MICROBIAL BIOTECHNOLOGY

OBJECTIVES

To enable the students to understand the basic knowledge in Microbial Biotechnology

UNIT-I

Definition, Concepts - biotechnological potentials of microalgae - food - feed - Colourant - fuel and pharmaceutically valuable compounds.

UNIT-II

Production of microbial biofertilizers - Mass cultivation of cyanobacteria (Spirullina), Azolla and other N2 fixers (*Azospirillum, Azatobacter & Rhizobium*)

UNIT-III

Basic principle - antagonism, amensalism, parasitism, nematophagy. Microbial herbicides, microbial insecticides - bacterial insecticide Pseudomonas, Bacillus sp. - Bacillus thuringiensis - toxins - BT cotton - viral insecticide - entomopathogenic fungi.

UNIT-IV

Production microbial products - malt beverages - alcohol - vinegar - lactic acid- citric acid- penicillin - streptomycin- L-lysine- L-glutamic acid - protease - lipase - pectinase and riboflavin.

UNIT-V

Microbes in abatement of heavy metal pollution - heavy metal tolerant microbes - Mechanism of heavy metal and antibiotic resistance - role of biosorption - biotransformation of Xenobiotics - Superbug - rDNA application. Biodegradation of oil and petroleum products. Microbial leaching - Copper - Uranium.

TEXT BOOKS:

1. Satyanarayana.U (2005) Biotechnology, Books and Allied (P) Ltd, Kolkatha.
2. Raledge C and Kristiansen B Eds (2001). Basic Biotechnology, 2nd edition, Cambridge University Press.
3. Balasubramanian D, Bryce CFA, Dharmalingam K, Green J, Jayaraman K. (1996). Concepts in Biotechnology University Press, India.
4. Borowitzka MA, Borowitzka LJ (1989). Microalgal Biotechnology, Cambridge University Press.
5. Alan T. Bull. Microbial Diversity and Bioprospecting. ASM press. Washington, D.C Gerbardt P, Murray RG, Wood WA, Kreig NR. (1994) Methods for General and Molecular Bacteriology - American Society for Microbiology Washington D.C.
6. Glazer AN, Nikaido H. (1994) Microbial Biotechnology - Fundamentals of Applied Microbiology WH Freeman and Company, New York.
7. Pnolella P (1998) Introduction to Molecular Biology, WCB Mc Graw Hill, Boston, Massacheutts.
8. Walsh G, Headon DR. (1994). Protein Biotechnology, John Wiley & Sons, New York.
9. Ellyn Daugherty (2008) Biotechnology, CBS publishers and distributors Pvt. Ltd., Chennai.
10. Arumugam, N. and Kumaresan, V. (2016) Fundamentals of Biotechnology, Saras Publication, Nagercoil.

SEMESTER II
PAPER-5
MEDICAL MICROBIOLOGY

OBJECTIVES

To create awareness of microbial diseases of human beings and causes and cures.

UNIT-I

Basics in Medical microbiology - Infectious diseases overview. Medically important microbes. Microbial diseases - sources, route of transmission. Pathogenesis - adhesion, invasion, host cell damage, release of pathogens. Microbial virulence and virulence factors - Signs and symptoms of microbial diseases. Treatment, Prevention and control of microbial infections. Immunity of microbial diseases.

UNIT-II

Diagnosis of microbial diseases - Collection, transport and preliminary processing of clinical pathogens. Clinical, microbiological, immunological and molecular diagnosis of microbial diseases. Modern methods of microbial diagnosis.

UNIT-III

Bacteriology - Characteristics, classification, pathogenesis, pathology, diagnosis, treatment, prevention and control of diseases caused by *Staphylococci, Streptococci, Bacillus, Clostridium, Corynebacterium, Escherichia, Salmonella, Shigella, Klebsiella, Proteus, Vibrio, Pseudomonas, Mycobacteria, Spirochaetes, Rickettsia*.

UNIT-IV

Virology - Structure, multiplication, classification and medical importance of DNA viruses - Pox, Herpes, Hepatitis, Adeno; RNA viruses - Picorna, Orthomyxo, Paramyxo, Rabdo and HIV virus. Viral vaccines and antiviral agents.

UNIT-V

Mycology - Human mycotic infections caused by Dermatophytes, *Histoplasma, Cryptococcus, Candida*, opportunistic mycoses. Mycotoxins. Parasitology - Medical importance of *Entamoeba, Giardia, Plasmodium, Taenia, Ascaris, Wucherhiria*. Laboratory techniques in parasitology.

TEXT BOOKS:

1. Ananthanarayan and Panikers (2013) Textbook Microbiology 9th edition, Universities Press (India) Private Ltd.

2. Balasubramanian, A. and Senthil kumar, P.K, (2017) Medical Microbiology. Darshan Publication, Rasipuram.

3. Rajesh P. Karyakarte and Ajit S. Damle. (2003). Medical Parasitology, Books and Allied (P) Ltd, Kolkatha.

4. Chaechter M. Medoff G. and Eisenstein BC. (1993) Mechanism of Microbial Diseases 2nd edition. Williams and Wilkins, Baltimore.

5. Collee, JG. Duguid JP, Fraser AG, Marimon BP. (1989) Mackie and Mc Cartney Practical Medical Microbiology, 13th Edition. Churchill Livingstone.

6. David Greenwood, Richard CD, Slack, John Forrest Peutherer. (1992) Medical Microbiology. 14th edition. ELBS with Churchill Livingstone.

REFERENCE BOOKS:

1. Hugo WB and Russell AD. (1989) Pharmaceutical Microbiology IV edition. Blackwell Scientific Publication, Oxford.

2. Joan Stokes E, Ridgway GL and Wren MWD. (1993). Clinical Microbiology, 7th edition. Edward Arnold. A division of Hodder and Stoughton.

3. Ronald M. Atlas. (1989) Microbiology. Fundamentals and Applications. II edition, Maxwell Macmillan international editions.

4. Topley & Wilsons's. (1990) Principles of Bacteriology, Virology and Immunity, VIII edition, Vol. III Bacterial Diseases, Edward Arnold, London.

PAPER-6

MICROBIAL PHARMACOLOGY

UNIT: I General principles of Microbial Pharmacology

Principles of pharmacokinetics and pharmacodynamics. Principles of toxicology and treatment of poisoning. Gene based therapy.

UNIT: II Systemic Pharmacology including recent advances of drug affecting:

Autonomic Nervous System- Neurohumoral transmission, Agonists and antagonist of cholinergic and adrenergic systems. Cardiovascular system- Cardiac electrophysiology, Drugs used in ischemic heart diseases, Hypertension C.C.F, Arrythmias and Hyperlipoproteineas. Renal- function, Physiology of urine formation. Diuretics and antidiuretics.

Central Nervous System- Neuro transmission in the central nervous system. General anaesthetics, Local anaesthetics, Sedatives and hypnotics, Antiepileptics, Analgesics- opioids non-opioids, Psychopharmacological agents, Drugs for CNS degenerative disorders and migrane.

UNIT: III Gastro Intestinal System- Drugs for peptic ulcer, Cathartics abd antidiarrhoeal agents, Emetics and antiemetics. Blood- Drugs affecting haemopoeitic system, Haematinics, coagulants, anticoagulants, fibrinolytics, antiplatelets. Autocoids- Histamine and antihistamine, 5-HT and its antagonists, Eicosanoides. Respiratory system - Drugs used for bronchial asthama and cough. Drugs affecting- uterine motility, Oxyocics and tocolytics. Heavy metals and chelating agents- Lead, mercury, iron, copper and arsenic. Drugs used for immunomodolation- Immunostimulants, Immunosuppresants.

UNIT: IV Hormones and Hormone Antagonists- Hypothalamic and pituitary hormones, Thyroid hormones and antithyroid drugs, Sex hormones and their antagonists, Adrenocorticosteroids and their antagonists, Antidiabetic drugs, Vit-D3. Chemotherapy of Microbial Diseases- Antimicrobial agents general considerations, Antimicrobial agents sulfonamides, Quinolones, β-lactum antibiotics, Aminoglycosides, Tetracyclines, chloramphenicol, Macrolide antibiotics, Miscellaneous antibiotics, Antimycobacterial agents, Antifungal agents, Antiviral agents, Antimalarial agents, Antiamoeibic agents, Antiprotozoal agents, Drugs for helminthiasis.

UNIT: V Chemotherapy of Neoplastic Diseases- Antihypertensives – Analgesics. Antiepileptics - Antiulcer drugs, antiinflammatory drugs, Principles and application of biostatics, Essential drug concepts, Drug addiction and drug abuse, important interactions and their mechanisms.

REFERENCE BOOKS:

1. Vyas, S.P. (2009). Theory and Practice in Novel Drug Delivery System, CBS publishers and distributors Pvt. Ltd., Chennai.
2. Text Book of The Therapeutics drugs and diseases management ED by Eric Harfindal, Dick R. Gourley.
3. Principles of drugs action by Glodstein, aranow and Kolman.
4. Herbal drug treatment by Agarwal.
5. Clinical pharmacology by D.R. Lawrence and P.N.Bennette.
6. The Pharmacology basis of Therapeutics by. Louis.S.Goodman and Alfred Gillman.
7. Handbook of experimental Pharmacology by S.K. Kulkarni, Vallabh Prakashan, Delhi.
8. ICH of technical requirements for registration of pharmaceutical for human use, ICH harmonized tripartite guidelines – guidelines for good clinical practice, E6, May 1996.
9. Good clinical practice – Guidelines for clinical trice on pharmaceutical products in India, central drugs standard control organization, New Delhi minister of health - 2001

PAPER-7
BIOINFORMATICS AND BIOSTATISTICS

OBJECTIVES

To enable the students to make use of the tools of bioinformatics and biostatistics to solve microbiological problems.

UNIT-I

Biology in the computer age - Computational Approaches to Biological questions.

Basics of computers - servers, workstations, operating systems, Unix, Linux. World Wide Web. Search engines, finding scientific articles - Pubmed - public biological databases.

UNIT-II

Sequence analysis - pairwise sequence comparison. Protein Data Bank, Swiss-prot, Genbank - sequence queries against biological databases - BLAST and FASTA - multifunctional tools for sequence analysis. Multiple sequence alignments, Phylogenetic alignment - profiles and motifs.

UNIT-III

Genomics and Proteomics - Sequencing genomes - sequence assembly - genome on the web - annotating and analysing genome sequences. Proteomics - biochemical pathway databases.

UNIT-IV

Predicting Protein structure and function from sequence - Determination of structure - feature detection - secondary structure prediction - predicting 3 D structure. Protein modelling.

UNIT-V

Biostatistics: Measures of Central tendency - mean (arithmetic, harmonic and geometric) median and mode; Correlation Co-efficient, Simple linear regression; basic idea of Significance Test, hypothesis tests, levels of significance, Student ‘t’, ‘Chi’ square and goodness of fit.

TEXT BOOKS:

1. Ruchi singh and Richa Sharma (2010). Bioinformatics Basics, Algorithms and Applications. Universities Press (India) Private Ltd.

2. Cynthia Gibas & Per Jambeck (2001). Developing Bioinformatics Computer Skills: Shroff Publishers & Distributors Pvt. Ltd (O'Reilly), Mumbai.

3. H.H. Rashidi & L.K Buehler (2002). Bioinformatics Basics: Applications in Biological Science and Medicine, CRC Press, London.

4. Des Higgins & Willie Taylor (2002). Bioinformatics: Sequence, structure and databanks, Oxford University Press.

5. Baxevanis A.D & Ouellette B.E.F (2001) Bioinformatics: A practical guide to the analysis of genes and proteins, Wiley Interscience - New York

6. Arora P.N & Malhon P.K (1996). Biostatistics Imalaya Publishing House, Mumbai.

7. Sokal & Rohif (1973). Introduction to Biostatistics, Toppan Co. Japan.

8. Stanton A & Clantz, Primer of Biostatistics - The McGraw Hill Inc., New York.

9. Chavali (2009). Bioinformatics and Bioprogramming in C. Universities Press (India) Private Ltd.

MAIN PRACTICAL
PAPER-1
(Subjects covering Paper 1, 2 and 3)

OBJECTIVES

To enable the students to get hands-on training on various aspects of general, food, agricultural and environmental microbiology and immunotechnology.

UNIT-I

1. Cleaning of glassware and sterilization.

2. Preparation and use of glassware cleaning solutions, sterilization.

3. Micrometry - counting and measurements.

4. Isolation of anaerobic and aerobic bacteria - cyanobacteria, actinomycetes and fungi.

5. Pure and axenic culture techniques - serial dilution - pour plate, spread plate, streak plate methods and stab culture techniques.

UNIT-II

1. Bacterial Staining methods - simple, Gram's, acid fast, flagella, capsule and spore.

2. Fungal Staining methods - Lacto-phenol cotton blue.

3. Motility of bacteria.

4. Determination of growth - growth curve - generation time - synchronous and asynchronous growth - estimation of growth - microscopic - plate - membrane filter - turbidometry - dry weight - wet weight - chlorophyll.

5. Study of virus infected plant samples

UNIT-III (Microbial Physiology)

Isolation and Colorimetric estimation of

Hands on:

1. Amino acids - ninhydrin method

2. Protein - Biuret method/Lowry's method

3. Carbohydrate reducing sugars - Anthrone method/Benedicts method.

Isolation and Colorimetric estimation of

Hands on:

1. DNA - Diphenylamine method

2. RNA - Orcinol method

3. Pigments (chlorophyll - carotenoids - phycobiliproteins)

(Human anatomy and physiology)

1. Absolute Eosinophil Count. Demonstration of ECG/Echo and its interpretation techniques. Demonstration of lymphoid organs. Determination of Erythrocyte Sedimentation Rate. Determination of Specific Gravity of Blood.

2. Hair perforation Test. Measurement of Pulse, BP. Preparation and Examination of Blood smear. Blood Sugar analysis. Study of different histological slides. Total Platelet count

UNIT-IV

1. Microbial analysis of food products - bacterial and fungal

2. Microbial spoilage of refrigerated food

3. Extracellular enzyme activities - cellulase, protease, lipase and phosphatase

4. Milk microbiology - direct microscopic count - standard plate count - reductase test (resazurin/methylene blue) - isolation of microbes from yoghurt, curd.

5. Quantification of microorganisms in air - solid and liquid impingement techniques

6. Microbial flora from different soil types and habitats - isolation of nitrogen fixing bacteria, cyanobacteria and phosphate solubilizing organisms- development of Winogradsky Column

7. Field trip to dairy, food industries, sewage treatment plants.

UNIT-V

1. Precipitation techniques
Hands on: Agar gel diffusion - Ouchterlony's method.
Theory: Single radial immunodiffusion - staining.
Counter immuno electrophoresis & Rocket Immuno Electrophoresis.
2. Agglutination techniques
Hands on: Blood grouping and Rh factor - Latex agglutination - RF & ASLO. Theory: Heme agglutination RPHA / IHA.

TEXT BOOKS:

1. Rajan. S and Selvi Christy (2015). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.

2. Ponmurugan, (2012) Experimental procedures in bioprocess technology, Anjanaa Book House Publishers, Chennai.

3. Aaronson S. (1970) Experimental Microbial Ecology, Academic Press, New York

4. Bhatia A (2000). Manual of Practical Immunology, Aruna Bhatia 1st Edition, Palani Paramount Publication

5. Benson H.J (1994). Microbiological Applications, WmC Brown Publishers, Oxford.

REFERENCE BOOKS:

1. Clesceri L.S, Greenberg A.E, Eaton AD. (1998) Standard methods for examination of water & waste water American Public Health Association.
2. Collins C.H, Lyne P.M, (1985). Microbiological methods. Butterworths, London.
3. Gerhardt P, Murray R.G, Wood W.A, Kreig, N.R. (ed) (1994). Methods of General and Molecular Bacteriology. American Society for Microbiology, Washington DC
4. Holt J.S, Kreig N.R, Sheath P.H.A, Williams S.T. (1994) Bergey's Manual of Determinative Bacteriology (9th ed.), Williams & Wilkins, Baltimore.
5. Hudson L and Henry FC (1999) Practical Immunology, 3rd edition, Blackwell Scientific Publishers, Oxford, London.
6. Miller L.E, Luke H.R, Peacock J.E and Tomar R.H (1990). Manual of Laboratory Immunology, 2nd edition, Lea and Febiger - London.
7. Official Methods of Analysis (1995), Arlington, Virginia, USA.

8. Patrick R. Murray. (editor chief) (1999) Manual of clinical microbiology, 7th edition, ASM Press, Washington D.C.

9. Prakash M., Arora, C.K. (1998) Pathological techniques - Anmol Publications Pvt. Ltd. N.D.

10. Rhodes P.M, Stanbury P.F. Applied Microbial Physiology - A practical approach. IRL Press, Oxford University Press, Oxford.

11. Talwar GP (ed). (1982) A handbook of Practical Immunology, Vikas Publishing House Pvt. Ltd.

12. Talwar GP (1983). Microscopic Immunoassays and Applications, Vikas International Students Edition, Vikas Publishing House Pvt. Ltd.

13. Tuffery AA (ed) (1996) Laboratory Animals - An Introduction, 2nd edition, John Wiley and Sons, New York.

14. Wilson K, Walker J. (1995) Practical Biochemistry Principles and Techniques, Cambridge University Press.

MAIN PRACTICAL
PAPER-2
(Subjects covering Paper 4, 5 and 6)

OBJECTIVES

To impart knowledge on microbial diseases, metabolism and hands on training on computer applications in biology.

UNIT-I (Medical Microbiology)

1. Collection and transport of pathological specimens for microbiological examinations.

2. Bacteriological methods: Microscopic examination - blood - feaces - pus - sputum - throat swab and nose swab - urine - body fluids

3. Isolation and identification of the pathogen - culture and biochemical tests.

UNIT-II (Medical Microbiology)

1. Mycological methods: Macroscopic observation - microscopic observation - culture

2. Identification of *Mucor, Rhizopus, Aspergillus, Penicillium, Candida, Trichophyton, Microsporum, Epidermophyton* - SDA/Corn Meal Agar - Slide culture method - Germ tube method - Sugar assimilation/fermentation tests. Examination of parasites in clinical specimens - ova/cyst in feaces.

UNIT-III (Medical Microbiology)

1. Clinical - observation: Theory: a) X ray chest 2) Mantoux test for Mycobacterium tuberculosis infection.

2. Haematology: Total count (TC): RBC and WBC, - Differential count (DC) - Haemoglobin level, - Bleeding time - Clotting time – ESR

3. Biochemical : Serum - SGOT, SGPT, cholestrol, creatinine bilirubin and protein. Urine - colour, turbidity, sugar, albumin, bile salt, - phenylketone urea, bence Jones protein, RBC, pus cells, pH, acidity and alkalinity.

UNIT-IV (Microbial Pharmacology)

Antimicrobial assay - sensitivity test - Stokes and Kirby Bauer methods - Disc diffusion - agar dilution - broth dilution - MBC/MIC. Quality control for antibiotics.

UNIT-V (Bioinformatics - Demonstration only)

1. Basics of computers - basic commands - file creation, copying, moving & deleting in Linux & Windows. Using email - Using browsers - search engines, - Pubmed.

2. Using biological databases - Swissprot - Protein Data Bank and Genbank.

3. Different types of sequence analysis queries in BLAST and FASTA.

4. Multiple sequence alignments and Phylogenetic alignments.

5. Protein structure prediction software.

6. Genomes and Proteomes available on the web and their use.

7. Statistical software available on the web and their use.

TEXT BOOKS:

1. Rajan. S (2013) Manual for medical lab technology, Anjanaa Book House Publishers, Chennai.

2. Rajan. S and Selvi Christy (2015). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.

3. Atlas RM (1993). Handbook of Microbiological Media, (ed) Parks L.C, CRC Press, London.

4. Balows A, Hansler Jr K.L, Isenberg H.D, Shalomy H.J (1991). Manual of Clinical Microbiology, American Society for Microbiology, Washington DC.

5. Boyer R (2001) Modern Experimental Biochemistry, 3rd edition: Benjamin / Cummings Publishing Company Inc.

6. Brawshaw L.J. (1988). Laboratory Immunology, Sandders College Publishing.

REFERENCE BOOKS:

1. Clark J.M Jr and Switzer RI (1977) Experimental Biochemistry, 2nd Edition. W.H. Freeman, San Francisco.
2. Gerhardt P, Murray R.G, Wood W.A and Kreig N.R. (ed) (1994) Methods for General and Molecular Bacteriology - American Society for Microbiology, Washington D.C.
3. Jayaraman J (1981). Laboratory manual in Biochemistry, New Age Int. Publishers, New Delhi.
4. Lorian V (1991) Antibiotics in Laboratory Medicine, 3rd edition, Williams and Wilkins, Baltimore.
5. Myers R.M, Koshi G (1982) Diagnostic procedures in medical microbiology. IELC Combodia Press.
6. Plummer D.T (1987) An introduction to Practical Biochemistry, 3rd edition, Tata McGraw Hill, New Delhi.
7. Switzer R.L and Garrity L.F (1999) Experimental Biochemistry, 3rd edition, WH Freeman and Co
8. Warton D.C and McCarthy R.E (1972) Experiments and Methods in Biochemistry. MacMillan, New York.
9. Wilson K and Walker J (2000) Practical Biochemistry Principles and Techniques, 5th Edition, Cambridge University Press.
10. Work T.S and Work E (1972) Laboratory Techniques in Biochemistry and Molecular Biology. Vol. 3 - North-Holland, Amsterdam
11. Ruchi singh and Richa Sharma (2010). Bioinformatics Basics, Algorithms and Applications. Universities Press (India) Private Ltd.
12. Pal, G.K and Pravathi Pal (2016), A text book of Practical Physiology, 4th Edition Universities Press (India) Pvt Ltd,

ELECTIVE
PAPER - 2
(to choose 1 out of 3)
A. FOOD ANALYSIS AND QUALITY CONTROL

OBJECTIVES: The paper focuses on physical, chemical, microbial and sensory analysis of food, concepts of quality control and quality management, national and international food loss and adulterants in various food products

UNIT-I

Sampling – Sampling techniques and preparation of food samples.

Techniques used in food analysis – Chromatography, Electrophoresis, Electrometric determinations, Refractometry and Polarimetry Spectrophotometry, Fluorimetry, Radio - active tracer techniques, Atomic absorption

UNIT-II

Physico chemical methods for food analysis - Moisture and Total solids, Carbohydrates, Proteins, Fats, Fiber, Ash and its types, Minerals, Vitamins. Enzymatic methods

Biological methods of food analysis - Standard plate count; Plate loop method; Spiral plate; Droplet technique; Dye reduction; Catalase test and ELISA. Testing of food for organisms such as *B. cereus, C. botulinum, E. coli, L. monocytogenes, S.aureus, Salmonella* and *Shigella.*

UNIT-III

Sensory assessment of food quality –Appearance of food, Flavor of food, Texture of food. Sensory Tests – Difference, Rating and Sensitivity tests. Types of panels, Testing area and schedule.

Quality control of following food products – Milk and milk products, Oils and Fats, Cereal grains and flours, Fruits and vegetable products, Canned foods, Egg and egg products, Meat and Meat products

UNIT-IV

Food quality management – Objectives, Importance and Functions of quality control. Total quality, management, Good manufacturing practices, seven principles of HACCP and codex in food. Quality control, methods of – a. raw materials, b. manufacturing process and c. finished products.

UNIT-V

Food Safety – Role of voluntary agencies and legal aspects of consumer protection. National and International food laws – PFA, FDA, BIS, AGMARK, Essential Commodity Act, Export (quality and inspection act, Consumer protection act), Nutritional labeling requirements of foods. Food adulteration.

INDUSTRIAL VISIT: Food and Pharmaceuticals Industry and Report.

TEXT BOOKS:

1. Yeshajahu Pomeranz and Clifton E. Meloan (1996), Food Analysis, CBS publishers and distributors Pvt. Ltd., Chennai.
2. Rajan. S and Selvi Christy (2010). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.
3. Adams, M.R and Moss M.O (1995) Food Microbiology, New Age International (p) Limited Publishers.
4. Ananthanarayanan R and CK Jayaram Panicker, 1994, Textbook of microbiology Orient Longman.
5. Chakraborty P 1995, A Text book of microbiology, New Central Book Agency Pvt Ltd. Calcutta.
6. Debnath, 2005, Tools & Techniques of Biotechnology, Pointer Publishers, Jaipur.
7. Frazier, W.C and Westhoff, D.C (1988). Food microbiology, 4th edition, Tata Mac Graw Hill, New Delhi.
8. Jacobs.M.B., 1999, Chemical Analysis of Food & Food Products, CBS Publiishers, New Delhi.
9. Jay.J.M, 1996, Modern Food Microbiology, CBS Publishers, New Delhi.
10. Nielsen, S.S, 2004, Introduction to chemical Analysis of foods, CBS Publishers, New Delhi.
11. Pomeranz.Y, Meloan.C.E, 1996, Food Analysis – Theory & Practice, CBS Publiushers, New Delhi.
12. Ranganna. S., 2001, Handbook of Analysis & Quality control for Fruit & Vegetable Products, Tata McGraw Hill, New Delhi.
13. Robinson R.K (1990) Dairy Microbiology, Elsevier Applied science, London.
14. Salle, A.J. (1992). Fundamental Principles of Bacteriology. 7th Edition, Mc. Graw Hill Publishing Co. Ltd., New York.

PAPER - 2
B. GENETIC ENGINEERING

OBJECTIVES

To enable the students to understand the basic knowledge in Genetic Engineering.

UNIT-I

Gene as a unit of mutation and recombination. Mutagenesis, mutations and mutants - biochemical basis of mutations, spontaneous and induced mutations, isolation of mutants, mutagenesis, reversion, suppression, genetic analysis of mutants. Recombination methods
- conjugation and transformation.

UNIT-II

Enzymes in Genetic Engineering - DNA Polymerase, Polynucleotide kinase, T4 DNA ligase, Nick translation system, Terminal deoxynucleotidyl transferase, Reverse transcriptase Restriction endonucleases Type I & II. Vectors - plasmid, bacteriophage and other viral vectors, cosmids, Ti plasmid, yeast artificial chromosome.

UNIT-III

Strategy of recombinant DNA technology; Gene library - Genomic library, cDNA library - Cloning strategies - Use of linkers, adoptors, homopolymer tails - Nucleic acid hybridization - Colony hybridization, plaque hybridization; Blotting techniques - Southern, Northern, Western and dot blotting.

UNIT-IV

PCR - principles, techniques and applications. Gene isolation, cloning and expression, DNA sequencing, oligonucleotide synthesis, Southern and Northern hybridization, FISH, RAPD, PCR-RFLP, STRR, LTRR. DNA fingerprinting and their applications for diagnosis of disease, site-directed mutagenesis, Gene silencing, Gene transfer technologies.

UNIT-V

DNA chips and microarray gene screen technology; site directed mutagenesis, transgenic animals and gene knockout techniques, cell culture based techniques Genetic diagnosis. Applications in medical field, biology, transgenic plants, transgenic animals, Recombinant vaccines development. Gene therapy; Molecular basis of genetic diseases, genetic counseling.

TEXT BOOKS:

1. Molecular biology and Microbial genetics (1994) David Frifielder, Stanely R. Maloy, 2nd edition Jones and Barlett Publishers.

2. Channarayappa (2015). Molecular Biology, Universities Press (India) Private Ltd.

3. Genetics by Peter J Russell (1997) 5th edition Benjamin-Cummings Publishing Company.

4. Molecular Biotechnology (2003) Bernard R. Glick and Jack J.Pasternak., 2nd edition by ASM press.

5. Gene Cloning and DNA analysis (2004) T.A.Brown 2nd edition. By ASM press.

REFERENCES BOOKS:

1. Ajoy Paul (2011). Text Book of Genetics- from Genes to Genomes, Books and Allied (P) Ltd, Kolkatha.

2. Principles of Gene Manipulation and Genomics (2006) Sandy Primrose. 7th Edition, Black Well Publishers.

PAPER - 2
C. MICROBIAL BIONANOTECHNOLOGY

OBJECTIVES

To enable the students to understand the basic knowledge in Microbial Bionanotechnology.

UNIT-I

History - bionanotechnology - concept and future prospects - application in Life Sciences. Terminologies - nanotechnology, bionanotechnology, nanomedicine, nanowires, quantum Dots, nanocomposite, nanoparticles.

UNIT- II

Molecular nanotechnology - nanomachines - collagen. Uses of nanoparticles - cancer therapy - manipulation of cell and biomolecules. Cytoskeleton and cell organelles. Types of nanoparticles production - physical, chemical and biological. Microbial synthesis of nanoparticles

UNIT-III

Nanoparticles - types, functions - Silver, Gold and Titanium. Physical and chemical properties of nanoparticles. Characterization of nanoparticles - UV-Vis spectroscopy, Electron Microscopy - HRTEM, SEM, AFM, EDS, XRD.

UNIT-IV

Uses of nanopartcles in biology: Drug delivery - protein mediated and nanoparticle mediated. Uses of nanoparticles in MRI, DNA and Protein Microarrays. Nanotechnology in health sectors. Toxicology in nanoparticles - Dosimetry.

UNIT-V

Advantages of nanoparticles - drug targeting, protein detection, MRI, development of green chemistry - commercial viability of nanoparticles. Disadvantages - health risk associated with nanoparticles, inadequate knowledge on nanoparticles research.

TEXT BOOKS:

1. Parthasarathy, B.K. (2007). Introduction to Nanotechnology, Isha Publication.

2. Elisabeth Papazoglou and Aravind Parthasarathy (2007). Bionanotechnology. Morgan & Claypool Publishers.

3. Bernd Rehm (2006). Microbial Bionanotechnology: Biological Self-assembly Systems and Biopolymer-based Nanostructures. Horizon Scientific Press.

4. David E. Reisner, Joseph D. Bronzino (2008). Bionanotechnology: Global Prospects. CRC Press.

5. Ehud Gazit (2006). Plenty of Room for Biology at the Bottom: An Introduction to Bionanotechnology. Imperial College Press.

SEMESTER III
PAPER-8
MICROBIAL GENETICS AND MOLECULAR BIOLOGY

OBJECTIVES

To enable the students to understand the basic and applied aspects of molecular biology and microbial genetics.

UNIT-I

Introduction to identification of Genetic Material (Griffith, Avery and Hershy and Chase Experiments). Gene as a unit of mutation and Recombination. Mutagenesis, Mutations and Mutants - Biochemical basis of Mutation, Spontaneous and induced mutations, Isolation of mutants, mutagenesis, reversion, suppression, genetic analysis of mutants.

UNIT-II

Gene Transfer Mechanisms - Transformation - competence cells, regulation, general process; Transduction - general and specialized; conjugation - Hfr, Triparental mating, self transmissible and mobilizable plasmids, pili.

UNIT-III

Biology of Plasmids - Extrachromosomal heredity - biology of bacterial plasmids, structure of the plasmids, F1,ColE1, pSC101 and Ti plasmids, - replication, control, partitioning, incompatibility and gene transfer.

UNIT-IV

Transposable genetic elements and Gene Mapping - Introduction - Discovery, insertion sequences, complex and compound transposons - T10, T5, and retroposon. Genetic mapping - Ecoli - Virus T4 phage – using r II system.

UNIT-V

Concept of gene and Gene regulation - Organization of gene in prokaryotes and Eukaryotes - Introduction, Operon concept, lac and Trp operons, promoters and repressors, regulation of gene expression - Transcriptional control - promoters, terminators, attenuators and anti terminators; Induction and repression; the lac operon - catabolite repression; Biosynthesis; trp operon - upstream activator sequences and enhancers, two component regulatory systems. Translational control - ribosome binding, codon usage, antisense RNA; post- translational modification (epigenetics).

TEXT BOOKS:

1. Antony JF, Griffiths, Gilbert WM, Lewontin RC and Miller JH (2002). Modern Genetic Analysis, Integrating Genes and Genomes, 2nd edition, WH Freeman and Company, New York.

2. Blackburn GM, Gait MJ. (1996). Nucleic acids in chemistry and biology. Oxford University press.

3. Friedberg EC, Walker GC, Siede W. (1995). DNA repair and mutagenesis. ASM press.

4. Malacinski GM and Freifelder D (1998) Essentials of Molecular Biology, 3rd edition, John and Bartlett Publishers.

5. Lewin B. (2000). Genes VII. Oxford University press

6. Maloy SR, Cronan Jr. JE, Freifelder D (1994). Microbial genetics. Jones and Bartlett publishers.

7. Singer M, Berg P. (1991). Genes and Genomes. University Science Books.

8. Stryer L. (2002). Biochemistry. 5th edition, W.H.Freeman and company.

REFERENCE BOOKS:

1. Watson JD, Hopkins NH, Roberts JW, Steitz JA, Weiner AM. (1998). Molecular biology of the gene, 4th edition, Benjamin/Cummings publishing company.

2. Ajoy Paul (2011). Text Book of Genetics- from Genes to Genomes, Books and Allied (P) Ltd, Kolkatha.

3. Basu. S.B and Hossain. M (2016), Principles of Genetics, Books and Allied (P) Ltd, Kolkatha.

PAPER-9
RECOMBINANT DNA TECHNOLOGY

UNIT-I

Basics of DNA cloning: Simple cloning and cloning using linkers and adaptors. Cloning into various kinds of vectors – plasmids, phages lambda and M13, phagemids, cosmids, BACs and YACs. Selection and screening of clones.

UNIT-II

Methods of DNA and protein analysis: Isolation and purification of DNA. Agarose, polyacrylamide and pulsed field gel electrophoresis of DNA. Southern and Northern Blotting. Radiolabelling probes. RFLP analysis. DNA fingerprinting and its application in forensic sciences. Native PAGE, SDS-PAGE and two-dimensional PAGE analysis of proteins. Blotting techniques.

UNIT-III

Polymerase Chain Reaction: Concept of PCR and various thermophilic enzymes used in PCR. Gradient PCR versus Touchdown PCR. Designing primers. Cloning PCR products. Differential Display PCR, RAPD fingerprinting of micro-organisms, Overlap PCR, Rolling Circle Amplification Technology.

Construction of cDNA and genomic DNA libraries: Vectors used in the construction of cDNA versus genomic DNA libraries. Steps and enzymes involved in the construction of cDNA versus genomic DNA libraries.

UNIT-IV

Genome sequencing: DNA sequencing by Enzymatic and chemical method – traditional and cycle sequencing. STS mapping. E-PCR. Whole genome shotgun cloning methods. Clone-by-clone shotgun sequencing of genome map construction, clone selection,

Transcriptional analysis of gene expression and transcriptomics: Gene expression analysis by Northern Blotting, RT-PCR, EST analysis and the use of reporter genes. Enzymatic and bioluminescent reporters. Reporters used in protein localization and trafficking studies. Transcriptome analysis by DD-PCR and EST analysis, DNA microarrays (cDNA arrays and oligo arrays), Serial Analysis of Gene Expresion (SAGE).

UNIT-V

Protein engineering and proteome analysis: Proteome analysis by 2D gel electrophoresis coupled to mass spectrometric analysis. Protein arrays and their applications.

Pharmaceutical products of DNA technology: Human protein replacements – insulin, hGH and Factor VIII. Human therapies – TPA, interferon, antisense molecules. Vaccines – Hepatitis B, AIDS, and DNA vaccines. Good hygienic procedure (GHP), Good manufacturing procedure (GMP), Good laboratory procedure (GLP) and ISO-9ooo-HACCP.

Transgenics and animal cloning: Creating transgenic animals and plants**.** Animal cloning.

TEXT BOOKS:

1. Molecular Biology by David P. Clarke, 1st edition; Elsevier Academic Press; 2005.
2. Satyanarayana.U, Biotechnology, Books and Allied (P) Ltd, Kolkatha: 2005.
3. Molecular Cloning: A laboratory manual by Joseph Sambrook & David Russell, 3rd edition; CSHL Press; 2001.
4. DNA Technology: The Awesome Skill by I. Edward Alcamo, 2nd edition; Hardcourt Academic Press; 2001.
5. Molecular Biology of the Gene by James Watson, Tania Baker, Stephen Bell, Alexander Gann, Michael Levine & Richard Losick , 6th Edition; CSHL Press; 2007

PAPER-10
INDUSTRIAL BIOTECHNOLOGY

OBJECTIVES

To enable the students to understand the microbial processes applicable in industries and scale-up processes.

UNIT-I

Industrially important microorganisms: Screening techniques - Detection and assay of fermentation products - Strain improvements - Mutations, protoplast fusion and rDNA techniques for strain development.

UNIT-II

Industrial fermentation : Primary and secondary metabolites; Microbial Growth kinetics; Basic functions of fermenter - body construction, aeration, agitation, theories of aeration, oxygen transfer kinetics; Concepts of Newtonian and non - newtonian fluids - antifoam - Submerged and solid state fermentation - Scale up; Fermentation Biosensors; Downstream Processing.

UNIT-III

Industrial Production: Typical Fermentation processes for the industrial production of Wine, Beer, Bacitracin, Streptomycin, Riboflavin, B-carotene, Gibberellins, glutamic acid and surfactants. Commercially useful non-microbial products produced through microbes - insulin, interferons, B-cell growth factors, tissue plasmonogen activator. Microbial Enzymes - Enzyme immobilization, Microbial Insecticides. Production of SCP - Spirulina and yeast.

UNIT-IV

Algal biotechnology: Biotechnological potential of microalgae, food, feed and fuel production - pharmaceutically valuable of microalgae, pigments and H2 gas from BGA.

UNIT-V

Nanobiotechnology: Introduction - history and recent developments - sources of nanoparticles - microbial producers of nanoparticles -advantages of microbial nanoparticles - applications - social and ethical implications - ethical concerns about patenting of living organisms and genetic materials.

TEXT BOOKS:

1. Balasubramanian D, Bryce CFA, Dharmalingam K, Green J, Jayaraman K. (1996). Concepts in Biotechnology, University Press, India.
2. Satyanarayana.U, Biotechnology, Books and Allied (P) Ltd, Kolkatha: 2005.
3. Glazer AN, Nikaido H. (1994) Microbial Biotechnology - Fundamentals of Applied Microbiology WH Freeman and Company, New York.
4. Glick BR, Pasternak JJ. (1994) Molecular Biotechnology, ASM Press, Washingon DC.
5. Arumugam, N. and Kumaresan, V. (2016) Fundamentals of Biotechnology, Saras Publication, Nagercoil.
6.

REFERENCE BOOKS:

1. Baxevanis AD and BFF Ouellette, Wiley O, (2001). Bioinformatics - A practical guide to the analysis of genes and proteins. Interscience, New York.
2. Borowitzka MA, Borowitzka LJ (1989) Microalgal Biotechnology, Cambridge University Press.
3. Doolittle RF. (1990). Molecular evolution. Computer Analysis of Protein and Nucleic acid Sequences Methods in Enzymology. Academic Press, New York.
4. Faber K. (1992), Biotransformation in Organic Chemistry Springer Vulag.
5. Gerbardt P, Murray RG, Wood W A., Kreig NR. (1994), Methods for General and Molecular Bacteriology - American Society for Microbiology Washington D.C.
6. Glick BR, Pasternak JJ (1998), Molecular Biotechnology - Principles and Applications of Recombinant DNA, ASM Press, Washington DC.
7. Higgins D, Taylor W. (2000). Bioinformatics, sequence, structure and databanks A practical approach. Oxford University Press.
8. Gibas C and P. Jambek. (2001). Developing Bioinformatics computer skills O'Reilly, USA.
9. Misener S, Krawetz SA. (2000) Bioinformatics Methods and Protocols. Humana Press, Totowa, New Jersey.
10. Miyamoto MM, Cracraft JL. Phylogenetic Analysis of DNA sequences. Oxford University Press. Oxford.
11. Pnolella P (1998) Introduction to Molecular Biology, WCB Mc Graw Hill, Boston, Massacheutts.
12. Rashidi HH, Buehler LK. (2000) Bioinformatics Basics. Applications in Biological Science and Medicine. CRC Press, Washington DC.
13. Raledge C and Kristiansen B Eds (2001) Basic Biotechnology, 2nd edition, Cambridge University Press.
14. Walsh G, Headon DR. (1994). Protein Biotechnology, John Wiley & Sons, New York.

ELECTIVE
PAPER - 3
(to choose 1 out of 3)
A. BIOLOGICAL TECHNIQUES

OBJECTIVES

To enable the students to understand the basic biological techmiques.

UNIT-I

Microscopy and Related Techniques - Light Microscopy : Microscopic optics, components of microscopes. Basic principles and method of Bright field, Dark field, Phase contrast. Fluorescence, Polarization and confocal microscopes. Applications of various types of microscopy such as immunofluorescence - In situ hybridization. Electron Microscopy - Principle, Techniques and applications of Transmission Electron microscope (TEM) and Scanning Electron Microscope (SEM), Atomic Force Microscope (AFM). Photomicrography and Video micrography Developing and printing of microphotographs.

UNIT-II

Analytical Techniques - Spectroscopic methods - UV-Visible, Atomic Absorption Spectrophotometer, Atomic Emission Spectroscopy. Centrifugation - Principles, various types including centrifugation Electroanalytical methods - electrolytic all 4 golvanic cell - Potentiometric, conductimetric, coulometric & voltametric analysis. Biosensors. Radioactive Analysis : Principles of radioactivity, GM counter & LS counter.

UNIT-III

Principles & Applications of Chromatographic Techniques : Adsorption - Ion exchange and gel permeation - affinity chromotography for separation of compounds including GC and HPLC.

UNIT-IV

Electrophoresis Techniques - protein - nucleic acid - immuno - two dimensional electrophoresis.

UNIT-V

Molecular Biological Techniques

a) Microbiological techniques - purification, storage, measurement of microbial growth rate.

b) Isolation and amplification of nucleic acid - Plasmid isolation, chromosomal DNA isolation.

Polymerase chain reaction

c) Gene cloning techniques - Restriction digestion and Phosphatase treatment of cloning vectors. Cloning technique, separation and staining of DNA, qualification of DNA, gene transfer mechanisms - chemical and electroporation.

d) Methods of detection of clones - Nucleic acid transfer by blotting, Hybridization plaque, colony hybridization, histochemical detection of A -galactosidase, antibody screening including colour development reaction.

TEXT BOOKS:

1. Lodish, H. Baltimore Daerk . A. Zipsury, S.L. Marsudaisa. P. Darnel. J. (1995) Molecular cell biology.

2. Old, R.S. and Primrose, S.B. (1995) Principles of Gene manipulation. An introduction to genetic Engineering. 5th Edition. Blackwell Scientific Publication, London.

REFERENCE BOOKS:

1. Cynthia Gibas & Per Jambek (2001). Developing Bioinformatics Computer Skills, Shroff Publishers & Distributors Pvt. Ltd., O'reilly) Mumbai.

2. Demain, A.L. and Davies, J.E. (1999). Manual of Industrial Microbiology & Biotechnology, ASM Press.

3. Glick, B.R. and Pasternak, J.J. (1994). Molecular Biotechnology, ASM Press.

4. John G. Webster. (2004). Bioinstrumentation. University of Wisconsin, John Wiley & Sons, Inc.

5. Misener, S. and Krawetz, S.A. (2000). Bioinformatics Methods and Protocols. Human Press, Totowa, New Jersey.

6. Rashidi, H.H., and Buehler, L.K. (2002). Bioinformatics Basics: Applications in Biological Science and Medicine, CRC Press, London.

7. Sambrrok, J. and Ruseell, D.W. (2001) Molecular Cloning – A Laboratory Manual (3rd eidition, Vol. 1,2,3) Cold Spring Laboratory Press, New York.

8. Savile Pradbury. (1991). Basic measurement techniques for light microscopy, Oxford University Press, Royal Microscopical Society.

9. Surzeki, S. (2000). Basic Techniques in Molecular Biology, Springer.

10. Westermeier, R (1993). Electroporesis in practice – VCH – Federal Republic of Germany. 11. Willett, J.E. (1991). Gas Chromatography, John Wiley & Sons. 12. Wilson, K. and Walker (1995). Practical Biochemistry Principles and Techniques, Cambridge University Press.

PAPER - 3
B. HERBAL TECHNOLOGY

OBJECTIVES

To enable the students to understand the basic knowledge in Herbal technology.

UNIT - I

Pharmacognosy: Pharmacology - Definition and history, Indian systems of medicine - Siddha, ayurvedha, and Unani systems. Taxonomy of locally available medicinal plants, their chemical constituents and medicinal uses - Classification of Crude drugs - Chemistry of Drugs - Future of pharmacognosy.

UNIT - II

Classification of medicinal plants - Vernacular name and family - Geographical source, cultivation, collection, and processing for market and commerce in crude drugs. Morphological and histological studies, chemical constituents - Therapeutic and other pharmaceutical uses. Underground stem - ginger, Alpinia - Roots - Rauolfia - Belladona - Aerial parts - Bark - Cinchona.

UNIT - III

Leaves - Adathoda, Eucalyptus - Flower - Clove fruits seeds - Nux vomica Nutmegs, Gooseberry - unorganized drugs - Gum - Acacia - Resin - Turpentine, fixed oil - castor oil.

UNIT - IV

Herbal medicines for Human ailments - Drugs acting on cardiac diseases, cerebral diseases, Nasal, diseases - Blood pressure Drugs acting on Nervous system - Depressants. - stimulants - Respiration and Drugs - Urogenital system and drugs - Psychoactive plants.

UNIT - V

Propagation of medicinal plants - Micro and macro propagation conservation of rare medicinal plants Role of biotechnology in medicinal plants banks - cultivation of medicinal and aromatic plants - Drug adulteration - methods of Drug evaluation, Herbal food - Food processing - packaging - Herbal sale and Export of medicinal plants - marketing - Intellectual property rights - Export laws.

TEXT BOOKS:

1. Agarwal and Paridhavi, (2007) Herbal Drug Tecnology, 2nd Edition. Universities Press (India) Private Ltd.
2. Wallis, T.E, Text book of pharmacognosy by 5th edition. CBS publishers and distributors Chennai.
3. Kuntal Das (2014). Herbal Plants and their Applications in Cosmeceuticals, CBS publishers and distributors Pvt. Ltd., Chennai.

REFERENCE BOOKS:

1. George Edward Trease and W.C. Evans - Pharmacognosy 12th edition, English Language Books Society, Baelliere Tindall.
2. Handa, S.S. and Kapoor, V.K. Pharamcognosy by 2nd Edition, Vallabh Prakashan Publishers, New Delhi.
3. Jain, S.K (1980) Indian Medicinal plants.
4. Kokate, C.K., Durohit, A.P. and Gokhale, S.R., Pharmacognosy by 12th edition - Nirali Prakasham Publishers, Pune.
5. Kumar N.C. (1993) An Introduction to Medical Botany and Pharmacognosy.
6. Nadkarni (1981) Indian Materia Medica.
7. Shah, S.C. and Qudary (1990) A text book of Pharmacognosy.

PAPER - 3
C. VACCINE BIOTECHNOLOGY

OBJECTIVES

To enable the students to understand the basic knowledge in Vaccine Biotechnology.

UNIT-I

Immune system - recognition of nonself and self ; Humoral Immunity - immunoglobulins, basic structure, classes and subclasses; Cellular Immunity, lymphocytes, lymphokines, cytokines and interferon; Antigen Recognition-membrane. Receptors for antigens, MHC classification and functions, super antigen.

UNIT-II

Recombinant vaccines; polynucleotide as vaccines; vector vaccines; naked DNA vaccines; biosynthetic and chemically synthesized vaccines; subunit vaccine; antiidiotype vaccines; fusion vaccines; mixed particle vaccines; human mucosal vaccines; Combination vaccines; Edible vaccines produced in transgenic plants and microencapsulation.

UNIT- III:

EPI vaccines - production and testing of tetanus toxoid, diphtheria toxoid, pertussis vaccine, BCG vaccines; preparation of Hepatitis B vaccine and tissue culture derived rabies vaccine and AIDS vaccine.

UNIT-IV

Adjuvants - classification and properties; carriers - types and functions - vehicles - types, functions and mode of action ; biodegradable polymers - microspheres, liposomes and ISCOM ; immunostimulators (IS) - classification and mechanism of action of IS.

UNIT-V

Germ free, Axenic, Monoxenic, dixenic, Gnotobiotic, conventional, xyloxenic, SPF; isolators, Gnotobiotic technique, gene knockout mice; transgenic and SCID mouse; Athynic nude mouse; animal models of human diseases and techniques of experimentations.

TEXT BOOKS:

1. Ajoy Paul (2016). Text Book of Immunology, Books and Allied (P) Ltd, Kolkatha.
2. Chapel H and Halbey M (1986) Essentials of Clinical Immunology, ELBS.
3. Donal M. Weir, John Steward. (1993). Immunology VII edition. ELBS, London
4. Ivan M. Roit. (1994) Essential Immunology - Blackwell Scientific Publications, Oxford.

REFERENCE BOOKS:

1. Jacqucline S, Williams and Wilkins A. (1998) Basic Immunology - Warerly Company.
2. Janeway Travers. (1997). Immuno biology - The immuno system in health and Disease. 3rd edition Current Biology Ltd., London, New York.
3. Lydyard P, Whelan A and Fanzer MW (2000) Instant notes in Immunology, Edited By Hames BD, Viva Books Private Ltd.
4. Mark Reakman Diego Vergani. Basic and clinical immunology, Longman Asia Ltd., Hong kong.
5. Paul (1998) Fundamental Immunology. III Edition.
6. Peter J. Delves, Ivan M. Roit (eds) (1998) Academic Press - Encyclopedia of Immunology - 2nd edition.
7. Richard M. Hyde. (1995). Immunology III edition. National Medical series, Williams and Wilkins, Harward Publishing Company.
8. Clark WR (1991). The experimental foundations of modern immunology, John Wiley and Sons Inc. New York.

SEMESTER IV
PAPER - 11
RESEARCH METHODOLOGY

OBJECTIVES

To enable the student to understand the principles and applications of classical and modern techniques in Biology develop skill in preparation of reports, writing research communications and thesis interpret and analyze the experimental data using different biostatistical tools.

UNIT-I

Microscopy: light microscope - basic principles, types, (phase contrast, dark field and fluorescent microscope). Electron microscopy - principles, working function, electron probe, transmitted electron, image formation, back scattering, secondary electrons. X-ray diffraction, Auger electron, cathode luminescence. Types of EM: TEM, SEM, STEM - sample preparation for EM analysis. Camera Lucida - Principles and uses.

UNIT-II

Electromagnetic radiation: definition, components, biological effective wavelength (UV and visible), Spectrophotometry: principles and working function of spectrophotometers, types (single beam, double beam, Atomic absorption spectrophotometer, IR and NMR. Applications of various spectrophotometers.

UNIT-III

Radioactivity: nature of radioactivity, types of radioisotopes, half-life, Unit of radioactivity, detection and measurements. Geiger Muller counter, liquid scintillation counter, principles and working function. Autoradiography, application of radioisotopes in biological research. Centrifugation: Basic principles, sedimentation coefficient, centrifugal forces. Types of centrifuges - clinical, high speed, refrigerated, ultra. Types of centrifugation - rotar types, density gradient, differential centrifugation. Applications of centrifugation.

UNIT-IV

Chromatography - Principle, types and working function (Paper chromatography, TLC, GC, GC-MS and HPLC), Applications. Electrophoresis - Principle, types and methods. Horizontal, vertical, PAGE, Agarose electrophoresis, Applications. Pulse Field gel electrophoresis (PFGE) - Principle and applications. Gel documentation and molecular weight analysis.

UNIT-V

Molecular Techniques - DNA and plasmid isolation. Amplification of 16S rRNA or specific genes using PCR techniques, RAPD, STRR and LTRR analysis using PCR, RFLP analysis cloning strategies, DNA sequencing - Sanger's Dideoxy and Maxam and

Gilbert's methods. Automated DNA sequencing, Blotting techniques - southern, western, Dot blot- hybridization. Immunoblotting, ELISA - Applications in biological research.
Thesis writing; defining research problem, research design, general format, literature survey, primary source - articles, reviews, abstract, current contents (both text and CCOD), reference card, data analysis, data interpretation, report writing, proof correction.

REFERENCES BOOKS:

1. Wrigglesworth, J.M. 1984, Biochemical research technique - a practical introduction. John Wiley, New York.

2. Patki, L.R., Bhalchandra, L. and Jeevaji, I.H., 1989, An introduction to microtechniques, S. Chand and Company Ltd., New Delhi.

3. Keith Wilson and John Walker, 1994. Practical Biochemistry - principles and techniques, Cambridge Press, New York.

4. Keith Wilson and Goulding, K.H. 1986, a biologists guide to principles and techniques of practical biochemistry, ELBS, London.

5. Kothari, C.R., 1988. Research methodology, Wiley Eastern Ltd., New Delhi.

6. Irfan A. Khan and Atiya Khanum, 1994. Fundamental of Biostatistics, Ukaaz publishers, India.

7. Anderson, J., Durosn, B.H. and Poole, M. 1986. Thesis and assignment writing, Wiley Eastern Ltd., New Delhi.

MAIN PRACTICAL
PAPER-3
(Subjects covering Paper 7, 8 and 9)

OBJECTIVES

To impart practical knowledge on various aspects of molecular biology, microbial genetics, gene technology and industrial biotechnology.

UNIT-I

1. Isolation of DNA and RNA from microbial system - quantification - chemical methods dinitrophenol, orcinol - physical methods - UV absorption.
2. Isolation of plasmid DNA from bacteria (mini preparation).
3. Isolation of plasmid DNA from cyanobacteria (mini preparation)
4. Size characterization of DNA by agarose gel electrophoresis.
5. Enzyme immobilization technique.

UNIT-II

1. Isolation of antibiotic resistant microbes.
2. Induction of mutation by ultra-violet radiation and chemical mutagens.

UNIT-III

1. Protoplast / Spheroplast isolation.
2. Purification of plasmids - large scale.

UNIT-IV

1. Preparation of competent E. coli cells.
2. Transformation of Plasmid DNA to the E. coli cells.
3. PCR amplification - 16S rRNA and RAPD.
4. Southern blotting
5. Northern blotting.

UNIT-V

1. Separation of proteins by coloum chromatography, ion exchange - gel exclusion - adsorption
2. Separation of proteins by SDS - PAGE and native gel.
3. Production of proteases - optimization of conditions - pH - temperature.
4. Antibiotic assays - MIC - antibiotic resistance
5. Lipid separation using TLC.

REFERENCE BOOKS:

1. Ausubel FM, Brent R, Kingston, RE, Moore, D.D, Seidman J.G., Smith J.A and Struhl K. (1994). Current Protocols in molecular biology. Vol. 1 & 2. John Wiley & Sons Inc.

2. Dharmalingam K. (1986). Experiments with M13, Macmillan India Ltd. Chennai.

3. Gerhardt P, Murray RG, Wood WA and Kreig NR. (1994), Methods for general and molecular Bacteriology.

4. Hames BD and Rickwood D. (1990) Gel Electrophoresis - a practical approach (1990), Oxford University Press, New York.

5. Harwod AJ. (1994). Protocols for Gene Analysis. Humana Press.

6. Lorian V. (1991) Antibiotics in Laboratory Medicine Williams & Wilkins.

7. Sambrook J and Russell DW (2001) Molecular cloning - A Laboratory manual (3rd edition, Vols - 1, 2, 3). Cold Spring Harbor Laboratory. Cold Spring Harbor Laboratory Press, New York.

8. Surzyeki S (2000). Basic Techniques in Molecular Biology. Springer.

9. Westermeier R. (1993) - Electrophoresis in Practice - VCH - Federal Republic of Germany

10. Willett JE. (1991) Gas Chromatography, John Wiley & Sons.

11. Wilson K and Walker. (1995) Practical Biochemistry Principles.

12. Rajan. S and Selvi Christy (2010). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.

9. Ponmurugan, (2012) Experimental procedures in bioprocess technology, Anjanaa Book House Publishers, Chennai.

MAIN PRACTICAL
PAPER-4
(Subjects covering Paper-10)

OBJECTIVES

To impart practical knowledge on various aspects of research methodology.

1. Analysis of microorganisms using Bright field, Dark field, Phase contrast and Fluorescent microscopy.
2. Microscopic diagram using camera Lucida.
3. Measurement of microbes using micrometry.
4. Preparation of samples for Density gradient.
5. Separation of pigments using paper chromatography.
6. Separation of compounds from crude extracts using TLC.
7. Separation of DNA, proteins using electrophoretic techniques.
8. Molecular weight analysis of DNA and proteins using gel documentation.
9. DNA and plasmid isolation - small scale.
10. RAPD finger printing using PCR.
11. Blotting techniques - Southern and western blotting and hybridization.
12. ELISA test.

ELECTIVE
PAPER-4 (to choose 1 out of 3)
A. BIOREMEDIATION

OBJECTIVES

To enable the students to understand the aspects of bioremediation.

UNIT-I

Definition of Bioremediation - Types of pollution - organic, inorganic in soil, water and air - Remediation by bacteria, fungi, microalgae and green plants.

UNIT-II

Bioaccumulation and biomagnification processes - microbial remediation by natural attenuation - biostimulation - bioaugmentation.

UNIT-III

Application of immobilized microbes in soil decontamination - use of genetically engineered microorganism and bioremediation.

UNIT-IV

Biodegradation of organic compounds - humification and polymerization reaction - bio-transformation of metal and metal compounds - phyto -remediation use of microalgae, green plants to remove pollutants.

UNIT-V

Phyto-extraction - Types of phytoextraction - induced phyto-extraction and continuous phyto-extraction - phyto-degradation - rhizofiltration - phyto-stabilisation - phyto-volatisation of metals - phyto-remediation of organic. Bioavailability and uptake. Biotransformation and compartmentalisation.

REFERENCE BOOKS:

1. Moo-Young, M., Anderson, W.A. and Chakrabarty, A.M. 1996. Environmental biotechnology: Principles and applications. Boston, Mass.: Kluwer Academic Publishers.

2. Wainwright, M. 1999. An introduction to environmental biotechnology. Boston, Mass. Klumer Academic Publishers.

PAPER-4
B. MARINE MICROBIOLOGY

UNIT-I

Marine environment - see-benthic & littoral zone, saltpan, mangroves and estuarine microbes, microbial loop - marine microbial community - planktons, bacteria, fungi, protozoa.

UNIT-II

Survival at extreme environments - starvation - adaptive mechanisms in thermophilic, alkalophilic, asmophilic and barophilic, psychrophilic microorganisms - hyperthermophiles and halophiles - importance in biotechnology.

UNIT-III

Microbe-microbe interactions - Lichens, antagonistic interactions - amensalism, mycoparasitism - Animal-microbe interaction - Ectosymbiosis of Protozoa, Runinant symbiosis - Plant-microbe interaction - Rhizobium, Mycorrhizae, Anabaena - sponge.

UNIT-IV

Marine food borne pathogens & Water borne pathogens - Aeromonas, Vibrio, Salmonella, Pseudomonas, Leptospira, Cornybacter.

UNIT-V Production and applications of marine microbial products - pigments - Astaxanthin, β carotene - enzyme - antibiotics - polysaccharide - sea food preservation methods.

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PAPER-4
C. CLINICAL MICROBIOLOGY

UNIT -I

Infection and Immunity: General principles of Infection, Antigens, Antibodies, Antigen- antibody reactions, complement system

UNIT -II

Immune system - structure and functions, immune response, immunodeficiency disease, hypersensitivity, autoimmunity, Immunology of transplantation and malignancy, immunohematology

UNIT -III

Pathogenic/parasitic organisms: Bacterial, viral and protozoal infections of the gastrointestinal system, nervous system, lung, liver and eye; Sexually transmitted diseases, skin infections, zoonoses, arthropod borne diseases. Transmission and spread of diseases - Disease epidemiology.

UNIT -IV

Control and prevention of infections - drugs and antibiotics - drug resistance, Mycobacteria, leprosy and malarial parasite - importance, lifecycle, spread and control.

Biochemical changes due to infections - Blood test and tissue analysis. Isolation and identification of organisms from tissue samples. Disease detection - conventional and molecular techniques.

UNIT -V

Normal microbial flora of human body, Laboratory control of antimicrobial therapy, Immunoprophylaxis. Vaccines - types and methods of action. Biotechnological approaches to disease control and vaccine production. Genetic disorders and Gene therapy. Control of vectors - Mosquito control - Biotechnological approaches.

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Industrial Visit (IV)

Factory Industrial Visit (M. Sc. Applied Microbiology)

Course Objectives: Students will be exposed to professional work environment to acquire the knowledge, independent working capacity and leadership so that at the end of the course they will be able to manage the laboratory and research work with full responsibility and reliability.

Factory Industrial Visit Guide Line: Internship will be conducted in an institute under the supervision of supervisor/s.

During the **Industrial Visit**, students should his/her visiting work should be submitted to the supervisor/department. A report of an industrial Visit should be submitted to the department after completion of the work should be authorized by the concerned supervisor of the institute/factory.

Project / Dissertation with viva voce (M. Sc. Applied Microbiology)

Course Objectives: This course is designed to provide the knowledge and practice for the students of public health research activity, to enable them to carry out researches and solve research related problems and to help them in writing thesis and defend their work. Upon successful completion of the course, the students shall be able to: 1. Search relevant scientific literature 2. Develop a research proposal 3. They find appropriate data collection techniques and tools 4. Manage collected data 5. Analyze data with appropriate statistical techniques 6. Write thesis 7. Defend the findings

Proposal Development: At the beginning of Second year (Fourth Semester), students should carry out with the consultation of designated faculties. Extensive literature survey will develop research proposal during the initial 3 months period.

Data Collection/ Thesis Writing Students will carry out data collection, data management, data analysis, and thesis writing during the remaining period (Fourth Semester).

The Dissertation should have following format: 1. Title 2. Introduction 3. Materials and Methods 4. Results 5. Discussion 6. Conclusion 7. Recommendation 8. References 9. Appendix

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THIRUVALLUVAR UNIVERSITY

MASTER OF SCIENCE
DEGREE COURSE

M.Sc. BIOCHEMISTRY
UNDER CBCS

(With effect from 2017 - 2018)

The Course of Study and the Scheme of Examinations

S. No.	Subject	Paper	Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I						**CIA**	**Uni. Exam**	**Total**
1	MAIN	Paper-1	6	4	Cell Dynamics and Environment Biology	25	75	100
2	MAIN	Paper-2	6	5	Chemistry of Macromolecules	25	75	100
3	MAIN	Paper-3	5	5	Human Physiology and Nutrition	25	75	100
4	MAIN Practical	Paper – 1	5	-	Isolation and Characterization studies, Quantitative Analysis, Techniques	-	-	-
5	Main Practical	Paper - 2	5	-	Enzymology – Purification and Kinetic Studies, Microbial Biochemistry	-	-	-
6	Elective	**Paper – 1**	3	3	**(to choose 1 out of 3)** 1. Biophysical and Bio organic chemistry 2. Pharmaceutical Biochemistry 3. Plant biochemistry and plant molecular biology	25	75	100
			30	**17**		**100**	**300**	**400**
SEMESTER II								
7	MAIN	Paper-4	5	4	Analytical Biochemistry	25	75	100
8	MAIN	Paper-5	5	4	Advanced Enzymology	25	75	100
9	MAIN	Paper-6	5	4	Intermediary Metabolism	25	75	100

10	MAIN Practical	Paper - 1	5	5	Isolation and Characterization studies, Quantitative Analysis, Techniques	25	75	100
11	MAIN Practical	Paper - 2	5	5	Enzymology – Purification and Kinetic Studies, Microbial Biochemistry	25	75	100
12	Elective	Paper – 2	3	3	**(to choose 1 out of 3)** 1. Microbiology 2. Diagnostic Biochemistry 3. Biochemical and Environmental	25	75	100
13	Compulsory paper		2	2	Human Rights	25	75	100
			30	**28**		**175**	**525**	**700**
SEMESTER III						**CIA**	**Uni. Exam**	**Total**
14	MAIN	Paper-7	6	5	Advanced Endocrinology	25	75	100
15	MAIN	Paper-8	6	5	Research Methodology	25	75	100
16	MAIN	Paper-9	5	5	Biotechnology	25	75	100
17	MAIN Practical	Practical-3	5	-	Biochemical analysis of blood, Immunological and Molecular Biology techniques	-	-	-
18	MAIN Practical	Practical-4	5	-	Haematological methods, Urine analaysis	-	-	-
19	Elective	Paper - 3	3	3	**(to choose 1 out of 3)** 1. Immunology 2. Bioinformatics 3. Nano biotechnology	25	75	100
			30	**18**		**100**	**300**	**400**

SEMESTER IV						CIA	Uni. Exam	Total
20	MAIN	Paper-10	6	5	Molecular Biology	25	75	100
21	MAIN	Paper – 11	6	5	**Advanced Clinical Biochemistry**	25	75	100
22	MAIN	Practical-12	5	5	Project / Dissertation with *Viva Voce*	50	150	200
23	MAIN Practical	Paper-3	5	5	Biochemical analysis of blood, Immunological and Molecular Biology techniques	25	75	100
24	Main Practical	Paper – 4	5	5	Hametological methods, Urine analysis	25	75	100
24	Elective	Paper - 4	3	3	(to choose 1 out of 3) 1. Stem cell technology 2. Herbal Technology 3. Genetic Engineering	25	75	100
			30	**28**		**175**	**525**	**700**

Subject	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total Marks**
Main	12	4-5	56	100	1300
Main Practical	4	5	20	400	400
Elective	4	3	12	100	400
Compulsory Paper	1	2	2	100	100
Total	**21**	**-**	**90**	**-**	**2200**

THIRUVALLUVAR UNIVERSITY

M.Sc. BIOCHEMISTRY

SYLLABUS

UNDER CBCS

(With effect from 2017-2018)

SEMESTER I

PAPER-1

CELL DYNAMICS AND ENVIRONMENTAL BIOLOGY

UNIT-I : CELLULAR ORGANIZATION, DIVISION AND CYTOSKELETONS

Cell types - organization of prokaryotic and eukaryotic cells, cell division - mitosis and meiosis, cell cycle - phases of cell cycle, and regulation of cell growth and cell cycle, cell motility - molecular motors, microtubules, structure and composition, micro tubular associated proteins - role in intracellular motility.

UNIT-II : CELLULAR ORGANELLES, CELLULAR COMMUNICATION AND TRANSPORT

Cellular organelles – morphology and function. Differentiation of cell membrane - microvilli, epithelia, Bell and sqot desmosomes - mechanical function, cell-cell interaction, cell adhesion proteins, cell junctions, tight junction and gap junction, cell surface of plant cells and cancer cells.
Overview of membrane protein - peripheral and integral, molecular model of cell membrane - fluid mosaic model and membrane fluidity, solute transport across membrane - passive transport, active transport by ATP powered pumps, types of transport systems.

UNIT-III : ENVIRONMENT AND ECOLOGICAL SUCCESSION

Physical environment – Biotic and abiotic environment; concept of habitat and niche, niche width and overlap, fundamental and realized niche, resource partitioning, character displacement. Ecological succession - types, mechanisms, and changes involved in succession.

UNIT-IV : POPULATION ECOLOGY & ORIGIN OF CELLS

Characteristics ofa population, population growth curves, population regulation, life history statergies (r and k selection). Concept of metapopulation – demes and dispersal, interdemic extinctions, age structured populations. Origin of basic biological molecules; abiotic synthesis of organic monomers and polymers; concept of oparin and Haldane, experiment of miller. Evolution of prokaryotes and eukaryotes.

UNIT V : PALEONTOLOGY , EVOLUTIONARY HISTORY AND MOLECULAR EVOLUTION

The evolutionary time scale, eras, periods and epoch; major events in the evolutionary time scale. Concepts of neutral evolution, molecular divergence and molecular clocks; molecular tools in phylogeny, classification and identification; Convergent evolution, sexual evolution and co-evolution.

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1. The World of the cell - Becker, Kleinsmith and Harden Academic Internet Publishers; 5th edition 2006.
2. The Cell: A Molecular Approach, Fourth Edition- Geoffrey M. Cooper and Robert E. Hausman.
3. Cell and Molecular Biology by concepts and experiments - Gerald Karp John Wiley sons & Inc, - 2005.
4. Molecular cell Biology - Harvey Lodish. W. H. Freeman; Sol edition, 2007.
5. The Cell - Biochemistry, physiology and morphology - J. Brachet and A. E. Mirsky, Academic Press, 1963.

PAPER-2

CHEMISTRY OF MACROMOLECULES

UNIT-I: HOMO AND HETEROGLYCANS

Polysaccharides - occurrence, structure, properties and functions of homoglycans - starch, glycogen, cellulose, dextrin, inulin, chitins. Occurrence, structure, properties, and functions of heteroglycans - bacterial cell wall polysaccharides, glycoaminoglycans, agar, alginic acid, pectins, amino sugars and deoxy sugars, blood group substances and sialic acids. Glycoprotein and their biological applications. Lectins structure and functions.

UNIT-II: AMINOACIDS AND PROTEINS

Classification, properties and function of aminoacids and proteins.Primary structure - determination of amino acid sequence of proteins. The peptide bond: Ramachandran plot. Secondary structure - weak interactions involved - alpha helix and beta sheet and beta turns structure. Collagen triple helix. Super secondary structures - helix-loop-helix. Tertiary structure - alpha and beta domains. Quaternary structure - structure of hemoglobin.

UNIT-III : NUCLEIC ACIDS

Watson - Crick model of DNA structure. A, B and Z - DNA Cruciform structure in DNA, formation and stability of cruciforms, miscellaneous alternative conformation of DNA, slipped mispaired DNA, parallel stranded, anisomorphic DNA, palindrome.Types of RNA, hnRNA, methods for nucleic acid sequence determination, denaturation and renaturation, Cot value curve, hypochromic effect, DNA-protein interactions.

UNIT-IV : LIPIDS

Lipids - classification, phospholipids - classification, structure and functions. Ceramides and sphingomyelins. Eicosanoids, structure and functions of prostaglandins, thromboxanes, leukotrienes Types and functions of plasma lipoproteins. Amphipathic lipids - membranes, micelles, emulsions and liposomes. Steroids - cholesterol structure and biological role - bile acids, bile salts.

UNIT-V : VITAMINS

Vitamins - water soluble - thiamine, riboflavin, niacin, pyridoxine, folic acid, ascorbic acid-sources, structure, biochemical functions, deficiency diseases, daily requirements; fat soluble - vitamin A, vitamin D, vitamin E and vitamin K - sources, structure, biochemical functions, deficiency diseases, daily requirements.

References

1. Biochemistry -L. Stryer, W.H. Freeman and Co, 5th 2002.
2. Fundamentals of Biochemistry - Voet and Voet, John Wiley and sons NY, 2002.
3. Lehninger's Principle of Biochemistry -David L. Nelsonand Michael M. Cox. W. H. Freeman; 4th edition, 2004.
4. Text Book of Biochemistry with clinical correlation - Thomas .M. Devlin, John Wiley-Liss, Hobokhen NJ publishers, 2006.
5. Biochemistry - Zubey, GL WCB Publishers.

PAPER-3

HUMAN PHYSIOLOGY AND NUTRITION

UNIT-I : DIGESTION, ABSORPTION AND EXCRETION

Digestive secretions - composition, functions and regulation of saliva, gastric, pancreatic, intestinal and bile secretions. Digestion and absorption of carbohydrates, lipids and proteins.

Excretory system - structure of nephron. Formation of urine - glomerular filtration, tubular reabsorption of glucose, water and electrolytes, tubular secretion.

UNIT-II : BLOOD AND CIRCULATION

Composition and functions of blood and plasma. Blood groups. Blood coagulation - mechanism, fibrinolysis. Hemoglobin - structure, abnormal types, anemia. Structure of heart, cardiac cycle, heart sounds, E.C.G (elementary knowledge), blood pressure, spleen, lymph, normal composition and function of lymph - role of different lymph cells.

UNIT-III : RESPIRATION AND REPRODUCTION

Structure of lungs, mechanism and regulation of respiration. Transport of blood gases - O_2 and CO_2. Acid-base balance - role of buffers, erythrocytes, respiratory system and kidneys. Acidosis and alkalosis - metabolic and respiratory. Fluid electrolyte balance - regulation of water balance and sodium balance - role of renin-angiotensin and ADH.

Structure and function of reproductive organs, composition of semen, physiology of pregnancy, parturition and lactation.

UNIT-IV : NEUROMUSCULAR FUNCTION

Structure and function of nerves, neurons, resting and action potential, transmission of nerve impulses, synaptic transmission, compounds affecting synaptic transmission, neuromuscular junction. Structure of muscle cells and muscle contraction, molecular organization of muscle, proteins of contractile element - their organization and role in contraction, energy for contraction.

UNIT-V : NUTRITION

Basal metabolism, basal metabolic rate, factors affecting BMR, determination of BMR - direct and indirect method, respiratory quotient. Role of fiber in diet, role of essential amino acids - relation with Marasmus, Kwashiorkar disease, role of essential fatty acids, disorders of fatty acid metabolism, Refsum's disease. Trace elements - macro and micro, daily requirements, functions, deficiency manifestations. Nutrition at different stages of life - during infancy, adolescence, pregnancy and old age.

References

1. Review of Medical Physiology - William. F. Ganong. McGraw-Hill Medical; 22 edition, 2005.
2. Human Physiology and Mechanisms of Disease - Guyton. Saunders Publications; 6th edition, 1996.
3. Human physiology - C.C. Chatterjee. 11th edition, 1985.
4. Human Nutrition and Dietetics - Davidson and Passmore. Churchill Livingstone; 8th edition, 1986.
5. Principles of Nutrition - M.S.Swaminathan
6. Modern Nutrition and Health Diseases - M.E. Skilis and V.R. Young

ELECTIVE

PAPER-1
(To choose 1 out 3)

A. BIOPHYISCAL AND BIOORGANIC CHEMISTRY

UNIT-I : BIOENERGETICS

Thermodynamics - basic concepts. First, second and third laws of thermodynamics - enthalpy and entropy, exothermic and endothermic reactions. Free energy - standard free energy. Temperature and pressure dependence of free energy. Equilibrium for biochemical reactions. High energy phosphates and free energy. Redox reactions and free energy changes in biological reactions.

UNIT-II : SPECTROSCOPY AND STRUCTURAL ELUCIDATION

The electromagnetic spectrum - quantization of energy. Regions of the spectrum. Basic principles of UV, NMR and mass spectrometry and their biological applications. FT-NMR Nuclear overhauzer effect. Use of X-ray crystallography and CD in the study of proteins and nucleic acids.

UNIT-III : ATOMIC STRUCTURE AND CHEMICAL BONDS

Atomic orbitals. quantum numbers. Shapes of s, p and d orbitals. Aufbau principle, Pauli exclusion principle and Hund's rule. Electronic configuration of atoms, formation of chemical bonds, octet rule, ionic bond, covalent bond and co-ordinate bonds with examples.

UNIT-IV : FUNCTIONAL GROUPS AND REACTIONS

Classification of organic compounds based on functional groups and their nomenclature. Biologically important organic compounds (names and structures). Hemolytic and heterolytic cleavage of covalent bonds. Reactive species: electrophiles, nucleophiles and radicals. Types of organic reactions with examples. Inductive effect and resonance.

UNIT-V : ISOMERISM

Isomerism in organic compounds. Types of isomerisms, tautomerism with special reference to lactic acid.

Stereoisomerism. Geometric isomerism with special reference to maleic acid and unsaturated fatty acids. Partial double bond character of C-N bonds in amides. Geometrical isomerism in such compounds.

Optical isomerism, optical activity, enantiomers, diastereomers. Meso and dl forms. R-S and D-L notations in amino acids and sugars. Conformational analysis, conformations of ethane and cyclohexane.

B. PHARMACEUTICAL BIOCHEMISTRY

UNIT-I

Drug - Structural feature and pharmacology activity, prodrug concept. Absorption -first – pass effect. Distribution, metabolism- Phase I, II reactions, action of cytochrome p450 & elimination of drug receptor- localization, type and subtypes, models and their drug – receptor interaction, agonist & antagonist.

UNIT-II

Adverse response to drugs, Drug tolerance, Drug intolerance, Idio syneracy (pharmacogenesis), drug allergy. Tachyphylaxis, Drug abuse, vaccination against infection, factor that modifies the effect of drug. Assay of drug potency- bioassay and immunoassay.

UNIT-III

Biotechnology and pharmacy: Genetically engineered protein and peptide agents. Novel drug delivery systems – non conventional routes of administration. Anti-AIDS drug development, oncogenes ras target for drugs, multi-drug resistance.

UNIT-IV

Mechanism of action of drugs used in therapy of: Respiratory system – cough, bronchial – asthma, pulmonary tuberculosis. GIT – Digestants, appetite suppressants. Hypolipidemia agents, vomiting, constipation and peptic ulcer. Antimicrobial drugs – sulfonamides, trimethoprim, cotrimoxazole, penicillin, and macrolides. Aminoglycosides, Cephalosporin and bacterial resistance. Insulin and oral diabetic drugs, antifertility and ovulation inducingdrugs.

UNIT-V

Drugs of plant origin: Drug dependence and abuse – Management of self poisoning cancer. Chemotherapy – Cytotoxic drug. Immuno suppressive drug therapy. New Biological Targets for Drug Development. Novel Drug Screening Strategies.

References:

1. The pharmacology Vol I and II- Goodman And Gillman, Mc Graw Hill
2. Basic pharmacology- Foxtercox Bulter Worth’s, 1980.
3. Pharmacology and pharmacotherapeutics- R.S.Satoskar. S.D.Bhandhakar & S.S.Anilapure Popular Prakashar Bombay.
4. Principles of medicinal chemistry- William O. Foge.B.I. Waverks Pvt Ltd, New Delhi.
5. Oxford textbook of clinicasl pharmacology and drug therapy. D.G. Burger’s medicinal Chemistry & Drug Discovery.
6. Principles and practice- Manfred.E. Wolf John Wiley and sons

ELECTIVE

PAPER-4

(to choose 1 out 3)

C. PLANT BIOCHEMISTRY AND PLANT MOLECULAR BIOLOGY

UNIT-I : ENERGY GENERATING MECHANISM

Photosynthetic Pigments, Light and Dark reactions of photosynthesis. Proton gradient and ATP synthesis of chloroplast and Bacterium. Mode of action of DCMU, Regulation of photosynthesis, Bacterio rhodopsin, CAM metabolism, RUBISCO, photorespiration and crop productivity.

UNIT-II: NITROGEN METABOLISM AND PLANT HORMONES

Nitrogen cycle, biochemistry of Symbiotic and Nonsymbiotic nitrogen fixation. Assimilation of ammonium , carbon-nitrogen ratio, Uride metabolism, nitrate metabolism, genetics of nitrogen fixation, genetic manipulation of Nif genes, Biosynthesis, Mode of action, transport, distribution and physiological effect of Auxin, Giberrilin, Cytokinin, Aba and ethylene.

UNIT-III : PLANT DISEASE AND SECONDARY METABOLITES

Biochemistry of plant disease, defence mechanism of plants, biosynthesis, distribution and biological functions of industrially important secondary metabolite, (Any 10) Principles of plant disease control.

UNIT-IV : PLANT PHYSIOLOGY

Water relations of plant, Mechanism of water absorption. Aquaporin Symplast - Apoplast concept. Ascent of sap, Transpiration and Stomatal mechanism. Source and sink relationship, Translocation of Inorganic and Organic substances, Bud and Seed dormancy. Senescence, Stress response in plant, Phytochromes- Properties, Photochemicals, transformation, Mode of action and physiological effect.

UNIT-V : PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY

DNA polymorphism – Importance of RFLP and RAPD in plant breeding management. Aspects of plant genetic engineering. Tacking, Mapping and Cloning of plant genes, Selectable markers. Reporter genes and promoters used in plant vectors. Ti plasmids and Crown gall tumor, Genetic engineering of plant for disease resistance, Cytoplasmic Male Sterility, Edible oil, Biodegradable plastics, Delay of fruit ripening. Methods and Application of plant tissue culture.

Text Books:

1. Modern Plant Physiology - R.K. Sinha, Narosa Publishing House, 2004.
2. Microbiology – M.J. Pelczar, E.C.S. Chan and N.R. Kreig, Tata McGraw Hill Publishing Co., 5th Edition, 1986.
3. Microbiology – L.M. Prescott, J.P. Harley and D.A. Klein, McGraw Hill, 6th Edition, 2004.

References:

1. Introduction to Plant Biochemistry – T.W. Goodwin, Pergamon Press, 1986.
2. Plant Biochemistry and Molecular Biology – P.J. Lea, L.L. Castle and Lea, 2nd Edition, John Wiley & Sons, 1999.
3. Microbiology – B.D. Davis, R. Dulbecco, H.N. Eisen and H.S. Ginsberg. 3rd Edition, Harper & Row, 1980.

SEMESTER II
PAPER-4
ANALYTICAL BIOCHEMISTRY

UNIT I - ELECTROCHEMICAL TECHNIQUES AND ELECTROPHORESIS

Electrochemical techniques – principles, electrochemical cells – pH, Henderson – Hasselbalch equation, buffer capacity, pH measurement, glass electrode. Oxygen electrode – principle and application. Biosensors.

Separation of DNA fragments – Pulsed field gel electrophoresis. Autoanalyser – principal, instrumentation and applications. Isoelectric point-2D gel electrophoresis

UNIT II - ENZYME ASSAY, CENTRIFUGATION AND RADIOCHEMICAL TECHNIQUES

Enzyme monitoring technique – Assay methods, Immobilized enzymes.

Centrifugation: Preparative and Analytical ultracentrifuges.

Radiochemical methods – Basis concepts, counting methods and application. Autoradiography.

UNIT III – CHROMATOGRAPHY AND SPECTROSCOPY TECHNIQUES

GC, HPLC – principle, components, limitations and applications.

HPTLC – technique and applications

Optical rotatory dispersion, Circular dichroism, X-ray diffraction, Nuclear magnetic resonance, Electron spin resonance and Mass spectrometry – basic principle and application principle and applications of trubidimetry and nephelometry. Flow cytometry and cell separation.

UNIT IV – MOLECULAR TECHNIQUES

Restriction endonucleases, Restriction mapping, Nucleic acid probes – cloned probes, oligonucleotide probes and labelling of nucleic acid probs. Membrane blotting and hybridization of nucleic acids – Southern, Northern, Western, dot-plot and Fluorescent insitu hybridization. RFLR – Technique & applications.

PCR basic principle, technique, diagnostic and laboratory applications of PCR, RAPD

Construction of DNA and Oligonucleotide microarray.

UNIT V–MOLECULAR MARKERS ANALYSIS

Diagnostic applications of nucleic acid probes – sickle cell anaemia, thalassemia, haemophilia and lymphoid malignancy. Mutagenicity testing – Ames test. Comet assay and DNA fragmentation assay. Identifying protein – DNA interactions – DNA foot printing, DNA finger printing – Technique and applications. HLA typing – applications.

REFERENCES

1. Keith Wilson and John Walker - Principles and techniques of Biochemistry and Molecular Biology, Cambridge University Press, 6th Edition,2006.
2. Boyer R. - Experimental Biochemistry, Addison Wesley, 3rd Edition, 2002.
3. Bernard R. Glick and Jack.J. Pasternak - Molecular Biotechnology, ASM Press Washington 3rd Edition, 2003.
4. D W Brown - Organic Spectroscopy, Wiley New York 1st Edition, 1998.
5. M.Valcatcel - Principles of analytical chemistry-A Text book. Springer, 2000.
6. David James Holme and Hazel Pack - Longman, 1994.

PAPER-5
ADVANCED ENZYMOLOGY

UNIT-I : CLASSIFICATION, PURIFICATION AND ACTIVE SITE

Nomenclature and classification of enzymes, isolation and purification of enzymes – enzymeprotein determination by different methods, criteria of purity - specific activity.Enzyme units - Katal, IU. Measurement of enzyme activity - two point assay, kinetic assay, using radiolabelled substrates. Active site - determination of active site amino acids - chemical probe, affinity label, and site-directed mutagenesis, intrinsic and extrinsic regulations.Investigation of 3-D structure of active site.A brief account of nonprotein enzymes - ribozymes and DNA enzymes.

UNIT-II : ENZYME KINETICS

Kinetics of single substrate enzyme - catalysed reactions - Michaelis - Menten equation, importance of Vmax, Km, MM equation, and turnover number; Lineweaver - Burk plot, Eadie - Hofstee plot, and Hanes - Woolf plot .

Presteady - state kinetics and relaxation kinetics.Kinetics of Allosteric enzymes - MWC and KNF models Hill' equation coefficient. Kinetics of multi - substrate enzyme - catalysed reactions - Ping-pong bi-bi, random order and compulsory order mechanism.

UNIT-III : ENZYME CATALYSIS AND INHIBITION

Mechanism of enzymicaction , mechanism of serine proteases - chymotrypsin, lvsozyme, carboxy peptidase A and ribonuclease.

Reversible inhibition - competitive, uncompetitive, noncompetitive, mixed, substrate and allosteric inhibition.Irreversible inhibition.

UNIT-IV : COENZYMES AND ISOENZYMES

Coenzymes - prosthetic group, classification - vitamin and nonvitamin coenzymes, thiamine pyrophosphate - mechanism of oxidative and nonoxidative decarboxylation, transketolase reaction, PALP and PAMP - role of PALP in transamination and decarboxylation reaction, folate coenzymes and vitamin C, metabolite and nonvitamin coenzymes, lipoic acid, coenzyme Q, nucleoside triphosphate and S-adenosyl methionine. Isoenzymes.

UNIT-V : INDUSTRIAL AND CLINICAL USES OF ENZYMES

Industrial uses of enzymes - sources of industrial enzymes, thermophilic enzymes, amylases, glucose isomerases, cellulose degrading enzymes, lipases, proteolytic enzymes in meat and leather industry, detergents and cheesed production.

Clinical enzymology - Enzymes as thromblytic agents, anti-inflammatory agents.Immobilization of enzymes and their applications.

References

1. Enzymes - Dixon and Webb, Academic Press, 1964

2. Understanding enzymes - Palmer. Prentice Hall; 4 Sub edition, 1995

3. Enzymes - Boyer. Academic Press; 3rd edition, November 1983

4. Biochemistry - Metzler. Academic Press, 2000.

5. Biochemistry - Stryer. W. H. Freeman; 6 edition, 2006.

PAPER-6

INTERMEDIARY METABOLISM

UNIT-I : BIOENERGETICS AND BIOLOGICAL OXIDATION

Free energy and entropy.Phosphoryl group transfers and ATP. Enzymes involved in redox reactions. The electron transport chain - organization and role in electron capture.

Oxidative phosphorylation - Electron transfer reactions in mitochondria. F_1F_0 ATPase - Structure and mechanism of action. The chemiosmotic theory.Inhibitors of respiratory chain and oxidative phosphorylation - Uncouplers and ionophores.Regulation of oxidative phosphorylation.

Mitochondrial transport systems - ATP/ADP exchange, malate / glycerophosphae shuttle, creatine - phosphate shuttle.

UNIT-II : CARBOHYDRATE METABOLISM

Glycolysis ,citric acid cycle andgluconeogenesis-pathway, key enzymes and coordinate regulation.The pentose phosphate pathway. Metabolism of glycogen and regulation.Metabolism of galactose and fructose.The glyoxylate cycle.Cori cycle. Futile cycles, anaplerotic reactions.

UNIT-III : LIPID METABOLISM

Oxidation of fatty acids - α,β and ω. Metabolism of ketone bodies - Formation, utilization, excretion and clinical significance. Biosynthesis of fatty acids.Metabolism of triglycerides, phospholipids and sphingolipids. Cholesterol - Biosynthesis, regulation, transport and excretion. Eicosanoid metabolism.

UNIT-IV : AMINO ACID, PURINE AND PYRIMIDINE METABOLISM

Biosynthesis of aromatic aminoacids.Catabolism of amino acid nitrogen - Transamination, deamination, ammonia formation and the urea cycle.Disorders of the urea cycle.Catabolism of carbon skeletons of amino acids.Conversion of amino acids to specialized products.

Metabolism of purines - *De novo* and salvage pathways for biosynthesis.Purine catabolism.Biosynthesis and catabolism of pyrimidines.

UNIT-V PORPHYRINS,PHOTOSYNTHESIS AND METABOLIC INTEGRATION

Biosynthesis and degradation of heme.

Photosynthesis - Photosynthetic apparatus, light reaction, cyclic and noncyclic photophosphorylation. Dark reaction - Calvin cycle, Hatch-Slack pathway.Photorespiration.Starch biosynthesis and degradation.Bioluminescence.
Integration of metabolism - Interconversion of major foodstuffs.Metabolic profile of the liver, adipose tissue and brain.Altered metabolism in starvation.

Text Books

1. Biochemistry 4th ed. Brooks/Cole Pub Co - Campbell and Farrell, 2002.
2. Biochemistry NMS. 4th ed. Lippincott. Willams and Wilkins - Davidson and Sittman, 1999.
3. Biochemistry - Donald Voet, J.G. Voet and John Wiley, 1995.
4. Biochemistry, 2nd ed. Schaum's Outlines McGraw Hill - Kuchel and Ralston, 1998.
5. Harper's Biochemistry. 26th ed. McGraw Hill - Murray, et al. 2003.
6. Lehninger's Principles of Biochemistry, 4th ed. McMillan Worth - Nelson Cox, 2004.
7. Biochemistry - Stryer. W. H. Freeman; 6 editions, 2006.

MAIN PRACTICAL

PAPER-1

A. ISOLATION AND CHARACTERIZATION STUDIES

1. Isolation and estimation of glycogen from liver.

2. Isolation and estimation of DNA from liver and spleen.

3. Isolation and estimation of RNA from plant tissues or yeast.

4. Isolation of lecithin from egg yolk.

5. Denaturation of DNA and UV absorption studies. (demonstration).

B. QUANTITATIVE ANALYSIS

1. Estimation Of Ascorbic Acid

2. Estimation of inorganic phosphorus by Fiske and SubbaRao method.

3. Determination of pyruvate or lactate

4. Determination of tryptophan.

5. Determination of protein by Lowry's method.

6. Estimation of sodium by flame photometry.

7. Estimation of glutathione from tissue/blood

8. Estimation of Iron

C. TECHNIQUES

1. Preparation of buffers and measurement of pH using indicators and pH meter.

2. Separation of amino acids sugars and lipids by thin layer chromatography.

3. Separation of plant pigments by column chromatography.

4. Separation of serum proteins by PAGE.

5. PCR Technique - Demonstration

References

1. Practical Biochemistry - K. Wilson and I. Walker. 5th edition, Cambridge University press, 2000.

2. Practical Biochemistry – Shawney.

3. Biochemical Methods - S.Sadasivam & A.Manickam, New Age International.

MAIN PRACTICAL

PAPER-2

A. ENZYMOLOGY - PURIFICATION AND KINETIC STUDIES

1. Subcellular fractionation of organelles from liver cells and identification by marker enzyme - LDH

2. Isolation of acid phosphatase from potato.

a. Determination of optimum pH.
b. Determination of optimum temperature.
c. Effect of substrate concentration on acid phosphatase activity.
d. Inhibition of acid phosphatase activity.

3. Assay of clinically important enzymes.

a. Assay of serum/tissue alkaline phosphatase activity.
b. Assay of serum acid phosphatase activity.
c. Assay of serum creatinine phosphokinase activity
d. Assay serum alanine aminotransferase activity.
e. Assay of serum aspartate aminotransferase activity

B. MICROBIAL TECHNIQUES

1. Handling and maintenance of microscopy.
2. Sterilization techniques - principles, methods, moist heat, dry heat, filter types CDC, safety levels.
3. Preparation of media - liquid, solid, agar deep. Slant and plate.
4. Staining techniques - simple, differential and special staining.
5. Pure culture techniques - streak plate, pour plate.
6. Growth curve - non-visual method turbidity method.
7. Identification and enumeration of microorganisms from soil - streak plate, pour plate.
8. Identification and enumeration of microorganisms from water - standard plate count, MPN test and membrane filtration technique.
9. PCR Technique - Demonstration

References

1. Practical Biochemistry - K. Wilson and I. Walker. 5th edition, Cambridge University press, 2000.

2. Practical Biochemistry – Shawney.

3. Biochemical Methods - S.Sadasivam & A.Manickam, New Age International.

4. Medical laboratory Technology Volume I, II & III - KL Mukherjee

ELECTIVE

PAPER-2

(to choose 1 out of 3)

A. MICROBIOLOGY

UNIT-I : MORPHOLOGY AND ULTRASTRUCTURE

Ultrastructure of bacteria, fungi, algae and protozoa.Classification of microbes, molecular taxonomy, cell walls of eubacteria - peptidoglycan and related molecules.Structure and synthesis of cell wall and cell membrane of gram - positive and negative bacteria.Flagella and motlility.Cell inclusion bodies.

Blue and green bacteria.Budding and appendaged bacteria, spirilla, spirochaetes, gliding and sheathed bacteria, pseudomonads, lactic and propionoc acid bacteria.Endospore forming rods and cocci, myobacteria, rickettsia and mycoplasma.Archaebacteria.

UNIT-II : MICROBIAL GROWTH AND METABOLISM

Microbial growth - definition.Mathematical expression of growth, growth curve, measurement of growth and factors affecting growth.

Microbial metabolism - overview, photosynthesis in microbes.Role of chlorophylls, carotenoids and phycobilins, Calvin cycle.Chemolithotrophy: hydrogen - iron - nitrite oxidizing bacteria: nitrate and sulfate reduction: methanogenesis and acetogenesis, fermentations - diversity, syntrophy - role of anoxic decompositions. Nitrogen metabolism, nitrogen fixation, hydrocarbon transformation.

UNIT-III : MICROBIOLOGICAL TECHNIQUES

Methods in microbial identification.Pure culture techniques.Theory and practice of sterilization.Principles of microbial nutrition, construction of culture media.Enrichment culture techniques for isolation of chemoautotrophs, chemoheterotrophs and photosynthetic microbes.

UNIT-IV : VIRUSES

Bacteria, plant, animal and tumor viruses.Classification and structure of viruses.Lytic cycle and lysogeny. DNA viruses: positive and negative strand. Double stranded RNA viruses. Replication: example of herpes, pox, adenoviruses, retroviruses, viroids and prions.

UNIT-V : MEDICAL MICROBIOLOGY

Disease reservoirs; Epidemiological terminologies.Infectious disease transmissions. Respiratory infections caused by bacteria and viruses; Tuberculosis, sexually transmitted diseases including AIDS; Vector bone diseases, water borne diseases, Public health and water quality. Pathogenic fungi, Antimicrobial agents, Antibiotics.Penicillins and cephalosporins, Broad spectrum antibiotics.Antibiotics from prokaryocytes, antifungal antibiotics - mode of action, Resistance to antibiotics.

Text Books

1. Medical Microbiology- Jawetz, Melnick and Adelberg's, Lange Med. Brooks, et al 1998.
2. Microbiology. 4th ED - Davis, et al. Lippincott Williams and Wilkins, 1989.
3. Microbiology -Joklik, et al. Zinsser's McGraw Hill Professional, 1995.
4. Brack Biology of Microorganisms, 10th ed- Madigan, et al. Prentice Hall, 2002.
5. Microbiology, 5th Ed. - Pelczar et al. McGraw Hill, 2000.
6. Microbiology -Prescott et al. Mcgraw Hill, 1999.
7. General Microbiology. 5thed,Stainer RY, et al. Prentice Hall, 1986.

ELECTIVE

PAPER-2 (to choose 1 out of 3)

B. BIOCHEMICAL AND ENVIRONMENTAL TOXICOLOGY

UNIT-I

Definition and scope of toxicology: Eco-toxicology and its environment significance toxic effects. Basis for general classification & nature, dose - response relationship. Synergism and Antagonism, Determination of ED 50 & LD 50.

Acute and chronic exposures. Factors influencing toxicity. Pharmaco dynamics & Chemo dynamics.

UNIT-II

Principles & procedures of testing for acute toxic effects. Regulators guidelines, mammalian systems affected & the clinical signs of systemic toxicity. Factors affecting acute toxicity studies. Biochemical basis of toxicity. Mechanism of toxicity: disturbance of excitable membrane function altered calcium homeostasis. Covalent binding to cellular macromolecules. Genotoxicity. Tissue specific toxicity.

UNIT-III

Toxicity testing : Test Protocol, Genetic Toxicity Testing & Mutagenesis Assays: *Invivo* test systems- Bacterial Mutation Tests: Reversion Tests, Ames test, Fluctuation Tests & Eukaryote Mutation Tests In Vivo Mammalian Mutation Tests – host mediated assay & dominant lethal test. Use of drosophila in toxicity testing. DNA repair assays. Chromosome damage test. Toxicological Evaluation of Recombinant DNA –Derived Proteins.

UNIT-IV

Food toxicology: Toxicology of food additives. Metal toxicity: Toxicology of Arsenic, Mercury, Lead and Cadmium. Environmental Factors Affecting Metal Toxicity- Effect of Light, Temperature & PH. Diagnosis of toxic changes in liver and kidneys: Metabolism of Haloalkanes. Haloalkenes & Paracetomol with their toxic effects on tissues.

UNIT-V

Air pollution: common air pollutants and their sources. Air pollution & ozone. Air pollution due to chloroflurocarbons (CFCS) and asbestos. Occupational toxicology and assessment of occupational hazards: industrial effluent toxicology & environmental health. An overview of regulatory agencies: responsibilities of regulatory agencies. Management of toxicological risks. Regulatory approaches. Regulatory systems and organizations.

References:

1. Casarett and Doull's Toxicology, III rd edition - Klaassen C D, Amdur M O & Doull J (1986), Macmillan publishing company, New York. 26

2. Industrial Toxicology - Williams P L & Burson J L Van- Nostrand Reinhold, New York, 1985

3. Principles and methods of toxicology, II nd edition -Hayes A W, Raven press New York, 1988

4. Toxicology, Vol I - Stewart C P&Stolman A Academic press, New York, 1960

SEMESTER III

PAPER-7

ADVANCED ENDOCRINOLOGY

UNIT-I : CLASSIFICATION AND MECHANISM

Hormones - definition, classification based on receptors, hormone cascade system involving CNS, hypothalamus, anterior pituitary, target gland, feedback mechanisms, classification of hormones (polypeptides, glycoproteins and POMC peptides), genes and formation of polypeptide hormones - POMC peptides and vasopressin, insulin, Parathyroid.

UNIT-II : AMINO ACID DERIVED HORMONES

Synthesis of amino acid derived hormones-epinephrine and thyroxine, inactivation and degradation of hormones, signal transduction and second messengers - adenylate cyclase system, cAMP, adrenalin and glycogen degradation. G-protein as cellular transducer, inositol triphosphate and calcium release, glycogen phosphorylase kinase, DAG and protein kinase C-pathway.

UNIT-III : CYCLIC HORMONAL CASCADE SYSTEM AND PROTEIN KINASES

Cyclic hormonal cascade system - chronotropic control, melatonin and serotonin - light and dark cycle, ovarian cycle and role of hormones, hormone - receptor interactions, multiple hormone subunits Sactchard analysis, structure beta -adrenergic receptor and insulin receptor, internalization of receptors, intracellular action - protein kinases, insulin receptor - transduction through tyrosine kinase, vasopressin - protein kinase A, GnRH-protein kinase C, atrial natriuretic factor - protein kinase G.

UNIT-IV : HORMONE RECEPTORS AND REGULATION

Steroid hormone receptors, intracellular protein receptors, structural organization of receptor protein, hormone binding domain, antigenic domain and DNA binding domain, organizations of functional elements - hormone response elements, positive and negative transcriptional effects of S.R, receptor activation - upregulation and down regulation, apoptosis - steroid hormone action at cell level, multiple endocrine neoplasia - different types.

UNIT-V : STEROID HORMONES

Structure, biosynthesis, transport of steroid hormones in blood and metabolic inactivation of steroid hormones, control of synthesis and release of steroid hormones, Hormones that directly stimulate synthesis and release of steroid hormone with reference to the second messengers and the signal pathway (cortisol, aldosterone, testosterone, 17B - estradiol, progesterone and calcitriol).

References

1. Textbook of biochemistry (with clinical correlation) by Devlin, Wiley-Liss; 6 edition (2005)

2. Textbook of endocrinology by Wilson and Foster, W.B. Saunders Co.

3. Harper's Biochemistry by R.K. Murray et al. McGraw-Hill Medical; 27 edition (2006)

PAPER-8

RESEARCH METHODOLOGY

UNIT- I : SCIENTIFIC RESEARCH & WRITING

Importance and need for research. Ethics and scientific research. Formulation of hypothesis. Types and characteristic designing a research work. Scientific writing - Characteristics - Logical format for writing thesis and papers. Essential features of abstract, introduction, review of literature, materials and methods, and discussion. Effective illustration - tables and figures. Reference styles - Harvard and Vancouver systems.

UNIT-II : BIOSTATISTICS

Collection and classification of data - diagrammatic and graphic representation of data- measurement of central tendency - standard deviation - normal distribution - test of significance based on large samples - small samples - Student t test -correlation and regression - Chi square test for independence of attributes - ANOVA.

UNIT- III : BIOINFORMATICS

Introduction to bioinformatics, scope of bioinformatics, role of computers in biology The internet. The World Wide Web. Useful search engines - Boolean searching, search engine algorithms. Finding scientific articles – PubMed,Science direct.

UNIT-IV : DATABASES

Data base concepts - database, database system, database management systems - hierarchical , rational and network, database security. Biological databases - types, sequence and structure. Data submission and data retrieval. Searching sequence databases - sequence similarity searches, amino acid substitution matrices. Database search - FASTA and BLAST, CLUSTAL.

UNIT-V : BIOETHICS AND PATENTING

Declaration of Bologina. Ethics in animal experimentation. CPCSEA guidelines - Animal care and technical personnel environment, animal husbandry, feed, bedding, water, sanitation and cleanliness, waste disposal, anesthesia and euthanasia.

Composition of (Human) institutional Ethical Committee (IEC) - General ethical issues. Specific principles for chemical evaluation of drugs, herbal remedies and human genetics research, Ethics in food and drug safety. Environmental release of microorganisms and genetically engineered organisms Ethical issues in human gene therapy and human cloning.

Patenting - definition of patent. Product and process patents. Patenting multicellular organisms. Patenting and fundamental research.

Books Recommended

1. How to write a scientific paper- R.A. Day.. Cambridge University Press.
2. Guide to scientific and technical writing - Cooray P.G.
3. Methods of Research - Carter V. Good and Douglas E seats.
4. The craft of scientific writing - Alley, Michael. Englewood Cliffs. N.N. Prentice 1987.
5. Desk Top Publishing on PC - M.C. Sharma, BPB Publications, 1997.
6. Introduction to Bioinformatics - Lesk, A.M. Oxford 2002.
7. Bioinformatics Computing 1st Edition - Bergeron BP 2002 Printice Hall
8. Fundamental concepts of bioinformatics - Krane et al Benjamin Cummings.
9. An Introduction to Biostatistics - Sundar Rao, Jesudian Richard.
10. Fundamentals of statistics - S.P. Gupta , Sultan Chand.
11. Ethics and the use of alternatives to animals in research and education, ShiraneePereira, CPCSEA.
12. CPCSEA guidelines for laboratory animal facility (CPCSEA) - No.13 Seaward road, Valmiki Nagar, Chennai-41.
13. Ethical guidelines for biomedical research on human subjects. ICMR, New Delhi,2000.
14. Dickson. Molecular and cell biology of human gene therapeutics. Series Chapman and Hall 1995.

PAPER-9

BIOTECHNOLOGY

UNIT-I : TOOLS OF GENETIC ENGINEERING

Basic principles - mechanism of natural gene transfer by Agrobacterium, generation of foreign DNA molecules, restriction enzymes, their types and target sites, cutting and joining DNA molecules, linkers, adapters, homopolymers, enzymes used in genetic engineering, cloning vehicles and their properties, natural plasmids, i*nvitro* vectors, cosmids and T-DNA based hybrid vectors.

UNIT-II : DNA CLONING AND SEQUENCING

Cloning strategies - cloning with single strand DNA vectors, cDNA cloning and gene libraries, recombinant selection and screening methods, expression of cloned genes-problems and solutions, shuttle vectors, DNA sequencing strategies - Sanger's and Maxam Gilbert's methods, PCR-types and applicationsand DNA hybridization, Southern, Northern andWestern blotting.

UNIT-III : GENE TRANSFER AND APPLICATIONS

Techniques of tissue culture-culturing explants and haploids, protoplasts fusion, methods of gene transfer to plants, animals and bacteria-Ca transfection, electroporation, shotgun and others, transgenic plants, GM foods, and biopesticides, gene knockouts and transgenic animals, xenogarfting, biodegradation, stimulation and its applications, bioleaching.

UNIT-IV : INDUSTRIAL BIOTECHNOLOGY

Applications of biotechnology-industrial biotechnology-fermentors, principle, types product recovery and purification of ethanol, citric acid, vitamin B 12, streptomycin, enzyme biotechnology-production and uses of industrially important enzymes such as protease.

UNIT-V : BIOSAFETY AND BIOETHICS

Biotechnology - potential hazards, biological weapons, biosafety of GM foods and GMOs - substantial equivalence and safety testing, gene drain, the tangled genes, human genome research - the objectives and approaches, the controversies, issues of biotechnology-social and scientific, technology protecting systems and the terminator, IPR, its concepts and conditions -patenting of genes, cells and life forms, evaluation of life patenting.

References

1. Genes - VIII by Lewin B, Oxford University Press, 2003
2. Basic Biotechnology - Ratledge & Kristianeen, Cambridge University press 2nd ed.
3. Gene cloning - an introduction by TA Brown, Chapman and Hall.
4. Molecular Biotechnology, 2nd ed - Glick & Pasternak, Panima Publications.

ELECTIVE
PAPER – 3
(To choose 1 out of 3)

A. IMMUNOLOGY

UNIT-I : LYMPHOID SYSTEM, ANTIGENS AND ANTIBODY

Lymphoid system - central and peripheral lymphoid organs and cells involved in immune system. Antigen, haptens, adjuvants, antigenicity, antigenic determinants and epitopes. Immunoglobulins basic structure, classification, functions, allotypes and idiotypes. Theories of antibody formation- side chain and clonal selection theory. Antibody diversity - mechanisms contributing to diversity - somatic recombination, rearrangement and generation of antibody diversity.

UNIT-II : IMMUNITY AND COMPLEMENT SYSTEM

Types of immunity - innate and acquired immunity, antitoxin, antibacterial and antiviral immunity. Immune response - primary and secondary - humoral and cell mediated immunity. Antigen recognition - T cell and B cell receptor complexes, antigen processing and presentation. Interaction of T and B cells, cytokines. Immunological memory, cytotoxicity - immunotolerance, immunosuppression.

Complement system - components, nomenclature, activation of complement, complement receptors and alternate pathway.

Immunity toextracellular and intra cellular microbes-Bacteria,Virus,Fungi and Parastites

UNIT-III : VACCINES AND IMMUNOLOGICAL TECHNIQUES.

Vaccines - killed attenuated organisms, toxoid, recombinant vaccines, subunit vaccines, DNA vaccines, synthetic peptide vaccines, antiidiotypic vaccines. Immunization practices- immunoprophylaxis and immunotherapy.

Immunological techniques - Production of polyclonal and monoclonal antibodies. Immunoprecipitation, RIA, ELISA, fluorescent immunoassay, avidin-biotin mediated assay, immunohistochemistry, immunoelectrophoresis, immunoblotting. Complement fixation test.

UNIT-IV : GENETIC BASIS OF IMMUNOLOGY, TRANSPLANTATION AND TUMOR IMMUNOLOGY

MHC complex - gene organization - HLA genes class I and II antigens. Structure and function. Histocompatibility testing - lymphocytotoxicty test - cross matching. MHC and disease association.

Transplantation - types, genetics of transplantation - graft versus host reactions. Tissue matching and immuno suppressive agents.

Tumor immunology - immune surveillance, tumor antigens, immune response to tumors, immunotherapy of tumors.

UNIT-V : HYPERSENSITIVITY, AUTOIMMUNE AND IMMUNODEFICIENCY DISORDERS

Hypersensitivity - definition and classification - type I, II, III, IV and V hypersensitivity, mechanism involved, diagnosis and treatment.

Autoimmunity and autoimmune diseases - mechanism of development, diagnosis and treatment.

Immunodeficiency disorders-B cell deficiencies, T cell deficiencies, secondary immunodeficiency diseases-pathogenesis, diagnosis and treatment of AIDS.

References

1. Essential Immunology - Ivon Roitt, Blackwell Publishing, Incorporated; 11 edition, 2006
2. Cellular and Molecular Immunology -Abul K. Abbas, Andrew Lichtman, Saunders; 5th edition,2005
3. Practical Immunology - Frank C. Hay, Olwyn M. R. Westwood, Paul N. Nelson, and Leslie Hudson, Blackwell Science Ltd. Blackwell Publishing, Incorporated; 4 edition, December 1, 2001.
4. Immunological Techniques - D. M. Weir.
5. Basic and Clinical Immunology -Daniel P. Stites, John D. Stobo,J. Vivian Wells,Appleton & Lange; 6th edition,1987.

B. BIOINFORMATICS

UNIT-I

Computer peripherals and hardware description: computer system design. Recognition and Structure of Different Components of A Computer System And Their Respective Usage. I/O and Storage Devices with Data Communication with Introduction of Internet. Connections to the internet, internet service requirements and applications – e-mail - World Wide Web, URL, HTML, TCP/IP

UNIT-II

Operating systems: system and applications software, evolution of operating systems, layered structure of operating system, CUI and GUI's DOS internet and external commands, batch files: WIN 95/98: Anatomy of windows and features, multitasking.
Office applications : MS-Office 95/97/2000/2003 including MS-Word, MS-Excel, MS Powerpoint.

Logic developments: generation of programming languages, emulation of common DOS commands using C and C++, data structures in C objects and classes, pointers arravasione and two dimensional) normal string and file handling in C.

UNIT-III

Introduction to bioinformatics – biological data bases- sequence analysis-need and importance-pajirwise alignments – dot plot, dynamic programming – global(needle man-wunsch) and local (smith-waterman) alignment algorithms- scoring and substitution matrix – data base searching. Basics of Entrez, BLAST, and FASTA search procedures- multiple alignment. CLUSTAL – Njplot-Phylogenetis trees.

UNIT-IV

Secondary structure prediction of RNA and protein – detecting ORFs- restriction maps, algorithm for Tm calculations, primer design and probe synthesis – structural classification of proteins (SCOP and CATH) – structural genomics-functional genomics and proteomics – DNA microarrays – present status and future prospects.

UNIT-V

3-D Structural analysis of biomolecules – Molecular Visualization Tools – rasmol, Chime, weblab Viewer, Deep View, ISIS Draw, chemdraw, molmol, etc – computer modeling of proteins. Simulation studies and virtual reality – Simulation Of ES Complex Interaction and stereodynamic concept- structural studies of substrate – Ligand Binding – Drug Designing-introduction to PERL and BIOPERL to facilitate Biological Analysis.

References:

1. . Introduction to Bioinformatics-Lesk, A.M Oxford, 2002.
2. Campbell and Heyer. Discovering Genomics, Proteomics and Bioinformatics. Cold Spring Harbour Laboratory. Press & Benjamin Cummings, 2002.
3. Developing Bioinformatics Computer Skills-Gibas and Per Jambeck. O'Reilly & Associates, 2001.
4. Fundamental concepts of bioinformatics -Benjamin Cummings,Krane et al, 2002.
5. Bioinformatics computing Bergeron BP. 1st ed. - Printice Hall, 2002.
6. Bioinformatics: A practical guide to analysis of genes and proteins.2nd ed. - Baxevanis & Ouellette, Wiley-Inter Sci, 2001.

C. NANO BIOTECHNOLOGY

UNIT I: NANOBIOMATERIALS

Introduction – Biocompatibility - Antibacterial activity- Principles involved - Applications. Biomaterial Nanocircuitry: Protein based nanocircuity: Neurons for network formation. DNA nanostructures for mechanics and computing and DNA based computation: DNA based nanomechanical devices.

UNIT II: NANOBIOTECHNOLOGY

Interaction between Biomolecules and Nanoparticle surface, Different types of inorganic materials used for the synthesis of Hybrid Nano-bio assemblies, Application of Nano in biology, Nanoprobes for analytical applications- A new methodology in medical diagnostics and biotechnology, Current status of Nanobiotechnology, Future perspectives of Nanobiology, Nanosensors.

UNIT III: NANOMEDICINES

Developing of Nanomedicines, Nanosystems in use, Protocols for Nanodrug administration, Nanotechnology in Diagnostics applications, Materials used in diagnostics and therapeutic applications - Molecular Nanomechanics, Molecular devices, Nanotribology, Studying Tribology at Nanoscale, Nanotribology applications.

UNIT IV: MOLECULAR AND CELLULAR BIOLOGY

Molecular and cellular biology applications, 2-D electrophoresis and mass spectrometry of proteins, Protein Microarrays (Fabrication – Fluorescencedetection) - Binding Assays and Immunosensors- Integrated Nanobiotechnology Systems.

UNIT V: BIOLOGICAL METHODS OF SYNTHESIS

Use of Bacteria, Fungi, Actinomycetes for Nanoparticle Synthesis, Magnetotactic Bacteria for Natural Synthesis of Magnetic Nanoparticles: Mechanism of Formation: Viruses As Components for the Formation of Nanostructured materials: Synthesis Process and application, Role Of Plants in Nanoparticle Synthesis.

Reference:

1. Nanotechnology - Mark Ratner and Daniel Ratner, Pearson education.
2. Nanomaterials - A.K.Bandyopathy: New Age International Publishers
3. Bionanotechnology: Lessons From Nature - David S.Goodsell
4. Nanomedicine, Vol IIA: Biocomnpatibility - ROBERT A. FREITAS
5. Handbook of Nanostructured Biomaterials and their applications in nanobiotechnology – Harisingh Nalwa
6. Nanobiotechnology: ed. C.M.Niemeyer, C.A.Mirkin.
7. Nanocomposite Science and Technology Ajayan,Schadler &Braun.
8. BioMEMS(Microsystems)- Gerald A.Urban.
9. Introduction to Nanoscale Science And Technology (Nanostructure Science And Technology) – Massimiliano Diventra
10. Nanosystems: molecular : Molecular Machinery, Manufacturing And Composition- K.Eric Drexler
11. Springer handbook of nanotechnology- Bharat Bhusha
12. Nanobiotechnology: ed - C.M. Niemeyer, C.A.Mirkin.

SEMESTER IV

PAPER-10

MOLECULAR BIOLOGY

UNIT-I : DNA REPLICATION

Types of replication, evidence for semiconservative replication - Meselson and Stahl experiment, Replication in prokaryotes and inhibitors of replication, replication bubble, bidirectional replication, replicon, action of SSB, primase, DNA gyrase, topoisomerases, DNA polymerase I, II, and III, lagging and leading strand synthesis, Okazaki fragments, replication in RNA virus, plasmid replication (x174) reverse transcriptase, retroviruses, temporal control of replication. Eukaryotic replication and inhibitors of replication,

UNIT-II : TRANSCRIPTION

Transcription - definition, coding strand, template strand, sense strand and antisense strand, promotor, foot-printing experiment, DNA - dependent RNA polymerase role of Prinbnow box, template binding, prokaryotic transcription, Rho - dependent and independent transcription, posttranscriptional processing in prokaryotes, split genes, overiapping genes, housekeeping genes, biosynthesis of rRNA and tRNA, eukaryotic transcription, RNA editing - post-transcriptional modifications of eukaryotic RNAs, RNA splicing, introns and splicing reactions, self-splicing introns - group I and group II, exons, spacer sequences, enhancers.

UNIT-III : GENETIC CODE AND TRANSLATION

Genetic code - definition, deciphering of the genetic code, codon dictionary, salient features of genetic code. structure of tRNA, activating enzymes, binding of amino acids to tRNA, wobble mechanism and its significance, composition of prokaryotic and eukaryotic ribosomes, leader region, Shine-Dalgarno sequence, reading frameshift, prokaryotic and eukaryotic protein biosynthesis - initiation, elongation, translocation and termination, polysomes, post-translational modifications in prokaryotes and eukaryotes, inhibitors of protein synthesis.

UNIT-IV : PROTEIN TRANSPORT AND GENE EXPRESSION

Protein targeting, translocation, heat shock proteins, glycosylation, SNAPs and SNAREs, bacterial signal sequences, heat shock proteins, mitochondrial, chloroplast and nuclear protein transport, endocytosis-viral entry, ubiquitin TAG protein destruction, gene expression and regulations, molecular mechanism of regulation, prokaryotes - operon model, lac, trp, arabinose operons, repression and attenuation, eukaryotes - C value paradox, repetitive DNA, gene dosage and gene amplifications.

UNIT-V : MUTAGENESIS, DNA DAMAGE AND REPAIR

Mutagenesis and replication fidelity, misincorporation of nucleotides during DNA synthesis, transient and spontaneous chemical changes in DNA, frameshift mutagenesis, DNA damage - different types, DNA repair - direct reversal repair, direct repair of nicks, excision repair, nucleotide excision repair, mismatch repair, long and short patch mismatch repair, recombination error, SOS response and mutagenic repair.

References

1. Molecular biology -Robert F. WeaverMcGraw-Hill 4 edition, 2007
2. Advanced molecular biology -R. M. Twyman,1998
3. Genes VII - B. Lewin Oxford University Press, Cell Press, London, 2000.
4. Cell and molecular biology - G. Karp, John Wiley & Sons Inc, 2002.
5. Biochemistry - D.Voet and J. Voet. John Wiley and Sons Ltd, 1990

PAPER-11

ADVANCED CLINICAL BIOCHEMISTRY

UNIT-I : SPECIMEN COLLECTION AND ANALYSIS

Concepts of accuracy, precision, reproducibility, reliability, and other factors in quality control. Normal values. Clinical significance of sugars, proteins, ketone bodies, bilirubin and porphyrins. CSF - collection, composition and analysis. Amniotic fluid - Origin, collection, composition.

UNIT-II : DISORDERS OF CARBOHYDRATE AND LIPID METABOLISM

Disorders of carbohydrate metabolism - blood sugar levels, hyper-and hypoglycemia, regulation of blood glucose, renal threshold, diabetes mellitus - etiologic classification and diagnostic criteria, glucose tolerance test, metabolic complications - acute and late complications. Hypoglycemic agents. Glycogen storage diseases, galactosemia, fructosuria.

Disorders of lipid metabolism - plasma lipids and lipoprotein abnormalities, lipidosis, Xanthomatoses, hypocholestremic agents, fatty liver. Atherosclerosis. Tay Sach's disease, Niemann Picks disease, Gaucher's disease, inherited disorders of familiar hyper and hypolipoproteinemias.

UNIT-III : DISORDERS OF PROTEIN METABOLISM AND CLINICAL ENZYMOLOGY

Disorders of protein metabolism - non-protein nitrogenous constituents in blood - urea, uric acid and creatinine. Plasma protein abnormalities - deficiency, agammaglobulinemia, multiple myeloma, proteinuria, glomerulonephritis, nephrotic syndrome. Haemoglobinopathies - sickle cell anaemia and thalassimia. Phenylketonuria, tyrosinosis, alkaptonuria, maple syrup urine disease, Hartnup disease, homocystinuria, albinism.

Serum enzyme activities in diseases - Principle and assay of aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, acid phosphatase, streptokinase, asparaginase, isocitrate dehydrogenase, ceruloplasmin, y -glutamyl transpeptidase, creatine kinase and lactate dehydrogenase.

UNIT-IV : HEPATIC AND RENAL FUNCTIONAL TESTS

Normal structure and functions of liver, diseases of the liver, hepatitis types, cirrhosis, alcoholic liver disease, hepatic tumor and bilary tract diseases, liver function tests, disorders of bilirubin metabolism. Gastric function tests.
Renal function tests and related disorders - acute and chronic renal failure, urinary tract obstruction and analysis of urinary calculi.

UNIT-V: FREE RADICALS, CANCER AND DISORDERS OF NUCLEIC ACID METABOLISM

Free radicals in health and disease - Endogenous and exogenous free radicals. Oxidative damages to lipids, proteins and DNA. Role of enzymatic and non-enzymatic antioxidants. Cancer: Morphological and metabolic changes in tumor cells. Tumor markers - AFP, CEA, hCG. Carcinogenic agents.

Inborn errors of nucleic acid metabolism - Lesch Nyhan syndrome, immunodeficiency diseases associated with defects in purine nucleotide metabolism, gout, oratic aciduria, xanthinuria. Serology: C-reactive protein.

References

1. Text book of Biochemistry with clinical correlation - TM. Devlin, John Wiley and Sons, 1994
2. Clinical chemistry in diagnosis and treatment - P.D.Mayne. A Hodder Arnold Publication; 6Rev Ed edition, 1994.
3. Enzymes - P. Asokan, Chinnaa Publications, 2003.
4. Clinical biochemistry - Metabolic concepts and clinical aspects by W.J. Marshall and S.K. Bangeit, Churchill Livingstone, 1995.
5. Text Book of Medicine - K.V. Krishna Das, Jaypee Brothers Medical Publishers (P) Ltd, 1996.
6. Text Book of Medical Physiology - A.C. Guyton and J.E. Hall, Harcourt Asia, 2000.

MAIN PRACTICAL

PAPER -3

A. BIOCHEMICAL ANALYSIS OF BLOOD

1. Estimation of blood glucose by o-toluidine method.
2. Glucose tolerance test
3. Estimation of blood glucose by GOD-POD method using semiautoanalyser. (Demonstration)
4. Estimation of serum proteins by Bradford's Method.
5. Estimation of plasma fibrinogen.
6. Estimation of A.G. ratio in serum.
7. Estimation of blood urea by DAM method.
8. Estimation of serum uric acid by phosphotungstate method.
9. Estimation of serum creatinine by alkaline picrate method.
10. Estimation of serum triglycerides.
11. Estimation of serum cholesterol by Zlatkis, Zak and Boyle method.
12. Estimation of serum phospholipids.
13. Estimation of serum calcium.
14. Estimation of serum bilirubin by Evelyn Malloy method.
15. Estimation of glycosylated hemoglobin.

B. IMMUNOLOGICAL AND MOLECULAR BIOLOGY TECHNIQUES

1. Grouping of blood and Rh typing.
2. Latex agglutination test for rheumatoid factor and pregnancy.
3. ELISA - demonstration.
4. Extraction of genomic DNA and electrophoresis in agarose gel. (Demonstration)
5. Determination of molecular size of DNA. (Demonstration)
6. Restriction enzyme digestion and electrophoresis. (Demonstration)
7. Immunodiffusion
8. Production of antisera

References

1. Practical Biochemistry For Medical Students - Raghu, JAYPEE, 2006
2. Practical Clinical BiochemistryHardcover–Harold Varley,Sixth Edition, Alan H Gowenlock.
3. An Introduction to Practical Biochemistry - David T. Plummer Third Edition, Tata Mc Graw Hill
4. Medical laboratory Technology Volume I, II & III - KL Mukherjee
5. Haematology for students Practitioners - Ramnik Sood
6. Biochemical Methods - S.Sadasivam & A.Manickam, New Age International.

MAIN PRACTICAL

PAPER-4

A. HAEMATOLOGICAL METHODS

1. Collection, storage of blood and anticoagulants
2. Total RBC count
3. Total WBC count
4. Total platelet count
5. Differential WBC count
6. Absolute eosinophil count
7. Determination of hemoglobin content
8. Determination of clotting time.
9. Determination of prothrombin time
10. Determination of ESR.
11. Pathological examination of blood film.
12. Prothrombin time

B. URINE ANALYSIS

1. Collection and preservation of urine
2. Qualitative analysis of normal and pathological constituents in urine.
3. Microscopic analysis of urine
4. Estimation of titrable acidity of urine.
5. Estimate of true acidity.
6. Estimation of protein in urine by biuret method
7. Analysis of urinary calculi.
8. Estimation area in urine
9. Estimation uric acid in urine.
10. Estimation of calcium in urine.

C.Industrial study tour (Research institute/Industry one visit per year)

D. One week hands ontraining on any biochemical instrument.

References

1. Practical Biochemistry For Medical Students - Raghu, JAYPEE, 2006
2. Practical Clinical BiochemistryHardcover–Harold Varley,Sixth Edition, Alan H Gowenlock.
3. An Introduction to Practical Biochemistry - David T. Plummer Third Edition, Tata Mc Graw Hill
4. Medical laboratory Technology Volume I, II & III - KL Mukherjee
5. Haematology for students Practitioners - Ramnik Sood
6. Biochemical Methods - S.Sadasivam & A.Manickam, New Age International.

Elective

A. STEM CELL TECHNOLOGY

UNIT-I

Stem cells -Introduction, Definition and basics of stem cells. Classification of stem cells-different types of stem cells- Human embryonic stem cells, Adult stem cells. Sources of stem cells - Fetus and various adult tissues – Advantages of stem cells.

Blastocyst culture- Various stages of embryonic development. In vitro fertilization. Xeno-free derivation of stem cells – Alternative feeder cells and feeder free culture. Cryopreservation of stem cells – Conventional slow- freezing method and Vitrification method. Properties of stem cells - self renewel, clonality and plasticity. Pluripotent nature of stem cells - Extrinsic and Intrinsic factors. Characterization of human embryonic stem cells – Expression of cell surface marker, Karyotyping.

UNIT-II

Stem Cells and their developmental potentials, Characteristics of stem cells-Transdifferntiation of stem cells. Controlled differentiation of human embryonic stem cells. In vivo and invitro differentiation of stem cells. Application of stem cells.

UNIT-III

Therapeutic cloning strategies, derivation and propagation of human embryonic stem cells. Reproductive cloning by SCNT. Use of SCNT. Limitations of cloning – Hurdles to improve the efficiency of therapeutic cloning. Stem cell research and ethics – translational medicine ethics.

UNIT-IV

Hematopoietic stem cells (HSC) - Basics, Development and Regulation of HSC. Clinical Application of HSC – Gene Therapy – using haematopoietic stem cells HSC for Leukemia.

Mesenchymal stem cells (MSC) - Differentiation and Identification. Characteristics of mesenchymal stem cells. Clinical applications of stem cells. Stem cells and regenerative medicine. Ips –induced pluripotent stem cells.

UNIT-V

Skeletal Muscle Stem Cells – Development and functions. Liver stem cells – Organization and functions. Tumor stem cells – Basics differences and Similarities of cancer stem cells and stem cells. Cancer stem cell signaling – NOTCH pathway. Canonical wnt signaling pathways in hematopoietic stem cells. Stem cell therapies in animal models. Use and benefits of stem cell for human beings.

References:

1. Handbook of stemcells- Robert Lanza.
2. Stem cell research and therapeutic.s. – Yanhong Shi
3. Stem cells reviews- Humana Press
4. Stem cells – C.S. Potten
5. Adult stem cells – Kursad Turksen.

B. HERBAL TECHNOLOGY

UNIT – I : PHARMACOGNOSY

Definition and history, Indian systems of medicine - Siddha, ayurvedha, and Unani systems. Taxonomy of locally available medicinal plants, their chemical constituents and medicinal uses - Classification of Crude drugs - Chemistry of Drugs - Future of pharmacognosy.

UNIT – II : CLASSIFICATION OF MEDICINAL PLANTS

Vernacular name and family - Geographical source, cultivation, collection, and processing for market and commerce in crude drugs. Morphological and histological studies, chemical constituents - Therapeutic and other pharmaceutical uses. Underground stem - ginger, Alpinia - Roots - Rauolfia - Belladona - Aerial parts - Bark - Cinchona.

UNIT – III : BIOMEDICAL IMPORTANCE OF MEDICINAL PLANTS

Leaves - Adathoda, Eucalyptus - Flower - Clove fruits seeds - Nux vomica Nutmegs, Gooseberry - unorganized drugs - Gum - Acacia - Resin - Turpentine, fixed oil - castor oil.

UNIT – IV : HERBAL MEDICINES FOR HUMAN AILMENTS

Drugs Acting on Cardiac Diseases, Cerebral Diseases, Nasal diseases - Blood pressure Drugs acting on Nervous system – Depressants, Stimulants. Respiration and Drugs - Urogenital system and drugs - Psychoactive plants.

UNIT – V : PROPAGATION OF MEDICINAL PLANTS

Micro and macro propagation, conservation of rare medicinal plants, Role of biotechnology in medicinal plant's banks,cultivation of medicinal and aromatic plants. Drug adulteration - methods of Drug evaluation. Herbal food - Food processing - packaging - Herbal sale and Export of medicinal plants - marketing - Intellectual property rights - Export laws.

References

1. George Edward Trease and W.C. Evans - Pharmacognosy 12th edition, English Language Books Society, Baelliere Tindall.
2. Handa, S.S. and Kapoor, V.K. Pharamcognosy - 2nd Edition, Vallabh Prakashan Publishers, New Delhi.
3. Indian Medicinal plants - Jain, S.K,1980.
4. Kokate, C.K., Durohit, A.P. and Gokhale, S.R., Pharmacognosy - 12th edition - Nirali Prakasham Publishers, Pune.
5. An Introduction to Medical Botany and Pharmacognosy - Kumar N.C., 1993.
6. Indian Materia Medica – Nadkarni, 1981.
7. A text book of Pharmacognosy - Shah, S.C. and Qudary, 1990.
8. Text book of pharmacognosy , 5th edition -Wallis, T.E, CBS publishers and distributors, New Delhi.

C. GENETIC ENGINEERING

UNIT-I

Introduction to gene cloning: Early development of Genetics - Gene cloning - Specialized tools and techniques - Importance of gene cloning

Intellectual property rights and types, Patenting, Isolation and Purification of DNA; Preparation of total cell DNA, Plasmid DNA, Bacteriophage DNA, Plant cell DNA.

UNIT-II

Cloning And Expression Vectors : Plasmids- Bacteriophages (M13 and λ) PUC vectors yeast vectors, agrobacterium, medicated gene transfer, YAC, BAC, Human artificial chromosomes, Ti plasmid, SV40, baculoviruses, adenoviruses, papilloma viruses and retroviruses.

UNIT-III

Multipulation of purified DNA: DNA manipulative enzymes – Nucleases, Ligases, polymerases, Topoisomerases, Restriction enzymes performing restriction digests, Ligation-joining DNA molecules together – Random labeling Nick translation and End filling.

UNIT-IV

Introduction to DNA into living cells: Biolistics, Electroporation, Microinjection, Liposome – mediated method and Calcium phosphate method.

UNIT-V

Construction of libraries – Studying gene and genome structure – Blotting techniques, PCR, Insitu hybridization, DNA Sequencing, Chromosome Walking and Jumping, DNA foot printing, Restriction analysis of DNA, RFLP, RAPD –Principles, Procedures and Applications.

References:

1. Molecular cloning, vol. I, II, III, II nd edition, Sambrook J, Fritsch E. F. and Maniatis, 1989 Cold spring harbor laboratory press, New York.
2. DNA Cloning : A practical approach D.M. Glover and D.B. Hames, RL Press, Oxford, 1995.

3. Molecular and cellular methods in Biology and Medicine, P.B. Kaufman, W. Wu , D. Kim and L.J. Cseke, CRC Press Florida, 1995.

4. Methods in Enzymology Guide to Molecular Cloning Techniques, Vol. 152 S.L. Berger and A. R. Kimmel, Academic Press Inc, San Diego, 1996.

5. Methods in Enzymology Gene Expression Technology, Vol. 185D. V. Goedel, Academic Press Inc, San Diego, 1990.

6. DNA Science: A First Course in Recombinant Technology, D. A. Mickloss and G. A Freyer, Cold Spring Harbor Laboratory Press, New York, 1990.
7. Molecular Biotechnology, 2nd Ed. S. B. Primrose, Blackwell Scientific publishers, Oxford, 1994.
8. Milestones in Biotechnology, Classic Papers on Genetic Engineering, J. A. Davis and W. S. Reznikoff, Butterworth-Heinemann Boston, 1992.
9. Route Maps in Gene Technology, M. R. Walker, and R. Rapley, Blakwell Science, Oxford, 1997.
10. Genetic Engineering: An Introduction to Gene Analysis and Exploitation in Eukaryotes, S. M. Kingsman, Blackwell Scientific Publications, Oxford, 1998.

PROJECT / DISSERTATION

WITH *VIVA VOCE*

PAPER-12

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THIRUVALLUVAR UNIVERSITY
VELLORE - 632 115

MASTER OF SCIENCE

M.Sc. CHEMISTRY DEGREE COURSE

UNDER CBCS
(With effect from 2017 - 2018)

REVISED SYLLABUS SUBMITTED

ON

DECEMBER - 2016

THIRUVALLUVAR UNIVERSITY

MASTER OF SCIENCE

M.Sc. CHEMISTRY

DEGREE COURSE

UNDER CBCS

(With effect from 2017-2018)

The Course of Study and the Scheme of Examinations

S. No.	Study Components		Ins. Hrs/ week	Credit	Title of the Paper	Maximum Marks		
	Course Title							
1ST YEAR- SEMESTTER I						CIA	Uni. Exam	Total
1	MAIN	Paper-1	4	4	Organic Chemistry- I	25	75	100
2	MAIN	Paper-2	4	4	Inorganic Chemistry- I	25	75	100
3	MAIN	Paper-3	4	4	Physical Chemistry- I	25	75	100
4	MAIN PRACTICAL	Paper-1	5	0	Organic Chemistry Practical- I	-	-	-
5	MAIN PRACTICAL	Paper-2	5	0	Inorganic Chemistry Practical- I	-	-	-
6	MAIN PRACTICAL	Paper-3	5	0	Physical Chemistry Practical- I	-	-	-
7	ELECTIVE	Paper-1	3	3	(to choose 1 out of 3) A. Advanced Polymer Chemistry B. Heterocyclic Chemistry C. Materials Chemistry	25	75	100
			30	**15**		**100**	**300**	**400**

1ST YEAR- SEMESTER II						CIA	Uni. Exam	Total
8	MAIN	Paper-4	3	3	Organic Chemistry- II	25	75	100
9	MAIN	Paper-5	3	3	Inorganic Chemistry- II	25	75	100
10	MAIN	Paper-6	4	4	Physical Chemistry- II	25	75	100
11	MAIN PRACTICAL	Paper-1	5	5	Organic Chemistry Practical- I	25	75	100
12	MAIN PRACTICAL	Paper-2	5	5	Inorganic Chemistry Practical- I	25	75	100
13	MAIN PRACTICAL	Paper-3	5	5	Physical Chemistry Practical- I	25	75	100

14	Compulsory paper		2	2	Human Rights	25	75	100
15	ELECTIVE	Paper-2	3	3	(to choose 1 out of 3) A. Green Chemistry B. Supramolecular and Nanochemistry C. Modern Separation Techniques	25	75	100
			30	**30**		**200**	**600**	**800**

2nd YEAR- SEMESTER III						**CIA**	**Uni. Exam**	**Total**
16	MAIN	Paper-7	4	4	Organic Chemistry- III	25	75	100
17	MAIN	Paper-8	4	4	Inorganic Chemistry- III	25	75	100
18	MAIN	Paper-9	4	4	Physical Chemistry- III	25	75	100
19	MAIN PRACTICAL	Paper-4	5	0	Organic Chemistry Practical- II	-	-	-
20	MAIN PRACTICAL	Paper-5	5	0	Inorganic Chemistry Practical- II	-	-	-
21	MAIN PRACTICAL	Paper-6	5	0	Physical Chemistry Practical- II	-	-	-
22	ELECTIVE	Paper-3	3	3	(to choose 1 out of 3) A. Scientific Research Methodology B. Advanced Bioinorganic Chemistry C. Advanced analytical techniques	25	75	100
			30	**15**		**100**	**300**	**400**

2nd YEAR- SEMESTER IV						**CIA**	**Uni. Exam**	**Total**
23	MAIN	Pape-10	4	4	Organic Chemistry- IV	25	75	100
24	MAIN	Paper-11	4	4	Inorganic Chemistry- IV	25	75	100
25	MAIN	Paper-12	4	4	Physical Chemistry- IV	25	75	100
26	MAIN PRACTICAL	Paper-4	5	5	Organic Chemistry Practical- II	25	75	100
27	MAIN PRACTICAL	Paper-5	5	5	Inorganic Chemistry Practical- II	25	75	100
28	MAIN PRACTICAL	Paper-6	5	5	Physical Chemistry Practical- II	25	75	100

29	ELECTIVE	Paper-4	3	3	(to choose 1 out of 3) A. Environmental Chemistry B. Inorganic Photochemistry C. Medicinal Chemistry and Drug Design	25	75	100
			30	**30**		**175**	**525**	**700**

SUBJECT	PAPERS	CREDIT	TOTAL CREDITS	MARKS	TOTAL MARKS
MAIN PAPER	12	3-4	46	100	1200
MAIN PRACTICAL	6	5	30	100	600
ELECTIVE PAPER	4	3	12	100	400
COMPULSORY PAPER	1	2	2	100	100
TOTAL	**23**	**-**	**90**	**-**	**2300**

Note:

1. Theory Papers: Internal 25 marks; External 75 marks
2. Practical Papers: Internal 25 marks; External 75 marks

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THIRUVALLUVAR UNIVERSITY
M.Sc. CHEMISTRY
SYLLABUS
UNDER CBCS
(with effect from 2017-2018)

FIRST YEAR

SEMESTER I
PAPER - 1
ORGANIC CHEMISTRY I

OBJECTIVES:

To make the students learn and understand the concept of stereochemistry, conformational analysis and their application in the determination of reaction mechanism. To understand the mechanism of nucleophilic and electrophilic substitution reactions.

UNIT-I: STEREOCHEMISTRY

Optical activity and chirality, classification of chiral molecules as asymmetric and dissymmetric. A brief study of dissymmetry of allenes, biphenyls, spiro compounds, trans-cyclooctene, cyclononene and molecules with helical structures. Absolute configuration - R, S notation of biphenyls and allenes. Fischer projection. Inter conversion of Sawhorse, Newman and Fischer projections. Erythro and threo nomenclature, E and Z nomenclature - Asymmetric synthesis - Cram's rule.

UNIT-II: CONFORMATIONAL ANALYSIS

Conformational analysis of disubstituted cyclohexane and their stereochemical features (geometrical and optical isomerism (if shown) by these derivatives). Conformation and reactivity of substituted cyclohexanol (oxidation and acylation), cyclohexanone (reduction) and cyclohexane carboxylic acid derivatives (esterification and hydrolysis). Conformation and stereochemistry of cis and trans-decalin and 9 - methyldecalin.

UNIT-III: ALIPHATIC SUBSTITUTION REACTIONS

Nucleophilic substitution reactions: S_N1, S_N2 and S_Ni mechanisms - Neighboring group participation – Reactivity - structural and solvent effects - substitution in norbornyl and bridgehead systems - substitution at allylic and vinylic carbons - substitution by ambident nucleophiles - substitution at carbon doubly bonded to oxygen and nitrogen - alkylation and acylation of amines, halogen exchange, Von-Braun reaction, alkylation and acylation of active methylene carbon compounds, hydrolysis of esters, Claisen and Dieckmann condensation.

Electrophilic substitution reactions: S_E1, S_E2 and S_Ei mechanism, double bond shift - Reactivity. Migration of double bond, keto-enol interconversion, Stark- Enamine reaction, halogenation of aldehydes and ketones and decarboxylation of aliphatic acids.

UNIT-IV: ELIMINATION REACTIONS

E1, E2 and $E1_CB$ mechanism - E1, E2 and E1cB spectrum - Orientation of the double bond - Hoffman and Saytzeff rules - Competition between elimination and substitution. Typical elimination reactions- dehydration, dehydrohalogenation and dehalogenation. Stereochemistry of E2 eliminations in cyclohexane systems. Mechanism of pyrolytic eliminations. Chugaev and Cope eliminations.

UNIT-V: AROMATIC SUBSTITUTION REACTIONS

Electrophilic substitution reactions: The arenium ion mechanism. Orientation and reactivity (ortho, meta and para directing groups). Typical reactions including Reimer - Tieman reaction, Vilsmeier - Haack, Gattermann, Gattermann - Koch reaction and Kolbe reaction. Synthesis of di and tri substituted benzene (symmetrical tribromo benzene, 2-amino-5-methyl phenol, 3-nitro-4-bromobenzoic acid, 3, 4- dibromonitrobenzene and 1, 2, 3 - trimethylbenzene) starting from benzene or any monosubstituted benzene.

Nucleophilic substitution reactions: Mechanisms: S_N1, S_NAr and Benzyne mechanisms. Methods for the generation of benzyne intermediate and reactions of aryne intermediate. Nucleophilic substitution involving diazonium ions. Aromatic nucleophilic substitution of activated halides, Ziegler alkylation and Chichibabin reaction.

Recommended Books

1. C. Wentrup, Reactive Molecules, John Wiley and Sons, New York (1984).
2. C.K. Ingold,Structure and mechanism in organic chemistry, Cornell Universitypress.
3. E. S. Gould, Mechanism and Structures in Organic Chemistry, Holt, New York (1959).
4. Ernest Eliel, Stereochemistry of carbon compounds, McGraw Hill, New York (1962).
5. Francis A. Carey and Richard J. Sundberg, Advanced Organic Chemistry, Part A and B, III Edition, Plenum Press (1990).
6. Graham Solomons, Organic Chemistry.
7. J. March, Advanced organic reaction mechanism and structure, Tata McGraw Hill.
8. J. Miller, Advanced Organic Chemistry, III Edition.
9. J. Miller, Aromatic Nucleophilic Substitution
10. Longman, A Guide book to mechanism in organic chemistry.
11. Marc London,Organic Chemistry.
12. Nasipuri, Stereochemistry, Alhed Publishers, 2003.
13. Mc Murry, Organic Chemistry, V Edition, Asian Books Pvt Ltd (2000).
14. Niel Isaacs, Physical Organic Chemistry, ELBS Publications (1987).
15. P. Ramesh, Basic principles of Organic Stereochemistry, Madurai Kamaraj University.
16. P. S. Kalsi, Stereochemistry and mechanism through solved problems, WileyEastern Ltd., (1994).
17. P. S. Kalsi, Stereochemistry, Conformation analysis and Mechanism, II Edition, Wiley Eastern Limited, Chennai (1993).
18. R. K. Bansal, Organic Reaction Mechanism.
19. R.O.C. Norman, Organic Synthesis, Chapman and Hall, New York (1980).
20. S. M. Mukherji and S.P. Singh, Organic Reaction Mechanism, MacMillan India Ltd., Chennai (1990).
21. Stanley. H. Pines, Organic Chemistry, 5^{th} Edn, McGraw Hill International Edition. 1987.
22. T. L. Gilchrist and C.W. Rees, Carbenes, Nitrenes and Arynes, Thomas Nelson and Sons Ltd., London.
23. Peter Sykes, A Guide book to mechanism in organic chemistry, Pearson Edition (2006).
24. C. N. Pillai, Textbook of Organic Chemistry, University press (India) private Ltd (2009).

PAPER -2
INORGANIC CHEMISTRY I

OBJECTIVES:
To learn about the inorganic polymers. To study the concept of coordination chemistry, stability of the complexes and stereochemistry of complexes. To know about the structure and bonding of inorganic compounds.

UNIT-I: STRUCTURE AND BONDING - I

Polyacids: Isopolyacids and heteropolyacids of vanadium, chromium, molybdenum and tungsten.
Inorganic Polymers: Silicates, structure - properties - correlation and applications - molecular sieves, polysulphur - nitrogen compounds and poly – organophosphazenes
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UNIT-II: STRUCTURE AND BONDING - II

Boron hydrides: Polyhedral boranes, hydroboration, carboranes and metallocarboranes.
Metal clusters : Chemistry of low molecularity metal clusters (upto) trinuclear metal clusters, multiple metal-metal bonds. Cubane clusters and Zintl clusters.

UNIT-III: COORDINATION CHEMISTRY - I

Stability of complexes; thermodynamic aspects of complex formation; factors affecting stability, HSAB approach. Determination of stability constants by spectrophotometric, polarographic and potentiomteric methods.

UNIT-IV: COORDINATION CHEMISTRY - II

Stereochemical aspects; stereoisomerism in inorganic complexes; isomerism arising out of ligand distribution and ligand conformation; chirality and nomenclature of chiral complexes; optical rotatory dispersion and circular dichroism. Macrocyclic ligands; types; porphyrins; corrins, Schiff bases; crown ethers and cryptates.

UNIT-V: COORDINATION CHEMISTRY - III

Evidences for metal-ligand orbital overlap, molecular orbital theory and energy level diagrams, concept of weak and strong field ligands, Jahn-Teller distortion, charge - transfer spectra. Term states for "d"- ions, energy diagrams, d-d transitions, Orgel and Tanabe - Sugano diagrams, spin orbit coupling, nephelauxetic effect, spectral and magnetic characteristics of transition metal complexes.

TEXT BOOKS

1. F. A. Cotton and G.W. Wilkinson, Advanced Inorganic Chemistry– A comprehensive Text, John Wiley and Sons (1988).
2. J. E. Huheey, Inorganic Chemistry, Harper and Collins, NY, IV Edition, (1993).
3. K. F. Purcell and J. C. Kotz, Inorganic Chemistry WB Saunders Co., USA, (1977).
4. M. C. Shrivers, P.W Atkins, CH. Langford, Inorganic Chemistry, OUP, (1990).
5. N. N. Greenwood and Earnshaw, Chemistry of the Elements, Pergamon Press, New York (1984).
6. N. H Ray, Inorganic Polymers, Academic Press, (1978)
7. S. F. A. Kettle, Coordination Chemistry, ELBS, (1973).

Suggested References

8. A. B. P. Lever, Inorganic Electronic Spectroscopy, II Edn., Elsevier, New York, (1984).
9. B.E. Dogulas DH McDaniel's and Alexander, Concepts and Models of Inorganic Chemistry, Oxford IBH, (1983).
10. B.N. Figgis, Introduction to Ligand Fields, Interscience, (1966).
11. E.L. Mutterties, Polyhedral Boranes, Academic Press, New York (1975).
12. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., NY (1974).
13. W.U. Mallik, G.D. Tuli, R.D. Madan, Selected topics in Inorganic Chemistry, S. Chand and Co., New Delhi, (1992).
14. D. M.P.Mingos and D. J. Wales, Introduction to Cluster Chemistry, Prentice Hall, 1990.
15. R. Gopalan, Text book of Inorganic Chemistry, University press (India) private Ltd.

PAPER-3
PHYSICAL CHEMISTRY I

OBJECTIVE:

To study the partial molar property, fugacity and its significance. Theories and basic concepts of chemical kinetics - mechanism of acid, base and enzyme catalysis reaction. To acquire knowledge on phase equilibria of three component system. To study the basics of colloids.

UNIT-I: THERMODYNAMICS

Partial molar properties -Partial molar free energy (chemical potential), Partial molar volume and Partial molar heat content - Their significance and determination of these quantities. Variation of chemical potential with temperature and pressure.
Definition of fugacity - determination of fugacity by graphical method - variation of fugacity with temperature and pressure - the concept of activity and activity coefficients – determination of activity and activity coefficient by emf method - determination of activity and activity coefficients for non-electrolytes - determination of standard free energies - choice of standard states.

UNIT-II: PHASE EQUILIBRIA

Physical equilibria involving phase transition: Two component system - Congruent system (phenol-aniline) and Incongruent system (sodium chloride- water) - Peritectic reactions. Three component system: Solid - Liquid equilibria - hydrate formation (sodium chloride - sodium sulphate - water); Liquid - Liquid equilibria - one pair of partially miscible liquids (acetic acid - chloroform - water and alcohol - benzene - water); two pairs of partially miscible liquids (water - ethyl alcohol - succinic nitrile).

UNIT-III: COLLOIDS

Surface phenomena - surfactants, micellization, critical micelle concentration (CMC), factors affecting CMC of surfactants, micro emulsions, reverse micelles and surface films (electro kinetic phenomena).

Structure and stability of colloids - Zeta potential (derivation), electro osmosis, protective colloids, gold number, sedimentation potential, streaming potential and Donnan membrane equilibrium.

UNIT-IV: CHEMICAL KINETICS

Absolute Reaction Rate Theory (ARRT) - Potential energy surfaces - partition function and activated complex- Eyring equation - estimation of free energy, enthalpy and entropy of activation and their significance.

Reactions in solutions - effect of pressure, dielectric constant and ionic strength on reactions in solutions - kinetic isotope effects - linear free energy relationships. Hammett and Taft equation.

UNIT-V: CATALYSIS

Acid - Base catalysis - mechanism of acid - base catalyzed reactions - Bronsted catalysis law. Catalysis by enzymes - Kinetics of enzyme catalyzed reaction - Michaelis - Menten equation and its interpretation. Effect of substrate concentration, pH and temperature on enzyme catalyzed reactions - inhibition of enzyme catalyzed reactions - Competitive, Non-competitive and Uncompetitive inhibition.

TEXT BOOKS

1. S. Glasstone, Thermodynamics for Chemists, Affiliated East West Press, New Delhi (1950).
2. J. Rajaram and J. C. Kuriacose, Thermodynamics for Students of Chemistry, Lal Nagin Chand, New Delhi (1986).
3. Samuel Glasstone, Textbook of Physical Chemistry, Macmillan India Limited, 2nd Edition
4. Terence Cosgrove – Colloid Science - Principles, methods and applications
5. Robert J. Hunter - Foundations of Colloid Science, 2nd Edition
6. J. Rajaram and J.C. Kuriacose, Kinetics and Mechanism of Chemical Transformations. Mac Millan India Ltd (1993).
7. K. J. Laidler, Chemical Kinetics, Harper and Row, New York (1987).

Suggested References

1. W. J. Moore, Physical Chemistry, Orient Longman, London (1972).
2. K. G. Denbiegh, Thermodynamics of Steady State, Methien and Co. Ltd, London (1951).
3. K. Nash, Elements of Chemical Thermodynamics, Addision Wesley (1962).
4. Alexander and Johnson- "Colloid science"- Oxford University Press
5. R. G. Frost and Pearson, Kinetics and Mechanism, Wisely, New York (1961).
6. Amdur and G. G. Hammes, Chemical Kinetics, Principles and Selected Topics, McGraw Hill, New York (1968).
7. M.V. Sangaranarayanan and V. Mahadevan, Text book of Physical Chemistry, University press (2011).

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ELECTIVE
PAPER-I
(to choose 1 out of 3)

A. ADVANCED POLYMER CHEMISTRY

OBJECTIVE:

To gain the knowledge in the preparation, properties, characterization and applications of polymers.

UNIT- I: BASIC CONCEPTS

Classification - Nomenclature and isomerism - functionality - Molecular forces and chemical bonding in polymers - molecular weight – linear, branched and cross linked polymers. Thermoplastic and thermosetting polymers - Elastomers, fibers and resins. Techniques of polymerization - bulk solution, emulsion and suspension.

UNIT- II: KINETICS AND MECHANISM

Kinetics and mechanism of polymerization - free radical, cationic, anionic and co-ordination polymerization (Ziegler-Natta Catalyst). Copolymerization - kinetics (Detailed Study). General characterization-kinetic chain length-degree of polymerization, chain transfer - initiators - inhibitors - retarders.

UNIT-III: A. STRUCTURE AND PROPERTIES

Structure - property relationship - mechanical properties, thermal properties - glass transition temperature - factors affecting glass transition temperature - crystallinity and melting point - related to structure.

B. POLYMER CHARACTERIZATION AND ANALYSIS

Crystalline nature - X-Ray diffraction - Differential Scanning Calorimetry (DSC) - Thermo Gravimetric Analysis - molecular weight determination - Osmometry (membrane), viscosity, ultra centrifuge and gel permeation chromatography.

UNIT-IV: INDUSTRIAL AND NATURAL POLYMERS

Important industrial polymers - preparation and application of polyethylene, poly vinyl chloride, poly urethanes, polytetrafluro ethylene (TEFLON), nafion and ion - exchange resins. Importance of natural polymers - application and structures of starch, cellulose and chitosan derivatives.

UNIT-V: ADVANCES IN POLYMERS

Biopolymers - biodegradable polymers - biomedical polymers - poly electrolytes - conducting polymers - high temperature and fire retardant polymers - polymer blend - polymer composites - polymer nanocomposites - IPN inter penetrating network polymers - electroluminescent polymers.

TEXT BOOKS:

1. F. W. Bill Meyer. Text book of polymer science, III Edition, John Wiley and sons, New York.
2. P. J. Flory. Principles of Polymer Chemistry, Cornell Press (recent edition).
3. V. R. Gowarikar, B. Viswanathan, J. Sridhar, Polymer Science - Wiley Eastern, 1986.
4. F. S. Misra - Introduction to Polymer Chemistry, Wiley Eastern Ltd.,
5. P. Bahadur, N. V. Sastry, Principles of Polymer Science, Narosa Publishing House.
6. G. Odian, Principles of Polymerization, McGraw Hill Book Company, New York, 1973.
7. Charles E. Carraher, Jr, Seymour/Carraher's polymer chemistry. -- 7th Edition

Suggested References

1. Rudin, The Elements of Polymer Science and Engineering. Academic Press, New York, 1973.
2. E. H. Brawn, The Chemistry of High Polymers, Butter worth & Co., London, 1948.
3. G. S. Krishenbaum, Polymer Science Study Guide, Gordon Breach Science publishing, New York, 1973.
4. E. A. Coolins, J. Bares and E. W. Billmeyer, Experiments in Polymer Science, Wiley Interscience, New York, 1973

PAPER-1

B. HETEROCYCLIC CHEMISTRY

OBJECTIVES:

To know the student about chemistry of heterocyclic compounds. To understands the strategies for designing the chemical synthesis. To make the students knowledgeable in higher heterocycles.

UNIT I: NOMENCLATURE OF HETEROCYCLES

Introduction, nomenclature systems- systematic nomenclature system (Hantzsch – Widman system) and replacement nomenclature system for monocyclic, fused, spiro and bridged heterocycles. Aromatic heterocycles: Introduction, chemical behavior of aromatic heterocycles, classification (structural types). Criteria of aromaticity in heterocycles (bond lengths, dipole moments, empirical resonance energy, delocalization energy, Dewar resonance energy, chemical shits and ^{1}HNMR spectra).

UNIT- II: NONAROMATIC HETEROCYCLES

Introduction, strain, bond angle strain, torsional strain and their consequences in small ring heterocycles, conformations of six membered heterocycles – molecular geometry, barriers to ring inversion, pyramidal inversion and 1,3 diaxial interactions. Stereoelectronic effect in saturated six membered heterocycles- anomeric effect, other related effects and attractive interactions through space.

UNIT III: SMALL RING HETEROCYCLES

Three membered and four membered heterocycles: Synthesis and reactions of aziridines, oxiranes, thiranes, azetidines, oxetanes and thietanes. Benzo- fused five membered heterocycles: Synthesis and reactions including medicinal applications of benzopyrroles, benzofurans and benzothiophenes.

UNIT- IV: MESO IONIC HETEROCYCLES

General classification, chemistry of some important meso-ionic heterocycles of type A and B and their applications. Six membered heterocycles with on heteroatom: Synthesis and reactions of pyrylium salts and pyrones and their comparisons with pyridinium and thiopyrylium salts and pyridones.

UNIT- V: HIGHER HETEROCYCLES

Six membered heterocycles with two or more heteroatom: Synthesis and reactions of diazines. triazines and tetrazines. Seven and large membered heterocycles: Synthesis and reactions of azepines, oxepines , thiepines and diazepines. Synthesis of five and six membered heterocycles with P, As, Sb and Bi.

Text book:

1. Heterocyclic Chemistry, Vol. 1-3, R. R. Gupta, M. Kumar and V.Gupta , Spinger Verlag.

Suggested references:

2. The Chemistry of Heterocycles, T. Eicher and S. Hauptmann, Thieme.
3. Heterocyclic Chemistry, J. A. Joule, K. Mills and G. F. Smith, Chapman and Hall.
4. Heterocyclic Chemistry, T. L. Gilchrist, Longman Scientific Technical.
5. Contemporary Heterocyclic Chemistry, G. R. Newkome and W.W. Paudler, Wily –inter Science.
6. An Introduction to the Heterocyclic Compounds, R. M. Acheson, John wiely.
7. Comprehensive Heterocyclic Chemistry, A. R. Katrizky and C.W. Rees, eds. Pergamon press.

PAPER-1
C. MATERIALS CHEMISTRY

OBJECTIVES:

To learn about different types of materials. To understand the classifications of materials. To learn the advancements of material chemistry.

UNIT-I: MULTIPHASE MATERIALS

Ferrous alloys**:** Fe-C phase transformation in ferrous alloys, stainless steels, non- ferrous alloys, properties of ferrous and non-ferrous alloys and their applications.
Glasses**:** Glassy state, glass formers, glass modifiers and applications.
Ceramics**:** Ceramic structures, mechanical properties, clay products, refractories-characterizations, properties and applications.
Composites**:** Microscopic composites- dispersion-strengthened and particle reinforces-fibre-reinforced composites and macroscopic composite.
Nanomaterials**:** Nanocrystalling phase- preparation- special properties and applications.
Thin films and Langmuir - Blodgett films**:** Preparation techniques; evaporation/sputtering and sol-gel methods. Photolithography, properties and application of thin films.

UNIT-II: LIQUID CRYSTALS

Mesomorphic behaviour, thermotropic liquid crystals, positional order, bond orientational order, nematic and smectic mesophases; smectic-nematic transition and clearing temperature-horneotropic, planar and schlieren textures, twisted nematics, chiral nematics, molecular arrangement in smectic A and smectic C phases, optical properties of liquid crystals. Dielectric susceptibility and dielectric constants.

UNIT-III: IONIC CONDUCTORS

Types of ionic conductors, mechanism of ionic conduction, interstitial jumps (Frenkel). Vacancy mechanism, diffusion super ionic conductors; phase transitions and mechanism of conduction in super ionic conductors, examples and applications of ionic conductors.

High Tc Materials**:** Defect perovskites, high Tc superconductivity in cuprates, preparation and characterization of 1-2-3 and 2-1-4 materials, anisotropy, normal state properties: temperature dependence of electrical resistance, optical phonon modes, super conducting state; heat capacity;

Coherence length, elastic constants, position lifetimes and microwave absorption - Applications of high Tc materials.

UNIT-IV: MATERIALS FOR SOLID STATE DEVICES

Rectifiers, transistors, capacitors- IV-V compounds, low dimensional quantum structures, optical properties.
Organic solids: Conducting organic solids, organic superconductors and magnetism in organic materials.
Fullerenes: doped fullerenes as superconductors.
Molecular devices**:** Molecular rectifiers and transistors, artificial photosynthetic devices, optical storage memory and switches-sensors.
Nonlinear optical materials: nonlinear optical effects. Second and third order - molecular hyper polarisability and second order electric susceptibility - materials for second and third harmonic generation.

UNIT-V: ADVANCED MATERIALS

Brief study of the following: Fiber reinforced plastics (FRP), fiber reinforced metals (FRM), metal matrix composites (MMC), surface acoustic wave (SAW) materials, ceramics and cermets, electrets and SMART materials.

BOOKS SUGGESTED:

1. Solid State Chemistry and its applications, Anthony R.West, (1998), John Wiley & Sons, New York.
2. Material Science and Engineering. An Introduction. W.D. Callister. Wiley.
3. Principles of the Solid State, H.V. Keer. Wiley Eastern.
4. Materials Science for Engineers: J. C. Anderson, K.D. Leaver, P. Leevers and R.D. Rawlings, 5^{TH} Edition, Nelson Thornes Ltd.
5. Thermotropic Liquid Crystals. Ed. G.W. Gray. John Wiley.
6. Handbook of Liquid Crystals. Kelker and Hafz. Chemie Verlag.
7. Materials science, M. Arumugam ,Anuradha publications (2012) , Chennai.
8. Materials Science, S. L. Kakani, Amit Kakani, (2006), New Age International (P) Limited, Publishers, Chennai.

9. Material Science and Engineering: A First Course, V. Raghavan, 5TH Edition (2007), Prentice-Hall of India (P) limited.
10. A.R. West, Solid State Chemistry and its Applications, (1984) John Wiley & Sons, Singapore.
11. C.N R. Rao and J. Gopalkrishnan, New Directions in Solid State Chemistry, (1997) Cambridge Univ. Press.
12. T. V. Ramakrishnan and C. N. R. Rao, Superconductivity Today, (1992) Wiley Eastern Ltd., New Delhi.
13. P. Ball, Designing the Molecular World: Chemistry at the Frontier, (1994) Princeton University Press.

SEMESTER II

PAPER - 4

ORGANIC CHEMISTRY II

OBJECTIVES:

To understand the nature of carbon-hetero atom multiple bond additions and the mechanism of a chemical reactions.To understand the techniques involved in the rearrangements and their synthetic utility. To know the methods of synthetic strategies and applications. To apply the knowledge of chemical reactions in organic synthesis.

UNIT-I: ADDITION TO CARBON - CARBON AND CARBON – HETERO MULTIPLE BONDS

Electrophilic, nucleophilic and neighbouring group participation mechanisms - addition of halogen and nitrosyl chloride to olefins. Hydration of olefins and acetylenes. Hydroboration, hydroxylation, Michael addition, 1, 3 - dipolar additions, Simon - Smith reaction. Mannich, Stobbe, Darzen, Wittig, Wittig - Horner and Benzoin reactions. Carbenes and nitrenes: Methods of generation, structure, addition reactions with alkenes and insertion reactions.

UNIT-II OXIDATIONS AND REDUCTIONS

Mechanism - study of the following oxidation reactions - oxidation of alcohols - use of DMSO in combination with DCC and acetic anhydride in oxidising alcohols - oxidation of methylene to carbonyl, oxidation of aryl methane - allylic oxidation of olefins - ozonolysis - oxidation of olefinic double bonds and unsaturated carbonyl compounds - oxidative cleavage of C-C bond. Reduction: Selectivity in reduction of 4-t-butylcyclohexanone using selecterides. Hydride reductions - reduction with $LiAlH_4$, $NaBH_4$, tritertiarybutyloxyaluminium hydride, sodium cyanoborohydride, trialkyltin hydride and hydrazines.

UNIT-III: MOLECULAR REARRANGEMENTS

A detailed study with suitable examples of the mechanism of the following rearrangements: Wagner - Meerwein, Pinacol - Pinacolone, Demjanov, Dienone - phenol, Favorski, Baeyer - Villiger, Wolf, Stevens and Von Richter rearrangements.

UNIT-IV: MODERN SYNTHETIC METHODS, REACTIONS AND REAGENTS

Synthesis of simple organic molecules using acetylation and alkylation of enamines, Grignard reactions, Diels - Alder reaction, phosphorus and sulphur ylides, Robinson annulations. Retrosynthetic Analysis: Basic principles and terminology of retrosynthesis, one group and two group C-X disconnections, one group C-C and two group C-C disconnections, amine and alkene synthesis. Protection and deprotection of functional groups (R-OH, R-CHO, RCO-R, R-NH_2 and R-COOH). Uses of the following reagents: DCC, Trimethylsilyliodide, 1, 3-Dithiane (umpolung), and diisobutylaluminiumhydride (DIBAL).

UNIT-V: HETEROCYCLES, VITAMINS AND STEROIDS

Synthesis of imidazole, oxazole, thiazole, flavones, isoflavones, anthocyanins, pyrimidines (cytocine, uaracil only) and purines (adenine, guanine only). Synthesis of vitamin-A_1 using Wittig method. Conversion of cholesterol to progesterone, estrone and testosterone.

Recommended Books

1. E. S. Gould, Mechanism and Structure in Organic Chemistry Holt, Rinehart and Winston Inc., 1959.
2. Francis A. Carey and Richard J, Sundberg, Advanced Organic Chemistry - Part B, 3rd Edition (1990).
3. H. O. House, Modern Synthetic Reactions, Benjamin Cummings Publishing Company, London (1972).
4. I. L. Finar, Organic chemistry, Vol. I and II, 5th Edition, ELBS Publication.
5. J. March, Advanced organic reaction mechanism and structure, Tata McGraw Hill.
6. Mc Murry, Advanced organic chemistry, Thomas Pvt. Ltd.,
7. Michael B. Smith, Organic Synthesis, McGraw Hill, International Edition (1994).
8. L.F. Fieser and M. Fieser, Organic Chemistry, Asia Publishing House, Bombay, 2000.
9. Michael Smith, Organic synthesis.
10. Parmer and Chawla, Organic reaction mechanisms, S. Chand and Co.,
11. Paul de Mayo, Molecular Rearrangements, Vol. I and II.
12. R. E. Ireland, Organic synthesis, Prentice Hall of India
13. R.O.C. Norman, Principles of organic synthesis, Chapman and Hall, London. 1980.

14. Raymond K. Mackie and David M. Smith,Guide book to Organic synthesis, ELBS Publication.
15. S. M. Mukherji and S.P. Singh, Organic Reaction Mechanism, MacMillan India Ltd., Chennai (1990).
16. Stuart Warren, Work book for organic synthesis, The Disconnection Approach,John Wiley & Sons (Asia) Pvt. Ltd.
17. W. Carruther, Jain Coldham, Modern Methods of organic synthesis, IV Edition.
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19. C. N. Pillai, Textbook of Organic Chemistry, University press (India) private Ltd (2009).

PAPER – 5

INORGANIC CHEMISTRY II

OBJECTIVES:

To make the students knowledgeable in solid state chemistry. To equip the students for their future career in nuclear industry. To learn the chemistry of lanthanides, to learn about nanotechnology and use of inorganic compounds in biological chemistry.

UNIT-I: THE CHEMISTRY OF SOLID STATE

Structure of solids; Comparison of X-ray and Neutron Diffraction; structure of pyrovoskite, cadmium iodide and nickel arsenide; spinels and antispinels, defects in solids, non-stoichometeric compounds. Electrical, magnetic and optical properties of solids, band theory. Semiconductors, superconductors, solid state electrolytes. Types of magnetic behaviour, dia, para, ferro, antiferro and ferrimagnetism, hysterisis.
Solid state lasers, inorganic phosphors and ferrites.

UNIT- II: NUCLEAR CHEMISTRY-I

Nuclear properties: Nuclear spin and moments, origin of nuclear forces, Nuclear models: liquid drop model and nuclear shell model. Modes of radioactive decay: Orbital electron capture, nuclear isomerism, internal conversion. Detection and determination of activity by cloud chamber, nuclear emulsion, bubble chamber, Geiger-Muller, scintillation and Cherenkov counters.
Nuclear reactions: Types, cross section, compound nucleus theory, high energy nuclear, direct nuclear, photonuclear and thermonuclear reactions.

UNIT- III: NUCLEAR CHEMISTRY-II

Stellar energy: synthesis of elements, hydrogen burning, carbon burning. Nuclear reactors: fast breeder reactors, particle accelerators, linear accelerators, cyclotron and synchrotron. Radio analytical methods: Isotope dilution analysis, radiometric titrations, radio immuno assay. Neutron activation analysis.

UNIT-IV: THE CHEMISTRY OF LANTHANIDES, ACTINIDES AND NANOTECHNOLOGY

The chemistry of solid state, lanthanides and actinides, oxidation state, spectral, magnetic characteristics, coordination numbers, stereochemistry, nuclear and non-nuclear applications.

Nanotechnology: Introduction - preparatory methods, characterization, application as sensors, biomedical applications, application in optics and electronics.

UNIT-V: BIOINORGANIC CHEMISTRY

Transport proteins: Oxygen carriers, metalloenzymes, carboxy peptidase, carbonic anhydrase, redox process, iron-sulphur proteins, chlorophyll, salient features of the photo synthetic process, vitamin-B_{12}, role of sodium, potassium, calcium, zinc and copper; fixation of nitrogen, nitrogen cycle.

Text Books

1. A. R. West, Basic solid state chemistry, John Wiley, (1991).
2. S. Glasstone, Source Book on Atomic Energy, Van Nostrand Co., (1969).
3. G. Frielander, J. W. Kennedy and J. M. Miller, Nuclear and Radiochemistry, John Wiley and Sons (1981).
4. Hari Jeevan Arnikar , Essentials of nuclear chemistry, New Age International (P) Ltd., (2005).
5. Hari Jeevan Arnikar,Nuclear Chemistry Through Problems, New Age International (P) Ltd., (2007).
6. G. T. Seaborg, Transuranium elements, Dowden Hitchinson and Ross, (1978).
7. Nishit Mathur, Nanochemistry, RBSA publishers (2010).
8. Patric Salomon, A hand book on Nano Chemistry, Dominant publishers and distributors (2008).
9. G. B. Sergeev, Nanochemistry ,Elsevier Science and Technology (2007).
10. U. Saityanarayana, Essentials of Biochemistry, Books and Allied (P) Ltd.,
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Suggested References

11. W. E. Addison, Structural principle in inorganic chemistry, Longman (1961).
12. D. M. Adams, Inorganic solids, John Wiley Sons (1974).
13. Azaroff, Solid State Chemistry, John Wiley.
14. B. E. Dogulas DH McDaniel's and Alexander, Concepts and Models of Inorganic Chemistry, Oxford IBH, (1983)
15. M. C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., New York (1974).
16. J.E. Huheey, Inorganic Chemistry - Principles, Structure and Reactivity, Harper Collins, New York, IV Edition (1993).
17. N. Greenwood and A. Earnshaw, Chemistry of Elements, Pergamon, NY, (1984).
18. F.A. Cotton and G. Wilkinson Advanced Inorganic Chemistry - A Comprehensive Text, John Wiley and Sons, V Edition (1988).
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20. W. U. Mallik, G.D. Tuli, R.D. Madan, Selected topics in Inorganic Chemistry, S. Chand and Co., New Delhi, (1992).
21. M.N. Hughes, The Inorganic Chemistry of Biological processes, Wiley London, II Edition (1982).
22. Jonathan W. Stead, David R. Turner and Karl. J. Wallace., Core concepts in Supramolecular Chemistry and Nanochemistry, John Wiley sons Ltd (2007).
23. Beoffry A.Ozin, Andre Arsenault, Ludovico &Cademartiri. Nano chemistry - A chemical approach to nano materials, Royal Society of chemistry (2009).
24. Kenneth J. Klabunde, Nano scale materials in Chemistry A. John Wiley & Sons Publishers (2001).
25. L. Stryer, Biochemistry, V Edition, Freeman & Co., New York (2002) .
26. D. L. Nelson and M. M. Cox, Lehninger, Principles of Biochemistry, III edition, McMillan North Publication (2002).
27. W. Kaim and B. Schwederski, Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life, an Introduction and Guide, Wiley, New York (1995).
28. S. J. Lippard and J. M. Berg, Principles of Bioinorganic Chemistry, University Science Books (1994).
29. I. Bertini, H. B. Grey, S. J. Lippard and J. S. Valentine, Bioinorganic Chemistry, Viva Books Pvt. Ltd., New Delhi (1998).
30. R. Gopalan, Text book of Inorganic Chemistry, University press (India) private Ltd.

PAPER-6
PHYSICAL CHEMISTRY II

OBJECTIVES:

To understand the behavior of kinetic reactions and fast reaction. To understand the behavior of electrolytes in solution. To know the structure of the electrode surface. To differentiate electrode kinetics from other types of kinetic studies. To know the applications of electrode process. To study the concept and applications of group theory.

UNIT-I: KINETICS OF COMPLEX REACTIONS & FAST REACTIONS

Kinetics of complex reactions, reversible reactions, consecutive reactions, parallel reactions, chain reactions, general treatment of chain reactions - chain length - Rice Herzfeld mechanism - explosion limits.
Study of fast reactions - relaxation methods - temperature and pressure jump methods- stopped flow and flash photolysis methods.

UNIT-II: ELECTROCHEMISTRY – I

Mean ionic activity and mean ionic activity coefficient - activity coefficient of strong electrolytes - determination of activity coefficient by electrochemical method.
Debye Huckel limiting law - qualitative and quantitative verification - limitation - Debye Huckel limiting law at appreciable concentrations of electrolytes - Debye - Huckel - Bronsted equation.

UNIT-III: ELECTROCHEMISTRY – II

Electrode - electrolyte interface - adsorption at electrified interface - electrical double layer - electro capillary phenomenon - Lippmann equation - Structure of double layers - Helmholtz - Perrin, Guoy - Chapman and Stern model of electrical double layers.
Diffusion - Fick's law of diffusion - Effect of ionic association on conductance-electro kinetic phenomena -membrane potential.

UNIT-IV: GROUP THEORY – I

Definition of basic terms in group theory – Group – Abelian group, cyclic group, subgroup, group multiplication table - similarity transformation and class, symmetry elements and symmetry operations -Point groups (any examples limited to n = 4 of C_{nv}, C_{nh}, D_{nh}, D_{nd}, & T, T_d, O, O_h), Reducible and Irreducible representations - direct product representation. Character Table - explanation of various column and Mullliken Symbol.

UNIT-V: GROUP THEORY – II

Orthogonality theorem and its consequences - construction of character table for C_{2V}, C_{3V}, C_{2h}, and D_{2d} point groups - hybrid orbitals in nonlinear molecules (CH_4, BF_3, and NH_3). Determination of representations of vibrational modes in nonlinear molecules (H_2O, NH_3, BF_3 and $[PtCl_4]^{2-}$). Symmetry selection rules of Infra-red and Raman spectra.

TEXT BOOKS

1. J. Rajaram and J. C. Kuriacose, Kinetics and Mechanism of Chemical Transformations. Mac Millan India Ltd (1993).
2. K. J. Laidler, Chemical Kinetics, Harper and Row, New York (1987).
3. K. L. Kapoor, A text book of Physical Chemistry, Mac Millan India Ltd., (2001).
4. S. Glasstone, Introduction to Electrochemistry, Affiliated East West Press, New Delhi (1960).
5. D. R. Crow, Principles and Applications to Electrochemistry, Chapman and Hall (1991).
6. K.V. Raman, Group Theory and its Applications to Chemistry, Tata Mc Graw Hill Publishing Co., (1990).
7. P. K. Bhattacharya, Group Theory and its Applications, Himalaya Publishers.
8. K.V. Ramakrishnan and M. S. Gopinath, Group Theory in Chemistry, Vishal Publications (1998).

SUGGESTED REFERENCES

1. R. G. Frost and Pearson, Kinetics and Mechanism, Wisely, New York (1961).
2. C. Capellos and B. H.J. Bielski, Kinetic Systems, Wisely Interscience, New York (1972).
3. Amdur and G.G. Hammes, Chemical Kinetics, Principles and Selected Topics, McGraw Hill, New York (1968).
4. G. M. Harris, Chemical Kinetics, D. C. Health and Co., (1966).
5. J. Robbins, Ions in Solution - An Introduction of Electrochemistry, Clarendon Press, Oxford (1972).

6. John O. M. Bockris, Amulya K.N. Reddy, Modern Electrochemistry 2B: Electrodics in Chemistry, Engineering, Biology and Environmental Science
7. F. A. Cotton, Chemical Applications of Group Theory, John Wiley and Sons inc., New York (1971).
8. N. Thinkham, Group Theory and Quantum Mechanics, McGraw Hill Book Company, New York (1964).
9. S. Schonland, Molecular Symmetry, Vannostrand, London (1965).
10. Alan Vincent, Molecular Symmetry and Group Theory-Programme Introduction to Chemical Application, Wiley, New York (1977).
11. S. Swarnalakshmi, T. Saroja and R. M. Ezhilarasi, A simple Approach to Group Theory in Chemistry, University press (India) private Ltd (2008).

ELECTIVE
PAPER-2
(to choose 1 out of 3)

A. GREEN CHEMISTRY

OBJECTIVES:

To know the principle and importance of green chemistry. To understand the student green chemistry strategies for designing the chemical synthesis. To know the solvent free synthesis. To make the students knowledgeable ultrasound and microwave assisted green synthesis.

UNIT- I: BASIC PRINCIPLES OF GREEN CHEMISTRY

Basic principles, prevention of waste/by-products, maximum incorporation of the reactants (starting materials and reagents) into the final product, prevention or minimization of hazardous products, designing safer chemicals, energy requirements for synthesis, selection of appropriate solvent, selection of starting materials, use of protecting groups, use of catalyst and products designed should be biodegradable.

UNIT- II: ULTRASOUND AND MICROWAVE ASSISTED GREEN SYNTHESIS

Ultrasound: Introduction, instrumentation, the phenomenon of cavitation. Sonochemical esterification, substitution, addition, alkylation, oxidation, reduction and coupling reactions.

Microwaves: Introduction, concept, reaction vessel/ medium, specific effects, atom efficiency (% atom utilization), advantages and limitations. N-alkylation and alkylation of active methylene compounds and Diels –Alder reactions. Reactions in water and reaction in organic solvents. Solvent free reactions and deprotection of esters.

UNIT- III: IONIC-LIQUIDS AS GREEN SOLVENTS

Introduction, structure, synthesis and applications of some important ionic liquids in organic synthesis.

Polymer supported reagents in green synthesis**:** Introduction - properties and advantages of polymer supported reagents and choice of polymers.

Substrate covalently bound to the support: Synthesis of oligosaccharides, intramolecular cyclisation. Selective chemical reactions on one aldehyde group of symmetrical aldehydes - Asymmetric synthesis.

Reagent linked to a polymeric material: Preparation of sulfonazide polymer and application in diazotransfer reaction. Synthesis of polymer bound per acid and its applications, synthesis of polystyrene tin dichloride resin and its applications.

Polymer supported catalytic reactions: Preparation of polymer supported $AlCl_3$ and applications - polymer supported photo sensitizers.

UNIT- IV: PHASE TRANSFER CATALYSIS IN GREEN SYNTHESIS

Introduction, mechanism of phase transfer catalyst reaction, types and advantages of phase transfer catalyst, types and applications of phase transfer reaction: Nitriles from alkyl or acyl halides, alkyl fluorides, alcohols, azides from alkyl halides, generation of dichlorocarbenes, addition to olefins, elimination reaction, alkylation reactions, Willamson synthesis, Benzoin condensation, Darzen reaction, Michael reaction, Wittig reaction, oxidation under PTC condition and reduction.

UNIT-V: INDUSTRIAL CASE STUDIES

Methyl Methacrylate (MMA)-Greening of Acetic acid manufacture, Vitamin-C- Leather manufacture-Types of Leather- Difference between Hide and Skin- Tanning –Reverse tanning-Vegetable tanning-Chrome tanning- Fat liquoring- Dyeing- Application-Polyethylene-Ziegler Natta Catalysis, Metallocene Catalysis- Eco friendly Pesticides-Insecticides.

Text Books:

1. New Trends in Green Chemistry, V. K. Ahluwalia, M. Kidwai, II Edn., Anamaya publishers New Delhi(2007).
2. Green Chemistry and Introductory text, Mike Lancaster, II Edition
3. Organic synthesis: Special techniques, V. K. Ahluwalia and R. Aggarwal, Narosa, New Delhi, 2003.

References:

4. Green Chemistry environment friendly alternatives, R. Sanghi and M M Srivastava, Narosa, New Delhi, 2003.
5. Green Chemistry – an introduction text, Royal Society of Chemistry, UK, 2002
6. P. T. Anastas and J. C. Warner, Green Chemistry theory and Practice, Oxford University press. Oxford (1988).
7. Phase Transfer Catalysis in Organic Synthesis, W. B. Weber, G. W. Gokel, Springer, Berlin, 1977.
8. Phase Transfer Catalysis, E. V. Dehmlov, S. S. Dehmlov, 2nd Edn., Verlagchemie, Wienhein, 1983.
9. Polymers as aids in Organic Synthesis, N. K. Mathur, C. K. Narang and R. E. Williams, Academic Press, NY, 1980.

PAPER-2

B. SUPRAMOLECULAR AND NANOCHEMISTRY

OBJECTIVES:

To know the student the basis of suprmolecular chemistry, metal-organic framework solids, nano materials and their applications.To understand the various techniques available to characterize the advanced nano materials. To identify the applications of nanotechnology.

UNIT-I: SUPRAMOLECULAR CHEMISTRY

Definition of supramolecular chemistry. Nature of binding interactions in supramolecular structures: ion-ion, ion-dipole, dipole-dipole, H-bonding, cation-p, anion-p, p-p, and vander Waals interactions. Supramolecular synthons.

Self-assembly molecules: Design, synthesis and properties of the molecules, self-assembling by H-bonding, metal-ligand interactions and other weak interactions, metallomacrocycles, catenanes, rotaxanes, helicates and knots.

UNIT-II: FRAMEWORK SOLIDS

Introduction-definition of porosity, pore size, pore volume, pore density-zeolites-synthesis and applications-metal organic frame work solids-definition-classifications-uses of different types of organic ligands- tuning of structure and properties - synthetic methods- advantage of MOF solids over zeolites- cracking of petroleum products

UNIT-III: SYNTHESIS OF SUPRAMOLECULES

Synthesis and structure of crown ethers, lariat ethers, podands, spherands, cyclophanes, cryptophanes, carcerands and hemicarcerands., Host-Guest interactions, lock and key analogy. Binding of cationic, anionic, ion pair and neutral guest molecules.
Molecular devices: molecular electronic devices, molecular wires, molecular rectifiers, molecular switches and molecular logic.

UNIT-IV: NANOCHEMISTRY

Introduction and definition of nanoparticles and nanomaterials, emergence of nanotechnology, challenges of nanotechnology. Synthesis of nanoparticles of ZnO_2, TiO_2, silver, gold, rhodium, palladium and platinum; carbon materials- fullerene- porous nano carbon (PNC).

Techniques of synthesis: Electroplating and electrophoretic deposition, conversion through chemicalreactions and lithography; Thin films: Chemical vapor deposition and atomic layer deposition techniques; Carbon fullerenes and nanotubes.

UNIT-V: ANALYTICAL CHARACTERIZATION AND APPLICATIONS

X-rays, Infrared, UV-Vis, Laser Raman, Electron microscopic techniques (SEM and TEM) - Thermal analysis (TG/DTA/DSC) methods.

Application of nanotechnology: modern technology in electronic, biological, consumer and domestic applications. Energy related application: photo-voltaic cells, energy storage nanomaterial. Drug delivery, drug targeting. Sensors and biosensors.

Reference Books

1. C.N.R. Rao, A. Muller, A.K. Cheetam (Eds), The Chemistry of Nanomaterials, Vol.1, 2, Wiley – VCH, Weinheim, 2004
2. Nanochemistry, Kenneth J. Klabunde and G.B.Sergeev
3. G.Zhong Cao. Nanostructures and Nanomaterials: Synthesis, Properties and Applications, Imperial College Press (2004)
4. Metal-Organic Frameworks Applications from Catalysis to Gas Storage. Cejka, J, ed. (2011). Wiley-VCH. ISBN 978-3-527-32870-3
5. Zeolites and Catalysis: Synthesis, Reactions and Applications. Jiri Cejka; Avelino Corma; Stacey Zones (2010). John Wiley & Sons. ISBN 978-3-527-63030-1.
6. J.-M. Lehn; Supramolecular Chemistry-Concepts and Perspectives (Wiley-VCH, 1995)
7. P. D. Beer, P. A. Gale, D. K. Smith; Supramolecular Chemistry (Oxford University Press, 1999)

8. J. W. Steed and J. L. Atwood; Supramolecular Chemistry (Wiley, 2000).
9. C. P. Poole Jr, F. J. Owens, Introduction to nanotechnology, 2nd edition, Wiley-India, Delhi, 2008.
10. C. C. Kouch, Nanostructures materials: Processing, properties and applications, William Andrew publications, Newyork, 2002.
11. T. Pradeep, Nano: The essentials., McGrew Hill Education.(2007)

PAPER-2

C. MODERN SEPARATION TECHNIQUES

OBJECTIVES:

To learn the basic concept of chromatography. To understand the different chromatographic techniques. To study the applications of chromatography. To know the separation and purification methods.

UNIT-I: BASIC CONCEPTS OF CHROMATOGRAPHY

General description: Definitions, terms and parameters used in chromatography. Classification of chromatographic methods. Elution chromatography on columns. Migration rates of solutes, zone broadening, column efficiency and optimization of column performance.

UNIT-II GAS CHROMATOGRAPHY(GC)

Principles of gas-liquid chromatography, instrumentation, carrier gas, sample injection, column configuration and detection system (FID, TCD, ECD). Gas chromatographic columns (open tubular columns and packed columns) and stationary phases. Interfacing GC/MS.

UNIT-III: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)

Column efficiency. Instrumentation: pumping system, sample injection system. Liquid chromatographic columns - types of column packing. Detectors: Absorbance detector and electrochemical detectors. Partition chromatography.

UNIT-IV: ION-EXCHANGE CHROMATOGRAPHY (IEC)

Definition, requirements for ion exchange resin. Synthesis and types of ion-exchange resins. Principle and basic features of ion - exchange reactions. Exclusion chromatography: Theory and principle of size exclusion chromatography. Experimental techniques of gel-filtration chromatography (GFC) and gel-permeation chromatography (GPC). Materials for packing-factors governing column efficiency. Methodology and applications.

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UNIT-V: PURIFICATION AND EXTRACTION TECHNIQUES

Principle and techniques: Desiccants, precipitation: types of precipitation, factors affecting the precipitation. Distillation: fractional, steam, azeotropic, vacuum distillations. Recrystalization and sublimation.

Solvent extraction: Principle and techniques. Factors affecting the extraction efficiency: Ion association complexes, chelation, synergistic extraction and pH. Role of chelating ligands in solvent extraction. Introduction to solid phase extraction (SPE) and microwave assisted extraction (MAE) and applications.

REFERENCES

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8th Edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th ed., 2001 John Wiley & Sons, Inc, India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, 1993, prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, 6th edition, Third Inidan Reprint.2003 Pearson Education Pvt. Ltd., New Delhi.
5. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders College Publishing, California, 1990.
6. Introduction to Chromatography Theory and practice, V.K.Srivastava, K.K.Srivastava, Chand &.Company Ltd , New Delhi
7. Principles of Instrumental Analysis, , D.A. Skoog,,F.James Holler, Timothy.A.Nieman ,Harcourt Asia (P) Ltd
8. Principles of Instrumental Analysis, D.A. Skoog, , Saunders College Pub. Co, III Edn., 1985
9. Text Book of Quantitative Organic Analysis A.I Vogel, , ELBS III Edn, 1987.
10. Fundamentals of Analytical Chemistry, D.A. Skoog and D. M. West, Holt Rinehart and Winston Publications, IV Edn, 2004.
11. Instrumental Methods of Analysis, Willard, Merit, Dean and Settle, , CBS Publishers and Distributors, IV Edn.,1989
12. G. D. Christian and J. E. O. Reilly, Instrumental Analysis, Allyn and Bacon Inc, II Edn., 1988.
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MAIN
PRACTICAL PAPER – 1
ORGANIC CHEMISTRY PRACTICAL- I

A) Identification of components in a two component mixture and preparation of their derivatives. Determination of b.p. / m.p. for components and m.p. for the derivatives.

B) Any Six preparations from the following:

1. Preparation of o-benzoyl benzoic acid (Fridel Crafts Reaction)
2. p-Nitrobenzoic acid from p-nitrotoluene (Oxidation)
3. Anthroquinone from anthracene (Oxidation)
4. Glucose pentaacetate from Glucose (Acetylation)
5. m-Nitroaniline from m-dinitrobenzene (Reduction)
6. Benzophenone oxime from benzophenone (Addition reaction)
7. p-Chlorotoluene from p-toluidine (Sandmeyers' Reaction)
8. 2,3 - Dimethylindole from phenyl hydrazine and 2 - butanone (Fisher Indole Synthesis)
9. 1,2,3,4 - Tetrahydrocarbazole from cyclohexanone (Fisher Indole Synthesis)
10. Methyl orange from sulphanilic acid (Diazo Reaction)

University Examination	**Marks**
Qualitative organic Analysis	40
Preparation	20
Viva voce	10
Record	05
Total	**75**

CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK)
MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	**25**

References:

1. Arthur I. Vogel, "A Textbook of Practical Organic Chemistry", ELBS.
2. N.S. Gnanapragasam and B. Ramamoorthy, "Organic Chemistry Lab Manual" (2006), S. Visvanathan Printers & Publishers.

PRACTICAL PAPER – 2
INORGANIC CHEMISTRY PRACTICAL – I

A) Semimicro qualitative analysis of mixture containing two common and two rare cations. The following are the rare cations to be included. W, Ti, Te, Se, Ce, Th, Zr, V, U, Li, Mo and Be.

B) Complexometric Titrations (EDTA): Estimation of Ca, Mg and Zn.

C) Preparation of the followings:

1. Potassium tris (oxalate) aluminate (III) trihydrate
2. Tris (thiourea) copper (I) chloride
3. Potassium tris (oxalato) chromate (III) trihydrate
4. Sodium bis(thiosulphato) cuprate (I)
5. Tris (thiourea) copper (I) sulphate
6. Sodium hexanitrocobaltate (III)
7. Chloropentammine cobalt (III) chloride
8. Bis (acetylacetonato) copper (II)
9. Hexamminenickel (II) chloride
10. Bis (thiocyanato) pyridine manganese (II)

D). Separation of zinc and magnesium on an anion exchange.

Marks distribution:

University Examination	Marks
Qualitative Inorganic Analysis	25
EDTA Complexometric Titration	20
Preparation	15
Viva Voce	10
Record	05
Total	**75**

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CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK)
MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	**25**

PRACTICAL PAPER-3
PHYSICAL CHEMISTRY PRACTICAL- I

Experiments in Thermodynamics, colligative properties, phase rule, chemical equilibrium and chemical kinetics.

Typical examples are given and a list of experiments is also provided from which suitable experiments can be selected as convenient.

1. Heat of solution from Solubility measurements
2. Determination of Molecular weight
3. Determination of activity and activity coefficient
4. Construction of Phase diagram involving two / three component systems
5. Determination of partial molar quantities
6. Verification of Freundlich Adsorption isotherm
7. Reaction rate and evaluation of other kinetic parameters using polarimetry
8. Determination of Reaction rate and Rate constant using Analytical techniques: Conductometry and Dilatometry
9. Verification of Beer Lambert law.

Detailed list of Experiments for Physical Chemistry Practical I

Typical list of possible experiments is given.
Experiments of similar nature and other experiments may also be given.
Any 15 experiments have to be performed in a year.

1. Determine the temperature coefficient and energy activation of hydrolysis of ethyl acetate.
2. Study the kinetics of the reaction between acetone and iodine in acidic medium by half-life method and determine the order with respect to iodine and acetone.
3. Study the effect of solvent (DSMO-water, acetone-water system) on the rate of acid catalysed hydrolysis of acetal by dilatometry.
4. Study the Saponification of ethyl acetate by sodium hydroxide conductometrically and determine the order of the reaction.
5. Determine the order with respect to Silver (I) in the oxidation and rate constant and for uncatalysed reaction.
6. Study the inversion of cane sugar in the presence of acid using Polarimeter.
7. Determine the rate constant and order of the reaction between potassium persulphate and potassium iodide and determine the temperature coefficient and energy of activation of the reaction.
8. Study the effect of ionic strength on the rate constant for the saponification of an ester.
9. Study the salt effect on the reaction between acetone and iodine.

10. Study the kinetics of the decomposition of sodium thiosulphate by mineral acid (0.5M HCI).
11. Study the primary salt effect on the kinetics of ionic reactions and test the Bronsted relationship (iodide ion is oxidized by persulphate ion).
12. Study the kinetics of enzyme catalysed reactions (Activity of tyrosinase upon tyrosine spectrophotometrically).
13. Study the salt effect, the solvent effect on the rate law of alkaline hydrolysis of crystal violet.
14. Study the reduction of aqueous solution of ferric chloride by stannous chloride.
15. Determine the molecular weight of benzoic acid in benzene and find the degree of association.
16. Determine the activity coefficient of an electrolyte by freeing point depression method.
17. Study the phase diagram form-toluidine and glycerine system.
18. Construct the phase diagram for a simple binary system naphthalene - phenantherene and benzophenone-diphenyl amine.
19. Construct the boiling point composition diagram for a mixture having maximum boiling point and minimum boiling point.
20. Study the complex formation between copper sulphate and ammonia solution by partition method.
21. Study the simultaneous equilibria in benzoic acid - benzene - water system.
22. Determine the degree of hydrolysis and hydrolysis constant of aniline hydrochloride by partition method.
23. Determine the molecular weight of a polymer by viscosity method.
24. Determine the viscosities of mixtures of different compositions of liquids and find the composition of a given mixture.
25. Determine the partial molal volume of glycine / methanol and formic acid / sulphuric acid by graphical method and by determining the densities of the solutions of different compositions.
26. Study the temperature dependence of the solubility of a compound in two solvents having similar inter molecular interactions (benzoic acid in water and in DMSO water mixture) and calculate the partial molar heat of solution
27. Construct the phase diagram of the three component of partially immiscible liquid system (DMSO-water benzene; acetone-chloroform -water; chloroform-acetic acid-water)
28. Construct the phase diagram of a ternary aqueous system of glucose -potassium chloride and water
29. Study the surface tension - concentration relationship for solutions (Gibb's equation)

30. Study the absorption of acetic acid by charcoal (Freundlich isotherm).
31. Study the complex formation and find the formula of silver-ammonia complex by distribution method.
32. Determine the dissociation constant of picric acid using distribution law

Marks distribution:

University examination	Marks
Procedure	10
Manipulation	25
Result	25
Viva voce	10
Record	05
Total	**75**

CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK): MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	**25**

SECOND YEAR
SEMESTER III

PAPER - 7
ORGANIC CHEMISTRY III

OBJECTIVE:
To understand the concepts of spectral techniques and to apply these techniques for the quantitative and structural analysis of organic compounds. To learn the chemistry of terpenes, alkaloids and free radicals and their importance.

UNIT-I: UV AND IR SPECTROSCOPY AND THEIR APPLICATIONS

Ultraviolet-Visible spectroscopy: Types of electronic transitions - chromophores and auxochromes - factors influencing the positions and intensity of absorption bands - absorption spectra of dienes, polyenes and unsaturated carbonyl compounds - Woodward - Fieser rules and its applications.

Infra Red Spectroscopy: Vibrational frequencies and factors affecting them - identification of functional groups - intra and inter molecular hydrogen bonding – functional group region- finger print region - far IR region.

UNIT-II: NMR SPECTRA AND ITS APPLICATIONS

Nuclear spin - magnetic moment of a nucleus - nuclear energy levels in the presence of magnetic field - basic principles of NMR experiments - CW and FT NMR - ^{1}H NMR - Chemical shift and coupling constant - factors influencing proton chemical shift and vicinal proton - proton coupling constant- ^{1}H NMR spectra of simple organic molecules such as CH_3CH_2Cl and CH_3CHO.

AX and AB spin system - nuclear overhauser effect- chemical exchange.

^{13}C NMR - proton decoupling and Off resonance decoupling spectra - factors affecting ^{13}C NMR chemical shift - ^{13}C NMR spectra of simple organic molecules.

UNIT-III: PHYSICAL METHODS OF STRUCTURAL DETERMINATION

Mass spectroscopy - Principles - measurement techniques - (El, Cl, FD, FAB, SIMS) - presentation of spectral data - molecular ions - isotope ions - fragment ions of odd and even electron types - rearrangement ions - factors affecting cleavage patterns - simple and multicentre fragmentation – Mc Lafferty rearrangement - Mass spectra of hydrocarbons, alcohols, phenols, aldehydes and ketones. ORD and its applications - Octant rule - cotton effect - axial halo ketone rule - Problem solving (for molecules with a maximum number of C10).

UNIT-IV: TERPENES AND ALKALOIDS

Introduction - classification - isoprene rule - structural determination of terpenoids'- Citral, geraniol - linalool - farnesol - α-pinene and camphor.
Introduction - isolation of alkaloids - total synthesis of quinine - morphine and reserpine.

UNIT-V: FREE RADICALS

Long and short-lived free radicals - methods of generation of free radicals - detection of free radicals by ESR - Addition of free radicals to olefinic double bonds - aromatic radical substitutions reactions - decomposition of diazo compounds – phenol coupling - Sandmeyer reaction - Gomberg reaction - Pschorr reaction - Ulmann reaction and Hunsdiecker reaction.

RECOMMENDED BOOKS

1. Francis A. Carey and Richard J. Sundberg, Advanced organic chemistry, III Edition (1990). G.A Swan,Introduction to alkaloids
2. I.L. Finar, Organic chemistry, Vol. II, 5thedition ELBS publication.
3. J. Dyer, Application of absorption spectroscopy of organic compounds, Prentice and Hall of India, Pvt., New Delhi.
4. J. March, Advanced organic reaction mechanism and structure, Tata McGraw Hill.
James verghese ,Terpene Chemistry.
5. Neil S. Issac, Physical organic chemistry, ELBS publication 1987.
6. O.P. Agarwal, Chemistry of organic Natural Products, Goel Publishing House, Meerut.
7. P.S. Kalsi, Spectroscopy of organic compounds,Wiley Eastern Ltd., Chennai.
8. R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric identification of organic compounds, John Wiley and Sons, New York.
9. S.M. Mukherji and S.P. Singh,Organic Reaction Mechanism, MacMillan India Ltd., Chennai (1990).
10. Schliemann, Introduction to the spectroscopic methods for the identification organic compounds, 2 volumes, Pergamon Press.
11. W. Kemp, Spectroscopy, Macmillan Ltd.,
12. Y.R. Sharma,Structural identification of organic compounds, S. Chand & Co.

PAPER- 8
INORGANIC CHEMISTRY III

OBJECTIVE:
To study about the Coordination complexes, Substitution in Coordination complexes and Inorganic Photochemistry.

UNIT-I: ORGANO METALLIC CHEMISTRY - I

Carbon donors: Alkyls and aryls metallation, bonding in carbonyls and nitrosyls, chain and cyclic donors, olefins, acetylene and allyl system. Synthesis, structure and bonding of metallocenes (ferrocene only).
Reactions: Association, substitution, addition and elimination reactions, ligand protonation, electrophilic and nucleophilic attack on ligands. Carbonylation, decorboxylation, oxidative addition and fluxionality.

UNIT-II: ORGANO METALLIC CHEMISTRY - II

Catalysis: Hydrogenation of olefins (Wilkinson's catalyst), hydroformylation of olefins using cobalt or rhodium catalysts (Oxo process), oxidation of olefins to aldehydes and ketones (Wacker process), polymerization (Zeigler - Natta Catalyst); cyclo oligomerisation of acetylene using nickel catalyst (Reppe's catalyst); polymer-bound catalysts.

UNIT-III: COORDINATION CHEMISTRY - IV

Electron transfer reactions, outer and inner sphere processes; atom transfer reaction, formation and rearrangement of precursor complexes, the bridging ligand, precursor and successor complexes. Marcus theory. Complementary, non-complementary and two electron transfer reactions.

UNIT-IV: COORDINATION CHEMISTRY - V

Substitution Reactions: Substitution in square planar complexes, reactivity of platinum complexes, influences of entering, leaving and other groups, the Trans effect.

UNIT-V: COORDINATION CHEMISTRY - VI

Substitution of octahedral complexes of cobalt and chromium, replacement of coordinated water, solvolytic (acids and bases) reaction applications in synthesis (platinum and cobalt complexes only).
Inorganic Photochemistry: Photo-substitution, Photoredox and isomerisation process, application of metal complexes in solar energy conversion.

Text books

1. R.C. Mehrothra, A. Singh, Organo Metallic Chemistry, Wiley Eastern Co., (1992).
2. F. Basolo and R.G. Pearson, Mechanism of Inorganic Reaction, Wiley NY (1967).
3. J. Huheey, Inorganic Chemistry, Harper and Collins, NY IV Edition, (1993).
4. K.F. Purcell and J.C. Kotz, Inorganic Chemistry, W. Saunders Co., (1977).
5. S. FA Kettle, Coordination Chemistry, ELBS, (1973).
6. F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry, John Wiley and Sons, V Edition (1988).
7. D.F. Shrivers, Pw. Atkins and C.H. Langford, Inorganic Chemistry, OUP (1990).
8. Guillermo J. Ferraudi, Elements of inorganic photochemistry, Wiley (1988).
9. Arthur W. Adamson, Paul D. Fleischauer, Concepts of inorganic photochemistry, Wiley(1975).

Suggested References

1. G. Coates M.l. Green and K. Wade. Principles of Organometallic chemistry, Methven Co., London (1988).
2. P. Powell, Principles of Organometallic chemistry, Chappman and Hall. (1998).
3. G.S. Manku, Theoretical Principles of Inorganic Chemistry, McGraw-Hill Education, (1984).
4. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., New York (1974).
5. R.B. Heslop and K. Jones, Inorganic Chemistry, Elsevier Scientific Publ., (1976).
6. F. Basolo and R.G. Pearson, Mechanism of Inorganic Reaction, Wiley NY (1967).
7. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., New York (1974).
8. B.E. Dogulas DH McDaniel's and Alexander, Concepts and Models of Inorganic Chemistry, Oxford IBH (1983).
9.WU. Mallik, G.D. Tuli, R.D. Madan, Selected topics in Inorganic Chemistry, S. Chand and Co., New Delhi (1992).

PAPER-9
PHYSICAL CHEMISTRY III

OBJECTIVES:

To study the electrochemical kinetics, over potential, corrosions and fuel cells. To know the solid state and its properties. To Study the principles and applications of spectroscopy. To study statistical thermodynamics,

UNIT-1: ELECTROCHEMISTRY- III

Mechanism of electrode reactions - polarization and over potential - the Butler-Volmer equation for one step and multistep electron transfer reactions - significance of electron exchange current density and symmetry factors - transfer coefficient and its significance - mechanism of the hydrogen and oxygen evolution reactions.

Corrosion and passivation of metals - Pourbaix diagram - Evan's diagram - fuel cells - electrodeposition - principle and applications.

UNIT-II: SOLID STATE

Classification of solids - Imperfection in solids - point, line and plane defect - Electrons and holes - Non-stoichiometry - Imperfection and physical properties of solids (brief study). **Electrical properties** - electrical conductivity - Hall effect - dielectric properties - piezo electricity, Ferro electricity and conductivity; **Optical properties** - Photo conductivity -luminescence - color center - lasers - refraction - birefringence;

Magnetic properties - diamagnetism - paramagnetism - ferro - antiferro and ferrimagnetisms. Calculation of magnetic moments. Mechanical and thermal properties.

UNIT-III: SPECTROSCOPY - I

Microwave spectroscopy – Rotational spectroscopy of rigid rotator - non rigid rotator - diatomic and polyatomic molecules.

Vibrational spectroscopy - Harmonic oscillator - anharmonicity - vibrational spectra of polyatomic molecules - vibrational frequencies - group frequencies - vibrational coupling- overtones - Fermi resonance.

Raman Spectroscopy- Raman effect, Stoke’s and Anti-stoke’s lines, rotational and vibrational Raman spectra.

Electronic spectroscopy - Progressions and sequences, selection rules, Franck - Condon principle, types of electronic transitions - solvent effects.

UNIT-IV: SPECTROSCOPY- II

Resonance spectroscopy - Zeeman effect - equation of motion of spin in magnetic fields - chemical shift - spin-spin coupling - NMR of simple AX and AMX type molecules - calculation of coupling constants - ^{13}C, ^{19}F, ^{31}P NMR spectra - applications - a brief discussion of Fourier Transformation Resonance Spectroscopy.

UNIT-V: STATISTICAL THERMODYNAMICS- I

Objectives of statistical thermodynamics - concept of thermodynamic and mathematical probabilities - permutations and combinations, distribution of distinguishable and non-distinguishable particles. Stirling approximation, Maxwell - Boltzmann distribution law - Fermi - Dirac and Bose - Einstein statistics - comparison with Maxwell -Boltzmann distribution law and their applications - radiation law - electron gas in metals.

Partition function - evolution of translational, vibrational and rotational partition functions for mono and diatomic ideal gases.

Text Books

S.Glasstone, Introduction to Electrochemistry, Affiliated East West Press, New Delhi (1960).

D.R. Crow, Principles and Applications to Electrochemistry, Chapman and Hall (1991).

S. Glasstone, Introduction to Electrochemistry, Affiliated East West Press, New Delhi (1960).

P.H.Rieger, Electrochemistry, Chapman and Hall, New York (1994).

R.Crow, Principles and Applications to Electrochemistry, Chapman and Hall (1991).

Lesley E.Smart, Elaine A.Moore, Solid State Chemistry - An Introduction

Charles Kittel - Introduction to Solid State Physics

Anthony R. West - Solid State Chemistry and its Applications

C.N. Banwell and E.M. McCash, Fundamentals of Molecular spectroscopy, IV - Edition, Tata McGraw Hill (2005).

N. Sathyanarayana, Vibrational Spectroscopy, New Age International Publishers (2004).

Caringtion and Ad. Mclachlan, Introduction to Magnetic Resonance, Harper and Row, New York (1967).

M. C.Gupta, Statistical thermodynamics, Wiley Easter, New Delhi (1990).

R.Hasee, Thermodynamics Of Irreversible Process, Addition Wesley, Reading, Mass (1969).

Suggested References

J.O.M. Bokris and A. K. N. Reddy, Electrochemistry, Vol. 1 and 2, Plenum, New York (1977).

P. Dalahay, Electrode Kinetics and Structure of Double Layer, Inter Science, New York (1965).

J.Robbins, Ions in Solution-An Introduction to Electrochemistry, Clarendon Press, Oxford (1993).

H.Reiger, Electrochemistry, Chapman and Hall, New York (1994).

W.J. Moore, Physical Chemistry, Orient Longman, London (1972).

J.M. Murrell, S.F.A. Kettle and J.M. Tedder, The Chemical Bond, Wiley (1985).

R.C. Ropp, Solid State Chemistry

C N. Banwell, Fundamentals of Molecular Spectroscopy, Mc Graw Hill (1966).

Raymond Chang, Basic Principles of Spectroscopy, McGraw Hill Ltd., New York (1971).

G M. Barrow, Introduction to Molecular Spectroscopy, Mc Graw Hill, New York (1962).

W. Kemp, NMR in Chemistry, Mc Millan Ltd., (1986).

D. Mclauchlan, Magnetic Resonance, Oxford Chemistry Series, Oxford (1970).

P. Staughan and S. Walker, Spectroscopy, Vol. I, II & III, Chapman and Hall (1976).

J.K. Sanders and B.K. Hunter, Modern NMR Spectroscopy, A Guide for Chemists, Oxford University Press, Oxford (1987).

Jk.M. Sanders, E.C. Constable and B.K. Hunter, Modern NMR Spectroscopy - a Work Book of Chemical Problems, Oxford (1989).

Francis W Sears and Gerhard L Salinger, Thermodynamics, kinetic theory, and statistical thermodynamics.

P. Dalahay, Electrode Kinetics and Structure of Double Layer, Inter Science, New York (1965).

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ELECTIVE
PAPER-3
(to choose 1 out of 3)

A. Scientific Research Methodology

OBJECTIVES:

To study about the importance of research, literature survey, error analysis, statistical treatment. To study about the conventions of writing thesis.

UNIT-I: INTRODUCTION

Nature and importance of research - aims, objective, principles and problems - selection of research problem - survey of scientific literature - primary and secondary sources - citation index for scientific papers and journals - patents.

UNIT-II: CONDUCT OF RESEARCH WORK

Physical properties useful in analysis and methods of separation prior to analysis - Isolation techniques - extraction - Soxhlet extraction, crystallization, sublimation - methods for vacuum sublimation and distillation under reduced pressure.
Chemistry of working with hazardous materials - acid / base / water sensitive, corrosive, toxic, explosive and radioactive materials.

UNIT-III: EVALUATION OF ANALYTICAL DATA

Precision and accuracy - Reliability - determinate and random errors - distribution of random errors - normal distribution curve.

UNIT-IV: STATISTICAL TREATMENT OF ANALYTICAL DATA

Statistical treatment of finite samples - the students test and F test - criteria for rejection of an observation - the Q test, significant figures and computation rules - data plotting - least square analysis.

UNIT-V: THESIS AND ASSIGNMENT WRITING

Conventions of writing - the general format - page and chapter format - use of quotations and footnotes - preparation of tables and figures - referencing - appendices - revising editing and evaluating the final product - proof reading - meanings and examples of commonly used abbreviations.

REFERENCES

1. Douglas A. Skoog and Donald, M. West, Fundamental of analytical chemistry, Halt Saundersons International Edition.
2. J. Anderson, H.M. Durston and M.Poole, Thesis and assignment writing - Wiley Eastern Ltd., (1970).
3. J. March, Advanced organic chemistry - reactions, Mechanism & Structure. McGraw Hill Student Edition.
4.Vogel's Textbook of quantitative chemical analysis, ELBS edition.
5. Rajammal P. Devados, Research Methodolgy.

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PAPER-3
B. ADVANCED BIOINORGANIC CHEMISTRY

OBJECTIVES:

1. *To learn the importance of Bioinorganic Chemistry*
2. *To learn the role of metal ions in the biologically important complexes*
3. *To learn mechanism of photosynthesis*

UNIT - I: SCOPE OF BIOINORGANIC CHEMISTRY

Introduction: Trace elements, complex formation, hard and soft acids and bases (HSAB), inert and labile complexes. Amino acids and proteins - structure of proteins, peptide bond - enzymes - nucleic acid - carbohydrates - blood - plasma.

Concepts of essentiality - evolution of essential trace elements - future essential trace elements- role of minerals - working of essential trace elements - essential ultra trace elements - essential ultra trace nonmetals.

UNIT - II: METALLOPORPHYRINS

Respiratory proteins: Hemoglobin and Myoglobin - structure and functions - oxygenation reactions - structure and functions relationship - structural models for dioxygen binding - synthetic models for oxygen binding - models for Hemoproteins – Hemerythrin - Hemocyanin. Non-redox metalloenzymes: Peroxidase, Catalayse and Alcohol Dehydrogenase (Structure, mechanism of action and model compound)

UNIT - III: METALLOENZYMES

Copper enzymes: Superoxide dismutase, cytochrome oxidase and ceruplasmin - Molybdenum enzymes: Pyridoxyal oxidase and xanthine oxidase. Zinc enzymes: Carbonic anhydrase and carboxy peptidase. Cobalt enzyme: Vitamin B_{12}. Biomineralization – Siderophores - Ferritin and Transferrin,

UNIT - IV: METALS IN MEDICINE

Metal deficiency and disease - toxicity of mercury, cadmium, lead, beryllium, selenium and arsenic - biological defence mechanism - meaning and example of chelation therapy - Metals used for diagnosis (Tc, Fe and Co) - Metals in medicine: platinum complexes as anticancer drugs, Pt-DNA binding, complexes of gold, copper, zinc, mercury, arsenic and antimony as drugs.

UNIT - V: NITROGEN FIXATION AND PHOTOSYNTHESIS

Nittogenase enzyme: Reactivity, reduction involving nitride / diazene intermediate, dinitrogen complexes and their reactivity in vitro nitrogen fixation. Photosynthesis: Structure of chlorophyll in green plants (Z- Scheme) - ATP synthesis - Role of manganese complex in oxygen evolution - dark reaction (Calvin cycle).

TEXT BOOKS

1. K. Hussain Reddy, Bioinorganic Chemistry, New Age international publishers (2007)
2. S. J. Lippard & J. M. Berg. Principles of Bioorganic Chemistry, Panima Publ. Corpn. (2005). 3. E. I. Ochiai. Bioinorganic Chemistry – An Introduction, Allyn and Bacon Inc. (1977).
4. M.N. Hughes, Inorganic Chemistry of Biological Processes, John Wiley &Sons, 2nd Edition, 1985
5. R.P. Hanzlik. Inorganic Aspects of Biological and Organic Chemistry, Academic Press (1976)

REFERENCE BOOKS

1. H. Kraatz & N. Metzler-Nolte (Eds.). Concepts and Models in Bioinorganic Chemistry, Wiley (2006).
2. I. Bertini, H. B. Gray, S. J. Dippard & J. S. Valentine, Bioinorganic Chemistry, Viva Books Pvt. Ltd. (2004).
3. A.W. Addison, W.R. Cullen, D. Dolphin & B.R. James (eds.). Biological Aspects of Inorganic Chemistry, John Wiley (1977).
4. R.J.P. Williams & J.R.R.F. Dasilva. New Trends in Bioinorganic Chemistry, Academic Press (1978).
5. A. E. Martel. Inorganic Chemistry in Biology and Medicine, ACS Symp. Series, ACS (1980).
6. S. J. Lippard. Progress in Inorganic Chemistry: Bioinorganic Chemistry, Vol. 38, John Wiley (1990).
7. N. Kaim & B. Schwederski. Bioinorganic Chemistry: Inorganic Elements in the Chenistry of Life, John Wiley (1994).
8. Advanced Inorganic Chemistry, F.A. Cotton and G. W. Wilkinson. John Wiley &Sons, 5th Ed. 1988.
9. Inorganic Chemistry, Principles of Structure and Reactivity, J. E. Huheey,E.A. Keiter 4th Ed. Harper Collins, 1993.
10. Bioinorganic chemistry, R. W. Hay, Halsted Press, 1984.
11. Principles of Bioinorganic Chemistry, S. J. Lippard and J.M. Berg, Panima Publishing Corporation, 2nd Ed., 1995.

PAPER-3
C. ADVANCED ANALYTICAL TECHNIQUES

OBJECTIVES:
On the completion the course the students will have the knowledge of various instrumental techniques. The students should have learnt data analysis and electroanalytical techniques.

UNIT-1: ELECTROANALYTICAL TECHNIQUES:

Voltametry - coulometry - amperometry – potentiometry – polarography - electrolytic conductivity - impedance spectroscopy.

UNIT-1I: CHEMICAL ANALYSIS:

Non-destructive techniques: Wavelength and energy dispersive X-ray fluorescence spectroscopy (WDS and EDS) - X-ray absorption spectroscopy (XANES and EXAFS) - secondary ion mass spectrometry (SIMS) - temperature programmed desorption (TPD) - thermal desorption spectroscopy (TDS).

Destructive techniques: Atomic absorption spectroscopy (AAS) - inductively coupled plasma-atomic emission spectroscopy (ICP-AES).

UNIT-1II: IMAGING AND DEPTH PROFILING:

Basic concepts in surface imaging - secondary electron microscopy (SEM) - secondary Auger microscopy (SAM) - scanning probe microscopy (SPM) - scanning tunneling microscopy (STM) - transmission electron microscopy (TEM) - surface imaging - depth profiling. Associated techniques of microscopy and spectroscopy.

UNIT- IV: THERMAL ANALYSIS:

Thermo gravimetric and differential thermal analysis - thermometric titrations - differential scanning colourimetry - basic instrumentation and applications.

UNIT–V: RADIOCHEMICAL METHODS

Hot atom chemistry – the Szilard – chalmers process, chemistry of recoil atoms, chemical effects on radioactive decay, solvated electron. Uses of radiations in the study of matter, neutron activation analysis, dilution analysis, dosimetry, synthesis of organic and inorganic compounds by irradiation. Radiometric analysis and radiography.

TEXT BOOKS:

1. R. Wiesendanger, *Scanning Probe Microscopy and Spectroscopy,* Cambridge University Press, 1994.
2. Frank A. Settle, Handbook of instrumental techniques for analytical chemistry, Prince Hall, New Jersey, 1997.
3. K. W. Kolasinski, Surface science: Foundations of catalysis and nanoscience, John Wiley and Sons, West Susses, 2002.
4. D. A. Skoog, D. M. West, F. J. Holler and S. R. Couch, Fundamentals of analytical chemistry. Brooks/ColeCengage learning, New Delhi, 2004.
5. P. Atkins and J. de Paula, Atkins' physical chemistry, 8th Ed., Oxford University Press, New Delhi, 2008.
6. T. Pradeep, Nano: The essentials, McGraw-Hill Education, New Delhi, 2010.
7. F. Scholz, Electroanalytical Methods, Springer, 2nd Ed., 2010.
8. Allen J. Bard and Larry R. Faulkner, Electrochemical Methods: Fundamentals and Applications, 2nd edition 2001, John Wiley & Sons
9. Allen J. Bard (Ed), Electroanalytical Chemistry, Vol.13, Plenum Press 1983
10. Joseph Wang, Analytical Electrochemistry, 3rd edition 2006, John Wiley & Sons
11. D.A .Skoog, 1985, Principles of Instrumental Methods of analysis, III Edition, Saunders College Publ.
12. Willard Merrit, Dean and Settle, 1986, Instrumental methods of analysis, VI Edition, CBS Publ.
13. D.A. Skoog and D.M. West, 1982, Fundamentals of Analytical Chemistry, IV Edition, old Reinhord & Winston, Publication

SUGGESTED REFERENCE BOOKS:

1. G.D.Christian & J.E.O. Reily, 1986, Instrumental Analysis, II Edition, Allegn Recon.
2. H.A. Strobel, 1976, Chemical Instrumentation, Addition- Wesely Publ Co.
3. Kolthoff and Elwing (All Series) - Treatise on Analytical Chemistry.
4. Willson Series - Comprehensive Analytical Chemistry.
5. Willard, Merit, Dean and Settle, Instrumental Methods of Analysis, CBS Publishers and Distributors, IV Edn. 1986
6. Schoog, Holler, Nieman, Principles of Instrumental Analysis**,** Thomson Asia Pte Ltd., Singapore, 2004.

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SEMESTER IV

PAPER - 10
ORGANIC CHEMISTRY IV

OBJECTIVE:

To understand the concepts of Aromaticity, Photochemical Reactions, Antibiotics and proteins. Applications and Techniques of Dyeing.

UNIT-I: AROMATICITY

Aromaticity of benzenoid - non-benzenoid and heterocyclic compounds - Huckel's rule - Aromatic systems with π electron numbers other than six - non-aromatic (cyclo octatetraene etc,) and anti aromatic system (cyclobutadiene etc.) - system with more than 10π electrons - Annulenes upto C18 (synthesis of all these compounds is not expected).

UNIT-II: PHOTOCHEMISTRY

Photochemical excitation - fate of the excited molecules - Jablonski diagram - study of photochemical reactions of ketone - photo reduction - photo cycloaddition - Paterno - Buchi reaction - di pi-methane rearrangement - Pericyclic analysis of electrocyclic - cyclo addition and sigmatropic reactions - correlation diagrams for butadiene - cyclobutene system - hexatriene to cyclohexadiene systems - structure of bulvalene - fluxional molecule - Cope and Claisen rearrangement.

UNIT-III PROTEINS AND NUCLEIC ACIDS

Proteins - peptides and their synthesis - synthesis of tripeptide - merrifield synthesis - determination of tertiary structure of protein - biosynthesis of proteins - nucleic acids - types - DNA & RNA polynucleotide chain - components - biological functions - structure and role of (genetic Code) DNA and RNA (nucleotides only) - Biosynthesis of cholesterol.

UNIT-IV: ANTIBIOTICS

Introduction - structural elucidation and synthesis of penicillin – streptomycin - chloromycetin and tetracyclines.

UNIT-V: DYES

Introduction - classification and various methods of dyeing - preparations and applications of dyes - Nitroso dyes - Azodyes - Fast green - Methyl Orange - Methyl Red - Fast Red - Tripheylmethane dyes - Malachite green - Rosaniline - Aniline blue - Crystal violet - Xanthene dyes - Fluorescein - Rhodamine-B - Anthroquinone dyes - Alizarin.

Recommended Books:

1. Charles H.Depey and Orville, Molecular Reaction and Photochemistry,L. Chapman, Prentice Hall of India Pvt., Ltd., New Delhi.
2. Eric E.Conn, Paul. R. Stumpf, George Bruening and Roy H. Dole, Outlines of Biochemistry, V Edition, John Wiley and Sons.
3. Francis A. Carey and Richard J. SandburgAdvanced Organic Chemistry, Plenum Press, New York.
4. I. L. Finar, Organic Chemistry, Vol. II, VEdition ELBS publication.
5. J. March,Advanced organic reaction mechanism and structure, Tata McGraw Hill.
6. L.Smith, Robert L.Hill I. Robert Lehman, Robert J.Let Rowitz, Philip Handlar and Abraham white, Principles of Biochemistry General Aspects, VII EditionMcGraw Hill Int.,
7. Lubert Stryer, Biochemistry, Freeman and Co.,New York.
8. O.P. Agarwal, Chemistry of organic Natural Products, Goel Publishing House, Meerut.

PAPER-11
INORGANIC CHEMISTRY - IV

OBJECTIVE:
To study about the Inorganic Spectroscopy and Nuclear Chemistry.

UNIT-I: INORGANIC SPECTROSCOPY - I

Applications to inorganic systems of the following: ultra violet, visible, infra-red and Raman spectra of metal complexes, organometallic and simple inorganic compounds with special reference to coordination sites and isomerism.

UNIT-II: INORGANIC SPECTROSCOPY - II

Application to Inorganic systems of the followings
NMR, NQR and Mossebauer spectra - NMR of ^{31}P, ^{19}F, NMR shift reagents. NQR - Nitrosyl compounds. Mossebauer spectra of Fe and Sn systems.

UNIT-III: INORGANIC SPECTROSCOPY - III

ESR Introduction - Zeeman equation, g-value, nuclear hyperfine splitting, interpretation of the spectrum, simple carbon centered free radicals. Anisotropy - g-value and hyperfine splitting constant. McConnell's equation, Kramer's theorem.ESR of transition metal complexes of copper, manganese and vanadyl complexes.

Photoelectron spectroscopy (UV and X-ray) - photo electron spectra - Koopman's theorem, fine structure in PES, chemical shift and correlation with electronic charges.

UNIT-IV: INSTRUMENTAL ANALYSIS - I

AAS, AES and AFS – Principle, instrumentation and applications, advantages of AAS, interferences; GLC and HPLC – Principle, instrumentation and working, types of detectors; Inductively coupled plasma spectroscopy (ICP)- introduction, instrumentation, interferences and applications.

UNIT-V INSTRUMENTAL ANALYSIS - II

Laser Raman spectroscopy - principle, interfaces, advantages and applications.
Magnetic susceptibility and its determination - Guoy method, Faraday method and applications.
Polarography and Amperometry - Principle, instrumentation and applications.

TEXT BOOKS

1. A. Earnshaw, Introduction to Magneto Chemistry, Academic Press, London, (1968).
2. C.N.R. Rao, I.R. Ferraro, Spectroscopy in Inorganic Chemistry, Vol. I and Vol. II, Academic Press, (1970).
3. D. A. Skoog and D.M.West, Principles of Instrumental Methods of Analysis, Saunder's College Publ. III Edition, (1985).
4. E. A. V. Ebsworth, D. W. H. Rankin and S. Cradock, Structural Methods in Inorganic Chemistry, II Edition, Blackwell Scientific Publications, Oxford, London (1991).
5. G.D. Christian and J.E.G. Reily, Instrumental Analysis, Allegn Becon, II Edition, (1986).
6. H.A. Strobel, Chemical Instrumentation, Addison - Wesley Pub. Co., (1976).
7. R. S. Drago, Physical Methods for Chemists,Saunders College Publishing, Philadelphia (1992).
8. Willard Merrit, Dean and Settle, Instrumental methods of analysis, CBS Publ. VI edition, (1986).

Suggested References

1. AI Vogel, Text book of Qualitative Analysis - IV Edition (1985).
2. C. N. Banwell and E.M. Mc Cash, Fundamentals of Molecular Spectroscopy, IV edition, Tata McGraw Hill, New Delhi (1994).
3. D.A. Skoog D.M. West, Holt Reinhert and Winston, Fundamental of Analytical Chemistry, Publication, IV Edition (1982).
4. D.N. Sathyanarayana, Electronic Absorption Spectroscopy and Related Techniques, Universities Press (India) Ltd., Hyderabad (2001).
5. FA Cotton and G Wilkinson, Advanced Inorganic Chemistry, John Wiley and Sons, V Edition (1988).
6. G. Aruldhas, Molecular Structure and spectroscopy, Prentice Hall of India Pvt. Ltd., New Delhi (2001).
7. J. Huheey, Inorganic Chemistry, Harper and Collins, NY, IV Edition, (1993).
8. J. M. Hollas, Modern Spectroscopy, IVedition, John Wiley & Sons, Ltd., Chichester (2004).
9. M.C. Shrivers, P.W Atkins, CH. Langford, Inorganic Chemistry, OUP (1999).
10. Nakamoto, Infrared and Raman Spectra of Inorganic and Coordination Compounds, III Edn., John Wiley and Sons, New York, (1986).
11. O. Khan, Molecular Magnetism, New York, VCH (1993).
12. R.L. Carlin, Magneto chemistry, Springer-Verlag, New York, (1986).
13. S.F.A.Kettle, Physical Inorganic Chemistry: A Coordination Chemistry Approach, Oxford University Press, (1998)

PAPER-12
PHYSICAL CHEMISTRY-IV

OBJECTIVE

To study the principles of photochemical reactions. To study the Experimental methods and kinetics studies of photochemical reactions. Study of electrode - electrolytic interface. To study the fundamental principles of quantum chemistry and its application to chemical bonding. Schrödinger wave equation and its applications. To study statistical thermodynamics, quantum statistics and irreversible thermodynamics.

UNIT- I: PHOTOCHEMISTRY - I

Absorption and emission of radiation - Franck - Condon Principle - decay of electronically excited states - Jablonski diagram - radiative and non-radiative processes - fluorescence and phosphorescence - spin forbidden radiative transition - Internal conversion and intersystem crossing - energy transfer process - kinetics of unimolecular and bimolecular photophysical processes - excimers and exciplexes - static and dynamic quenching - Stern-Volmer analysis.

UNIT- II: PHOTOCHEMISTRY - II

Experimental methods - quantum yield and life time measurements - steady state principle - quantum yield and chemical actinometry.

Kinetics of photochemical reactions: hydrogen and halogen reactions,

Brief study about photoredox, photosubstitution, photoisomerization and photosensitized reactions - photovoltaic and photogalvanic cells, photo electrochemical cells, photo-assisted electrolysis of water, aspects of solar energy conversion.

UNIT- III: QUANTUM CHEMISTRY - I

Failure of classical mechanics - Compton effect - wave particle duality - uncertainty principle - waves - wave equation for electrons - quantum mechanical postulates - The concept of operators - Hermitian property. Schrodinger wave equation - application of Schrodinger's equation - the particle in a box (one, and three dimensional cases) - particle in a ring, solution to rigid rotor and harmonic oscillator. Schrodinger equation for hydrogen atom (no derivation is required) and the solutions.

UNIT- IV: QUANTUM CHEMISTRY - II

Approximation methods - Perturbation and Variation methods - application to hydrogen

molecule and helium atoms. Born - Oppenheimer approximation - valence bond theory for hydrogen molecule - LCAO - MO theory for diatomic molecules. Concept of hybridization - Huckel theory for conjugated molecules (Ethylene, butadiene and benzene).

UNIT- V: STATISTICAL THERMODYNAMICS - II

Thermodynamic functions in terms of partition functions - application of partition function to heat capacity of ideal gases - nuclear partition function - contribution to heat capacity of ortho and para hydrogen. Heat capacity of solids - Einstein and Debye models, Negative Kelvin temperature. Entropy of monoatomic gases - Sackur-Tetrode equation.

Irreversible thermodynamics - forces and fluxes - linear force - flux relation - phenomenological equations.

TEXT BOOKS

N.J.Turro, Modern Molecular Photochemistry, Benjamin, Cumming, Menlo Park, California (1978).

K.K.Rohatgi, Mukherjee, Fundamentals of Photochemistry, Wiley Eastern Ltd., (1978).

R.K. Prasad, Quantum Chemistry, Wiley Eastern, New Delhi (1992).

D.A. Mcquarrie, Quantum Chemistry, University Science Books, Mil Valley, California (1983).

Quantum Chemistry, Allyn and Bacon, Boston (1983).

R.Anantharaman, Fundamentals of Quantum Chemistry, Mac Millan India Limited (2001).

M.W. Hanna, Quantum Mechanics in Chemistry, W.A. Benjamin Inc. London (1965).

M.C.Gupta, Statistical thermodynamics, Wiley Easter, New Delhi (1990).

R.Hasee, Thermodynamics Of Irreversible Process, Addition Wesley, Reading, Mass (1969).

L.K. Nash, Elements of Chemical Thermodynamics, Addision Wesley (1962).

G.M. Barrow, Physical Chemistry, McGraw Hill (1988).

R.L. De Koch and H.B. Gray, Chemical Structure and Bonding, Benjamin- Cumming, Menlo Park, California. S.Glasstone, Text Book of Physical Chemistry.

Suggested References

A.K. Chandra, Introductory Quantum Chemistry, Tata Mc Graw Hill.

D.A. Mc Quarrie, Quantum Chemistry, University Science Books, Mill Valley, California (1983).

P.W. Atkins, Molecular Quantum Mechanics, Oxford University Press, Oxford (1983).

J.G.Clavert and J.N.Pitts, Photochemistry, Wiley, London (1966).

R.P.Wayne, Photochemistry, Butterworths, London (1970).

B.J.Mc Clenlland, Statistical Thermodynamics, Chapman and Hall, London (1973).

Cleyde, Physical Chemistry, Schaum Series, Mc Graw Hill (1976).

Dole, Thermodynamics, Prentice Hall, New York (1954).

Prigogine, Introduction to Thermodynamics of Irreversible Process, Interscience, New York (1961).

N.O.Smith, Elementary Statistical Thermodynamics - A Problem Approach, Plenum Press, NewYork (1961).

G.Clavert and J.N.Pitts, Photochemistry, Wiley, London (1966).

R.P.Wayne, Photochemistry, Butterworths, London (1970).

Francis W Sears and Gerhard L Salinger, Thermodynamics, kinetic theory, and statistical thermodynamics.

ELECTIVE
PAPER- 4
(to choose 1 out of 3)

A. ENVIRONMENTAL CHEMISTRY

OBJECTIVES:

To understand the concept of different types of pollution. To learn the various techniques involved in the analysis of pollutants. To know the methods for the control of pollution

UNIT-I AIR POLLUTION AND WATER POLLUTION

Classification of air pollution according to origin, chemical composition and state of matter - effects of air pollutants on living and nonliving things - ambient air quality standards - problems of air pollution in India - pollutions in industrial area (cement industry and thermal power plant) - Effect and consequences of air pollution: acid rain, green house effect, global warming and ozone depletion - major air pollution disasters - Bhopal Gas Leak - Chernobyl Nuclear Accident and Three Mile Island disaster.

Classification of water pollutants: DOD, BOD and COD - Effects of water pollutant on life and Environment.

UNIT-II SAMPLING AND ANALYSIS OF WATER AND AIR POLLUTANTS

Methods of sampling of gaseous, liquid and solid pollutant - analysis and effect of sulfur oxides, nitrogen oxides and carbon monoxide - biochemical effects and toxicology of Cd, Cr, As, Pb and Cu. Environmental implications of fertilizers, insecticides, pesticide - effect of pesticide residue on life - analytical techniques for pesticides residue analysis (Neutron Activation Analysis, Anodic Stripping Voltammetry and Atomic Absorption Spectroscopy) .

UNIT-III METHODS OF CONTROL OF AIR AND WATER POLLUTION

Methods of control of air pollution: Electrostatic precipitations - wet and dry scrubber, filters, gravity and cyclonic separation - adsorption, absorption and condensation of gaseous effluent.

Methods of control of water pollution: Water and waste water treatment - aerobic and anaerobic - aeration of water - principle of coagulation, flocculation, softening, disinfection, demineralization and fluoridation.

UNIT – IV NOISE POLLUTION

The decibel scale - effect: physiological, psychological, acute and chronic - Measurement of noise level (Sound level meter, Magnetic tap recorder, noise limit indicator) - noise control in industries: Administrative, engineering and path control - Protection of the personne (ear plugs, ear muffs. Helmets) - acoustic absorptive materials - noise control methods in industrial plants.

UNIT-IV RADIOACTIVE POLLUTION

Classification: Non-ionizing and ionizing radiation - radioactive pollution and their sources - natural and anthropogenic - biological effect of radiation on the human body - radiation doses -preventive measure from nuclear radiation - regulations from safety measure.

Radioactive wastes: Classification - low level and high level - radioactive waste disposal - geological disposal - ocean dumping - sub-sea bed dumping - subductive waste disposal method - transmutation of high - level radioactive waste - radioactive waste management in India.

TEXT BOOKS

1. S.S Dara ," A Text Book of Environmental chemistry and Pollution Control ",S.. Chand & company Ltd, New Delhi
2. V. K. Ahluwalia," Environmental chemistry", Ane Books India, Chennai.
3. Anu Gopinath and Chandradasan, Environmental Chemistry., Vishal Publishing Co, Delhi.

REFERENCE BOOKS

1. A. K. De. "Environmental Pollution", New age intenational publishers, New Delhi
2. G. S. Sodhi, "Fundamental Concepts of Environmental Chemistry", Narosa Publishing House, New Delhi.
3. S.M. Khopkar, Environmental Pollution Analysis,
4. S. P.Mahajan, Pollution control in process industries.

http://www.nios.ac.in/media/documents/313courseE/L36.pdf

http://www.iisc.ernet.in/currsci/dec252001/1534.pdf

http://www.sciencelog.net/2014/12/radioactive-pollution-causes-and-effect.html

http://collegesat.du.ac.in/UG/Envinromental%20Studies_ebook.pdf

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PAPER- 4
B. INORGANIC PHOTOCHEMISTRY

UNIT-I: BASICS OF PHOTOCHEMISTRY

Absorption, excitation, photochemical laws, quantum yield, electronically excited states, life times-measurements of the times. Flash photolysis, energy dissipation by radiative and non-radiative processes, absorption spectra, Frank-Condon principle, photochemical stages-primary and secondary processes.

UNIT-II: EXCITED STATES OF METAL COMPLEXES

Excited states of metal complexes: Comparison with organic compounds, electronically excited states of metal complexes, charge transfer spectra and charge transfer excitations.

UNIT-III: LIGAND FIELD PHOTOCHEMISTRY

Photosubstitution, photooxidation and photoreduction, lability and selectivity, zero vibrational levels of ground state and excited state, energy content of excited state, zero-zero spectroscopic energy, development of the equations for redox potentials of the excited states.

UNIT-IV: REDOX REACTIONS BY EXCITED METAL COMPLEXES

Energy transfer under condition of a weak interaction and strong interaction-examples formation; condition of the excited states to be useful as redox reactants, excited electron transfer, metal complexes as attractive condidates, (2,2-bipyridine and 1,10-phenanthroline complexes), illustration of reducing and oxidising character of Ru (II) (bipyridal complex, comparison with Fe(bipy); role of spin-orbit coupling-life time of these complexes. Application of redox processes of electronically excited states for catalytic purposes, transformation of low energy reactants into high energy products and conversion of chemical energy into light.

UNIT-V: METAL COMPLEX SENSITIZERS

Metal complex sensitizers, electron relay, metal colloid systems, semiconductor supported metal or oxide systems, water photolysis, nitrogen fixation and carbon dioxide reduction.

Book Suggested:

1. Concepts of Inorganic Photochemistry, A.W. Adamson and P.D. Fleischauer, Wiley.
2. Inorganic Photochemistry, J.Chem. Educ. vol. 60 No. 10, 1983.
3. Progress in Inorganic Chemistry, Vol. 30ed. S.J. Lippard. Wiley.
4. Coordination Chem. Revs. 1981, vol. 39, 121, 1231, 1975, 14, 321,; 1990 97, 313.
5. Photochemistry of Coordination Compounds, V. Balzari and V. Carassiti, Academic Press.
6. Elements of Inorganic Photochemistry, G.J. Ferraudi, Wiley.
7. S.Arunachalam, "Inorganic Photochemistry - An Introduction to Photochemical andPhotophysical Aspects of Metal Complexes", Kala Publications, Tiruchirappalli, India, 2002.
8. D.M. Roundhill, “Photochemistry and photophysics of Metal complexes”, Springer;Edition, 1994

PAPER – 4
C. MEDICINAL CHEMISTRY AND DRUG DESIGN

Objectives:

Students should be able to understand concepts of drug design and mechanism of drug action of different drugs. Students will be aware of metabolism and delivery methods of different classes of drugs.

UNIT-I: DRUG DESIGN

Development of new drugs, concepts of pro-drugs and soft drugs, Principles of drug design, Quantitative structure activity relationships. History and development of QSAR (Quantitative Structure Activity Relationships) - Concepts of drug parameters. High throughput Screening.

UNIT-II: IMPORTANCE AND MECHANISM OF DRUG ACTION

Antibiotics: Drug action of penicillin, cephalosphorin, tetracycline and macrocyclic antibiotics (no synthesis). Antimalerials: Trimethoprim- NSAIDS: Paracetamol, Meperidine, Aminopyrine-Ibuprofen, Oxyphenylbutazone, Diclophenac sodium, Indomethacin-Antitubercular and antileprotic: Ethambutol, Isoniazide and Daspone - Anaesthetics: Lidocaine, - Antihistamines: Phenobarbital, Diphenylhydramine- Tranquilizers: Diazepham, Trimeprazine, Thiopental - Anti AIDS agents: Acylovir, Ganciclovir.

UNIT-III: PHYSICO-CHEMICAL FACTORS AND BIOLOGICAL ACTIVITIES

Physical properties - Features governing drug action - Structurally specific - nonspecific drugs -Thermodynamic activity - Theories - Cut-off point - Factors governing ability of drugs -Absorption - Distribution - Excretion - Biotransformation - Intramolecular distances -Dissociation constants - Isosterism and Bioisosterism.

UNIT-IV: CLASSIFICATION OF MEDICINAL COMPOUNDS

Central Nervous system acting drugs – (General and Local anaesthetics, Sedatives and Hypnotics, Anticonvulsants, Narcotic and Non-narcotic analgesics, Anti-Parkinsonian agents, Anti-depressants, Tranquilizers, Psychomimetics) - Pharmacodynamic agents (Anti-arrythmics, Anti-anginals, Vasodialators, Anti-hypertensives, Diuretics, Antihistamines) - Chemotherapeutic Agents (Antibiotics, Antivirals, Antifungals) - Drugs for metabolic and endocrine disorders (Anti-thyroid drugs, Anti-diabatic drugs, biosynthetic insulin) – Therapeutic Index (Definitions with examples).

UNIT-V: DRUG ANALYSIS

Principles of quantitative analysis of the following drugs in formulations: Aspirin - benzyl penicillin - ascorbic acid - isoniazid - codeine - chloramphenical - riboflavin and folic acid.

Reference Books

1. Burger's Medicinal Chemistry & Drug discovery, Vol 1-3, 5th Ed, 1995.
2. Wilson, Gisvold & Dorque: Text book of Organic Medical and Pharmaceutical Chemistry, 10th Ed, Lippincoh pover publishers, 1998.
3. David A Williams, William O. Foye & Thomas L. Lemke, Foye's Principles of medicinal Chemistry, 6th Edition, Lippincott Williams & Wilkins, 2002.
4. Zubay G, Biochemistry, Maxwell Macmillan International Editions, second edition, 1987.
5. R. L. Foster, The Nature of Enzymology, Croom Helm, 1980.
6. D. L. Purich, (Ed), Contemporary Enzyme kinetics and Mechanisms, Academic Press, 1983.
7. Dugas H, Bio-organic Chemistry, A chemical approach to enzyme action, Springer 2003.
8. Chemistry of drug design and drug action-. R. B. Silverman (2004) Acad. press
9. Graham Patrick, An Introduction to Medicinal Chemistry- 2nd Edn. Qxford, 2010
10. N. K. Jain, Advances in Controlled and Novel Drug Delivery, CBS, 2001.
11. Lednicer, The Organic Chemistry of Drug Synthesis, Vol. 1, 5th Edition, John Wiley & Sons, 2001.
12. Foye's Principles of Medicinal Chemistry, Sixth Edition, Wolters Kluwer, 2008
13. G.R. Chatwal, Medicinal Chemistry, Himalaya Publishing House.
14. V.K. Ahluwalia and M. Chopra, Medicinal Chemistry, Ane Book Pvt. Ltd., 2008.
15. J. B. Taylor and P . D. Kenewell., Introductory medicinal chemistry.
16. D. C. Garratt., Quantitative analysis of drugs.
17. G. L. Patrick., An introduction to medicinal chemistry.
18. Beckett and Stenlake., Practical pharmaceutical chemistry. Vol 1 and 2.

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MAIN PRACTICAL
PRACTICAL PAPER-4
ORGANIC CHEMISTRY PRACTICAL- II

I. ANY SIX PREPARATIONS FROM THE FOLLOWING INVOLVING TWO STAGES

1. sym-Tribromo benzene from aniline (bromination, diazotization and hydrolysation)
2. Benzanilide from benzophenone (addition and Beckmann rearrangement)
3. m-Nitro benzoic acid from methyl benzoate (nitration and hydrolysation)
4. 2, 4.- Dinitrobenzoic acid from p-nitrotoluene (oxidation and nitration)
5. m-Nitro benzoic acid from benzaldehyde (oxidation and nitration)
6. Benzil from benzaldehyde (rearrangement)
7. Anthraquinone from phthalic anhydride (Fridel Crafts reaction)
8. Acetyl salicylic acid from methyl salicylate (hydrolysis and acetylation)
9. 2- Phenyl indole from phenyl hydrazine (Fisher indole reaction)
10. m-nitroaniline from nitrobenzene (nitration and reduction)

II. ANY TWO EXERCISES IN THE EXTRACTION OF NATURAL PRODUCTS

1. Caffeine from tea leaves
2. Lactose from milk
3. Citric acid from lemon
4. Piperine from black pepper

III. CHROMATOGRAPHIC SEPARATIONS

1. Column chromatography - Separation of anthracene and picric acid from anthracene picrate.
2. Thin layer chromatography - Separation of green leaf pigments.
3. Paper chromatography - Identification of amino acid.

IV. ANY FIVE ESTIMATIONS

1. Estimation of aniline
2. Estimation of phenol
3. Estimation of glucose
4. Estimation of ethyl methyl ketone
5. Estimation of amino group
6. Estimation of amide group
7. Saponification of fat or an oil
8. Iodine value of an oil
9. Estimation of sulphur in an organic compound

V.SPECIAL INTERPRETATION OF ORGANIC COMPOUNDS USING UV, IR, PMR AND MASS SPECTRA OF THE FOLLOWING 15 COMPOUNDS

[See ANNEXURE – I]

Recommended Books

Arthur I.Vogel, A text book of Practical Organic Chemistry, ELBS
Raj K. Bansal, Laboratory Manual of Organic Chemistry, Wiley Eastern limited.

UNIVERSITY EXAMINATION MARKS

University Examination	Marks
Estimation	25
Preparation	25
Interpretation of spectra	10
Viva Voce	10
Record	05
Total	**75**

CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK)
MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	**25**

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PRACTICAL PAPER - 5
INORGANIC CHEMISTRY PRACTICAL - II

1. ANALYSIS OF ORES

1. Determination of percentage of calcium and magnesium in dolomite.
2. Determination of percentage of MnO_2 in pyrolusite.
3. Determination of percentage of lead in galena.

II. ANALYSIS OF ALLOYS

1. Estimation of tin and lead in solder.
2. Estimation of copper and zinc in brass.
3. Estimation of chromium and nickel in stainless steel.

III. ANALYSIS OF INORGANIC COMPLEX COMPOUNDS

1. Preparation of cis and trans potassium bis (oxalato) diaquochromate(III) and analysis of each of these for chromium.
2. Preparation of potassium tris (oxalato) ferrate (III) and analysis for iron and oxalate.

IV. QUANTITATIVE ANALYSIS OF THE FOLLOWING MIXTURES
(one by volumetric and one by gravimetric method)

1. Copper and Nickel
2. Copper and Zinc
3. Iron and Nickel
4. Iron and Magnesium

V. COLORIMETRIC ANALYSIS USING PHOTOELECTRIC METHOD

1. Estimation of iron
2. Estimation of nickel
3. Estimation of manganese
4. Estimation of copper

VI. AMPEROMETRIC TITRATIONS (With dead stop endpoint)

1. Thiosulpate - iodine system
2. Iron (II) - cerium (IV) systems.

Reference book.
N.N. Greenwood and A. Earnshaw, Chemistry of the Elements, Vol.II, Pergamon Press (1997

VII. SPECTRAL INTERPRETATION OF THE FOLLOWING INORGANIC COMPOUNDS

[See ANNEXURE – II]

UNIVERSITY EXAMINATION MARKS

University Examination	Marks
I. Estimation of mixture containing two metal ions	
procedure	5
Volumetric analysis	15
Gravimetric analysis	10
II. Colorimetric estimation (or) Amperometric titration	
Estimation	15
Procedure	5
III. Interpretation of spectra	10
Viva Voce	10
Record	05
Total	**75**

CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK)
MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	**25**

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PRACTICAL PAPER-6
PHYSICAL CHEMISTRY PRACTICAL- II

EXPERIMENTS IN ELECTROCHEMISTRY:
CONDUCTOMETRY, POTENTIOMETRY, PH METRY AND SPECTROSCOPY.

I.CONDUCTIVITY MEASUREMENTS

1. Determination of equivalent conductance of a strong electrolyte and verification of Debye - Huckel - Onsager Equation
2. Verification of Debye-Huckel limiting law
3. Verification of Ostwald's Dilution law for a weak electrolyte.
4. Determination of pK_a values of weak acids and weak bases.
5. Conductometric titrations between acid (simple and mixture of strong and weak acids) - base,
6. Precipitation titrations including mixture of halides.

II. E.M.F MEASUREMENTS

1. Determination of standard potentials (Copper, Silver & Zinc)
2. Determination of thermodynamic quantities from EMF measurements –
3. Potentiometric titrations – Neutralization reactions
4. Determination of pH of buffer solution and calculation of pK_a.
5. Determination of stability constant of a complex.
6. Determination of solubility product of a sparingly soluble salt.
7. Potentiometric titrations – Redox titrations.
8. Potentiometric titrations – Precipitation titration of mixture of halides by EMF measurements.

III. SPECTROSCOPY: INTERPRETATION OF SPCTRA [See ANNEXURE – III].

1. Experiments given only to familiarize the interpretation of spectra provided.
2. Interpretation of UV-Visible spectra of simple molecules for the calculation of molecular data
3. Identification of functional groups (5 typical spectra will be provided).
4. IR and NMR spectral calculations of force constant and coupling constants respectively
5. Identification and interpretation of a spectra (5 each in IR and NMR will be provided)

LIST OF EXPERIMENTS SUGGESTED FOR PHYSICAL CHEMISTRY PRACTICAL II

Typical list of possible experiments are given.
Experiments of similar nature and other experiments may also be given.
The list given is only a guideline.
Any 15 experiments have to be performed in a year.

1. Determination of the equivalent conductance of a weak acid at different concentrations and verify Ostwald's dilution law and calculate the dissociation constant of the acid.
2. Determination of equivalent conductance of a strong electrolyte at different concentrations and examine the validity of the Onsager's theory as limiting law at high dilutions.
3. Determination of the activity co-efficient of Zinc ions in the solution of 0.002M Zinc sulphate using Debye-Huckel limiting law.
4. Determination of the solubility product of silver bromate and calculate its solubility in water and in 0.01 M $KBrO_3$ using Debye-Huckel limiting law.
5. Conductometric titrations of a mixture of HCl, CH_3COOH and $CuSO_4$ and NaOH.
6. Determination of the dissociation constant of an acid at different dilution.
7. Determination of the solubility of the lead iodide in water , 0.04 M KI and 0.04 M $Pb(NO_3)_2$ at 298 K
8. Determination of the solubility product of leadiodide at 298 K and 308 K and calculate the molar heat of solution of lead iodide.
9. Compare the relative strength of acetic acid and mono chloroacetic acid by conductance method.
10. Determine the basicity of organic acids (oxalic /benzoic).
11. Determine the electrode potentials of Zn and Ag electrodes in 0.1M and 0.001M solutions at 298 K and fine the standard potentials for these electrodes and test the 12.
12. Determine the activity co-efficient of an electrolyte at different molalities by EMF measurements.
13. Determine the dissociation constant of acetic acid titrating it with sodium hydroxide using quinhydrone as an indicator electrode and calomel as a reference electrode.

14. Study of the electrolytic separation of metals (Ag, Cu, Cd and Zn)
15. Determine the strength of a given solution of KCl using differential potentiometric titration technique.
16. Determine the dissociation constant of acetic acid in DMSO, DMF, acetone and dioxane by titrating it with KOH.
17. Determine the transport number of Ag ions and nitrate ions by Hittorf's method.
18. Determine the transport number of cadmium ions and sulphate ions by measuring emf of concentration cells with and without transference.
19. Determine the dissociation constant of monobasic or dibasic acid by all the Alber-Serjeant method.
20. Determine the pH of the given solution with the help of indicators using buffer solutions and by colorimetric method.
21. Perform acid-base titration in a non aqueous medium.
22. Determine the pH of a given solution by EMF method using glass and calomel electrodes and evaluate pKa value of an acid.
23. Determine the pH of a given solution by emf methods using hydrogen electrode and quinhydrone electrode.
24. Estimate the concentration of cadmium and lead ions by successive reduction in polarography. Verify Illkovic equation.
25. Determine lead ion by amperometric titrations with potassium dichromate.
26. Determine ferric ion by amperometric titration.
27. Determine pH value of an acid-base indicator (methyl red) by colorimetry.
28. Determine the composition and instability constant of a complex by mole ratio method.
29. By colorimetry determine simultaneously Mn and Cr.
30. Study the effect of solvent on the conductivity of $AgNO_3$/acetic acid and determine the degree of dissociation and equilibrium constant in different degree of dissociation and mixtures (DMSO, DMF, dioxane, acetone, water) and test the validity of Debye-Huckel Onsager's equation.
31. Determine the solubility of $Ca(TiO_3)_2$ in deionised water and in dilute solution of KCl at 298 K. Determine the solubility product graphically.
32. Determine the equivalent conductivity of a Ca electrolyte and dissociation constant of the electrolyte.
33. Determine the equivalent dissociation constant of a polybasic acid.
34. Calculate the thermodynamic parameters for the reaction $Zn + H_2SO_4$ gives $ZnSO_4 + H_2$ by emf method.

35. Determine the formation constant of silver-ammonia complex and stoichiometry of the complex potentiometrically.
36. Determine the stability constant of a complex by polarographic method.
37. Determine the g value from a given ESR spectrum.

UNIVERSITY EXAMINATION MARKS

University Examination	Marks
Procedure	10
Manipulation	25
Result	15
Interpretation of spectra	10
Viva Voce	10
Record	05
Total	**75**

CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK)
MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	**25**

THIRUVALLUVAR UNIVERSITY

MASTEROF SCIENCEDEGREECOURSE

M.Sc. COMPUTER SCIENCE

UNDERCBCS
(With effect from 2017-2018)

The Course of Study and the Scheme of Examinations

S.NO.	Study Components / Course Title		Ins. Hrs. /week	Credit	Title of the Paper	Maximum Marks		
SEMESTERI						**CIA**	**Uni. Exam**	**Total**
1	MAIN	Paper-1	5	5	Formal Languages and Automata Theory	25	75	100
2	MAIN	Paper-2	4	3	Advanced Java Programming	25	75	100
3	MAIN	Paper-3	4	3	Web Application using C#	25	75	100
4	MAIN	Paper-4	4	3	Data Base Management Systems	25	75	100
5	MAIN PRACTICAL	Paper-1	3	2	Advanced Java Programming Lab	25	75	100
6	MAIN PRACTICAL	Paper-2	3	2	Web Application using C# Lab	25	75	100
7	MAIN PRACTICAL	Paper-3	3	2	Data Base Management Systems Lab	25	75	100
8	ELECTIVE	Paper-1	4	3	***(to choose either A or B or C)*** A. Object Oriented Analysis and Design B. Cloud Computing C. Principles of Programming	25	75	100
			30	**23**				**800**
SEMESTERII						**CIA**	**Uni. Exam**	**Total**
9	MAIN	Paper-5	4	4	Compiler Design	25	75	100
10	MAIN	Paper-6	4	3	Enterprise Java Programming	25	75	100
11	MAIN	Paper-7	4	3	Enterprise Applications using C#	25	75	100
12	MAIN	Paper-8	4	3	Unix Network Programming	25	75	100
13	MAIN PRACTICAL	Paper-4	3	2	Enterprise Java Programming Lab.	25	75	100
14	MAIN PRACTICAL	Paper-5	3	2	Enterprise Applications using C# Lab	25	75	100
15	MAIN PRACTICAL	Paper-6	2	2	Unix Programming Lab	25	75	100
16	**Compulsory Paper**		2	2	**Human Rights**	25	75	100

17	ELECTIVE	Paper-2	4	3	***(to choose either A or B or C)*** A. Software Testing B. Web Services C. Cryptography and Network Security	25	75	100
			30	**24**				**800**
SEMESTE III						**CIA**	**Uni. Exam**	**Total**
18	MAIN	Paper-9	5	5	Distributed Operating Systems	25	75	100
19	MAIN	Paper-10	4	3	Software Project Management	25	75	100
20	MAIN	Paper-11	4	3	Mobile Computing	25	75	100
21	MAIN	Paper-12	4	3	Design and Analysis of Algorithms	25	75	100
22	MAIN PRACTICAL	Paper-7	3	2	Mobile Computing Lab	25	75	100
23	MAIN PRACTICAL	Paper-8	3	2	Design and Analysis of Algorithms Lab	25	75	100
24	MAIN PRACTICAL	Paper-9	3	2	Mini Project	25	75	100
25	ELECTIVE	Paper-3	4	3	***(to choose either A or B or C)*** A. Software Quality Assurance B. Big Data C. Soft Computing	25	75	100
			30	**23**				**800**
SEMESTER IV						**CIA**	**Uni. Exam**	**Total**
26		Paper-11	30	20	Project Work	80	120	200
			30	**20**		**80**	**120**	**200**

Subject	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total marks**
MAIN	12	3-5	41	100	1200
ELECTIVE	3	3	9	100	300
MAIN PRACTICAL	8	2	16	100	800
MINI PROJECT	1	2	2	100	100
MAIN PROJECT	1	20	20	200	200
COMPULSORY PAPER	1	2	2	100	100
Total	**26**	**-**	**90**	**-**	**2700**

Structure of the Course and Evaluation Pattern:

The duration of University examination for theory and practical subjects shall be3 hours. The maximum mark for each theory is 100 with25 for Continuous Internal Assessment (CIA) and75 for University Examination.

CIA Theory Exam		
I	Two tests	15 Marks
II	Assignment /Seminar	5 Marks
III	Attendance	5 Marks
	Total	**25 Marks**

The maximum marks for each practical is 100 with 25 for Internal Assessment and75 for University Examination.

CIA Practical Exam		
I	One Test	20 Marks
II	Record	5 Marks
	Total	**25 Marks**

Semester Practical Exam		
1.	Experiment 1	25 Marks
2.	Experiment 1	25 Marks
3.	Viva – Voce	15 Marks
4.	Record	10 Marks
	Total	**75 Marks**

THIRUVALLUVARUNIVERSITY

M.Sc. COMPUTERSCIENCE
SYLLABUS

UNDERCBCS

(With effect from 2017-2018)

SEMESTER –I **MAIN PAPER-1** **5H/5C**

FORMAL LANGUAGES AND AUTOMATA THEORY

UNIT–I

Fundamentals - String, Alphabets, Operations, Finite State Machine – Definitions, Divisibility by Three Tester - Set Theory – Relations – Functions- Counting Techniques – Logic-Methods of Proof

UNIT-II

Finite Automata –Deterministic and Nondeterministic Finite Automata – Equivalence of NFA and DFA – Finite Automata with Outputs –Finite Automata with Null Moves – Finite Automata and Sequential Circuits

UNIT-III

Chomsky classification of grammars -Regular Expression – Relation between Regular languages and Finite Automata- Closure Properties – Automata for Union, Intersection and Difference of Languages – Context free grammars – Normal forms for Context Free Grammar – Parse Trees – Ambiguity Grammars – Removing Ambiguity from Grammars

UNIT-IV

Basic Structure – Types of Acceptance by PDA – Correspondence between PDA and CFL – Parsing and PDA -Languages of PDA – Equivalence of PDA and CFG – Deterministic PDA

UNIT-V

Basic structure of TM – Instantaneous Description of Turing Machine – Language of TM – Turing Machine as Computer for Positive Integer- Universal Turing Machine – Turing Machine for 1's Complement, 2's Complement- TM for Well Formed Parenthesis – TM for Unary addition and Multiplication – TM for Palindrome Recognition – TM for GCD – TM for 0^n1^n

TEXT BOOKS

1. C.K. Nag pal“ Formal Languages and Automata Theory” , Oxford University Press, Fourth Edition, 2013

2. Hop croft and Ullman, “Introduction to Automata Theory, Languages and Computation”, Narosa Publishing House, Delhi, 2002

3. E.V. Krishnamurthy “Theory of Computer Science” East West Press Pvt. Ltd.

REFERENCES

1. Juraj Hromkovic, “Theoretical Computer Science”, Springer Indian Reprint, 2010

2. John E. Hocroft, “Introduction to Automata Theory, Languages and Computation”, Paperback, 2008.

3. K.V.N. Sunitha, “Formal Languages and Automata Theory”, Paperback, 2015.

4. A Puntambekar, “Formal Languages and Automata Theory for JNTU”, Paperback, 2015.

SEMESTER –I **MAIN PAPER -2** **4H/3C**

ADVANCED JAVA PROGRAMMING

UNIT-I

Design Patterns: Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern, Prototype Pattern, Singleton Pattern- Adapter Pattern- Proxy Pattern-Decorator Pattern-Command Pattern- Template Pattern- Mediator Pattern-Collection Framework – Array List class – Linked List class – Array List vs. Linked List - List Iterator interface - Hash Set class- Linked Hash Set class-Tree Set class Priority Queue class - Map interface-Hash Map class- Linked Hash Map class –Tree Map class - Comparable interface -Comparator interface-Comparable vs. Comparator

UNIT-II

Applet Fundamentals- Applet Class - Applet lifecycle- Steps for Developing Applet Programs- Passing Values through Parameters- Graphics in Applets- GUI Application - Dialog Boxes - Creating Windows - Layout Managers – AWT Component classes – Swing component classes- Borders – Event handling with AWT components - AWT Graphics classes - File Choosers - Color Choosers – Tree – Table – Tabbed panels–Progressive bar - Sliders.

UNIT-III

JDBC -Introduction - JDBC Architecture - JDBC Classes and Interfaces – Database Access with MySQL -Steps in Developing JDBC application - Creating a New Database and Table with JDBC - Working with Database Metadata; Java Networking Basics of Networking - Networking in Java- Socket Program using TCP/IP - Socket Program using UDP- URL and In et address classes.

UNIT–IV

Servlet: Advantages over Applets - Servlet Alternatives - Servlet Strengths - Servlet Architecture - Servlet Life Cycle – Generic Servlet, Http Servlet - First Servlet - Invoking Servlet - Passing Parameters to Servlets - Retrieving Parameters - Server-Side Include – Cookies- JSP Engines - Working with JSP - JSP and Servlet - Anatomy of a JSP Page.

UNIT-V

Client-Side Programming: Client-side programming technologies - Form design using HTML, XHTML and DHTML and CSS - Client side validation Using Java Script - Content Structuring using XML - Adding Interactivity with AJAX - Query Framework- Server-side Programming- Web Servers - Handling request and response - Handling Form data - Session management - Database Access.

TEXT BOOK

1. S.Sagayaraj, R.Denis, P.Karthik & D.Gajalakshmi, “Java Programming“, Universities Press, 2017.

REFERENCES

1. Patrick Naughton& Herbert Schildt, “The Complete Reference: Java 2”, Tata McGraw Hill, 1999
2. Bruce W.Perry, “Java Servlet and JSP Cook Book”, O'Reilly, 2004.

SEMESTER –I **MAIN PAPER -3** **4H/3C**

WEB APPLICATION USING C#

UNIT – I

Introduction to ASP.NET: Evolution of .NET – Benefits of .NET – Overview of .NET - ASP.NET overview: Exploring new features of ASP.NET - ASP.NET Technologies- Exploring an ASP.NET 4.0 Web Application – Creating an ASP.NET website.

UNIT – II

Developing a Web Application: Specifying a location for a web application – File types in ASP.NET - Exploring ASP.NET Web pages - ASP.NET Coding Models – Application Structure and State: Structure of an application- The Global. Sax Application file – States.

UNIT – III

ASP.NET Controls: Standard Controls: The Control Class – The Web Control class- The Label Control- the Button Control – The Text Box Control - The Image Control - The List Box Control – Navigation Controls: The Tree View Control - Creating Static Menus - Validation Controls: Using the Required Field Validator Control- Using the Range Validator Control – HTML Controls: HTML Server Controls – HTML Form Class.

UNIT - IV

Accessing Data in ASP.NET : Working with Database Controls: The Grid View Control The Data list control-The Details view control- LINQ Queries: Introducing LINQ Queries-Data Structures in LINQ – Deffered Query Execution and Immediate Execution LINQ and Generic Types – ADO.NET Entity Framework: Exploring ADO.NET Entity Framework – Exploring the features of Entity Framework – Working with Files and Streams: Introducing the System.IO Namespace – Working with Drives and Directories- Exploring the Directory class.

UNIT – V

ASP.NET Web Services: Introduction – Infrastructures of ASP.NET web services – Web Service Properties – Security in ASP.NET: Working with Login Controls – Working with User Profiles – Crystal Reports: Understanding Crystal Reports.

TEXT BOOK

1. KOGENT Learning Solutions, "ASP.NET 4.0 (Covers C# 2010 and VB 2010 codes) Black Book", Dream-Tech Press

REFERENCES

1. Pankaj Agarwal "Principles of .NET Framework", Vayu Education of India.
2. Mathew MacDonald, Adam Freeman and Mario Szpuszta, "Pro ASP.NET 4 in C# 2010", Fourth Edition. Press.
3. Scott Millett, "Professional ASP.NET Design Patterns", Paperback, 2011.
4. Shivprasad Koriala and Rajesh Pillai, "C# and ASP.NET Projects", Paperback, 2007.

SEMESTER –I **MAIN PAPER- 4** **4H/3C**

DATABASE MANAGEMENT SYSTEMS

UNIT-I

File System vs. DBMS- Database System Applications- View of Data- Data base language-Database design-ER Mode l_ Relational Model-Network Data Model-Hierarchical Data Model-Data Storage & Querying- Data Architecture.

UNIT-II

Relational Model-Structure of Relational Databases - Relational Algebra and Calculus- SQL - Basic Structure- Set Operations- Aggregate Functions- Null Values- Nested Queries-Complex Queries-Views - Modification of the Database - Advanced SQL- Triggers.

UNIT-III

Functional Dependencies – Features of Relational designs-Decomposition and Normalisation using Functional Dependencies and Multi valued Dependencies-Join dependencies-Domain key Normal form.

UNIT-IV

Overview of Physical Storage Media- Magnetic disks-RAID- Tertiary Storage-File Organization – Organization of records in Files- Indexing and Hashing-Ordered Indices- B+ -Tree Index Files - B-Tree Index Files – multiple Key Access - Static and Dynamic Hashing-QueryProcessing-TransactionManagement-Transactions-Concurrency.

UNIT-V

Distributed Databases - Homogeneous and Heterogeneous Databases-Distributed Data Storage - Distributed Transactions-Commit Protocols - Concurrency Control - Object BasedDatabases-ComplexDatatypes-StructuredTypesandInheritanceinSQL–Object identity and Reference-Types in SQL-XML-structure of XML data- XML Document - Schema - Querying and Transformation - Data Mining and Data Ware housing.

TEXTBOOK

1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan-“Database System Concepts”, Fifth Edition, McGraw-Hill, 2006.

REFERENCES

1. Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, Tata McGraw-Hill Publishing Company, 2003.
2. Ramez Elmasri and Shamkant B. Navathe, “Fundamental Database Systems”, Third Edition, Pearson Education, 2003.
3. Hector Garcia–Molina, Jeffrey D.Ullmanand Jennifer Widom- “Database System Implementation”-PearsonEducation-2000.
4. Narang,”DatabaseManagementSystems”, 2nd ed., PHI.

SEMESTER –I **MAIN PRATICAL PAPER- 1** **3H/2C**

ADVANCED JAVA PROGRAMMING LAB

1. Collections using Set, List and Map interfaces
2. Applet programs
3. AWT Controls
4. CRUD operation Using JDBC
5. Displaying Query Results in a Table
6. TCP Socket
7. UDP Socket
8. Web application using Servlet and JDBC
9. Cookies and Session tracking
10. Web application using JSP and JDBC

SEMESTER –I **MAIN PRATICAL PAPER- 2** **3H/2C**

WEB APPLICATIONUSING C# LAB

1. Web Configuration File
2. HTML Control Classes, Control Events, Container and Input Control Classes,
3. HTTP Request Classes & Response Classes
4. Web Control Classes & Control Tags
5. Validation Controls
6. Rich Controls
7. Data Access
8. Components
9. Custom Controls
10. User Controls

SEMESTER –I **MAIN PRATICAL PAPER- 3** **3H/2C**

DATABASE MANAGEMENT SYSTEMS LAB

1. Creating data base tables and using data types. - Create table- Modify table - Drop table

2. Practical Based on Data Manipulation- Adding data with Insert - Modify data with Update -Deleting records with Delete

3. Practical Based on Implementing the Constraints - NULL and NOT NULL - Primary Key and Foreign Key Constraint - Unique, Check and Default Constraint

4. Practical for Retrieving Data Using following clauses - Simple select clause - Accessing specific data with Where - Ordered By - Distinct and Group By

5. Practical Based on Aggregate Functions - AVG –COUNT – MAX –MIN –SUM -CUBE

6. Practical Based on implementing all String functions and Date and Time Functions, union, intersection, set difference.

7. Implement Nested Queries & JOIN operation.

8. Practical Based on performing different operations on a view.

9. Practical Based on implementing use of triggers, cursors & procedures.

10. Make Database connectivity with front end tools MS-Visual Studio with C# programming.

SEMESTER –I **ELECTIVE PAPER- 1** **4H/3C**

(To choose either A or B or C)

A. OBJECT ORIENTED ANALYSIS AND DESIGN

UNIT - I

System Development - Object Basis-Development life cycle - Methodologies-Patterns - Frame works-Unified Approach-UML.

UNIT - II

Use - Case Models-Object Analysis-Object relations-Attributes-Methods-Class and object responsibilities-Case Studies.

UNIT - III

DesignProcess-DesignAxioms-ClassDesign-Objectstorage-ObjectInterpretability-Case Studies.

UNIT - IV

User interface design-View layer classed-Micro-level processes-View Layer Interface-Case Studies.

UNIT - V

Quality Assurance Tests - Testing strategies - Object O riented on Testing - Test Cases - Test Plans - Continuous Testing – Debugging Principles – System usability – Measuring user satisfaction-Case Studies.

TEXTBOOK

1. Ali Bahrami, "Object Oriented Systems Development", McGraw Hill International Edition, 1999

REFERENCES

1. Grady Booch, "Object Oriented Analysis and Design", Pearson Education-2nd Edition

2. -Oriented Analysis and Design using UML", PHI.

3. Carol Britton and Jill Doake, "Object – Oriented System Development: A Gentel Introduction", Paperback, 2012.

4. David West and Brett McLaughlin, "Head First Object-Oriented Analysis and Design", Kindle Edition, 2011.

SEMESTER –I **ELECTIVE PAPER- 1** **4H/3C**

(To choose either A or B or C)

B. CLOUD COMPUTING

UNIT - I

Fundamentals – Cloud computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why cloud computing Matters – Advantages of Cloud computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services

UNIT- II

Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services –On-Demand computing –Discovering Cloud Services Development Services and Tools – Amazon Ec2- Google App Engine – IBM Clouds.

UNIT -III

Centralizing Email communications –collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.

UNIT -IV

Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications–Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing – Collaborating on Databases – Storing and Sharing Files – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis.

UNIT -V

OGSA – Sample Use Cases – OGSA Platform Components – OGSI – OGSA Basic Services. Globus Toolkit – Architecture – Programming Model – High Level Services – OGSI.Net. Middleware Solutions.

TEXT BOOK

1. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, 2008.

REFERENCES

1. Haley Bear, "Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", Que Publishing, 2009.

2. Thomas Erl, "Cloud Computing", Paperback, 2014.

3. Arshdeep Bahga, Vijay Madisetti, "Cloud Computing: A Handa-on Approach", Universities Press, August 2014.

4. Rajkumar Buyya and James Broberg, " Cloud Computing: Principles and Paradigms", Paperback, 2013

SEMESTER –I **ELECTIVE PAPER- 1** **4H/3C**

(To choose either A or B or C)

C. PRINCIPLES OF PROGRAMMING LANAGUES

UNIT - I

Language design Issues: Reasons for studying concepts of programming language language evaluation criteria-influences on language design-structure and operation of computer virtual computers and binding times-language paradigms.

UNIT - II

Data types: Properties of types and objects-elementary data types- structured data types. Abstraction: Abstract data types-encapsulation by sub programs-type definition-storage management.

UNIT - III

Sequence Control: Implicit and explicit sequence control-sequencing with arithmetic and non-arithmetic expressions-sequence control between statements**.** Subprograms control: subprogram sequence control-attributes of data control shared data in subprograms.

UNIT - IV

Inheritance: Inheritance-polymorphism; Language Translation Issues: Programming language syntax-stages in translation-formal translation models.

UNIT - V

Advances in language design: variations on subprogram control-language constructors for parallel processing language semantics-software architecture.

TEXTBOOK

1. Terrance W.Pratt, Marvin V Zelkowitz, "Programming Languages, Design and Implementation", PHI, 2002, (4^{th} edition).

REFERENCES

1. Ravi Sethi, "Programming Languages Concepts &Constructs", Addison-Wesley, (2nd edition), 1996.
2. E.Horowitz, "Fundamentals of programming languages", Galgotia Publishers, 1984.
3. A.B.Tucker, "Robert, Noonan, Programming Languages", McGrawHill, 2002.
4. 4. D.Appleby, J.J.Vande Kopple, "Programming languages Paradigm and practice", McGraw Hill, International Editions, (2ndedition), 1997.

SEMESTER –II **MAIN PAPER- 5** **4H/4C**

COMPILER DESIGN

UNIT-I

Lexic an analysis: Regular expression- Non deterministic automata-deterministic automata EquivalenttoNFAs-minimizingthestatesofDFA-implementationoflexicalanalyzer.

UNIT-II

Syntax analysis: Top down parsing concepts-recursive descent parsing - predictive parsers-non recursive predicate parsing- bottom-up parsing- handle pruning- shift reduce parsing-operator parsing-LR parsers-parser generators -YACC.

UNIT-III

Intermediate code generation: Syntax directed definitions - construction of syntax trees-top down translation-bottom up evaluation of inherited attributed -recursive evaluators-assigning space at compiler construction time-type checking-overloading of functions and operators -polymorphic function.

UNIT-IV

Storage organization: Storage organization -storage allocation strategies - parameter passing - symbol tables-dynamic storage allocation - intermediate languages - representation of declarations - assignment statement - Boolean expression - back patching-procedure calls.

UNIT-V

Code generation and Code optimization: Design of code generators - runtime storage management - basic blocks-flow graphs-register allocation and assignment-DAG representation of basic blocks - peephole optimization - code optimization - the principle sources of optimization - optimization of basic blocks - global data flow analysis-loop optimizations.

TEXTBOOK

1. AlfredAho, RaviSethi, JeffyD.Ullman, “Compilers-Principles, Techniques and Tools”, Pearson, 1986.

REFERENCES

1. David Galles, “Modern Compiler Design”, Pearson Education Asia, 2007
2. Steven S. Muchnick, “Advanced Compiler Design & Implementation”, Morgan Kaufmann Pulishers, 2000
3. C. N. Fisher and R. J. LeBlanc, “Crafting a Compiler with C”, Pearson Education, 2000

SEMESTER –II **MAIN PAPER- 6** **4H/3C**

ENTERPRISE JAVA PROGRAMMING

UNIT-I

Introduction -Enterprise Architecture Styles - J2EE Architecture - Containers - J2EE Technologies - Developing J2EE Applications - Naming and directory services - Using JNDI - JNDI Service providers Application Servers - Implementing the J2EE Specifications - J2EE packaging and Deployment - J2EE packaging overview - Configuring J2EE packages

UNIT-II

JSP Benefits - Framework roles - Simple JSF application - User Interface Component Model - Navigational Model - Life Cycle of JSF page - Using JSF in JSP Pages – Setting up a page, using core tags - using HTML tags - using localized messages - Using converters.

UNIT-III

Introduction to Enterprise Beans - Session Bean - Entity Bean - Message driven Bean - defining clients access with interfaces - contents of an enterprise Bean - life cycle of enterprise Bean - creation of Enterprise Bean - application client - web client - other Enterprise Bean features-handling exceptions.

UNIT–IV

Struts Architecture - Struts classes - Action Forward, Action Form, Action Servlet, Action classes - Understanding struts - config.xml, Understanding Action Mappings, Struts flow with an example application.

UNIT-V

Hibernate - Architecture of Hibernate - Life cycle of Hibernate Entities- Exploring HQL - Understanding Hibernate O/R Mapping - Collection Mapping - Association Mapping - Relationships in Java and Databases.

TEXT BOOKS

1. Marty Hall, Larry Brown., “Core Servlets and Java Server Pages”, 2nd Edition, Pearson Education, 2004
2. Stephanie Bodoffetl., “The J2EE™ Tutorial”, Pearson Education, Second Edition, 2005.
3. Minter Dave, Linwood Jeff, “Beginning Hibernate, From Novice to Professional”, Apress, Second Edition, 2006
4. *http://www.tutorialspoint.com/hibernate/*

REFERENCES

1. Patrick Naughton& Herbert Schildt, “The Complete Reference: Java 2”, Tata McGraw Hill, 1999
2. Bruce W.Perry, “Java Servlet and JSP Cook Book”, O'Reilly, 2004.

SEMESTER –II **MAIN PAPER- 7** **4H/3C**

ENTERPRISE APPLICATION USING C#

UNIT – I

Introduction – Creating a Simple Component – Properties and State – Database Components – Consuming the Database Component –Enhancing the Component with Error Handling – Aggregate Information–Data Objects.

UNIT - II

User Controls–Creating a Simple User Control–Visual Studio .NET Custom Control Support – Independent User Controls –Integrated User Controls –User Control Events – Limitations – Deriving Custom Controls.

UNIT - III

Designing for Scalability–Profiling –Caching-Output Caching–Client Side–Query Structuring– Events–CustomCachingControl–CachingwithHTTPCachePolicyClass–Fragment Caching – Data Caching –A Simple Cache Test–Caching to Provide Multiple Views.

UNIT – IV

Determining Security Requirements –Restricted File Types – Security Concepts –ASP .NET Security Model–Security Strategies – Certificates – SSL –Forms Authentication –Web. Config Settings– Login Page – User Lists – Protecting User Passwords with Encryption – Custom Roles – Windows Authentication–IIS Settings –Web. Config Setting –A windows Authentication Test.

UNIT – V

EnterpriseLibrary–DevelopingApplicationswithEnterpriseLibrary–DesignBlocks–Caching– Cryptography–Data Access – Exception Handling –Logging – Policy Injection – Security – Unity – Validation – Deployment Tools –Development of Deployment Tools –Choosing a Deployment Strategy–Click once Update Strategy – Deployment and Security.

TEXTBOOK

1. Matthew Mac Donald, “The Complete Reference–ASP .NET”, Tata McGraw Hill, 2002.

REFERENCES

1. Stephen Walther, "ASP .NET 2.0 Unleashed", SAMS Publishing, 2006.
2. ImarSpaanjaars, "Beginning ASP.NET 4.5 in C# and VB", Paperback, 2012.
3. Scott Millett, "Professional ASP.NET Design Patterns", Paperback, 2011.
4. Shivprasad Koriala and Rajesh Pillai, "C# and ASP .NET Projects", Paperback, 2007.

SEMESTER –II **MAIN PAPER- 8** **4H/3C**

UNIX NETWORKING PROGRAMMING

UNIT-I

Overview of UNIXOS - File I/O-File Descriptors -File sharing-Files and directories-File types-File access permissions-Files systems-Symbolic links-Standard I/Library- Streams and file objects-Buffering-System data files and information-Password file- Group file-Login accounting-system identification.

UNIT-II

Environment of a UNIX process - Process termination - command line arguments - Process control-Process identifiers-Process relationships terminal logins-Signals- threads.

UNIT-III

Introduction -Message passing (SVR4)-pipes-FIFO-message queues-Synchronization (SVR4)-Mutexes-condition variables-read-write locks–file locking-record locking-semaphores-Shared memory (SVR4).

UNIT-IV

Introduction -transport layer-socket introduction-TCP sockets-UDP sockets-raw sockets-Socket options-I/O multiplexing-Name and address conversions.

UNIT-V

Application-Debugging techniques-TCPecho client server-UDPecho client server- Ping-Trace route-Client server applications like file transfer and chat.

TEXTBOOKS

1. W.Richard Stevens, Advanced programming in the UNIX environment, Addison Wesley, 999. (Unit1, 2 &3)
2. W. Stevens, Bill Fenner, Andrew Rudoff, "Unix Network Programming", Volume 1, The Sockets Networking API, 3rd Edition, Pearson education, Nov2003. (unit4&5)

REFERENCES

1. Meeta Gandhi, Tilak Shetty and Rajiv Shah – The 'C' Odyssey Unix –The open Boundless C, 1st Edition, BPB Publications 1992.

2. Stvens,"Unix Network Programming: Inter process Communications",Vol2,2nded., PHI.

3. Bill Fenner, "Unix Network Programming: The Sockets Networking", Vol 1, 3rd ed., Paperback, 2012.

4. Mark G.Sobell, "A Practical Guide to Linux Commands, Editors and Shell Programming", Paperback, 2012.

SEMESTER –II **MAIN PRACTICAL PAPER- 4** **3H/2C**

ENTERPRISE JAVA PROGRAMMING LAB

1. Simple JSF application using JSP in JSF
2. HTML render kit in JSF
3. Core render kit in JSF
4. Creating Enterprise Bean
5. Creating Web Client
6. Using Session Bean
7. Struts Action
8. Struts Forward Action
9. Object Relational Mapping
10. Collection Mapping

SEMESTER –II **MAIN PRATICAL PAPER- 5** **3H/2C**

ENTERPRISE APPLICATION USING C# LAB

1. Creation and consumption of a simple component and database component and components using aggregate functions.

2. Creation of a Custom control which includes the following operation
A textboxes that parses the separator and identifies the first name and last name.

2. Create a popup calendar control that consists of a textbox and calendar control. The calendar control pops uponly by clicking the calendar control

3. Cache the output of the page for a specified time using Output Caching

5. Cache the data content of the web page using the Data Caching

6. Cache portion of a web page using Fragment caching

7. Create a simple profile and provide customized settings for the user.

8. Using the Forms Authentication, authenticate the user and encrypt the password using either SHA or RSA algorithm.

9. Implementation of deployment tools (XCOPY or Web Setup wizard)

10. Working with enterprise library tool with various features (Data access, exception, Cryptography, logging).

SEMESTER –II **MAIN PRATICAL PAPER- 6** **2H/2C**

UNIX PROGRAMMING LAB

1. Write a shell script to copy, rename and print multiple files using choice menus.

2. Write a shell script to display logged in users who are using high CPU percentage.

3. Write a shell script to list processes based on CPU percentage and memory un usage.

4. Write a shell script to display total used and free memory space.

5. Write a shell script that takes as command – line input a number and a word. The program should then print the word times, one word per line.

6. Write a shell scripts using the following statements.

a) While-loop

b) For-loop

c) If-then-else

d) Switch

7. Write a shell script using grep statement.

8. Write a shell script that can search all immediate sub-directories of the current- directory for a given file and then quit if it finds one.

9. Write a shell script program to include verbose Debug option for debugging.

10. Write a shell script program to include trace Debug option for debugging.

SEMESTER –II **COMPULSORY PAPER** **2H/2C**

HUMAN RIGHTS

UNIT-I

Definition of Human Rights - Nature, Content, Legitimacy and Priority - Theories on Human Rights - Historical Development of Human Rights.

UNIT-II

International Human Rights - Prescription and Enforcement up to World War II - Human Rights and the U .N .O. - Universal Declaration of Human Rights - International Covenant on Civil and Political Rights - International Convenant on Economic, Social and Cultural Rights and Optional Protocol.

UNIT-III

Human Rights Declarations - U.N. Human Rights Declarations - U.N. Human Commissioner.

UNIT-IV

Amnesty International - Human Rights and Helsinki Process - Regional Developments - European Human Rights System - African Human Rights System - International Human Rights in Domestic courts.

UNIT-V

Contemporary Issues on Human Rights: Children's Rights - Women's Rights - Dalit's Rights - Bonded Labour and Wages - Refugees - Capital Punishment.
Fundamental Rights in the Indian Constitution - Directive Principles of State Policy - Fundamental Duties - National Human Rights Commission.

TEXT BOOKS

1. International Bill of Human Rights, Amnesty International Publication, 1988.
2. Human Rights, Questions and Answers, UNESCO, 1982
3. Mausice Cranston - What is Human Rights
4. Desai, A.R. - Violation of Democratic Rights in India
5. Pandey - Constitutional Law.
6. Timm. R.W. - Working for Justice and Human Rights.

SEMESTER –II **ELECTIVE PAPAER- 2** **4H/3C**

(to choose either A or B or C)

A. SOFTWARE TESTING

UNIT - I

Introduction - Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs. Flow graphs and Path testing: - Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT - II

Transaction Flow Testing:-transaction flows, transaction flow testing techniques. Dataflow testing: - Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT – III

Domain Testing:-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability. Paths, Path products and Regular expressions: - path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

UNIT - IV

Logic Based Testing- overview, decision tables, path expressions, kv charts, specifications. State, State Graphs and Transition testing- state graphs- good & bad state graphs- state testing, Testability tips.

UNIT - V

Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like J Meter or Win runner).

TEXT BOOKS

1. Baris Beizer, Dream tech, "Software Testing techniques", second edition, Paperback, 2002.

2. Dr.K.V.K.K. Prasad, Dream tech, "Software Testing Tools", Paperback, 2004.

REFERENCES

1. Brian Marick, "The craft of software testing", Pearson Education.

2. P.C.Jorgensen, "Software Testing", 3rd edition, Aurbach Publications

3. Edward Kit, "Software Testing in the Real World", Pearson.

4. Perry and John Wiley, "Effective methods of Software Testing", 2nd Edition, 1999.

SEMESTER –II **ELECTIVE PAPAER- 2** **4H/3C**

(to choose either A or B or C)

B. WEB SERVICES

UNIT – I

Overview of Distributed Computing. Introduction to web services– Industry standards-Technologiesandconceptsunderlyingwebservices–theirsupporttowebservices.Applications that consume web services.

UNIT – II

XML–itschoiceforwebservices–networkprotocolstobackenddatabases-technologies–SOAP, WSDL–exchangeofinformationbetweenapplicationsindistributedenvironment–locatingremote web services–its access and usage. UDDI specification– an introduction.

UNIT - III

A brief outline of web services – conversation –static and interactive aspects of system interface and its implementation, workflow –orchestration and refinement, transactions, security issues– the common attacks – security attacks facilitated within web services quality of services – Architecting of systems to meet users requirement with respect tolatency, performance, reliability, QOS metrics, Mobile and wireless services– energy consumption, network band width utilization, portals and services management.

UNIT - IV

Buildingrealworldenterpriseapplicationsusingwebservices–samplesourcecodestodevelopweb services–
stepsnecessarytobuildanddeploywebservicesandclientapplicationstomeetcustomersrequirement– Easier development, customization, maintenance, transactional requirements, seamless porting to multiple devices and platforms.

UNIT - V

Deployment of Web services and applications onto Tomcat application server and axis SOAP server–Web services platform as a set of enabling technologies for XML based distributed computing.

TEXT BOOK

1. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services: Architects Guide, Prentice Hall, Nov2003.

REFERENCES

1. Kirk Zurell- "C Programming for Embedded Systems" R&D, Books- 2000.
2. David. E, Simon,"Anembedded software primer", Pearson Education Asia-Addison Wesley Longman (Singapore), Low Priced Edition, 2001,ISBN- 81- 7808- 045- 1.
3. Michael Barr, "Programming Embedded Systems in C and C++", Shroff Publishers & Distributors Pvt. Ltd., Calcutta. March 2001, ISBN- 81- 7366 - 076 – X.
4. Andreas Witting, Michael Wittig, "Amazon Web services in Action", Paperback, 2015

SEMESTER –II **ELECTIVE PAPAER- 2** **4H/3C**

(To choose either A or B or C)

C. CRYPTOGRAPHY AND NETWORK SECURITY

UNIT - I

Security Problems: Security problem in computing- Security Attacks – Security Services – Security Mechanisms – OSI security attack-Standards and standard setting organizations

UNIT - II

Data Security: Basic encryption and decryption-Substitution-Transposition-Block ciphers Data encryption standard encryption and decryption-Differential and linear crypto analysis Advanced encryption–Standard encryption and decryption - Block cipher models-Triple DES with two keys-Stream cipher-RC4- RSA algorithm – Diffie -Hellman key exchange algorithm.

UNIT - III

Message Authentication: Hash Functions – MD5-Hash algorithm - SHA 512 logic - Authentication Protocols-Digital signature standards

UNIT - IV

Network Security: IP security overview, IP security architecture, Authentication header, Encapsulating security pay load, combining security association, Key management-Web security considerations, secure socket layer, secure electronic transaction.

UNIT - V

System Security: Intruders and intrusion detection-Malicious software, Viruses and related threats, virus counter measures, distributed denial of services attack-Firewalls design principles-Trusted systems.

TEXT BOOK

1. William Stallings,"Cryptography and Network Security – Principles & Practice", Third Edition Pearson Education.

REFERENCES

1. Charles P. Pleeger, "Security in Computing", PHI Learning, 1998.
2. Prakash C. Gupta, "Cryptography and Network Security", Paperback, 2005.
3. Alfred J.Menezes and Paul C. Van Oorschot, "Handbook of Applied Cryptography", Kindle edition, 1996.
4. Nicholar J. Daras and Michael Th. Rassias, "Computation, Cryptography and Network Security", hard cover, 2015.

SEMESTER –III **MAIN PAPER -9** **5H/5C**

DISTRIBUTED OPERATING SYSTEMS

UNIT-I

Evolution –Models – Popularity - Distributed Operating System – Issues – Distributed Computed Environment - Features of a Good Message Passing – Issues- Synchronization – Buffering - – Multi data gram Messages – Encoding and Decoding of Message Data – Process Addressing – Failure Handling – Group Communication.

UNIT-II

The RPC Model –Transparency – Implementation – Stub – Messages – Marshaling - Server Management –Parameter Passing Semantics – Call Semantics – Communication protocols – Complicated – Client server Binding – Exception Handling – Security – Special types – Heterogeneous – Light Weight – Optimization

UNIT-III

Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithms - Process Migration – Threads.

UNIT–IV

Meet Hadoop: Data - Data Storage and Analysis - Comparison with Other Systems - A Brief History of Hadoop - The Apache Hadoop Project – Map Reduce: A Weather Dataset - Analyzing the Data with UNIX Tools - Analyzing the Data with Hadoop - Scaling Out - Hadoop Streaming - Hadoop Pipes

UNIT-V

The Configuration API - Configuring the Development Environment - Running Locally on Test Data - Running on a Cluster - The Map Reduce Web UI - Using a Remote Debugger - Tuning a Job - Map Reduce Workflows

TEXT BOOKS

1. Pradeep K. Sinha, “Distributed Operating System Concepts and Design”, PHI, New Delhi, 2007.
2. Tom White, “Hadoop: The Definitive Guide”, Published by O’Reilly Media, Third Edition, 2009

REFERENCES

1. Andrew S Tanaenbaum, "Modern Operating System", PHI, New Delhi, 2001
2. D.M. Dhamdhare, 2002, Operating System, Tata McGraw-Hill, New Delhi.
3. A.S. Tanenbaum, Operating Systems: Design and Implementation, Prentice-Hall of India, New Delhi.
4. Nutt, 2005, Operating Systems, 3 rd Edition, Pearson Education, Delhi.

SEMESTER –III **MAIN PAPER -10** **4H/3C**

SOFTWARE PROJECT MANAGEMENT

UNIT-I

Project Management-Introduction to Project and Project management- problems with software projects - Project Management Knowledge Area and Framework- Stages of project - Feasibility study -cost-benefit analysis - Planning - project execution - project and product lifecycle - Project Stakeholders - All Parties of project - role of project manager - Exploration of Open Source Software tools for project management. Checkpoints And Processes of Project -Major Milestones- Minor Milestones- Periodic status assessments. Project Processes- Initiating Processes- Planning Processes- Control Processes- Executing Processes- Closing Processes- Process Groups- Process Interactions.

UNIT-II

Project Planning -Integration Management - Introduction - Project plan development – Plan Execution - Scope Management - Introduction - methods for selecting projects - project charter - scope statement - work breakdown structure - Stepwise Project Planning -Overview - Main steps in project planning. Project Scheduling-Time Management- Importance of project schedules- Schedules and activities - Sequencing and scheduling activity - Project Network Diagrams - Network planning models- Duration Estimating and schedule development- Critical path analysis- Program evaluation and review Techniques.

UNIT-III

Technical Metrics For Software-Software Process and Project Metrics- Size Oriented Metrics- Function-Oriented Metrics- Extended Function Point Metrics- A Framework for Technical Software Metrics- Metrics for Requirement Specification Quality- Metrics for Analysis- Metrics for Design- Metrics for Source Code- Metrics for Testing- Metrics for Maintenance. Technical Metrics For Object-Oriented Systems-Intent of Object-Oriented Metrics- Characteristics of Object-Oriented Metrics - Metrics for OO Design Model- Class-Oriented Metrics- Operation-Oriented Metrics- Metrics for Object-Oriented Testing- Metrics for Object-Oriented Projects.

UNIT–IV

Overview- Benefits- Technologies related to ERP- E R P packages- Business Process Re-engineering- Implementation Life Cycle of ERP- Training - Team Training- End User Training- Post Implementation (Maintenance Mode) - Implementation in large-scale organization- Applications of ERP in functional areas- Marketing- Personnel- Financial & Production.

UNIT-V

Decision structure- Decision Support Trends- DSS Components- Using DSS- What-if analysis- sensitivity analysis- Goal Seeking Analysis- Optimization Analysis- Executive Information Systems- Enterprise portals and decision support- knowledge management systems.

TEXT BOOKS

1. James A O'Brien, George M maracas, Ramesh Behl, "Management Information Systems", McGraw Hill.
2. Walker Royce: Pearson Education, 2005: Software Project Management.
3. Indu Chhabra, "Software Engineering: A Concise Study", Publishers, 1st Edition.

REFERENCES

1. A Guide to the Project Management Body of Knowledge (PMBOK), Project Management Institute, PA, (2004).
2. Harold Kerzner, Frank P. Saladis, Project Management Workbook and PMP/CAPM Exam Study Guide, Wiley Publishers (2006)
3. Claudia M. Baca, Patti, PMP: Project Management Professional Workbook, Sybex, Workbook (2003).
4. Joel Henry, Pearson Education: Software Project Management.
5. PankajJalote, Pearson Education, 2005: Software Project Management.

SEMESTER –III **MAIN PAPER -11** **4H/3C**

MOBILE COMPUTING

UNIT-I

Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.

UNIT-II

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.

UNIT-III

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

UNIT–IV

Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.

UNIT-V

MOBILE PLATFORMS AND APPLICATIONS Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: i OS, Android, BlackBerry, Windows Phone – M Commerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

TEXT BOOK

1. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt. Ltd, New Delhi – 2012. 64

REFERENCES

1. Jochen H. Schller, “Mobile Communications”, Second Edition, Pearson Education, New Delhi, 2007.
2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
4. William.C.Y.Lee, “Mobile Cellular Telecommunications-Analog and Digital Systems”, Second Edition, Tata McGraw Hill Edition, 2006.
5. C.K.Toh, “AdHoc Mobile Wireless Networks”, First Edition, Pearson Education, 2002.
6. Android Developers : http://developer.android.com/index.html
7. Apple Developer : https://developer.apple.com/
8. Windows Phone Dev Center: http://developer.windowsphone.com 9. BlackBerry Developer : http://developer.blackberry.com/

SEMESTER –III **MAIN PAPER -12** **4H/3C**

DESIGN AND ANALYSIS ALGORITHMS

UNIT-I

Algorithm Analysis – Time Space Tradeoff – Asymptotic Notations – Conditional asymptotic notation – Removing condition from the conditional asymptotic notation - Properties of big-Oh notation – Recurrence equations – Solving recurrence equations – Analysis of linear search.

UNIT-II

Divide and Conquer: General Method – Binary Search – Finding Maximum and Minimum – Merge Sort – Greedy Algorithms: General Method – Container Loading – Knapsack Problem.

UNIT-III

Dynamic Programming: General Method – Multistage Graphs – All-Pair shortest paths – Optimal binary search trees – 0/1 Knapsack – Travelling salesperson problem .

UNIT–IV

Backtracking: General Method – 8 Queens problem – sum of subsets – graph coloring – Hamiltonian problem – knapsack problem.

UNIT-V

Graph Traversals – Connected Components – Spanning Trees – Biconnected components – Branch and Bound: General Methods (FIFO & LC) – 0/1 Knapsack problems – Introduction to NP-Hard and NP-Completeness.

TEXT BOOKS

1. Ellis Horowitz, SartajSahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007. (For Units II to V)

2. K.S. Easwarakumar, Object Oriented Data Structures using C++, Vikas Publishing House pvt. Ltd., 2000 (For Unit I)

REFERENCES

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.

2. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", Second Edition, Prentice Hall of India Pvt. Ltd, 2003.

3. Alfred V. Aho, John E. Hop croft and Jeffrey D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, 1999.

SEMESTER –III **MAIN PRACTICAL PAPER -73H/2C**

MOBILE COMPUTING LAB

1. Creation of simple application using Button, Text View and Edit Text
2. Creating an application which uses Radio buttons & Option Group
3. Creating an application with Alert Dialog box
4. Creating an application with Date Picker Widget
5. Creating an application which creates Progress Bar
6. Creating an application with Spinner
7. Creating an application with Menus and Intents
8. Creating an application with File I/O
9. Creating an application which connects RDBMS (SQ Lite / My SQL)
10. Creating an application with Phone services (SMS, Call etc.)

SEMESTER –III **MAIN PRACTICAL PAPER -83H/2C**

DESIGN AND ANALYSIS OF ALGORITHMS LAB

1. Liner &Binary search using Divide and Conquer
2. Quick sort using Divide and Conquer
3. Merge Sort using Divide and Conquer
4. Selection Sort using Divide and Conquer
5. Maximum and Minimum using Divide and Conquer
6. 0/1 knapsack using Dynamic Programming
7. All pairs of Shortest path algorithm
8. Minimum Cost Spanning Tree using Prims Algorithm & Kruskal Algorithm
9. N-Queens Problem using Backtracking
10. Sum of Subset of numbers

SEMESTER –III **MAIN PRACTICAL PAPER -93H/2C**

MINI PROJECT

REGULATIONS

a) Students should do their Mini Project work in the College during 3rd semester.
b) The Candidate should submit the filled in format as given in **Annexure-I** to the department for the approval during the 2nd week of July.
c) Each internal guide shall have maximum of eight Students.
d) Periodically the project should be reviewed minimum three times by the advisory committee.
e) The Students should prepare two copies of the project work and submit the same on the date fixed by the Department for the evaluation. After evaluation one copy is to be retained in the College Library and the student can hold one copy.
f) A Sample Cover page format of the Mini project work is enclosed in **Annexure-II**.
g) Format of the **Title page** and **certificate** are enclosed in **Annexure-III.**
h) The Students should use Presentation during their Mini Project Viva voce Examinations.
i) To pass the Mini Project and viva-voce a candidate should secure 50% marks. The candidate should compulsorily attend viva-voce examination to secure pass in that paper.

The evaluation of Mini Project is as follows:

The maximum mark for each Mini Project is 100 with 25 for Continuous Internal Assessment (CIA) and 75 for Semester Examination.

CIA Project Work		
I	First Review	10 Marks
II	Second Review	10 Marks
III	Report Preparation	5 Marks
	Total	**25 Marks**
Semester Project Work		
1.	Evaluation of Project Work Document	55 Marks
2.	Viva – Voce	20 Marks
	Total	**75 Marks**

SEMESTER –III **ELECTIVE PAPAER- 3** **4H/3C**

(to choose either A or B or C)

A. SOFTWARE QUALITY ASSURANCE

UNIT-I

The Role of SQA – SQA Plan – SQA considerations – SQA people – Quality Management – Software Configuration Management

UNIT-II

Managing Software Organizations – Managing Software Quality – Defect Prevention – Software Quality Assurance Management

UNIT-III

Software Quality – Total Quality Management (TQM) – Quality Metrics – Software Quality Metrics Analysis

UNIT–IV

Software Quality Program Concepts – Establishment of a Software Quality Program – Software Quality Assurance Planning – An Overview – Purpose & Scope.

UNIT-V

Software Standards–ISO 9000 Quality System Standards - Capability Maturity Model and the Role of SQA in Software Development Maturity – SEI CMM Level 5 – Comparison of ISO 9000 Model with SEI's CMM

TEXT BOOKS

1. Watts S Humphrey, "Managing the Software Process", Pearson Education Inc
2. Mordechai Ben-Menachem / Garry S Marliss, "Software Quality", Vikas Publishing House, Pvt, Ltd., New Delhi

REFERENCES

1. Gordon G Schulmeyer, "Handbook of Software Quality Assurance", Third Edition, Artech House Publishers 2007
2. Nina S Godbole, "Software Quality Assurance: Principles and Practice", Alphab Science International, Ltd, 2004

SEMESTER –III **ELECTIVE PAPAER- 3** **4H/3C**

(to choose either A or B or C)

B. BIGDATA

UNIT-I

Big Data in the Enterprise: Search at Scale – Multimedia Content - Sentiment Analysis – Enriching and Contextualizing Data – Data Discovery and Exploratory Analytics – Operational Analytics or Exploratory Analytics – Realizing opportunities from Bid Data – Taming the "Big Data" – New Information Management Paradigm: New Approach to enterprise Information management for Big Data – Implications of Big Data to Enterprise IT – Big Data Implications for Industry: Big Data uses cases by Industry Vertical.

UNIT-II

Scale-Out architecture – Database Workloads – Database Technologies for managing the workloads – Columnar Database - Polyglot persistence: The next generation architecture - Big Data warehouse and analytics – How Hadoop Works – Additional consideration for BDW – Data Quality implications for Big Data.

UNIT-III

Understanding Data Integration Patterns – Big Data Workload Design Approaches – Map reduce patterns, algorithms and use cases, No SQL Modeling Techniques.

UNIT–IV

Challenges in Big Data Analysis – Big Data Analytics Methodology – Analyze and Evaluate Business Use case – Develop Business Hypotheses – Setting up Big Data Analytics System – Gathering Data with Apache Flume.

UNIT-V

In-Memory Computing Technology: Guidelines – Real Time Analytics and CAP Theorem – Hadoop and No SQL Conundrum – Using an In-Memory Data Grid for Real time Data Analysis – Map Reduce and real Time Processing – Big Data Workflow – Design Principles for Contextualizing Big Data.

TEXT BOOK

1. Soumendra Mohanty, Madhu Jagadeesh, and Harsha Srivatsa, "Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics", Apress Publication.

REFERENCES

1. Bid Data Now 2012 Edition", O'Reilly, First Edition, 2012
2. Paul Zikopoulos, Thomas Deutsch, Dirk Deroos, David Corrigan, Krishnan Parasuraman and James Giles, "Harness the power of Big Data", McGraw Hill, 2013

SEMESTER –III **ELECTIVE PAPAER- 3** **4H/3C**

(to choose either A or B or C)

C. SOFT COMPUTING

UNIT-I

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set – Theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT-II

Derivative based Optimization – Descent Methods – The Method of Steepest Descent – classical Newton's Method – Step Size Determination – Derivative Free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT-III

Supervised Learning Neural Networks – Perceptrons – Adaline Back propagation Multilayer perceptrons – Radial Basis Function Networks – Unsupervised Learning and Other Neural Networks – Competitive Learning Networks – Kohonen Self – Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT–IV

Adaptive Neuro – Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework – Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT-V

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TEXT BOOK

1. J.S.R. Jang, C.T. Sun and E. Mizutani, "Neuro Fuzzy and Soft Computing", PHI,Pearson Education, 2004.

REFERENCES

1. Timothy J. Ross, "Fuzzy Logic with Engineering Application, " McGraw Hill, 1977.
2. Davis E. Goldberg, "Genetic Algorithms Search, Optimization and Machine Learning", Addision Wesley, 1989.
3. S. Rajasekaran and G.A.V. Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003. Emereo Pty Limited, July 2008.
4. Ahmar, Abbas, "Grid Computing A Practical Guide to technology and Applications", Charles River media, 2003.

SEMESTER –IV **MAIN PAPER- 11**

PROJECT WORK

REGULATIONS

a. Students should do their four months Project work in Company / Institutions during fourth semester.
b. The Candidate should submit the filled in format as given in **Annexure-IV** to the department for approval during the Ist Week of January.
c. Each internal guide shall have maximum of eight Students.
d. Periodically the project should be reviewed minimum three times by the advisory committee.
e. The Students should prepare three copies of the project work and submit the same on the date fixed by the department for the evaluation. After evaluation, one copy is to be retained in the College Library and one copy is to be submitted to the University (Registrar) and the student can hold one copy.
f. A Sample Cover page format of the Project Work is enclosed in **Annexure-V**.
g. Format of the **Title page** and **certificate** are enclosed in **Annexure-VI.**
h. The Students should use Presentation during their Project Viva voce Examinations.
i. For the project work and viva-voce a candidate should secure 50% of the marks for pass. The candidate should compulsorily attend viva-voce examination to secure pass in that paper.

The evaluation of project is as follows:

The maximum mark for each Project is 200 with 80 for Continuous Internal Assessment (CIA) and 120 for Semester Examination.

CIA Project Work		
I	First Review	25 Marks
II	Second Review	25 Marks
III	Report Preparation	30 Marks
	Total	**80 Marks**
Semester Project Work		
1.	Evaluation of Project Work Document	80 Marks
2.	Viva – Voce	40 Marks
	Total	**120 Marks**

For the conduct of University Examinations in practical subjects and Project work the University will appoint two external examiners.

ANNEXURE - I

THIRUVALLUVAR UNIVERSITY

College Name :

Course :

Student Name :

Register Number :

Title of the Project :

Name of the Internal Guide :

Qualification :

Teaching Experience :

Place :

Date : Signature of Internal Guide

Name of the HOD :

Designation :

Place:

Date : Signature of the HOD
(with seal)

ANNEXURE-II

COLLEGE BONAFIDE CERTIFICATE

ACKNOWLDGEMENT

ABSTRACT
TABLE OF CONTENTS
TABLE OF FIGURES

CONTENTS

Title Page No.

1. INTRODUCTION
   1.1 ORGANIZATIONPROFILE
   1.2 SYSTEM SPECIFICATION
      1.2.1 HARDWARECONFIGURATION
      1.2.2 SOFTWARESPECIFICATION
2. SYSTEM STUDY
   2.1 EXISTINGSYSTEM
      2.1.1 DRAWBACKS
   2.2 PROPOSEDSYSTEM
      2.2.1 FEATURES
3. SYSTEM DESIGN ANDDEVELOPMENT
   3.1 FILEDESIGN
   3.2 INPUT DESIGN
   3.3 OUTPUT DESIGN
   3.4 DATABASE DESIGN
   3.5 SYSTEM DEVELOPMENT
      3.5.1 DESCRIPTION OF MODULES (Detailed explanation about the project work)
4. TESTINGAND IMPLEMENTATION
5. CONCLUSION BIBLIOGRAPHY

APPENDICES
   A. DATA FLOW DIAGRAM
   B.TABLE STRUCTURE
   C.SAMPLE CODING
   D. SAMPLE INPUT
   E.SAMPLE OUTPUT

ANNEXURE-III

a. Format of the Cover Page

TITLE OF THE PROJECT WORK

Mini Project work submitted in partial fulfillment of the

requirements for the degree of

Master of Science in Computer Science

to

Thiruvalluvar University, Serkkadu, Vellore - Pin code

By

STUDENTNAME REG. NO.

College Emblem

MONTH – YEAR

COLLEGE NAME

(AFFILIATED TO THIRUVALLUVAR UNIVERSITY)

PLACE with Pin Code

b. Format of the certificate

MINI PROJECTWORK

TITLE OF THE PROJECT WORK

Bonafide Work Done by

STUDENTNAME

REG. NO.

Mini Project Work submitted in partial fulfillment of the
requirements for the degree of

Master of Science in Computer Science

to the **College Name and Address, Affiliated college from Thiruvalluvar University, Serkkadu, Vellore – Pin code.**

INTERNALGUIDE HEAD OF THE DEPARTMENT

Submitted for the Viva-Voce Examination held on _____

Internal Examiner External Examiner

NNEXURE-IV

THIRUVALLUVAR UNIVERSITY

College Name :

Course :

Student Name :

Register Number :

Title of the Project :

Address of Organization / Institution:

Name of the Internal Guide :

Qualification :

Teaching Experience :

Place :

Date : Signature of Internal Guide

Name of the HOD :

Designation :

Place:

Date : Signature of the HOD
(with seal)

Principal

ANNEXURE-V

Title Page
Original Copy of the Approved Proforma of the Project Proposal
Certificate of Authenticated work
Abstract
Acknowledgement
Table of Contents
Table of Figures

CONTENTS

Title Page No.

CHAPTER 1: INTRODUCTION
- 1.1 Background
- 1.2 Objectives
- 1.3 Purpose, Scope, and Applicability
  - 1.3.1 Purpose
  - 1.3.2 Scope
  - 1.3.3 Applicability
- 1.4 Achievements
- 1.5 Organization of Report

CHAPTER 2: SURVEY OF TECHNOLOGIES
CHAPTER 3: REQUIREMENTS AND ANALYSIS
- 3.1 Problem Definition
- 3.2 Requirements Specification
- 3.3 Planning and Scheduling
- 3.4 Software and Hardware Requirements
- 3.5 Preliminary Product Description
- 3.6 Conceptual Models

CHAPTER 4: SYSTEM DESIGN
- 4.1 Basic Modules
- 4.2 Data Design
  - 4.2.1 Schema Design
  - 4.2.2 Data Integrity and Constraints
- 4.3 Procedural Design
  - 4.3.1 Logic Diagrams
  - 4.3.2 Data Structures
  - 4.3.3 Algorithms Design
- 4.4 User interface design
- 4.5 Security Issues
- 4.6 Test Cases Design

CHAPTER 5: IMPLEMENTATION AND TESTING
- 5.1 Implementation Approaches
- 5.2 Coding Details and Code Efficiency
  - 5.2.1 Code Efficiency
- 5.3 Testing Approach
- 5.3.1 Unit Testing
  - 5.3.2 Integrated Testing
- 5.4 Modifications and Improvements

CHAPTER 6: RESULTS AND DISCUSSION
6.1 Test Reports
6.2 User Documentation
CHAPTER 7: CONCLUSIONS
7.1 Conclusion
7.2 Limitations of the System
7.3 Future Scope of the Project
REFERENCES
APPENDIX

ANNEXURE-VI

a. Format of the Cover Page

TITLE OF THE PROJECT WORK

Project work submitted in partial fulfillment of the

requirements for the degree of

Master of Science in Computer Science

to the

Thiruvalluvar University, Serkkadu, Vellore – Pin code

By

STUDENTNAME REG. NO.

College Emblem

MONTH – YEAR

COLLEGE NAME

(AFFILIATED TO THIRUVALLUVAR UNIVERSITY)

PLACE with Pin Code

b. Format of the certificate

PROJECTWORK

TITLE OF THE PROJECT WORK

Bonafide Work Done by

STUDENTNAME

REG. NO.

Project work submitted in partial fulfillment of the

requirements for the degree of

Master of Science
in
Computer Science

College Name and Address, Affiliated college from Thiruvalluvar University, Serkkadu, Vellore – Pin code.

INTERNALGUIDE HEAD OF THE DEPARTMENT

Submitted for the Viva-Voce Examination held on _____

Internal Examiner External Examiner

THIRUVALLUVAR UNIVERSITY
MASTER OF SCIENCE
DEGREE COURSE
M.Sc. MATHEMATICS
UNDER CBCS
(with effect from 2017 - 2018)

The Course of Study and the Scheme of Examinations

S.NO.	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
	Course Title							
	SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	MAIN	Paper-1	6	5	Algebra I	25	75	100
2	MAIN	Paper-2	6	5	Real Analysis I	25	75	100
3	MAIN	Paper-3	6	4	Ordinary Differential Equations	25	75	100
4	MAIN	Paper-4	6	5	Differential Geometry	25	75	100
5	ELECTIVE	Paper-1	6	3	**(to choose 1 out of 4)** A. Finite Element Method B. Discrete Mathematics C. Graph Theory D. Reliability & Queueing Theory	25	75	100
			30	**22**		**125**	**375**	**500**
	SEMESTER II					**CIA**	**Uni. Exam**	**Total**
6	MAIN	Paper-5	5	4	Algebra II	25	75	100
7	MAIN	Paper-6	6	5	Real Analysis II	25	75	100
8	MAIN	Paper-7	6	5	Partial Differential Equations	25	75	100
9	MAIN	Paper-8	6	4	Mechanics	25	75	100
10	**Compulsory Paper**		2	2	**Human Rights**	25	75	100
11	ELECTIVE	Paper-2	5	3	**(to choose 1 out of 4)** A. *Programming in C++ - Practical B. Fuzzy Mathematics C. Calculus of Variations and Integral Equations D. Mathematical Modelling	25	75	100
			30	**23**		**150**	**450**	**600**

SEMESTER III						CIA	Uni. Exam	Total
12	MAIN	Paper-9	6	5	Complex Analysis I	25	75	100
13	MAIN	Paper-10	6	5	Topology	25	75	100
14	MAIN	Paper-11	6	5	Operations Research	25	75	100
15	MAIN	Paper-12	6	5	Probability Theory	25	75	100
16	ELECTIVE	Paper-3	6	3	**(to choose 1 out of 4)** A. Tensor Analysis and Relativity Theory B. Analytic Number Theory C. Fluid Dynamics D. Algebraic Topology	25	75	100
			30	**23**		**125**	**375**	**500**
SEMESTER IV						**CIA**	**Uni. Exam**	**Total**
17	MAIN	Paper-13	6	5	Complex Analysis II	25	75	100
18	MAIN	Paper-14	6	5	Functional Analysis	25	75	100
19	MAIN	Paper-15	6	5	Mathematical Statistics	25	75	100
20	MAIN	Paper-16	6	4	Difference Equations	25	75	100
21	ELECTIVE	Paper-4	6	3	**(to choose 1 out of 4)** A. Number Theory and Cryptography B. Algebraic Number Theory C. Stochastic Processes D. *Mathematical Softwares – Practical	25	75	100
			30	**22**		**125**	**375**	**500**

***Programming in C++ and Mathematical Software Practical's:**

External = 75 Marks = 60 (Practical) + 15 (Record)

Internal (CIA) = 25 Marks = 20 (Test) + 5 (Observation)

Subject	Papers	Credit	Total Credit	Marks	Total Marks
Main	16	4 - 5	76	100	1600
Elective	4	3	12	100	400
Compulsory Paper	1	2	2	100	100
Total	**21**	**---**	**90**	**---**	**2100**

THIRUVALLUVAR UNIVERSITY
M.Sc. MATHEMATICS
SYLLABUS
UNDER CBCS
(with effect from 2017 - 2018)
SEMESTER - I
PAPER - 1
ALGEBRA - I

Objectives : To introduce the concepts and to develop working knowledge on class equation, finite abelian groups, linear transformations, real quadratic forms.

UNIT-I

Another counting principle - class equation for finite groups and its applications - Sylow's theorems (For theorem 2.12.1, Only First proof).

Chapter 2: Sections 2.11 and 2.12

UNIT-II

Direct products - Finite abelian groups- Modules

Chapter 2: Sections 2.13 and 2.14 (Only Theorem 2.14.1)
Chapter 4: Section 4.5

UNIT-III

Linear Transformations: Canonical forms - Triangular form - Nilpotent transformations.

Chapter 6: Sections 6.4 , 6.5

UNIT-IV

Jordan form - rational canonical form.

Chapter 6 : Sections 6.6 and 6.7

UNIT-V

Trace and transpose - Hermitian, unitary, normal transformations, real quadratic form.

Chapter 6 : Sections 6.8, 6.10 and 6.11

Recommended Text

I.N. Herstein. *Topics in Algebra* (II Edition) Wiley Eastern Limited, New Delhi, 1975.

Reference Books

1. M.Artin, *Algebra,* Prentice Hall of India, 1991.
2. P.B.Bhattacharya, S.K.Jain, and S.R.Nagpaul, *Basic Abstract Algebra* (II Edition) Cambridge University Press, 1997. (Indian Edition)
3. I.S.Luther and I.B.S.Passi, *Algebra*, Vol. I –Groups(1996); Vol. II Rings, Narosa Publishing House , New Delhi, 1999
4. D.S.Malik, J.N. Mordeson and M.K.Sen, *Fundamental of Abstract Algebra*, McGraw Hill (International Edition), New York. 1997.
5. N.Jacobson, *Basic Algebra,* Vol. I & II W.H.Freeman ; also published by Hindustan Publishing Company, New Delhi, 1980.

PAPER - 2
REAL ANALYSIS - I

Objectives : To work comfortably with functions of bounded variation, Riemann - Stieltjes Integration, convergence of infinite series, infinite product and uniform convergence and its interplay between various limiting operations.

UNIT-I : FUNCTIONS OF BOUNDED VARIATION

Introduction - Properties of monotonic functions - Functions of bounded variation - Total variation - Additive property of total variation - Total variation on [a, x] as a function of x - Functions of bounded variation expressed as the difference of two increasing functions - Continuous functions of bounded variation.

Chapter - 6 : Sections 6.1 to 6.8

UNIT-II : THE RIEMANN - STIELTJES INTEGRAL

Introduction - Notation - The definition of the Riemann - Stieltjes integral - Linear Properties - Integration by parts- Change of variable in a Riemann - Stieltjes integral - Reduction to a Riemann Integral - Euler’s summation formula - Monotonically increasing integrators, Upper and lower integrals - Additive and linearity properties of upper and lower integrals - Riemann's condition.

Chapter - 7 : Sections 7.1 to 7.13

UNIT-III : THE RIEMANN-STIELTJES INTEGRAL

Integrators of bounded variation-Sufficient conditions for the existence of Riemann-Stieltjes integrals-Necessary conditions for the existence of Riemann-Stieltjes integrals-Mean value theorems for Riemann - Stieltjes integrals - The integrals as a function of the interval - Second fundamental theorem of integral calculus-Change of variable in a Riemann integral-Second Mean Value Theorem for Riemann integral-Riemann-Stieltjes integrals depending on a parameter-Differentiation under the integral sign.

Chapter - 7 : 7.15 to 7.25

UNIT-IV : INFINITE SERIES AND INFINITE PRODUCTS

Absolute and conditional convergence - Dirichlet's test and Abel's test - Rearrangement of series - Riemann's theorem on conditionally convergent series. Double sequences - Double series - Rearrangement theorem for double series - A sufficient condition for equality of iterated series - Multiplication of series - Cesaro summability - Infinite products.

Chapter 8 : Sections 8.8, 8.15, 8.17, 8.18, 8.20, 8.21 to 8.26

UNIT-V: SEQUENCES OF FUNCTIONS

Pointwise convergence of sequences of functions - Examples of sequences of real - valued functions - Definition of uniform convergence - Uniform convergence and continuity - The Cauchy condition for uniform convergence - Uniform convergence of infinite series of functions - Uniform convergence and Riemann - Stieltjes integration - Uniform convergence and differentiation - Sufficient condition for uniform convergence of a series - Mean convergence.

Chapter - 9 Sec 9.1 to 9.6, 9.8, 9.10,9.11, 9.13

Recommended Text

Tom M. Apostol : *Mathematical Analysis*, 2nd Edition, Addison-Wesley Publishing Company Inc. New York, 1997.

Reference Books

1. Bartle, R.G. *Real Analysis*, John Wiley and Sons Inc., 1976.
2. Rudin,W. *Principles of Mathematical Analysis*, 3rd Edition. McGraw Hill Company, New York, 1976.
3. Malik,S.C. and Savita Arora. *Mathematical Anslysis*, Wiley Eastern Limited.New Delhi, 1991.
4. Sanjay Arora and Bansi Lal, *Introduction to Real Analysis*, Satya Prakashan, New Delhi, 1991.
5. A.L.Gupta and N.R.Gupta, *Principles of Real Analysis*, Pearson Education, (Indian print) 2003.

PAPER - 3
ORDINARY DIFFERENTIAL EQUATIONS

Objectives : To develop strong background on finding solutions to linear differential equations with constant and variable coefficients and also with singular points, to study existence and uniqueness of the solutions of first order differential equations.

UNIT-I : LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS

Second order homogeneous equations-Initial value problems-Linear dependence and independence - Wronskian and a formula for Wronskian -Non-homogeneous equation of order two.

Chapter - 2 : Sections 1 to 6

UNIT-II : LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS

Homogeneous and non-homogeneous equation of order n - Initial value problems-Annihilator method to solve non-homogeneous equation - Algebra of constant coefficient operators.

Chapter - 2 : Sections 7 to 12.

UNIT-III : LINEAR EQUATION WITH VARIABLE COEFFICIENTS

Initial value problems - Existence and uniqueness theorems - Solutions to solve a non-homogeneous equation - Wronskian and linear dependence - reduction of the order of a homogeneous equation - homogeneous equation with analytic coefficients -The Legendre equation.

Chapter - 3 Sections 1 to 8

UNIT-IV : LINEAR EQUATION WITH REGULAR SINGULAR POINTS

Euler equation - Second order equations with regular singular points -Exceptional cases - Bessel Function.

Chapter 4 : Sections 1 to 4 and 6 to 8

UNIT-V: **EXISTENCE AND UNIQUENESS OF SOLUTIONS TO FIRST ORDER EQUATIONS**

Equation with variable separated - Exact equation - method of successive approximations - the Lipschitz condition - convergence of the successive approximations and the existence theorem.

Chapter 5 : Sections 1 to 6

Recommended Text

E.A.Coddington, *An introduction to ordinary differential equations* (3^{rd} Reprint) Prentice-Hall of India Ltd.,New Delhi, 1987.

Reference Books

1. Williams E. Boyce and Richard C. DI Prima, *Elementary differential equations and boundary value problems*, John Wiley and sons, New York, 1967.
2. George F Simmons, *Differential equations with applications and historical notes,* Tata McGraw Hill, New Delhi, 1974.
3. N.N. Lebedev, *Special functions and their applications*, Prentice Hall of India, New Delhi, 1965.
4. W.T. Reid. *Ordinary Differential Equations*, John Wiley and Sons, New York, 1971
5. M.D.Raisinghania, *Advanced Differential Equations*, S.Chand & Company Ltd. New Delhi 2001
6. B.Rai, D.P.Choudary and H.I. Freedman, *A Course in Ordinary Differential Equations,* Narosa Publishing House, New Delhi, 2002.

PAPER - 4
DIFFERENTIAL GEOMETRY

Objectives : This course introduces space curves and their intrinsic properties of a surface and geodesics. Further the non-intrinsic properties of surfaces are explored.

UNIT-I : SPACE CURVES

Definition of a space curve - Arc length - tangent - normal and binormal - curvature and torsion - contact between curves and surfaces - tangent surface - involutes and evolutes - Intrinsic equations - Fundamental Existence Theorem for space curves - Helics.

Chapter I : Sections 1 to 9

UNIT-II : INTRINSIC PROPERTIES OF A SURFACE

Definition of a surface - curves on a surface - Surface of revolution - Helicoids - Metric - Direction coefficients - families of curves - Isometric correspondence - Intrinsic properties.

Chapter II: Sections 1 to 9

UNIT-III : GEODESICS

Geodesics - Canonical geodesic equations - Normal property of geodesics - Existence Theorems - Geodesic parallels

Chapter II: Sections 10 to 14

UNIT-IV : GEODESICS (Contd . . .)

Geodesics curvature - Gauss - Bonnet Theorem - Gaussian curvature - surface of constant curvature.

Chapter II: Sections 15 to 18

UNIT-V : NON INTRINSIC PROPERTIES OF A SURFACE

The second fundamental form - Principal curvature - Lines of curvature - Developable - Developable associated with space curves and with curves on surface - Minimal surfaces - Ruled surfaces.

Chapter III: Sections 1 to 8

Recommended Text

T.J.Willmore, *An Introduction to Differential Geometry,* Oxford University Press,(17th Impression) New Delhi 2002. (Indian Print)

Reference Books

1. Struik, D.T. *Lectures on Classical Differential Geometry*, Addison - Wesley, Mass. 1950.
2. Kobayashi. S. and Nomizu. K. *Foundations of Differential Geometry*, Interscience Publishers, 1963.
3. Wilhelm Klingenberg: *A course in Differential Geometry*, Graduate Texts in Mathematics, Springer-Verlag 1978.
4. J.A. Thorpe *Elementary topics in Differential Geometry*, Under - graduate Texts in Mathematics, Springer - Verlag 1979.

ELECTIVE: PAPER - 1
(to choose any 1 out of the given 4)
A. FINITE ELEMENT METHOD

Objective: To give a basic expertise in the use of Finite Element Method Techniques.

Unit–I: SECOND ORDER DIFFERENTIAL EQUATIONS IN ONE DIMENSION

Finite element models Background – Basic steps of finite element analysis– Model boundary value problem–Discretization of the domain–Derivation of element equations– Connectivity of elements–Imposition of- boundary conditions–Solution of equations– Post computation of the solution–Some Remarks. (Numerical Example 3.2.1only).
Chapter 3: Sections: 3.1 to 3.3

Unit – II: SECOND ORDER DIFFERENTIAL EQUATIONS IN ONE DIMENSION: APPLICATIONS

Axi-symmetric problems–Model equation–weak form–finite element model– preliminary comments–Discrete systems–Linear elastic spring– Torsion of circular shafts–Electrical resistor circuits –Fluid flow through pipes– Heat transfer – Governing equations –Finite element models – Fluid mechanics – Governing equations – Finite element model. (Numerical Examples 3.4.1, 4.2.1, 4.2.2, 4.3.1, 4.4.1 only)
Chapter 3: Section: 3.4 , Chapter 4: Sections: 4.1– 4.4.

Unit – III: SECOND ORDER DIFFERENTIAL EQUATIONS IN ONE DIMENSION: APPLICATIONS

Solid and Structural Mechanics–Preliminary Comments–Finite Element Model of Bars and cables – Plane trusses: Introduction – Basic truss element–General truss element – Constraint equations – Penalty approach – Direct approach. (Numerical Examples4.6.1,4.6.2,4.6.5only)

Chapter4: Sections: 4.5 to 4.6

Unit–IV: BEAMS AND FRAMES

Introduction–Euler-Bernoulli beam element–Governing equation–Discretization of the domain – Derivation of element equations – Assembly of Element Equations – Imposition of boundary conditions– Post processing of solution – Timoshenko beam elements–Governing equations – Weak form–General finite element model.

Chapter5: Sections:5.1,5.2 (5.2.1to5.2.6),5.3 (5.3.1to 5.3. 3)

Unit–V: EIGEN VALUE AND TIME DEPENDENT PROBLEMS

Eigen value problems: Introduction – Formulation of Eigen value problems – Finite element formulation.Time dependent problems: Introduction–Semi discrete finite element models– Parabolic equations–Time Approximation (Numerical Example 6.1.1 only).

(Chapter 6: Sections: 6.1 (6.1.1to 6.1.3), 6.2 (6.2.1 to 6.2.3)

Book for Study:

J.N.Reddy, An Introduction to the Finite Element Method (Third Edition) Tata McGraw - Hill Publishing Company Limited, New Delhi, 2005.

Books for Reference

1. George R.Buchanan, Finite element analysis,Tata McGraw Hill company Limited, New Delhi, 2006.
2. David V.Hutton, Fundamentals of Finite element Analysis, Tata McGraw Hill company Limited, New Delhi, 2005.
3. Klaus Jurgen Bathe, Edward L. Wilson, Numerical methods in finite element Analysis, Prentice Hall of India private Limited, New Delhi,1987.
4. C.S.Krishnamoorthy, Finite element Analysis Theory and Programming (Eighteenth Reprint), Tata McGraw Publishing company Limited, New Delhi, 2007.

ELECTIVE: PAPER - 1
B. DISCRETE MATHEMATICS

Objectives: This course aims to explore the topics like lattices and their applications in switching circuits, finite fields, polynomials and coding theory.

UNIT - I: LATTICES

Properties and examples of Lattices - Distributive lattices - Boolean algebras - Boolean polynomials - Minimal Forms of Boolean Polynomials.
Chapters: 1 to 4 and 6.

UNIT - II: APPLICATIONS OF LATTICES

Switching Circuits - Applications of Switching Circuits
Chapters: 7 and 8.

UNIT - III: FINITE FIELDS AND POLYNOMIALS

Finite fields
Chapter: 13.

UNIT - IV: FINITE FIELDS AND POLYNOMIALS

Irreducible Polynomials over Finite fields - Factorization of Polynomials over Finite fields.
Chapters: 14 and 15.

UNIT - V: CODING THEORY

Introduction to Coding - Linear Codes.
Chapters: 16 and 17.

Recommended Text

Rudolf Lidl & Gunter Pilz. APPLIED ABSTRACT ALGEBRA, Second Indian Reprint 2006, Springer Verlag, NewYork.

Reference Books

1. A.Gill, *Applied Algebra for Computer Science*, Prentice Hall Inc., New Jersey.
2. J.L.Gersting, *Mathematical Structures for Computer Science*(3^{rd} Edn.), Computer Science Press, New York.
3. S.Wiitala, *Discrete Mathematics- A Unified Approach*, McGraw Hill Book Co.

ELECTIVE: PAPER - 1
C. GRAPH THEORY

Objectives : To study and develop the concepts of graphs, subgraphs, trees, connectivity, Euler tours, Hamilton cycles, matching, coloring of graphs, independent sets, cliques, vertex coloring, and planar graphs

UNIT-I : GRAPHS, SUBGRAPHS AND TREES

Graphs and simple graphs - Graph Isomorphism - The Incidence and Adjacency Matrices - Subgraphs - Vertex Degrees - Paths and Connection - Cycles - Trees - Cut Edges and Bonds - Cut Vertices.

Chapter 1 (Section 1.1 - 1.7) ; Chapter 2 (Section 2.1 - 2.3)

UNIT-II : CONNECTIVITY, EULER TOURS AND HAMILTON CYCLES

Connectivity - Blocks - Euler tours - Hamilton Cycles.

Chapter 3 (Section 3.1 - 3.2) ; Chapter 4 (Section 4.1 - 4.2)

UNIT-III : MATCHINGS, EDGE COLOURINGS

Matchings - Matchings and Coverings in Bipartite Graphs - Edge Chromatic Number - Vizing's Theorem.

Chapter 5 (Section 5.1 - 5.2) ; Chapter 6 (Section 6.1 - 6.2)

UNIT-IV : INDEPENDENT SETS AND CLIQUES, VERTEX COLOURINGS

Independent sets - Ramsey's Theorem - Chromatic Number - Brooks' Theorem - Chromatic Polynomials.

Chapter 7 (Section 7.1 – 7.2); Chapter 8 (Section 8.1 – 8.2, 8.4)

UNIT-V: PLANAR GRAPHS

Plane and planar Graphs - Dual graphs - Euler's Formula - The Five-Colour Theorem and the Four-Colour Conjecture.

Chapter 9 (Section 9.1 - 9.3, 9.6)

Recommended Text

J.A.Bondy and U.S.R. Murthy, *Graph Theory and Applications*, Macmillan, London, 1976.

Reference Books

1. J.Clark and D.A.Holton , *A First look at Graph Theory*, Allied Publishers, New Delhi, 1995.
2. R. Gould. *Graph Theory*, Benjamin/Cummings, Menlo Park, 1989.
3. A.Gibbons, *Algorithmic Graph Theory*, Cambridge University Press, Cambridge, 1989.
4. R.J.Wilson and J.J.Watkins, *Graphs : An Introductory Approach*, John Wiley and Sons, New York, 1989.
5. R.J. Wilson, *Introduction to Graph Theory*, Pearson Education, 4th Edition, 2004, Indian Print.
6. S.A.Choudum, *A First Course in Graph Theory*, MacMillan India Ltd. 1987.

ELECTIVE: PAPER - 1
D. RELIABILITY AND QUEUEING THEORY

Objectives : To study applications of Mathematics.

UNIT - I : RELIABILITY DEFINITION AND FAILURE DATA ANALYSIS

Introduction – Definition of Probability – Failure Data – Mean Failure Rate – Mean Time To Failure (MTTF) – Mean Time Between Failure (MTBF) – Graphical Plots.

Chapter-2: 2.1 - 2.2
Chapter-3: 3.2 - 3.6

UNIT - II : FAILURE DATA ANALYSIS

Four important points – MTTF in terms of Failure density – Generalization – Reliability in terms of Hazard rate and failure density – MTTF in integral form. Introduction – Definition of Probability – Failure Data – Mean Failure Rate – Mean Time To Failure – Mean Time Between Failure – Graphical Plots.

Chapter-3: 3.7 - 3.11

UNIT - III : SYTEM RELIABILITY

Introduction – Series Configuration – Parallel Configuration – Mixed Configuration – Application to specific hazard Models – An r out of n structure – Systems not reducible to mixed configuration.

Chapter-6: 6.1 - 6.6 and 6.8

UNIT - IV : INTRODUCTION TO QUEUEING PROCESS

Measuring system performance – Some general results Simple data book keeping for queues - Poisson process and the exponential distribution – Markovian Property of the exponential distribution.

Chapter-1: 1.4 - 1.8

UNIT - V : SIMPLE MARKOVIAN BIRTH-DEATH QUEUEING MODELS

Steady state solution for the M / M / 1 model – Methods of solving steady state difference equations – Queues with parallel channels and truncation (M / M / c / K).

Recommended Text

1. Srinath. L. S., Reliability Engineering, East West Press, New Delhi. (for Units I , II and III)
2. Donald Gross, Carl M. Harris, Fundamentals of Queueing Theory, Wiley India. (for Units IV and V)

Reference Books

1. Cox. D. R. and H.D. Miller, Theory of Stochastic Processes, Methuen, London, 1965.
2. Cramer. H. and M. Leadbetter, Stationary and Related Stochastic Processes, Wiley, New York, 1966.
3. Karlin. S and H. Taylor, A First Course in Stochastic Processes, 2^{nd} edition, Academic Press, New York, 1975.

SEMESTER - II
PAPER - 5
ALGEBRA - II

Objectives : To study field extension, roots of polynomials, Galois Theory, finite fields, division rings, solvability by radicals and to develop computational skill in abstract algebra.

UNIT-I

Extension fields - Transcendence of e.

Chapter 5: Section 5.1 and 5.2

UNIT-II

Roots or Polynomials.- More about roots

Chapter 5: Sections 5.3 and 5.5

UNIT-III

Elements of Galois theory.

Chapter 5 : Section 5.6

UNIT-IV

Solvability by Radicals - Finite fields - Wedderburn's theorem on finite division rings.

Chapter 5: Section 5.7.
Chapter 7: Sections 7.1 and 7.2 (Only Theorem 7.2.1)

UNIT-V

Solvability by radicals - A theorem of Frobenius - Integral Quaternions and the Four - Square theorem.

Chapter 7 : Sections 7.3 and 7.4

Recommended Text

I.N. Herstein. *Topics in Algebra* (II Edition) Wiley Eastern Limited, New Delhi, 1975.

Reference Books

1. M.Artin, *Algebra,* Prentice Hall of India, 1991.
2. B.Bhattacharya, S.K.Jain, and S.R.Nagpaul, *Basic Abstract Algebra* (II Edition) Cambridge University Press, 1997. (Indian Edition)
3. I.S.Luther and I.B.S.Passi, *Algebra,* Vol. I - Groups (1996); Vol. II *Rings,* Narosa Publishing House , New Delhi, 1999
4. D.S.Malik, J.N. Mordeson and M.K.Sen, *Fundamental of Abstract Algebra*, McGraw Hill (International Edition), New York. 1997.
5. N.Jacobson, *Basic Algebra,* Vol. I & II Hindustan Publishing Company, New Delhi.

PAPER - 6
REAL ANALYSIS II

Objectives : To introduce measure on the real line, Lebesgue measurability and integrability, Fourier Series and Integrals, in-depth study in multivariable calculus.

UNIT - I : FOURIER SERIES AND FOURIER INTEGRALS

Introduction - Orthogonal system of functions - The theorem on best approximation - The Fourier series of a function relative to an orthonormal system - Properties of Fourier Coefficients - The Riesz-Fischer Thorem - The convergence and representation problems in trigonometric series - The Riemann - Lebesgue Lemma - The Dirichlet Integrals - An integral representation for the partial sums of Fourier series - Riemann's localization theorem - Sufficient conditions for convergence of a Fourier series at a particular point - Cesaro summability of Fourier series- Consequences of Fejes's theorem - The Weierstrass approximation theorem

Chapter 11 : Sections 11.1 to 11.15 (Apostol)

UNIT - II : MULTIVARIABLE DIFFERENTIAL CALCULUS

Introduction - The Directional derivative - Directional derivative and continuity - The total derivative - The total derivative expressed in terms of partial derivatives - The matrix of linear function - The Jacobian matrix - The chain rule - Matrix form of chain rule - The mean - value theorem for differentiable functions - A sufficient condition for differentiability - A sufficient condition for equality of mixed partial derivatives - Taylor's theorem for functions of R^n to R^1

Chapter 12 : Section 12.1 to 12.14 (Apostol)

UNIT - III : IMPLICIT FUNCTIONS AND EXTREMUM PROBLEMS

Functions with non-zero Jacobian determinants - The inverse function theorem -The Implicit function theorem - Extrema of real valued functions of severable variables - Extremum problems with side conditions.

Chapter 13 : Sections 13.1 to 13.7 (Apostol)

UNIT - IV THE LEBESGUE INTEGRAL

Length of open sets and closed sets - Inner and outer measure : Measurable sets - Properties of measurable sets - Measurable functions - Definition and existence of the Lebesgue integral for bounded function.

Chapter 11 : Section 11.1 to 11.5 [R. R. Goldberg]

UNIT - V THE LEBESGUE INTEGRAL (Contd . . .)

Properties of the Lebesgue integral for bounded measurable functions - The Lebesque integral for unbounded functions - Some fundamental theorems - The metric space L^2 [a, b] - The integral on $(-\infty, \infty)$ and int plane.

Chapter 11 : Section 11.6 to 11.10 [R. R. Goldberg]

Recommended Texts

1. Tom M. Apostol : *Mathematical Analysis*, 2nd Edition, Addison-Wesley Publishing Company Inc. New York, 1974. (for Units I, II and III)
2. Richard R. Goldberg, Methods f Real Analysis, Oxford & IBH Publishing, New Delhi, 1975. (for Unit IV and V)

Reference Books

1. Burkill,J.C. *The Lebesgue Integral*, Cambridge University Press, 1951.
2. Munroe,M.E. *Measure and Integration*. Addison-Wesley, Mass.1971.
3. Roydon,H.L.*Real Analysis*, Macmillan Pub. Company, New York, 1988.
4. Rudin, W. *Principles of Mathematical Analysis*, McGraw Hill Company, New York,1979.
5. Malik,S.C. and Savita Arora. *Mathematical Analysis*, Wiley Eastern Limited. New Delhi, 1991.
6. Sanjay Arora and Bansi Lal, *Introduction to Real Analysis*, Satya Prakashan, New Delhi, 1991

PAPER - 7
PARTIAL DIFFERENTIAL EQUATIONS

Objectives : The aim of the course is to introduce to the students the various types of partial differential equations and how to solve these equations.

UNIT - I : PARTIAL DIFFERENTIAL EQUATIONS OF FIRST ORDER

Formation and solution of PDE- Integral surfaces - Cauchy Problem order equation - Orthogonal surfaces - First order non-linear - Characteristics - Compatible system - Charpits method.

Chapter 0: 0.4 to 0.11 (omit 0.1, 0.2, 0.3 and 0.11.1)

UNIT - II : FUNDAMENTALS

Introduction – Classification of Second Order PDE - Canonical forms – Adjoint Operators - Riemann's method.

Chapter 1 : 1.1 to 1.5

UNIT - III : ELLIPTIC DIFFERENTIAL EQUATIONS

Derivation of Laplace and Poisson equation - BVP - Separation of Variables - Dirichlet's Problem and Newmann Problem for a rectangle - Solution of Laplace equation in Cylindrical and spherical coordinates - Examples.

Chapter 2 : 2.1, 2 2 , 2.5 to 2.7, 2.11, 2.12(omit 2.3, 2.4, 2.8, 2.9, 2.10 and 2.13)

UNIT - IV : PARABOLIC DIFFERENTIAL EQUATIONS

Formation and solution of Diffusion equation - Dirac-Delta function - Separation of variables method - Solution of Diffusion Equation in Cylindrical and spherical coordinates - Examples.

Chapter 3 : 3.1 to 3.7.

UNIT - V : HYPERBOLIC DIFFERENTIAL EQUATIONS

Formation and solution of one-dimensional wave equation - canocical reduction – IVP - D'Alembert's solution - IVP and BVP for two-dimensional wave equation - Periodic solution of one-dimensional wave equation in cylindrical and spherical coordinate systems - Uniqueness of the solution for the wave equation - Duhamel's Principle - Examples.

Chapter 4: 4.1 to 4.12 (omit 4.5, 4.6 & 4.10)

Recommended Text

K. Sankar Rao, *Introduction to Partial Differential Equations*, 2nd Edition, Prentice Hall of India, New Delhi. 2005

Reference Books

1. R.C.McOwen, *Partial Differential Equations*, 2nd Edn. Pearson Eduction, New Delhi, 2005.
2. I.N.Sneddon, *Elements of Partial Differential Equations*, McGraw Hill, New Delhi, 1983.
3. R. Dennemeyer, *Introduction to Partial Differential Equations and Boundary Value Problems*, McGraw Hill, New York, 1968.
4. M.D.Raisinghania, *Advanced Differential Equations*, S.Chand & Company Ltd., New Delhi, 2001.

PAPER - 8
MECHANICS

Objectives : To study mechanical systems under generalized coordinate systems, virtual work, energy and momentum, to study mechanics developed by Newton, Langrange, Hamilton Jacobi and Theory of Relativity due to Einstein.

UNIT-I : MECHANICAL SYSTEMS

The Mechanical system - Generalised coordinates - Constraints - Virtual work - Energy and Momentum.

Chapter 1 : Sections 1.1 to 1.5

UNIT-II : LAGRANGE'S EQUATIONS

Derivation of Lagrange's equations- Examples - Integrals of motion.

Chapter 2 : Sections 2.1 to 2.3 (Omit Section 2.4)

UNIT-III : HAMILTON'S EQUATIONS

Hamilton's Principle - Hamilton's Equation - Other variational principle.

Chapter 4 : Sections 4.1 to 4.3 (Omit section 4.4)

UNIT-IV : HAMILTON-JACOBI THEORY

Hamilton Principle function - Hamilton-Jacobi Equation - Separability

Chapter 5 : Sections 5.1 to 5.3

UNIT-V : CANONICAL TRANSFORMATION

Differential forms and generating functions - Special Transformations - Lagrange and Poisson brackets.

Chapter 6 : Sections 6.1, 6.2 and 6.3 (omit sections 6.4, 6.5 and 6.6)

Recommended Text

D. T. Greenwood, *Classical Dynamics*, Prentice Hall of India, New Delhi, 1985.

Reference Books

1. H. Goldstein, *Classical Mechanics*, (2^{nd} Edition) Narosa Publishing House, New Delhi.
2. N.C.Rane and P.S.C.Joag, *Classical Mechanics*, Tata McGraw Hill, 1991.
3. J.L.Synge and B.A.Griffth, *Principles of Mechanics* (3^{rd} Edition) McGraw Hill Book Co., New York, 1970.

HUMAN RIGHTS
COMPULSORY PAPER

UNIT – I

Definition of Human Rights – Nature, Content, Legitimacy and Priority – Theories of Human Rights – Historical Development of Human Rights.

UNIT – II

International Human Rights – Prescription and Enforcement upto World War II – Human Rights and the U. N. O. – Universal Declaration of Human Rights – International Covenant on Civil and Political Rights – International Covenant or Economic, Social and Cultural Rights and Optional Protocol.

UNIT – III

Human Rights Declarations – U.N. Human Rights Declarations – U.N. Human Rights Commissioner.

UNIT – IV

Amnesty International – Human Rights and Helsinki Process – Regional Developments – European Human Rights System – African Human Rights System – International Human Rights in Domestic courts.

UNIT – V

Contemporary Issues on Human Rights: Children's Rights – Women's Rights – Dalit's Rights – Bonded Labour and Wages – Refugees – Capital Punishment.
Fundamental Rights in the Indian Constitution – Directive Principles of State Policy – Fundamental Duties – National Human Rights Commission.

Reference Magazines:

1. The Lawyer, Bombay.
2. Human Rights Today, Columbia University.
3. International Instruments of Human Rights, UN Publication.
4. Human Rights Quarterly, John Hopkins University, U.S.A.

Books for Reference:

1. International Bill of Human Rights, Amnesty International Publication, 1988.
2. Human Rights, Questions and Answers, UNESCO, 1982.
3. Mausice Cranston - What is Human Rights.
4. Desai, A.R - Violation of Democratic Rights in India.
5. Pandey - Constitutional Law.
6. Timm R.W - Working for Justice and Human Rights.
7. Human Rights - A Selected Bibliography, USIS.
8. J.C. Johari - Human Rights and New World order.
9. G.S. Bajwa - Human Rights in India.
10. Amnesty International - Human Rights in India.
11. P.C. Sinha & K. Cheous (Ed) - International Encyclopedia of Peace, Security, Social Justice and Human Rights (Vols. 1 - 7).
12. Devasia, V.V - Human Rights and Victimology.

ELECTIVE: PAPER-2
(to choose any 1 out of the given 4)
A. PROGRAMMING IN C++ PRACTICALS

Objectives: This courses introduces a higher level language C++ and numerical methods for hands-on experience on computers. Stress is also given on the error analysis.

- Functions in C++ - Classes and Objects.
- Constructors and destructors - Operator Overloading
- Inheritance : Pointers and Polymorphism.

Recommended Text

Balagurusamy, *Object Oriented Programming with* C++, Tata McGraw Hill, New Delhi, 1999.

Reference Books

D. Ravichandran, *Programming with* C++, Tata McGraw Hill, New Delhi, 1996.

COMPUTER LABORATORY PRACTICE EXERCISES

COMPUTER LANGUAGE EXERCISES FOR PROGRAMMING IN C++

1. Write a class to represent a vector (a series of float values). Include member functions to perform the following tasks: To create the vector, To modify the value of a given element, To multiply by a scalar value, To display the vector in the form (10, 20, 30,…). Write a program to test your class.
2. Create a class FLOAT that contains one float data member. Overload all the four arithmetic operators so that they operate on the objects of FLOAT.
3. Write a program which shows the days from the start of year to date specified. Hold the number of days for each month in an array. Allow the user to enter the month and the day of the year. Then the program should display the total days till the day.
4. Write a program to include all possible binary operator overloading using friend function.
5. Write a program to read an array of integer numbers and sort it in descending order. Use readdata, putdata, and arraymax as member functions in a class.
6. Write a program to read two character strings and use the overloaded '+' operator to append the second string to the first.
7. Develop a program Railway Reservation System using Hybrid Inheritance and Virtual Function.
8. Using overloaded constructor in a class write a program to add two complex numbers.
9. Create a class MAT of size(m,n). Define all possible matrix operations for MAT type objects.
10. Write a program that determines whether a given number is a prime number or not and then prints the result using polymorphism.
11. Write a program to illustrate the dynamic initialization of constructors.
12. Write a program to illustrate the use of pointers to objects.
13. Write a program to illustrate how to construct a matrix of size m x n .
14. Write a program to arrange the given data in ascending / descending order using various sorting algorithms
15. Write a program to find the biggest /smallest number in the given data using various search algorithms

ELECTIVE: PAPER-2
B. FUZZY MATHEMATCS

Objectives : To introduce the basic notions and study the techniques of Fuzzy Mathematics.

UNIT - I : FUZZY SETS

Fuzzy sets – Basic Types – Basic concepts – Characteristics – Significance of the paradigm shift – Additional properties of α – cuts.

Chapter 1 : Sections 1.3 to 1.5 and Chapter 2 : Section 2.1

UNIT - II : FUZZY SETS VERSUS CRISP SETS

Representation of Fuzzy sets – Extension principle of Fuzzy sets – Operation on Fuzzy sets – Types of operation – Fuzzy complements.

Chapter 2 : Sections 2.2 and 2.3 and Chapter 3 : Sections 3.1 and 3.2

UNIT - III : OPERATIONS ON FUZZY SETS

Fuzzy intersection – t-norms – Fuzzy unions – t-conorms.

Chapter 3 : Sections 3.3 and 3.4.

UNIT - IV : FUZZY ARITHMETIC

Fuzzy number – Linguistic variables – Arithmetic operation on intervals – Lattice of Fuzzy numbers.

Chapter 4 : Sections 4.1 to 4.4

UNIT - V : FUZZY RELATIONS

Crisp Versus fuzzy relations – Projection and Cylindric extension – binary fuzzy relations – binary relations on a single set.

Chapter 5 : Sections 5.1 to 5.4

Recommended Text

G. J. Klir and Bo Yuan, *Fuzzy Sets and Fuzzy Logic : Theory and Applications*, PHI, New Delhi, 2005.

Reference Books

1. H. J. Zimmerman, *Fuzzy Set Theory and its Applications*, Allied Publishers, 1996.
2. A. Kaufman, Introduction to the theory of Fuzzy Subsets, Academic Press, 1975.
3. V. Novak, Fuzzy Sets and their Applications, Adam Hilger, Bristol, 1969.

ELECTIVE: PAPER-2
C. CALCULUS OF VARIATIONS AND INTEGRAL EQUATIONS

Objectives : The aim of the course is to introduce to the students the concept of calculus of variation and its applications and second to introduce various types of integral equations and how to solve these equations.

UNIT-I : VARIATIONAL PROBLEMS WITH MOVING BUNDARIES

The concept of Variation and its properties – Euler's equation – Variational problems for functional – Functionals dependent on higher order derivatives – Functions of several independent variables – Some applications to problems of mechanics.

Chapter 1 : 1.1 to 1.7

UNIT - II : VARIATIONAL PROBLEMS WITH MOVING BOUNDARIES

Movable boundary for a functional dependent on two functions – One sided variations – Reflection and Refraction of extremals – Diffraction of light rays.

Chapter 2 : 2.1 to 2.5

UNIT - III INTEGRAL EQUATIONS

Introduction – Definition – Regularity conditions – Special kinds of Kernals – Eigen values and eigen functions – Convolution integral – Reduction to a system of algebraic equations – Examples – Fredholm alternative – Examples – An approximation method.

Chapter 1 : 1.1 to 1.5
Chapter 2 : 2.1 to 2.5

UNIT - IV METHOD OF SUCCESSIVE APPROXIMATIONS AND FREDHOLM THEORY

Method of successive approximations – Iterative scheme – Examples – Volterra integral equations – Examples – Some results about the resolvent kernel – The method of solution of Fredholm equation – Fredholm first theorem – Examples.

Chapter 3 : 3.1 to 3.5
Chapter 4 : 4.1 to 4.3

UNIT - V APPLICATIONS TO ORDINARY DIFFERENTIAL EQUATIONS

Initial value problems – Boundary value problems – Examples – Singular integral equations – The Abel integral equations - Examples.

Chapter 5 : 5.1 to 5.3
Chapter 8 : 8.1 to 8.2

Recommended Text

1. A. S. Gupta, *Calculus of Variations with Applications*, PHI, New Delhi, 2005. (for Units I and II)
2. Ram P. Kanwal, *Linear Integral Equations,* Theory and Techniques, Academic Press, New York, 1971. (for Units III, IV and V)

Reference Books

1. M. D. Raisinghania, Integral Equations and Boundary Value Problems, S. Chand & Co., New Delhi, 2007.
2. Sudir K. Pundir and Rimple Pundir, Integral Equations and Boundary Value Problems, Pragati Prakasam, Meerut. 2005.

ELECTIVE: PAPER-2
D. MATHEMATICAL MODELLING

Objective of the course:

This course aims at introducing mathematical modeling through differential equations, systems of ordinary differential equations, difference equations, graphs, calculus of variations and dynamical programming.

Unit – I: MATHEMATICAL MODELLING THROUGH SYSTEMS OF ORDINARY DIFFERENTIAL EQUATIONS OF THE FIRST ORDER

Mathematical modelling in Population Dynamics – Mathematical Modelling of Epidemics Through Systems of Ordinary Differential Equations of First Order– Mathematical Models in Medicine, Arms Race, Battles and International Trade in Terms of Systems of Ordinary Differential Equations – Mathematical Modelling in Dynamics Through Systems of Ordinary Differential Equations of First Order.
(Chapter 3:3.1, 3.2, 3.5, 3.6)

Unit – II: MATHEMATICAL MODELLING THROUGH DIFFERENCE EQUATIONS

The Need for Mathematical Modelling Through Difference Equations: Some Simple Models – Basic Theory of Linear Difference Equations with Constant Coefficients – Mathematical Modelling Through Difference Equations in Economics and Finance.
(Chapter 5: 5.1 – 5.3)

Unit – III: MATHEMATICAL MODELLING THROUGH DIFFERENCE EQUATIONS

Mathematical Modelling Through Difference Equations in Population Dynamics and Genetics – Mathematical Modelling Through Difference Equations in Probability Theory –Miscellaneous Examples of Mathematical Modelling Through Difference Equations.
(Chapter 5: 5.4 – 5.6)

Unit – IV: MATHEMATICAL MODELLING THROUGH GRAPHS

Situations that can be Modelled Through Graphs – Mathematical Models in Terms of Directed Graphs – Mathematical Models in Terms of Signed Graphs – Mathematical Modelling in Terms of Weighted Digraphs.

(Chapter 7: 7.1 – 7.4)

Unit – V: MATHEMATICAL MODELLING THROUGH CALCULUS OF VARIATIONS AND DYNAMIC PROGRAMMING

Optimization Principles and Techniques – Mathematical Modelling Through Calculus of Variations – Mathematical Modelling Through Dynamic Programming. (Chapter 9: 9.1 – 9.3)

Recommended Text:

J.N. Kapur, Mathematical Modelling, Wiley Eastern Limited, Reprint 2000.

Reference Books:

1. **D.J. G. James** and **J.J. Macdonald,** Case studies in Mathematical modelling, Stanly Thames, Cheltonham.
2. **J.N. Kapur,** Maximum entropy models.
3. **M. Cross and AO. Moscrcadini,** The Art of Mathematical Modelling, Ellis Harwood and John Wiley.
4. **C. Dyson, Elvery,** Principles of Mathematical Modelling, Academic Press, New York.
5. **D.N. Burghes,** Modelling with Difference Equations, Ellis Harwood and John Wiley.

SEMESTER - III
PAPER - 9
COMPLEX ANALYSIS - I

Objectives : To Study Cauchy integral formula, local properties of analytic functions, general form of Cauchy's theorem and evaluation of definite integral and harmonic functions

UNIT-I : ANALYTIC FUNCTIONS AS MAPPINGS

Analytic functions in regions- conformal mapping-Fundamental Theorems: Line integrals-Rectifiable arcs-line integrals as functions of arcs-Cauchy's theorem for a rectangle- Cauchy's theorem in a disk.

Chapter3: Section 2 : 2.2 and 2.3;
Chapter 4 : Section 1 : 1.1 to 1.5;

UNIT-II : CAUCHY'S INTEGRAL FORMULA

The Index of a point with respect to a closed curve - The Integral formula - Higher derivatives. Local Properties of Analytic Functions: Removable Singularities - Taylors's Theorem - Zeros and poles - The local Mapping - The Maximum Principle.

Chapter 4 : Section 2 : 2.1 to 2.3;
Chapter 4 : Section 3 : 3.1 to 3.4

UNIT-III : THE GENERAL FORM OF CAUCHY'S THEOREM

Chains and cycles- Simple Continuity - Homology - The General statement of Cauchy's Theorem - Proof of Cauchy's theorem - Locally exact differentials- Multilply connected regions - Residue theorem - The argument principle.

Chapter 4 : Section 4 : 4.1 to 4.7;
Chapter 4 : Section 5: 5.1 and 5.2

UNIT-IV : EVALUATION OF DEFINITE INTEGRALS AND HARMONIC FUNCTIONS

Evaluation of definite integrals - Definition of Harmonic function and basic properties - Mean value property - Poisson formula.

Chapter 4 : Section 5 : 5.3 ;
Chapter 4 : Sections 6 : 6.1 to 6.3

UNIT-V : HARMONIC FUNCTIONS AND POWER SERIES EXPANSIONS

Schwarz theorem - The reflection principle - Weierstrass theorem - Taylor's Series - Laurent series .

Chapter 4 : Sections 6.4 and 6.5 ; Chapter 5 : Sections 1.1 to 1.3

Recommended Text

- Lars V. Ahlfors, Complex Analysis, (3rd edition) McGraw Hill Co., New York, 1979

Reference Books

1. H.A. Presfly, Introduction to complex Analysis, Clarendon Press, oxford, 1990.
2. J.B. Conway, Functions of one complex variables Springer - Verlag, International student Edition, Naroser Publishing Co.1978
3. E. Hille, Analytic function Thorey (2 vols.), Gonm & Co, 1959.
4. M.Heins, Complex function Theory, Academic Press, New York,1968.

PAPER - 10
TOPOLOGY

Objectives : To study topological spaces, continuous functions, connectedness, compactness, countability and separation axioms.

UNIT-I : TOPOLOGICAL SPACES

Topological spaces - Basis for a topology - The order topology - The product topology on X x Y - The subspace topology - Closed sets and limit points.

Chapter 2 : Sections 12 to 17

UNIT-II : CONTINUOUS FUNCTIONS

Continuous functions - the product topology - The metric topology.

Chapter 2 : Sections 18 to 21 (Omit Section 22)

UNIT-III : CONNECTEDNESS

Connected spaces - connected subspaces of the Real line - Components and local connectedness.

Chapter 3 : Sections 23 to 25

UNIT-IV : COMPACTNESS

Compact spaces - compact subspaces of the Real line - Limit Point Compactness - Local Compactness.

Chapter 3 : Sections 26 to 29

UNIT-V: COUNTABILITY AND SEPARATION AXIOM

The Countability Axioms - The separation Axioms - Normal spaces - The Urysohn Lemma - The Urysohn metrization Theorem - The Tietz extension theorem.

Chapter 4 : Sections 30 to 35

Recommended Text

James R. Munkres, *Topology* (2nd Edition) Pearson Education Pve. Ltd., Delhi-2002 (Third Indian Reprint)

Reference Books

1. J. Dugundji , *Topology* , Prentice Hall of India, New Delhi, 1975.
2. George F.Sinmons, *Introduction to Topology and Modern Analysis*, McGraw Hill Book Co., 1963
3. J.L. Kelly, *General Topology*, Van Nostrand, Reinhold Co., New York
4. L.Steen and J.Subhash, Counter Examples in Topology, Holt, Rinehart and Winston, New York, 1970.
5. S.Willard, *General Topology*, Addison - Wesley, Mass., 1970

PAPER - 11
OPERATIONS RESEARCH

Objectives: This course aims to introduce decision theory, PERT, CPM, deterministic and probabilistic inventory systems, queues, replacement and maintenance problems.

UNIT – I: INTEGER LINEAR PROGRAMMING

Types of Integer Linear Programming Problems - Concept of Cutting Plane - Gomory's All Integer Cutting Plane Method - Gomory's mixed Integer Cutting Plane method - Branch and Bound Method.

Chapter-7: 7.1 - 7.6

UNIT – II: DYNAMIC PROGRAMMING

Characteristics of Dynamic Programming Problem - Developing Optimal Decision Policy - Dynamic Programming Under Certainty - DP approach to solve LPP.

Chapter-20: 20.1 - 20.5

UNIT - III:

CLASSICAL OPTIMIZATION METHODS : Unconstrained Optimization - Constrained Multi-variable Optimization with Equality Constraints - Constrained Multi-variable Optimization with inequality Constraints.
NON-LINEAR PROGRAMMING METHODS: Examples of NLPP - General NLPP - Graphical solution - Quadratic Programming - Wolfe's modified Simplex Methods.

Chapter-23: 23.1 - 23.4 and Chapter-24: 24.1 - 24.4

UNIT-IV

REVISED SIMPLEX METHOD : Standard forms for Revised simplex Method - Computational procedure for Standard form I - comparison of simplex method and Revised simplex Method.
BOUNDED VARIABLES LP PROBLEM: The simplex algorithm

Chapter-26: 26.1 - 26.4
Chapter-28: 28.1, 28.2

UNIT-V : DECISION THEORY

Steps in Decision theory Approach - Types of Decision-Making Environments - Decision Making Under Uncertainty - Decision Making under Risk - Posterior Probabilities and Bayesian Analysis - Decision Tree Analysis - Decision Making with Utilities.

Chapter-11 : 11.1 - 11.8

Recommended Text

J. K. Sharma, *Operations Research*, Theory and Applications, Third Edition (2007) Macmillan India Ltd.

Reference Books

1. Hamdy A. Taha, *Operations Research*, (seventh edition) Prentice - Hall of India Private Limited, New Delhi, 1997.
2. F.S. Hillier & J.Lieberman *Introduction to Operation Research* (7^{th} Edition) Tata-McGraw Hill ompany, New Delhi, 2001.
3. Beightler. C, D.Phillips, B. Wilde ,*Foundations of Optimization* (2^{nd} Edition) Prentice Hall Pvt Ltd., New York, 1979
4. S.S. Rao - *Optimization Theory and Applications*, Wiley Eastern Ltd. New Delhi. 1990

PAPER - 12
PROBABILITY THEORY

Objectives : To introduce axiomatic approach to probability theory, to study some statistical characteristics, discrete and continuous distribution functions and their properties, characteristic function and basic limit theorems of probability.

UNIT-I : RANDOM EVENTS AND RANDOM VARIABLES

Random events - Probability axioms - Combinatorial formulae - conditional probability - Bayes Theorem - Independent events - Random Variables - Distribution Function - Joint Distribution - Marginal Distribution - Conditional Distribution - Independent random variables - Functions of random variables.

Chapter 1: Sections 1.1 to 1.7
Chapter 2 : Sections 2.1 to 2.9

UNIT-II : PARAMETERS OF THE DISTRIBUTION

Expectation- Moments - The Chebyshev Inequality - Absolute moments - Order parameters - Moments of random vectors - Regression of the first and second types.

Chapter 3 : Sections 3.1 to 3.8

UNIT-III: CHARACTERISTIC FUNCTIONS

Properties of characteristic functions - Characteristic functions and moments - semi-invariants - characteristic function of the sum of the independent random variables - Determination of distribution function by the Characteristic function - Characteristic function of multidimensional random vectors - Probability generating functions.

Chapter 4 : Sections 4.1 to 4.7

UNIT-IV : SOME PROBABILITY DISTRIBUTIONS

One point , two point , Binomial - Polya - Hypergeometric - Poisson (discrete) distributions - Uniform - normal gamma - Beta - Cauchy and Laplace (continuous) distributions.

Chapter 5 : Section 5.1 to 5.10

UNIT - V: LIMIT THEOREMS

Stochastic convergence - Bernoulli law of large numbers - Convergence of sequence of distribution functions - Levy-Cramer Theorems - de Moivre-Laplace Theorem - Lindberg Theorem - Lyapunov Theroem.

Chapter 6 : Sections 6.1 to 6.4, 6.6 to 6.9.

Recommended Text

M. Fisz, Probability Theory and Mathematical Statistics, John Wiley and Sons, New York, 1963.

Reference Books

1. R.B. Ash, Real Analysis and Probability, Academic Press, New York, 1972
2. K.L.Chung, A course in Probability, Academic Press, New York, 1974.
3. R.Durrett, Probability : Theory and Examples, (2nd Edition) Duxbury Press, New York, 1996.
4. V.K.Rohatgi An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern Ltd., New Delhi, 1988(3rd Print).
5. S.I.Resnick, A Probability Path, Birhauser, Berlin,1999.
6. B. R. Bhat, Modern Probability Theory (3^{rd} Edition), New Age International (P)Ltd, New Delhi, 1999

ELECTIVE: PAPER - 3
(to choose any 1 out of the given 4)
A. TENSOR ANALYSIS AND RELATIVITY THEORY

Objectives : The course aims to introduce vector algebra and vector calculus and special relativity and relativistic kinematics, dynamics and accelerated systems.

UNIT-I : TENSOR ALGEBRA

Systems of Different orders - Summation Convention - Kronecker Symbols - Transformation of coordinates in S_n - Invariants - Covariant and Contravariant vectors - Tensors of Second Order - Mixed Tensors - Zero Tensor - Tensor Field - Algebra of Tensors - Equality of Tensors - Symmetric and Skew –symmetric tensors - Outer multiplication, Contraction and Inner Multiplication - Quotient Law of Tensors - Reciprocal Tensor of Tensor - Relative Tensor - Cross Product of Vectors.

Chapter I : I.1 - I.3, I.7 and I.8 and Chapter II : II.1 - II.19

UNIT-II : TENSOR CALCULUS

Riemannian Space - Christoffel Symbols and their properties

Chapter III: III.1 and III.2

UNIT-III : TENSOR CALCULUS (Contd . . .)

Covariant Differentiation of Tensors - Riemann - Christoffel Curvature Tensor - Intrinsic Differentiation.

Chapter III: III.3 - III.5

UNIT-IV : SPECIAL THEORY OF RELATIVITY

Galilean Transformation - Maxwell's equations - The ether Theory - The Principle of Relativity.

Relativistic Kinematics : Lorentz Transformation equations - Events and simultaneity - Example - Einstein Train - Time dilation - Longitudinal Contraction - Invariant Interval - Proper time and Proper distance - World line - Example - twin paradox - addition of velocities - Relativistic Doppler effect.

Chapter 7 : Sections 7.1 and 7.2

UNIT-V : RELATIVISTIC DYNAMICS

Momentum - Energy - Momentum - energy four vector - Force - Conservation of Energy - Mass and energy - Example - inelastic collision - Principle of equivalence - Lagrangian and Hamiltonian formulations.

Accelerated Systems : Rocket with constant acceleration - example - Rocket with constant thrust

Chapter 7 : Sections 7.3 and 7.4

Recommended Texts

1. U.C. De, Absos Ali Shaikh and Joydeep Sengupta, *Tensor Calculus*, Narosa Publishing House, New Delhi, 2004. (**For Units I,II and III**)
2. D. Greenwood, *Classical Dynamics*, Prentice Hall of India, New Delhi, 1985. (**For Units IV and V**)

Reference Books

1. J.L.Synge and A.Schild, *Tensor Calculus*, Toronto, 1949.
2. A.S.Eddington. *The Mathematical Theory of Relativity*, Cambridge University Press, 1930.
3. P.G.Bergman, *An Introduction to Theory of Relativity*, New York, 1942
4. C.E.Weatherburn, *Riemannian Geometry and the Tensor Calculus*, Cambridge, 1938.

ELECTIVE: PAPER - 3
B. ANALYTIC NUMBER THEORY

Objectives : This course introduces arithmetic function and Dirichlet multiplication, averages of arithmetic function, congruence and quadratic residues

UNIT-I

Arithmetical function and Dirichlet multiplication.

Chapter 2

UNIT-II

Averages of Arithmetical function.

Chapter 3

UNIT-III

Congruence - Finite Abelian Groups and their characters

Chapter 5 (Omit 5.10 and 5.11) ; Chapter 6: 6.1 to 6.4

UNIT-IV

Finite Abelian Groups and their characters (contd. . .) - Dirichlet's theorem on Primes in Arithmetic Progressions

Chapter 6: 6.5 to 6.10; Chapter 7: All sections except 7.9

UNIT-V

Quadratic residues and quadratic reciprocity law.

Chapter 9 (Omit 9.10 and 9.11)

Recommended Text

Tom Apostol, *Introduction to Analytic Number theory*, Narosa Publications, New Delhi,

Reference Books

1. I. Niven and Zuckermann H.S. : *An Introduction to the theory of numbers,* Wiley Eastern Ltd. 1972
2. C.Y. Hsiung : *Elementary Theory of Numbers*, Allied Publishers.
3. W.W. Adams and L. J. Goldstein, *Introduction to Number Theory*, Prentice Hall Inc.
4. S.G. Telang, *Number Theory*.

ELECTIVE: PAPER - 3
C. FLUID DYNAMICS

Objectives : This course aims to discuss kinematics of fluids in motion, Equations of motion of a fluid, three dimensional flows, two dimensional flows and viscous flows.

UNIT-I

Kinematics of Fluids in motion. Real fluids and Ideal fluids - Velocity of a fluid at a point, Stream lines , path lines , steady and unsteady flows- Velocity potential - The vorticity vector- Local and particle rates of changes - Equations of continuity - Worked examples - Acceleration of a fluid - Conditions at a rigid boundary.

Chapter 2. Sections 2.1 to 2.10.

UNIT-II: EQUATIONS OF MOTION OF A FLUID

Pressure at a point in a fluid at rest. - Pressure at a point in a moving fluid - Conditions at a boundary of two inviscid immiscible fluids- Euler's equation of motion - Discussion of the case of steady motion under conservative body forces.

Chapter 3. Sections 3.1 to 3.7

UNIT-III

Some three dimensional flows. Introduction- Sources, sinks and doublets - Images in a rigid infinite plane - Axis symmetric flows - stokes stream function

Chapter 4 Sections 4.1, 4.2, 4.3, 4.5.

UNIT-IV : SOME TWO DIMENSIONAL FLOWS

Meaning of two dimensional flow - Use of Cylindrical polar coordinate - The stream function - The complex potential for two dimensional, irrotational incompressible flow - Complex velocity potentials for standard two dimensional flows - Some worked examples - Two dimensional Image systems - The Milne Thompson circle Theorem.

Chapter 5. Sections 5.1 to 5.8

UNIT-V : VISCOUS FLOWS

Stress components in a real fluid. - Relations between Cartesian components of stress- Translational motion of fluid elements - The rate of strain quadric and principal stresses - Some further properties of the rate of strain quadric - Stress analysis in fluid motion - Relation between stress and rate of strain - The coefficient of viscosity and Laminar flow - The Navier - Stokes equations of motion of a Viscous fluid.

Chapter 8. Sections 8.1 to 8.9

Recommended Text

F. Chorlton, *Text Book of Fluid Dynamics* ,CBS Publications. Delhi ,1985.

Reference Books

1. R.W.Fox and A.T.McDonald. *Introduction to Fluid Mechanics*, Wiley, 1985.
2. E.Krause, *Fluid Mechanics with Problems and Solutions*, Springer, 2005.
3. B.S.Massey, J.W.Smith and A.J.W.Smith, *Mechanics of Fluids,* Taylor and Francis, New York, 2005
4. P.Orlandi, *Fluid Flow Phenomena,* Kluwer, New Yor, 2002.
5. T.Petrila, *Basics of Fluid Mechanics and Introduction to Computational Fluid Dynamics,* Springer, berlin, 2004.

ELECTIVE: PAPER-3
D. ALGEBRAIC TOPOLOGY

Objectives: To introduce the ideas of algebraic topology to other branches of Mathematics.

UNIT – I : CALCULUS IN THE PLANE: PATH INTEGRALS

Angles and Deformations – Differntial forms and path Integrals – Independence of Path – Criterion for exactness. Angles and Deformations: Angle functions and Winding numbers – Reparametrizing and Deforming the Paths. Winding Numbers: Definition – Homotopy and Reparametrization – Varying the point – Degrees and Local Degrees.

Chapter – 1: (a) to (c); Chapter – 2: (a) to (b); Chapter – 3: (a) to (d).

UNIT – II: COHOMOLOGY AND HOMOLOGY

De Rham Cohomology and the Jordan Curve Theorem. Definition of the De Rham Graphs – The Coboundary map – the Jordon Curve Theorem – Applications and Variations.

Homology: Chains, Cycles, and H_0U – Boundaries, H_1U, and Winding Numbers – Chains on Grids – Maps and Homology – The First Homology Group for General Spaces.

Chapter 5: (a) to (d); Chapter 6: (a) to (e)

UNIT – III: HOLES AND INTEGRALS

Multiply connected regions – Integrations over continuous Paths and Chains – Periods of Integrals – Complex Integration.

Mayer – Victoris: The Boundary map – Mayer – Victoris for Homology – Variations and applications – Mayer – Victoris for Cohomology.

Chapter 9: (a) to (d); Chapter 10: (a) to (d)

UNIT – IV: COVERING SPACES AND FUNDAMENTAL GROUPS

Covering spaces: Definition – Lifting paths and Homotopies – G-coverings – Covering Transformations. The Fundamental Groups: Definitions and Basic Properties – Homotopy – Fundamental group and Homology. Fundamental Groups and Covering Spaces: Fundamental Group and Coverings – Automorphisms of Coverings – The Universal Covering – Coverings and Subgroups of the Fundamental Group.

Chapter 11: (a) to (d); Chapter 12: (a) to (c); Chapter 13: (a) to (d)

UNIT – V: THE VAN KAMPEN THEOREM

G-Coverings from the Universal Covering – Patching Coverings together – The Van Kampen Theorem.

Cohomology: Patching Coverings and Cech cohomology – Cech Cohomology and Homology – De Rham Cohomology and Homology – Proof of Mayer – Victoris fro De Rham Cohomology.

Chapter 14: (a) to (d); Chapter 15: (a) to (d)

Recommended Text:

William Fulton, Algebraic Topology – A First Course, Springer – Verlag, New York, 1995.

Reference Books:

1. M. K. Agoston, Algebraic Topology – A First Course. Marcel Dekker, 1992.
2. Satya Deo, Algebraic Topology, Hindustan Book Agency, New Delhi, 2003.
3. M. Greenberg and Harper, Algebraic Topology – A First Course, Benjamin / Cummings, 1981.
4. C. F. Maunder, Algebraic topology, Van Nastrand, New York, 1970.
5. J. R. Munkres, Topology, Prentica Hall of India, New Delhi, 2002, [3rd Indian Print].

SEMESTER - IV
PAPER - 13
COMPLEX ANALYSIS - II

Objectives : To study Riemann Theta Function and normal families, Riemann mapping theorem, Conformal mapping of polygons, harmonic functions, elliptic functions and Weierstrass Theory of analytic continuation.

UNIT - I: PARTIAL FRACTIONS AND ENTIRE FUNCTIONS

Partial fractions - Infinite products - Canonical products - Gamma Function - Jensen's formula - Hadamard's Theorem

Chapter 5 : Sections 2.1 to 2.4 ; Chapter 5 : Sections 3.1 and 3.2

UNIT - II: RIEMANN THETA FUNCTION AND NORMAL FAMILIES

Product development - Extension of $\zeta(s)$ to the whole plane - The zeros of zeta function - Equicontinuity - Normality and compactness - Arzela's theorem - Families of analytic functions - The Classical Definition

Chapter 5 : Sections 4.1 to 4.4 ; Chapter 5 : Sections 5.1 to 5.5

UNIT - III: RIEMANN MAPPING THEOREM

Statement and Proof - Boundary Behavior - Use of the Reflection Principle.
Conformal mappings of polygons : Behavior at an angle - Schwarz-Christoffel formula - Mapping on a rectangle.
Harmonic Functions : Functions with mean value property - Harnack's principle.

Chapter 6 : Sections 1.1 to 1.3 (Omit Section1.4) ;
Sections 2.1 to 2.3 (Omit section 2.4)
Section 3.1 and 3.2

UNIT-IV : ELLIPTIC FUNCTIONS

Simply periodic functions: Representation by exponentials-The Fourier development-Functions of finite order- Doubly periodic functions:The Period Module-Unimodular transformations-The Canonical basis-General properties of Elliptic functions.

Chapter 7 : Sections 1.1 to 1.3 ; Sections 2.1 to 2.4

UNIT-V : WEIRSTRASS THEORY

The Weierstrass ρ-function - The functions $\zeta(z)$ and $\sigma(z)$- The differential equation -The modular function $\lambda(\tau)$ - The Conformal mapping by $\lambda(\tau)$.

Chapter 7 : Sections 3.1 to 3.5

Recommended Text:

Lars V. Ahlfors, Complex Analysis, (3rd Edition) McGraw Hill Book Company, New York, 1979.

Reference Books

1. H.A. Presfly, Introduction to complex Analysis, Clarendon Press, oxford, 1990.
2. J.B. Corway, Functions of one complex variables, Springer - Verlag, International student Edition, Narosa Publishing Co.
3. E. Hille, Analytic function Thorey (2 vols.), Gonm & Co, 1959.
4. M.Heins, Complex function Theory, Academic Press, New York,1968.

PAPER - 14
FUNCTIONAL ANALYSIS

Objectives : To study the details of Banach and Hilbert Spaces and to introduce Banach algebras.

UNIT-I : BANACH SPACES

Definition - Some examples - Continuous Linear Transformations - The Hahn -Banach Theorem - The natural embedding of N in N**

Chapter 9 : Sections 46 to 49

UNIT-II : BANACH SPACES AND HILBERT SPACES

Open mapping theorem - conjugate of an operator - Definition and some simple properties - Orthogonal complements - Orthonormal sets

Chapter 9 : Sections 50 and 51 ; Chapter 10 : Sections 52, 53 and 54

UNIT-III : HILBERT SPACE

Conjugate space H* - Adjoint of an operator - Self-adjoint operator - Normal and Unitary Operators - Projections

Chapter 10 : Sections 55, 56,57,58 and 59

UNIT-IV : PRELIMINARIES ON BANACH ALGEBRAS

Definition and some examples - Regular and single elements - Topological divisors of zero - spectrum - the formula for the spectral radius - the radical and semi-simplicity.

Chapter 12 : Sections 64 to 69

UNIT-V: STRUCTURE OF COMMUTATIVE BANACH ALGEBRAS

Gelfand mapping - Applications of the formula $r(x) = \lim \| x^n \|^{1/n}$ - Involutions in Banach Algebras - Gelfand-Neumark Theorem.

Chapter 13 : Sections 70 to 73

Recommended Text:

G.F.Simmons , *Introduction to topology and Modern Analysis*, McGraw Hill International Book Company, New York, 1963.

Reference Books

1. W. Rudin *Functional Analysis*, Tata McGraw-Hill Publishing Company, New Delhi, 1973
2. G. Bachman & L.Narici, *Functional Analysis* Academic Press, New York, 1966.
3. H.C. Goffman and G.Fedrick, *First course in Functional Analysis*, Prentice Hall of India, New Delhi, 1987
4. E. Kreyszig *Introductory Functional Analysis with Applications*, John wiley & Sons, New York.,1978.

PAPER - 15
MATHEMATICAL STATISTICS

Objectives : This course introduces sampling theory, significance tests ,estimation, testing of hypotheses, ANOVA and sequential analysis with rigorous mathematical treatment.

UNIT-I : SAMPLE MOMENTS AND THEIR FUNCTIONS

Notion of a sample and a statistic - Distribution of the arithmetic mean of independent normally distributed random variables – The χ^2 - distribution – The distribution of the statistics ($\bar{X}$, S) – Student's t - distribution - Fisher's Z - distribution - Snedecor's F - distribution - Distribution of sample mean from non-normal populations.

Chapter 9 : Sections 9.1 to 9.8

UNIT-II : SIGNIFICANCE TEST

Kolmogorov Theorem 10.11.1 - Smirnov Theorem 10.11.2 - Concept of a statistical test - Parametric tests for small samples and large samples - χ^2 test - Tests of Kolmogorov and Smirnov type - The Wald-Wolfovitz and Wilcoxon -Mann-Whitney tests - Independence Tests by contingency tables.

Chapter 10 : Section 10.11; Chapter 12 :Sections 12.1 to 12.7

UNIT-III : ESTIMATION

Preliminary notion - Consistent estimation - Unbiased estimates - Sufficiency of an estimate - Efficiency of an estimate - Asymptotically most efficient estimates - methods of finding estimates - confidence Interval.

Chapter 13 : Sections 13.1 to 13.8

UNIT-IV : Analysis of Variance

One way classification and two-way classification. **Hypotheses Testing:** The Power functions and OC function - Most Powerful test - Uniformly most powerful test - unbiased test.

Chapter 15 : Sections 15.1 and 15.2
Chapter 16 : Sections 16.1 to 16.5

UNIT-V : SEQUENTIAL ANALYSIS

SPRT - Auxiliary Theorem - Wald's fundamental identity - OC function and SPRT – The expected value of $E(n)$ - Determination of A and B - Testing a hypothesis concerning p of zero – one distribution - Testing a hypothesis concerning the expected value m of a Normal population.

Chapter 17 : Sections 17.1 to 17.9

Recommended Text:

M. Fisz , *Probability Theory and Mathematical Statistics,* John Wiley and sons, New Your, 1963.

Reference Books:

1. E.J.Dudewicz and S.N.Mishra , *Modern Mathematical Statistics*, John Wiley and Sons, New York, 1988.
2. V.K.Rohatgi *An Introduction to Probability Theory and Mathematical Statistics,* Wiley Eastern New Delhi, 1988(3rd Edn)
3. G.G.Roussas, *A First Course in Mathematical Statistics,* Addison Wesley Publishing Company, 1973
4. B.L.Vander Waerden, *Mathematical Statistics,* G.Allen & Unwin Ltd., London, 1968.

PAPER - 16
DIFFERENCE EQUATIONS

Objectives : To introduce the process of discretization, Discrete version of Differential Equations, Discrete oscillation and the asymptotic behaviour of solutions of certain class of difference equations for linear cases only. Solution of difference equations using z-transforms is stressed.

UNIT-I : LINEAR DIFFERENCE EQUATIONS OF HIGHER ORDER

Difference Calculus - General Theory of Linear Difference Equations - Linear Homogeneous Equations with Constant coefficients - Linear non-homogeneous equations - Method of Undetermined coefficients, the method of variation of constants - Limiting behavior of solutions.

Chapter 2: Sections 2.1 to 2.5

UNIT-II : SYSTEM OF DIFFERENCE EQUATIONS

Autonomous System - The Basic Theory - The Jordan form - Linear periodic system.

Chapter 3: Section 3.1 to 3.4

UNIT-III : THE Z-TRANSFORM METHOD

Definition, Example and properties of Z-transform - The Inverse Z-transform and solution of Difference Equations: Power series method, partial fraction method, the inverse integral method - Volterra Difference Equation of convolution types - Volterra systems.

Chapter 5: Sections 5.1 to 5.3, 5.5 (omit 5.4)

UNIT-IV : ASYMPTOTIC BEHAVIOUR OF DIFFERENCE EQUATION

Tools and Approximations - Poincare's Theorem - Second order difference equations - Asymptotic diagonal systems - Higher order Difference Equations.

Chapter 8 : Sections 8.1 to 8.5

UNIT-V : OSCILLATION THEORY

Three-term difference Equation - Non-linear Difference Equations - Self-Adjoint second order equations.

Chapter 7 : Sections 7.1 to 7.3

Recommended Text:

Saber N. Elaydi, *An Introduction to Difference Equations*, Springer Verlag, New York, 1996.

Reference Books:

1. R.P.Agarwal., *Difference Equations and Inequalities*, Marcel Dekker, 1999.
2. S. Goldberg, *Introduction to Difference Equations*, Dover Publications, 1986
3. V. Lakshmi kantham and Trigiante, *Theory of Difference Equations*, Academic Press, New York, 1988.
4. Peterson, A *Difference Equations, An Introduction with Applications,* Academic Press, New York, 1991.

ELECTIVE: PAPER - 4
(to choose any 1 out of the given 4)
A. NUMBER THEORY AND CRYPTOGRAPHY

Objectives : This course aims to give elementary ideas from number theory which will have applications in cryptology.

UNIT-I : Elementary Number Theory

Time Estimates for doing arithmetic - Divisibility and Euclidean algorithm - Congruences - Applications to factoring.

Chapter – I Sec – 1.1 to 1.4

UNIT-II : Cryptography

Some simple crypto systems - Enciphering matrices

Chapter – III Sec – 3.1 and 3.2

UNIT-III : Finite Fields and quadratic Residues

Finite fields - Quadratic residues and Reciprocity

Chapter – II Sec – 2.1 and 2.2

UNIT-IV : Public Key Cryptography

The idea of public key cryptography - RSA - Discrete log - Knapsack

Chapter-IV Sec – 4.1 to 4.4

UNIT-V : Primality and Factoring

Pseudo primes - The rho method - Fermat factorization and factor bases - The Continued fraction method.

Chapter – V Sec – 5.1 to 5.4

Recommended Text:

Neal Koblitz, *A Course in Number Theory and Cryptography*, Springer-Verlag, New York, 2002, Second Edition.

Reference Books:

1. Niven and Zuckermann, *An Introduction to Theory of Numbers* (Edn. 3), Wiley Eastern Ltd., New Delhi, 1976.
2. David M.Burton, *Elementary Number Theory*, Wm C.Brown Publishers, Dubuque, Iowa, 1989.
3. K.Ireland and M.Rosen, *A Classical Introduction to Modern Number Theory*, Springer Verlag, 1972.

ELECTIVE: PAPER – 4
B. ALGEBRAIC NUMBER THEORY

Objectives : The course aims to provide a study on modules over rings, finite fields, algebraic extensions, number fields and cyclotomic fields, Noetherian rings and modules and Dedekind rings.

UNIT-I : ALGEBRAIC BACKGROUND

Rings and Fields- Factorization of Polynomials - Field Extensions - Symmetric Polynomials - Modules - Free Abelian Groups.

Chapter 1: Sec. 1.1 to 1.6

UNIT-II : ALGEBRAIC NUMBERS

Algebraic numbers - Conjugates and Discriminants - Algebraic Integers - Integral Bases - Norms and Traces - Rings of Integers.

Chapters 2: Sec. 2.1 to 2.6

UNIT-III : QUADRATIC AND CYCLOTOMIC FIELDS

Quadratic fields and cyclotomatic fields : Factorization into Irreducibles : Trivial factorization - Factroization into irreducibles - Examples of non-unique factorization into irreducibles.

Chapter 3: Sec. 3.1 and 3.2 ; Chapter 4: Sec. 4.2 to 4.4

UNIT-IV

Prime Factroization - Euclidean Domains - Euclidean Quadratic fields - Consequences of unique factorization - The Ramanujan -Nagell Theorem.

Chapter 4: Sec. 4.5 to 4.9

UNIT-V : IDEALS

Prime Factorization of Ideals - The norms of an Ideal - Non-unique Factorization in Cyclotomic Fields..

Chapter 5 : Sec. 5.2 to 5.4

Recommended Text

I. Steward and D.Tall. *Algebraic Number Theory and Fermat's Last Theorem* (3rd Edition) A.K.Peters Ltd., Natrick, Mass. 2002.

Reference Books

1. Z.I.Bosevic and I.R.Safarevic, *Number Theory*, Academic Press, New York, 1966.
2. J.W.S.Cassels and A.Frohlich, *Algebraic Number Theory*, Academic Press, New York, 1967.
3. P.Ribenboim, *Algebraic Numbers*, Wiley, New York, 1972.
4. P. Samuel, *Algebraic Theory of Numbers*, Houghton Mifflin Company, Boston, 1970.
5. A.Weil. *Basic Number Theory*, Springer, New York, 1967.

ELECTIVE: PAPER – 4
C. STOCHASTIC PROCESSES

Objectives : This course aims to introduce advanced topics in Markov process, Markov chains and Renewal theory.

UNIT - I : STOCHASTIC PROCESSES

Specification of stochastic processes – stationary processes – Markv Chains : Definitions and Examples – Higher transition probabilities – Generalization of independent Bernoulli trials.

Chapter 2 : 2.1 to 2.4; Chapter 3 : 3.1 to 3.3

UNIT - II : MARKOV CHAINS

Stability of Markov system – Graph theoretic approach – Markov chain with denumerable number of state – Reducible chains – Statistical inference for Markov chains.

Chapter 3 : 3.6 to 3.10

UNIT - III : MARKOV PROCESS WITH DISCRETE STATE SPACE

Poisson process: Poisson process and related distributions – Generalizations of Poisson process – Birth and death process – Markov process with discrete state space (Continuous time Markov chain).

Chapter 4 : 4.1 to 4.5

UNIT - IV : MARKOV PROCESS WITH CONTINUOUS STATE SPACE

Brownian motion – Weiner process – Differential equations for Weiner Process – Kolmogorov equations – First passage time distribution for Weiner process.

Chapter 5 : 5.1 to 5.5

UNIT - V : RENEWAL PROCESS AND THEORY

Renewal process and renewal equation – Stopping time – Wald's equation – Renewal theorem – Delayed and equilibrium renewal process.

Chapter 6 : 6.1 to 6.6

Recommended Text

J. Medhi, Stochastic Processes (2^{nd} Edition), New Age International, 1992.

Reference Books

1. S. Karlin, A first course in Stochastic Processes, (2nd Edition), Academic Press, 1958.
2. U.N. Bhat, Elements of Applied Stochastic Prcesses, John Wiley Sons, 1972.
3. E. Cinlar, Introduction to Stochastic Processes, PHI, 1975
4. S.K. Srinivasan and A. Vijayakumar, Stochastic Processes, Narosa, 2003.

ELECTIVE: PAPER – 4
D. MATHEMATICAL SOFTWARES PRACTICAL

Objectives : This course aims to practice the students in Mathematics document preparation and utilizing the software facility available for tedious computations.

- **CREATING A DOCUMENT USING LATEX**
  - Simple Typesetting
  - Page Layout (page size, margins, page style)
  - Formatting (Font size, Text Alignment)
  - Tables and Figures
  - Typesetting Mathematics
  - Bibliography Management.

- **MATLAB BASICS**
  - Algebra and Arithmetic
  - Calculus, Graphics and Linear Algebra
  - Curve Fitting and Interpolation
  - Ordinary Differential Equations

Reference Books

1. Latex Tutorials – A PRIMER Indian TEX Users Group, 2002, 2003 Indian TEX Users Group Floor III SJP Buildings, Cotton Hills Trivandrum 695014, India.
2. Brain R. Hunt, Ronald R. Lipsman and Jonathan M. Rosenberg, A Guide to MATLAB for Beginners and experienced users, Cambridge University Press, 2003.
3. Getting Started with MATLAB 7, Rudra Pratap, Oxford University Press, India, 2006.
4. Rose L. Spencer, Introduction to MATLAB.

COMPUTER LABORATORY PRACTICE EXERCISES

LATEX

1. Create a document file to prepare a Chapter in a Book.
2. Create a document file to prepare a research article.

MATLAB

1. Multiplication of matrices of order 4×4
2. Solution to linear non-homogeneous equations (4 unknowns)
3. Rank of a matrix of order atleast 4
4. Solving ordinary differential equations
5. Plotting of two and three dimensional graphs SPSS
6. Drawing Histograms, frequency curves and frequency polygons
7. Finding central measures and measures of dispersion
8. Finding correlation and rank correlation
9. Finding partial and multiple correlation
10. Calculation of ANOVA

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THIRUVALLUVAR UNIVERSITY

MASTER OF SCIENCE

DEGREE COURSE

M.Sc. PHYSICS

UNDER CBCS

(With effect from 2017-2018)

The Course of Study and the Scheme of Examinations

S.NO.	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
	Course Title							
SEMESTER I						CIA	Uni. Exam	Total
1	MAIN	Paper-1	6	5	Mathematical Physics -I	25	75	100
2	MAIN	Paper-2	6	5	Classical and Statistical Mechanics	25	75	100
3	MAIN	Paper-3	5	5	Quantum Mechanics - I	25	75	100
4	MAIN PRACTICAL	Paper-1	4	-	General Experiments	-	-	-
5	MAIN PRACTICAL	Paper-2	4	-	Electronics Experiments	-	-	-
6	ELECTIVE	Paper-1	5	3	**(to choose 1 out 3)** A. Electronic Devices and Applications B. Electronics Instrumentation C. Electronics communication systems	25	75	100
			30	**18**		**125**	**375**	**400**
SEMESTER II						CIA	Uni. Exam	Total
7	MAIN	Paper-4	5	4	Mathematical Physics -II	25	75	100
8	MAIN	Paper-5	5	4	Electromagnetic Theory and Plasma Physics	25	75	100
9	MAIN	Paper-6	5	5	Quantum Mechanics II	25	75	100
10	MAIN PRACTICAL	Paper-1	4	4	General Experiments	25	75	100
11	MAIN PRACTICAL	Paper-2	4	4	Electronics Experiments	25	75	100
12	**Compulsory Paper**		2	2	**Human Rights**	25	75	100
13	ELECTIVE	Paper-2	5	3	**(to choose 1 out 3)** A. Nano Science B. Fibre Optics C. Non linear Optics	25	75	100
			30	**26**		**150**	**450**	**700**

SEMESTER III						**CIA**	**Uni. Exam**	**Total**
14	MAIN	Paper-7	5	5	Spectroscopy	25	75	100
15	MAIN	Paper-8	5	5	Nuclear and Particle Physics	25	75	100
16	MAIN	Paper-9	5	5	Microprocessor and Microcontroller	25	75	100
17	MAIN PRACTICAL	Paper-3	5	-	Advanced General Experiments	-	-	-
18	MAIN PRACTICAL	Paper-4	5	-	Microprocessor, Microcontroller and C Programming	-	-	-
19	ELECTIVE	Paper-3	5	3	**(to choose 1 out 3)** A. Crystal Growth and Thin Films B. Advanced Spectroscopy C. Advanced Nuclear Physics	25	75	100
			30	**18**		**125**	**375**	**400**
SEMESTER IV						**CIA**	**Uni. Exam**	**Total**
20	MAIN	Paper-10	5	5	Material Science and Laser Physics	25	75	100
21	MAIN	Paper-11	5	5	Condensed matter Physics	25	75	100
22	MAIN	Paper-12	5	5	Project with *viva voce*	-	100 (75 Project +25 viva)	100
23	MAIN PRACTICAL	Paper-3	5	5	Advanced General Experiments	25	75	100
24	MAIN PRACTICAL	Paper-4	5	5	Microprocessor, Microcontroller and C Programming	25	75	100
25	ELECTIVE	Paper-4	5	3	**(to choose 1 out 3)** A. Advanced Microprocessor B. C Programming and MATLAB C. Numerical Methods and programming in C	25	75	100
			30	**28**		**255**	**345**	**600**

Subject	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total marks**
MAIN	12	4-5	58	100	1200
MAIN PRACTICAL	4	4-5	18	100	400
ELECTIVE	4	3	12	100	400
COMPULSORY PAPER	1	2	2	100	100
Total	**21**	**-**	**90**	**-**	**2100**

Project

There will be a Project work at the end of the Semester IV. The guidelines for the Project work with Viva-voce as follows.

a) The Project work carries 100 marks for which the Project report shall be evaluated for 75 marks and the Viva-voce carries 25 marks. The marks for Project report and Viva-voce are to be awarded jointly by the external examiners in consultation with project supervisor.
b) The Project report may consist of 40 to 50 pages.
c) The candidate has to submit the Project report 15 days before the commencement of the IV Semester examinations.
d) A candidate who fails in the Project/Dissertation may resubmit the report (on the same topic) with necessary modification/correction/ improvements in the subsequent even Semester examination for evaluation.
e) Each candidate shall be required to appear for Viva-voce examination (in defense of the Project only)

THIRUVALLUVAR UNIVERSITY

M.Sc. PHYSICS

SYLLABUS

UNDER CBCS

(With effect from 2017-2018)

SEMESTER I
PAPER-1

MATHEMATICAL PHYSICS I

UNIT-I: Linear Vector Spaces and Matrices

Linear Vector Spaces: Linear independence, basis and dimension - inner products. Orthonormality and completeness - Schwartz Inequality - Orthonormal basis - Gram-Schmidt orthogonalization process - Linear operators - Vectors in n dimensions - Matrix algebra, similarity transforms, matrix diagonalization - Orthogonal, Hermitian and Unitary matrices- Properties.

UNIT –II: Tensors

Coordinate transformation– summation convention - Contravariant, Covariant and mixed tensors – Rank of a tensor – symmetric and anti-symmetric tensors - Invariant tensors - Kronecker delta, Levi-civita tensor in three dimensions – contraction of tensors - product rule - Quotient rule - tensors of higher rank- Tensor forms of Operators.

UNIT-III: Ordinary Differential Equations

Second order linear differential equations: Wronskian, Ordinary and singular points- series solutions - Generating functions – Rodrigue's formula - Orthogonality relations - Important recurrence relations for Bessel, Legendre, Hermite and Laguerre functions - Spherical harmonics.

UNIT – IV: Green's functions

Dirac-delta function - Green's function - One dimensional Green function - boundary conditions – Eigen function - expansion of the Green's function- Reciprocity theorem – Sturm-Liouville type equations in one dimension and their Green's functions.

UNIT V: Probability theory and Random variables

Probability distributions and probability densities - Binomial, Poisson's and Normal - standard discrete and continuous probability distributions - moments and generating functions - Central limit theorem (statement and applications).

Books for Study:

1. P.K. Chattopadhyay, Mathematical Physics, Wiley Eastern, Madras, 1990.
2. G. Arfken and H.J. Weber, Mathematical Methods for Physicists, 5th Edition, Harcourt (India), New Delhi, 2001.
3. M.D. Greenberg, Advanced Engineering Mathematics, 2nd Edition, International Ed., Prentice - Hall International, New Jersey, 1998.
4. E. Kreyszig, Advanced Engineering Mathematics, 8th Edition Wiley, New York, 1999.
5. B.D. Gupta, Mathematical Physics, Vikas publishing house 3rd Edition, New Delhi, 2006.
6. Satyaprakash, Mathematical Physics, Sultan Chand & sons, New Delhi, 2004.

Books for Reference:

1. Schaum's outline series, McGraw Hill, (i) Vector and tensor analysis, (ii) Linear Algebra, (iii) Matrices, (iv) Differential Equations (v) Probability (vi) Statistics, 1964.
2. P.R Halmos, Finite dimensional Vector Spaces, 2nd Edition. Affiliated East - West, New Delhi, 1965.
3. C.R. Wylie and LC. Barrett, Advanced Engineering Mathematics, 6th Edition., International Edition. McGraw Hill, New York, 1995.
4. P.K. Chakrabarti and S.N. Kundu, A Text Book of Mathematical Physics, New Central Book Agency, Kolkata, 1996.
5. A.K. Ghatak, I.C. Goyal and S.H. Chua, Mathematical Physics Macmillan India, New Delhi, 2002.

PAPER-2

CLASSICAL AND STATISTICAL MECHANICS

PART A: CLASSICAL MECHANICS

UNIT-I: Lagrangian and Hamiltonian formulation

Hamilton's Variational Principle and Lagrange's equation - Lagrange Problems - Double Pendulum, Spherical pendulum, Cylinder rolling down an inclined plane - Hamilton's equations - cyclic variables – Principle of least action – Hamiltonian Problems - motion of a particle in a central force field, charged particle moving in an electromagnetic field – Equations of motion and first integrals –Scattering by central potential – Kepler's laws – Transformation from centre of mass to laboratory frame.

UNIT-II: Rigid body dynamics and Canonical transformations

Rigid body motion – Kinematics - Euler's angles - Angular momentum and kinetic Energy – Moment of inertia tensor - Euler's equations of motion – Torque-free motion of a rigid body - Motion of a symmetrical top under the action of gravity - Canonical transformation and their generators – simple examples – Poisson brackets – Equations of motion in Poisson bracket form - Noether's theorem.

UNIT-III: Hamilton - Jacobi Theory and Theory of Small Oscillations

Hamilton-Jacobi equations – Application to Linear harmonic oscillator problem - Action Angle variables - Application to Kepler's problem - Oscillatory motion - Theory of small oscillation –Two coupled pendulums - Linear triatomic molecule - Stability of Oscillatory motion - Forced Harmonic Oscillator - non- linear Oscillation in a symmetric potential.

PART B: STATISTICAL MACHANICS

UNIT-IV: Thermodynamics and Classical statistics

Thermodynamic parameters – thermodynamic potentials – Gibbs phase rule – First and second order phase transitions – Ehrenfest's equations - Random walk - Brownian motion - Langevin theory - Einstein theory.
Classical Statistics: Microstates and Macrostates - Phase space - Liouville theorem and it's significance - ensembles - Micro Canonical, Canonical and Grand Canonical ensembles - Partition function - Translational partition functions - Gibb's Paradox - Sackur- Tetrode equation.

UNIT-V: Quantum Statistics

Quantum Statistics of ideal gas - Ideas of Bose-Einstein and Fermi-Dirac Particles - Degeneracy of gases - Bose-Einstein condensation of gases - Photon gas - Planck's law of radiation and its limitation - Thermionic emission - Pauli's theory of Paramagnetism - Ising model.

Books for Study:

1. H. Goldstein, Classical Mechanics. 3rd Edition. Pearson Education, Asia, New Delhi, 2002.
2. S.N. Biswas, Classical Mechanics, Books and Allied Ltd., Kolkata, 1998.
3. Upadhyaya, Classical Mechanics, Himalaya Publishing Co., New Delhi, 1999.
4. Gupta Kumar Sharma, Classical Mechanics, Pragati Prakashan, Meerut, 2004.
5. K. Huang, Statistical Mechanics, Wiley Eastern Ltd., New Delhi, 1975.
6. B.K. Agarwal and M. Eisner, Statistical Mechanics, 2nd Edition, New Age International, New Delhi, 1998.
7. Sathya Prakash and J.P Agarwal, Statistical Mechanics, 7th Edition, Kedar Nath and Ram Nath & Co, Meerut, 1994.
8. J.K.Bhattacharjee, Statistical Mechanics: An Introductory Text, Allied Publication, New Delhi, 1996.

Books for Reference:

1. L.D. Landau and E.M. Lifshitz, Mechanics, Pergomon Press, Oxford, 1969.
2. K.R. Symon, Mechanics, Addison Wesley, London, 1971.
3. J.L. Synge and B.A Griffith, Principles of Classical Mechanics, Mc.Graw-Hill, NewYork, 1949.
4. C.R.Mondal, Classical Mechanics, Prentice - Hall of India, New Delhi.
5. L.P. Kadanoff, Statistical Physics - Statics, Dynamics and Renormalization, World Scientific, Singapore, 2001.
6. M. Glazer and J. Wark, Statistical Mechanics, Oxford University Press, Oxford, 2001.

PAPER-3

QUANTUM MECHANICS I

UNIT-I: Basic formalism

Wave functions for a free particle - Interpretation and conditions on the wave function - Postulates of quantum Mechanics and the Schrödinger equations – time dependent, independent - Expectation Value - Stationary States - Ehrenfest's theorem - Hermitian Operators for dynamical variables - Eigen values and Eigen functions - Uncertainty Principle.

UNIT-II: One Dimensional and Three Dimensional Problems

One Dimensional: Particle in a box – simple harmonic oscillator - Square well potential – Barrier penetration – Three Dimensional: Orbital angular momentum and spherical harmonics - Central forces and reduction of two body problem - Particle in a Spherical well - Hydrogen atom.

UNIT-III: General formalism

Hilbert's space - Dirac notation - Representation theory - Co-ordinate and momentum representations - Time evolution - Schrödinger, Heisenberg and Interaction pictures - Symmetries and conservation laws.

UNIT-IV: Approximation methods

Time-independent perturbation theory for non- degenerate and degenerate levels - Application to ground state of an harmonic oscillator and Stark effect in Hydrogen - Variation method -Application to ground state of Helium atom - WKB approximation - WKB quantization rule - Application to simple Harmonic Oscillator.

UNIT-V: Angular momentum and identical particles

Ladder Operators - Commutation rules for angular momentum operators - Eigen value spectrum from angular momentum algebra - Matrix representation - Spin angular momentum – Non-relativistic Hamiltonian including spin - Addition of two angular momenta - Clebsch- Gordan coefficients - Symmetry and anti symmetry of wave functions - Pauli's spin matrices.

Books for Study:

1. P.M. Mathews and K. Venkatesan, A Text book of Quantum Mechanics, Tata McGraw-Hill, New Delhi, 1976.
2. L.I. Schiff, Quantum Mechanics, 3rd Edition, International Student Edition,McGraw-Hill Kogakusha, Tokyo, 1968.
3. V. Devanathan, Quantum Mechanics, Narosa Publishing House, New Delhi, 2005.
4. V.K. Thankappan, Quantum Mechanics, 2nd Edition, Wiley Eastern Ltd, NewDelhi, 1985.
5. G. Aruldhas, Quantum Mechanics, Prentice-Hall of India, New Delhi, 2002.
6. Sathya Prakash Swati Saluja, Quantum Mechanics, Kedar Nath Ram Nath & Co Meerut, 2016.

Books for Reference:

1. E. Merzbacher, Quantum Mechanics 2nd Edition, John Wiley and Sons, NewYork, 1970.
2. P.A.M. Dirac, The Principles of Quantum Mechanics, Oxford University Press, London, 1973.
3. L.D. Landau and E.M. Lifshitz, Quantum Mechanics, Pergomon Press, Oxford, 1976.
4. Ajoy Ghatak, Loganathan, Quantum Mechanics theory and applications, Fourth edition, Macmillan, 1999.
5. Franz Schwabl, Quantum Mechanics, Narosa Publishing House, 1998.
6. B.S. Rajput, Advanced Quantum Mechanics, Seventh Edition, A Pragati Prakashan, 2007.
7. J.J.Sakurai, Modern Quantum Mechanics, Benjamin Cummings, 1985.
8. R.P. Feynman, R.B.Leighton and M.Sands, The Feynman Lectures on Physics, Vol.3, Narosa Publishing House, 1992.

ELECTIVE

PAPER - 1

(to choose 1 out of 3)

A. ELECTRONIC DEVICES AND APPLICATIONS

UNIT-I: Fabrication of IC and logic families

Fabrication of IC - Monolithic integrated circuit fabrication - pressure transducers - Monolithic RMS Voltage measuring device - Monolithic voltage regulators - Integrated circuit multipliers - Integrated circuit logic - Schottky TTL - P and N-MOS Logic - CMOS Logic - Tristate logic circuits.

UNIT-II: Opto electronic devices

Light sources and Displays - Light emitting diodes - Surface emitting LED - Edge Emitting LED - Seven segment display - LDR - Diode lasers - Photo detectors - Basic parameters - Photo diodes - p-i-n Photo diode - Solar cells - Photo transistors - IR and UV detectors.

UNIT-III: 555 Timer and applications

555 Timer - Description - Monostable operation - Frequency divider - Astable operation - Schmitt trigger - Phase Locked Loops - Basic principles - Analog phase detector - Voltage Controlled Oscillator - Voltage to Frequency conversion – temperature coefficient of resistance using IC 555 - PLL IC 565 - Description - Lock-in range - Capture range - Application - Frequency multiplication.

UNIT-IV: Op-amp applications

Instrumentation amplifier - V to I and I to V converter - Op-amp circuits using diodes - Sample and Hold circuits - Log and Antilog amplifiers - Multiplier and Divider - Electronic analog Computation solving simultaneous and differential equation- Schmitt Trigger - Astable, Monostable Multivibrator – Triangular wave generator - Sine wave generator - Active filters – Low, High and Band pass first and second order Butterworth filters – wide and narrow band reject filters.

UNIT-V: Pulse and digital Communication

Pulse communications - Introduction - Types - Pulse-Amplitude Modulation (PAM) - Pulse Time Modulation (PTM) : Pulse Width Modulation (PWM) - Pulse Position Modulation (PPM) - Pulse Code Modulation (PCM) - Principles of PCM - Quantizing noise - Generation and Demodulation of PCM - Effects of Noise - Advantages and applications of PCM - Pulse systems - Frequency-Shift keying - Digital communication - Modem classification - Modes of modem operation - Modem interconnection - Modem interfacing.

Books for Study:

1. S.M. Sze, Semiconductor Devices - Physics and Technology, Wiley, New York, 1985.
2. Millman and Halkias, Integrated Electronics, McGraw-Hill, New Delhi.
3. R.A. Gaekwad, Op-Amps and integrated circuits EEE, 1994.
4. Taub and Shilling, Digital Integrated Electronics, McGraw-Hill, New Delhi, 1983.
5. J. Millman, Digital and Analog Circuits and Systems, McGraw-Hill, London, 1979.
6. George Kennedy, Electronic communication systems 3rd Edition, McGraw-Hill, London, 1987.
7. G.S.N. Raju, Electronic Devices and Circuit , I.K. International Publishing House Pvt. Ltd., New Delhi, 2010.

Books for Reference:

1. R.F. Coughlin and F.F, Driscol, Op-Amp and linear integrated circuits, Prentice Hall of India, New Delhi, 1996.
2. M.S.Tyagi, Introduction to Semiconductor Devices, Wiley, New York.
3. P. Bhattacharya, Semiconductor Optoelectronic Devices, 2nd Edition, Prentice-Hall of India, New Delhi, 2002.
4. Deboo/ Burrous, Integrated circuits and semiconductor Devices – Theory and application, McGraw-Hill, New Delhi, 1985.
5. D. Roy Choudhury, Linear integrated circuits, Wiley Eastern, New Delhi, 1991.
6. Ramakant Gaekwad, Operational amplifiers, Wiley Eastern, New Delhi, 1981.
7. Louis E. Fresnel, Communication Electronics : principles and Applications, TMH Pub. Co., Ltd, 2002.

PAPER – 1

B. ELECTRONIC INSTRUMENTATION

UNIT-I : Transducers

Classification of Transducers - Principle, construction and working of Thermistor - LVDT, Electrical strain gauges and capacitive transducers, Photoelectric transducer, Piezoelectric transducer - Measurement of non-electrical quantities - Strain, Displacement, temperature, Pressure, Magnetic fields, vibration, optical and particle detectors.

UNIT-II: Digital Instrumentation

Principle, block diagram and working of Digital frequency counter, digital multimeter, digital pH meter, digital conductivity meter and digital storage oscilloscope.

UNIT-III: Analytical Instrumentation

Principle, block diagram, description, working and applications of UV-VIS spectrometer, IR spectrometer, Flame emission spectrometer and ICP - AES spectrometer - Basic concepts of Gas and Liquid Chromatography.

UNIT-IV: Bio-Medical Instrumentation

Physiological transducers to measure blood pressure, body temperature - Sources of Bio-electric potentials - resting potential, action potential, bio-potential electrodes - Principle, block diagram and operation of ECG and EEG - recorders.

UNIT-V: Computer Peripherals

Printers - Printer mechanism – Classification - Dot matrix, Ink jet and laser printers - Basic concepts of key board and mouse. Mass data storage - Hard Disk - Optical disk (CD) – DVD –Blueray disc – Universal Serial Bus (USB).

Books for Study:

1. Dr.Rajendra Prasad, Electronic Measurements and Instrumentation, Khanna Publications.
2. S.Ramabhadran, Electronic Measurements and Instrumentation Khanna Publications.
3. Leslie Cromwell fred J. Weibell, Erich A. Pfeiffer, Biomedical Instrumentation and Measurements 2nd Edition, Prentice –Hall of India Private Ltd, New Delhi, 2010.

Books for Reference:

1. S.M. Dhir, Electronics and Instrumentation, Khanna Publishers, Khandpur.
2. Albert D.Heltrick, William D. Cooper, Modern Electronics Instrumentation and measurement Techniques, PHI, New Delhi.

PAPER – 1

ELECTRONICS COMMUNICATION SYSTEMS

UNIT I- Signal Encoding Techniques

Antennas: types-Propagation modes – line of sight transmission- fading in the mobile environment – signal encoding techniques: criteria- ASK – FSK – BFSK – MFSK – PSK – BPSK – QPSK –multilevel PSK – AM modulation – Angle modulation – PCM – delta and adaptive delta modulation.

UNIT II – Coding and Error Control

Error detection – Parity check – cycle redundancy check – block error correction codes – hamming code – cyclic codes – BCH code – reed – Solomon codes – block interleaving – convolution codes – decoding – turbo coding – automatic repeat request – flow control – error control.

UNIT III – Satellite Communication

Satellite parameters and configurations – Satellite orbits – GEO – MEO – LEO – frequency bands – transmission impairments – Satellite foot print – atmospheric attenuation – satellite network – configuration – capacity allocation – multiplexing : FDM and TDM.

UNIT IV – Cellular wireless networks

Principles of cellular networks : Organization – frequency reuse – operation – mobile radio propagation effects – hand-off – power control – traffic engineering – first generation analog – AMPS – second generation – TDMA – mobile wireless TDMA design consideration – CDMA – mobile wireless CDMA design considerations – Soft handoff –IS 95 – Third generation systems – wireless local loop.

UNIT V – Wireless LANS

Overview: Wireless LAN applications, requirements and technology – Infrared LANS – spread spectrum LANS – narrow band microwave LANS – IEEE 802 architecture – IEEE 802.11 architecture.

Book for study:

1. William Schweber, Electronic Communication Systems, Complete Course Pearson Pub, 2011.
2. George Kennedy, Electronic Communication Systems, 3rd Edition, Tata McGraw-Hill Edition, New Delhi, 2008.

Book for References:

1. William Stallings, Wireless communications and Networks, Pearson education, Asia, 2002.
2. Robert J. Schoen beck, Electronic communications, modulation and transmission PHI, 1999.
3. P. Gnanasivam, Telecommunication switching and networks, PHI, 2004.

SEMESTER II

PAPER-4

MATHEMATICAL PHYSICS II

UNIT-I: Complex Variables

Functions of a complex variable – Single and multi valued functions - Analytic functions - Cauchy Riemann conditions – Singular points - Cauchy's integral theorem and formula - Taylor and Laurent expansions – Zeros and poles - Residue theorem - applications to evaluation of definite integrals.

UNIT –II: Partial differential equations

Laplace's equations – solutions of Laplace's Equations using cylindrical and spherical harmonics – Diffusion equation (Fourier equation of heat flow) – solutions of two and three dimensional heat flow - Wave equations – D' Alembert's solution - Interpretation - Vibrations of a rectangular membrane – Normal modes in three dimensions.

UNIT – III Laplace and Fourier Transforms

Laplace transforms: solution of linear differential equations with constant Coefficients – Fourier integral. Fourier transforms: Fourier sine and cosine transforms – Convolution theorems – Applications.

UNIT-IV: Group Theory

Definition of groups, subgroups and conjugate classes - Symmetry elements, Transformation, Matrix representation - Point groups - representation of a group - Reducible and irreducible representations - Orthogonality theorem - character of a representation - character Table C_{2v} and C_{3v} – Application to IR and Raman active vibrations of XY_3 molecules - Symmetry rotations SO(2) and SO(3) groups - Symmetry Unitary SU(2) and SU(3) groups.

UNIT –V Relativity

Relativistic mass-energy and momentum-energy relation – Relativistic Doppler effect – Velocity addition formula and its criticism - Relativistic Lagrangian and Hamiltonian for a particle – Minkowski's Space – four vectors – space-time and energy-momentum four vectors – centre of mass system for two relativistic particles – Invariance of Maxwell's field equations.

Books for Study:

1. P.K. Chattopadhyay, Mathematical Physics Wiley Eastern, Madras, 1990.
2. G. Arfken and H.J. Weber, Mathematical Methods for Physicists, 5th Edition, Harcourt, New Delhi, 2001.
3. M.D. Greenberg, Advanced Engineering Mathematics, 2nd Edition, International Ed., Prentice - Hall International, New Jersey, 1998.
4. E. Kreyszig, Advanced Engineering Mathematics, 8th Edition Wiley, New York, 1999.
5. B.D. Gupta, Mathematical Physics, Vikas publishing house 3rd Edition, New Delhi, 2006.
6. Satyaprakash, Mathematical Physics, Sultan Chand & sons, New Delhi, 2004.
7. F.A. Cotton, Chemical Application of Group Theory 3rd Edition, John Wiley and Sons, New York.
8. A.W. Joshi, Elements of group Theory for Physicists, 4th Edition, New Age International, New Delhi, 1997.
9. R.Resnick, Introduction to special theory of Relativity.
10. D.Rindler, Special Theory of Relativity, Oxford University Press, 1982.

Books for Reference:

1. Schaum's outline series, McGraw Hill, (i) Complex Variables, (ii) Laplace Transforms, (iii) Group Theory, (iv) Differential equations,1964.
2. P.R Halmos, Finite dimensional Vector Spaces, 2nd Edition. Affiliated East - West, New Delhi, 1965.
3. M. Hamermesh, Group Theory and Its application to Physical Problems Addison Wesley, London, 1962.
4. C.R. Wylie and LC. Barrett, Advanced Engineering Mathematics, 6th Edition., International Edition. McGraw Hill, New York, 1995.
5. P.K. Chakrabarti and S.N. Kundu, A Text Book of Mathematical Physics, New Central Book Agency, Kolkata, 1996.
6. A.K. Ghatak, I.C. Goyal and S.H. Chua, Mathematical Physics Macmillan India, New Delhi, 2002.

PAPER-5

ELECTROMAGNETIC THEORY AND PLASMA PHYSICS

UNIT I: Electrostatics

Laplace and Poisson equations – Boundary value problems - boundary conditions and uniqueness theorem – Laplace equation in three dimensions– Solution in Cartesian and spherical polar co ordinates – Examples of solutions for boundary value problems - Polarization and displacement vectors - Boundary conditions - Dielectric sphere in a uniform field – Molecular polarisability and electrical susceptibility –Langevin Theory of Polar molecules - Electrostatic energy in the presence of dielectric – Multipole expansion.

UNIT II: Magnetostatics

Biot-Savart Law - Ampere's circuital law - Magnetic vector potential and magnetic field of a localised current distribution - Magnetic moment, force and torque on a current distribution in an external field - Magnetostatic energy - Magnetic induction and magnetic field in macroscopic media - Boundary conditions - Uniformly magnetised sphere.

UNIT III: Maxwell Equations

Faraday's laws of Induction - Maxwell's displacement current - Maxwell's equations – free space and linear isotropic media - Vector and scalar potentials - Gauge invariance - Wave equation and plane wave solution- Coulomb and Lorentz gauges - Energy and momentum of the field - Poynting's theorem - Lorentz force - Conservation laws for a system of charges and electromagnetic fields.

UNIT IV: Electromagnetic Waves

Plane waves in non-conducting media - Linear and circular polarization, reflection and refraction at a plane interface- Fresnel’s law, interference, coherence and diffraction - Waves in a conducting medium - Propagation of waves in a rectangular wave guide - Inhomogeneous wave equation and retarded potentials - Radiation from a localized source - Oscillating electric dipole.

UNIT V: Elementary Plasma Physics

The Boltzmann Equation - Simplified magneto-hydrodynamic equations - Electron plasma oscillations - The Debye shielding problem - Plasma confinement in a magnetic field - Magneto-hydrodynamic waves - Alfven waves and magnetosonic waves.

Books for Study:

1. D.J. Griffiths, Introduction to Electrodynamics, 3rd Edition, Prentice-Hall of India, New Delhi, 2002.
2. J.R. Reitz, F. J. Milford and R. W. Christy, Foundations of Electromagnetic Theory, 3rd edition, Narosa Publication, New Delhi, 1986.
3. J. D. Jackson, Classical Electrodynamics, Wiley Eastern Ltd. New Delhi, 1975.
4. J. A. Bittencourt, Fundamentals of Plasma Physics, Pergamon Press, Oxford, 1988.
5. P.Lorrain, D.Corson, Electromagnetic fields and waves, CBS Publishers and distributors, 1986.

Books for Reference:

1. W. Panofsky and M. Phillips, Classical Electricity and Magnetism, Addison Wesley, Lodon, 1962.
2. J. D. Kraus and D. A. Fleisch, Electromagnetics with Applications, 5th Edition, WCB McGraw-Hill, New York, 1999.
3. B. Chakraborty, Principles of Electrodynamics, Books and Allied, Kolkata, 2002.
4. R. P. Feynman, R. B. Leighton and M. Sands, The Feynman Lectures on Physics, Vols. 2, Narosa, New Delhi, 1998.

PAPER-6

QUANTUM MECHANICS II

UNIT-I: Scattering Theory

The scattering problem - formulation –cross sections - Scattering amplitude – Greens function approach - Born approximation and its validity - Partial wave analysis - optical theorem - Phase shifts - Scattering length and effective range - Low energy scattering - Transformation from centre of mass to laboratory frame.

UNIT-II: Perturbation Theory

Time dependent perturbation theory - Constant and harmonic perturbations - Transition probabilities – Fermi-Golden rule - Selection rules for dipole radiation - Adiabatic approximation - Sudden approximation - The density matrix - spin density matrix and magnetic resonance - Semi classical treatment of an atom with electromagnetic radiation.

UNIT-III: Relativistic Quantum Mechanics

Klein-Gordon equation - Failures - Dirac equation - Plane - wave solutions - Interpretation of negative energy states - Antiparticles - Spin of electron - Magnetic moment of an electron due to spin - Energy values in a coulomb potential.

UNIT-IV: Dirac equation

Covariant form of Dirac equation - properties of gamma matrices - Traces -Separation of the equation and the Hydrogen atom problem - Invariance of Dirac equation under Lorentz transformation - T-Transformation for the Dirac equation in presence of electromagnetic field.

UNIT-V: Quantisation of Fields

Relativistic Lagrangian and Hamiltonian of a charged particle in an electromagnetic field - The Lagrangian and Hamiltonian formulations of field – Quantum equation for the field - Second quantization of Klein-Gordon field - creation and annihilation operators - Commutation relations - Quantization of electromagnetic field - Quantization of Schroedinger's field - Quantization of Dirac field.

Books for Study:

1. P.M. Mathews and K. Venkatesan, A Text book of Quantum Mechanics, Tata Mc Graw-Hill, New Delhi, 1976.
2. L.I. Schiff, Quantum Mechanics, 3rd Edition, International Student Edition, McGraw-Hill, Kogakusha, Tokyo, 1968.
3. E. Merzbacher, Quantum Mechanics, 2nd Edition, John Wiley and Sons, NewYork, 1970.
4. J.D. Bjorken and S.D. Drell, Relativistic Quantum Mechanics, McGraw-Hill, New York, 1964.
5. V. Devanathan, Quantum Mechanics, Narosa Publishing House, New Delhi, 2005.
6. P.A. M. Dirac, The Principles of Quantum Mechanics, Oxford University Press, London, 1973.
7. B.K. Agarwal, Quantum Mechanics and Field Theory, Lokbharti Publications, India, 1976.
8. Amitabha Lahiri and B.G. Pal, A First Book of Quantum Field Theory, Narosa Publications, New Delhi, 2005.

Books for Reference:

1. V.K. Thankappan Quantum Mechanics, 2nd Edition, Wiley Eastern Ltd, New Delhi, 1985,.
2. V. Devanathan, Angular Momentum Techniques in Quantum Mechanics, Kluwer Academic Publishers, Dordrecht, 1999.
3. L.D. Landau and E.M. Lifshitz, Quantum Mechanics, Pergomon Press, London, 1958.
4. J.S. Bell, Gottfried, M. Veltman, The Foundations of Quantum Mechanics, World Scientific, 2001.
5. G. Aruldhas, Quantum Mechanics, Prentice-Hall of India, New Delhi, 2002.
6. Claude Itzykson, Isau Bernard Zuber, Quantum Field Theory, McGraw-Hill International Edition, 1987.
7. Leslie E. Vallentine, Quantum Mechanics - A Modern Development, World Scientific Publications Pvt. Ltd, Singapore, 1998.

MAIN PRACTICAL
PAPER-1

GENERAL EXPERIMENTS

(Any 15 out of the given 25)

1. Cornu's method - Young's modulus by elliptical fringes.
2. Cornu's method - Young's modulus by hyperbolic fringes.
3. Determination of Stefan's constant.
4. Band gap energy - Thermistor.
5. Hydrogen spectrum - Rydberg's constant.
6. Co-efficient of linear expansion - Air wedge method.
7. Permittivity of a liquid using RFO.
8. Viscosity of liquid - Meyer's disc.
9. Solar spectrum - Hartmann's Interpolation formula
10. F.P. Etalon – spectrometer – determination of spacing between two plates
11. Iron / Copper arc spectrum.
12. Brass / Alloy arc spectrum.
13. B-H loop using Anchor ring.
14. Specific charge of an electron -Thomson's method / Magnetron method.
15. Electrical resistance of a metal / alloy as a function of temperature by four probe method
16. Edser and Butler fringes - Thickness of air film.
17. Spectrometer - Polarisability of liquids.
18. Spectrometer - Charge of an electron.
19. Determination of strain hardening co-efficient.
20. Thickness of the enamel coating on a wire - by diffraction.
21. Lasers: Study of laser beam parameters.
22. Measurement of Numerical aperture (NA) of a telecommunication graded index optic fiber.
23. Fiber attenuation of a given optical fiber.
24. Determination of solar constant.
25. Biprism - Wavelength of monochromatic source - Refractive Index of a liquid.

MAIN PRACTICAL

PAPER-2

ELECTRONICS EXPERIMENTS

(Any 20 out of the given 25)

1. FET as amplifier – frequency response, input impedance and output impedance.
2. Switching and power control using SCR and Triac.
3. Op-amp - Inverting, Non-inverting amplifier - Voltage follower - summing, difference, average amplifier - differentiator and integrator.
4. Op-amp - Study of the attenuation characteristics and design of the phase-shift Oscillator.
5. Op-amp - Study of the attenuation characteristics and design of the Wien Bridge Oscillator.
6. Op-amp - Solving simultaneous equations
7. Op-amp - Design of square wave, saw tooth wave, and Triangular wave generators.
8. Op-amp - Design of Schmitt Trigger and construction of Monostable multivibrator.
9. Op-amp - Design of active filters - second order - low pass, high pass, band pass and band reject.
10. Op-amp – 4 bit D/A converter - Binary weighted method and R-2R ladder method.
11. Arithmetic operations (Adder/ Subtractor) Using IC 7483.
12. Study of (i) Multiplexer using IC 74150 for the generation of Boolean functions and
    (ii) Demultiplexer using IC 74154
13. IC 7490 -as modulus counters and display using IC-7447
14. Up-down counters - Design of modulus counters.
15. IC 7476 - 4 bit Shift Register - Ring counter and Johnson counters.
16. IC 555 - Astable multivibrator and Voltage Controlled Oscillator.
17. IC 555 - Monostable multivibrator, Frequency Divider.
18. IC 555 - Schmitt Trigger and Hysteresis.
19. Temperature co-efficient of resistance using 555 timer.
20. Instrumentation Amplifier - using IC 741.
21. Pulse width modulator using IC 741.
22. A/D converter using comparator LM 339.
23. Phase Locked Loop.
24. Study of arithmetic and logical operations using IC74181
25. Study of A/D converters – 4 bit simultaneous A/D converter and successive approximation A/D converter using ADC IC 0801/IC 0804.

ELECTIVE
PAPER-2
(to choose 1 out of 3)

A. NANO SCIENCE

UNIT -I: NANOSCALE SYSTEMS

Introduction to Nanoscale – Size-Dependent properties - Size effect - surface tension, wettability - specific surface area and surface area to volume ratio – Reason for change in optical properties, electrical properties and mechanical properties – nanoscale catalysis - Principles of Top-Down and Bottom-Up approaches.

UNIT –II: SYNTHESIS OF NANOSTRUCTURE MATERIALS

Gas phase condensation – Vacuum deposition -Physical vapor deposition (PVD) - chemical vapor deposition (CVD) - Sol-Gel- Ball milling –spray pyrolysis – plasma based synthesis process (PSP) - hydrothermal synthesis - Etching technologies: wet and dry etching - photolithography – Drawbacks of optical lithography for nanofabrication - electron beam lithography – ion beam lithography - dip-pen nanolithography.

UNIT –III: QUANTUM DOTS

Quantum confinement - Excitons and excitonic Bohr radius – difference between nanoparticles and quantum dots - Preparation through colloidal methods - Epitaxial methods- MOCVD and MBE growth of quantum dots - current-voltage characteristics - magneto tunneling measurements - Absorption and emission spectra of quantum dots - photo luminescence spectrum.

UNIT IV: CHARACTERIZATION:

Nano SEM - Scanning Conducting microscopy (SCM) - High-resolution Transmission Electron Microscopy (HRTEM) - single nanoparticle characterization –Scanning capacitance microscopy. Principle and working of Atomic Force Microscopy (AFM) and Scanning tunneling microscopy (STM) – Principle of Transmission Electron Microscopy (TEM) – applications to nanostructures – nanomechanical characterization – nanoindentation.

UNIT V: APPLICATIONS OF NANOTECHNOLOGY:

Nanodiodes, Nanoswitches, molecular switches, Nano-logic elements - Single electron transistors - small metallic tunnel junctions - nanoparticles based solar cells and quantum dots based white LEDs – CNT based transistors –Surface acoustic wave (SAW) devices, microwave MEMS, field emission display devices, - Super hard nanocomposite coatings and applications in tooling - Biochemistry and medical applications: lab-on-a-chip systems. Nanoboat –nanosubmarines - DNA engineering.

Books for study:

1. S. Shanmugam,Nanotechnology TBH Edition.
2. T. Praddetp, Nano- the essential, Mc graw hill education, Chennai.
3. De Jongh J, Physics and Chemistry of Metal cluster components, Kulwer academic publishers, Dordrecht, 1994.
4. enneth J. Klabunde, Nanoscale Materials in Chemistry, KWiley & Sons, Publcn, 2001.
5. Dexler E, Nanosystems, John Wiley, CNY, 1992.
6. Sulabha K.Kulkarni, Nanotechnology: Principles and Practices, Capital Publishing company.
7. M.A.Shah, Principles of Nanoscience and Nanotechnology, Tokeer Ahmad.

Books for references:

1. Nanotechnology, AIP Press, Springer-Verlag, Gregory Timp editor, New York, , 1999.
2. N. JohnDinardo, Nanoscale characterization of surfaces & interfaces, 2nd Edition, Weinheim Cambridge: Wiley-VCH, 2000
3. Jan Korvink & Andreas Greiner, Semiconductors for micro and nanotechnology-An introduction for engineers, Weinheim Cambridge: Wiley-VCH, 2001.
4. W. Kamliu et. al Nanomaterials and mechanics, John Wiley.
5. Hand Book of Nanosciene, Engineering and Technology – The Electrical Engineering handbook series.

PAPER-2

B. FIBRE OPTICS

Unit I: Linear, nonlinear waves and Maxwell's equations

Simple pendulum – small and large oscillations – Duffing oscillator – Linear and nonlinear medium - Maxwell's equations – Electromagnetic waves phase and group velocity, modes in a planar and cylindrical wave guides – polarization - dielectric susceptibility – first and higher order susceptibilities.

Unit II: Optical fiber waveguides and sources

Ray theory transmission: Total internal reflection, acceptance angle, numerical aperture and skew rays –- evanescent field and Goos-Haechen shift – step index and graded index fibers – single and multi-mode fibers.

Sources: LED - Lasers – mode locked Lasers - modulation capability- transient response -semiconductor losses - diode structure and threshold conditions – modulation – temperature effects – source linearity and reliability – Photo detectors – PIN Photo detector – avalanche photodiode.

Unit III: Transmission characteristics of optical fibers

Attenuation – material absorption losses in silica fibers – linear and nonlinear scattering losses – fiber bend loss – mid-infrared and far-infrared transmission – intramodal and intermodal dispersion – overall fiber dispersion in multimode and single-mode fibers – modal birefringence.

Unit IV: Fabrication and connection of optical fibers

Glass fibers - Preparation of optical fibers – Liquid-phase (melting) and Vapour-phase deposition techniques – characteristics of single-mode, multimode, plastic-clad and all-plastic fibers - Stability of the Fiber Transmission Characteristics: Micro bending and hydrogen absorption – fiber alignment and joint loss – fiber splices – Fiber connectors: cylindrical ferrule expanded beam connectors - Fiber couplers: Three and four port couplers - star couplers.

Unit V: Nonlinear effects in fiber and solitons in optical fiber communication

Refractive index – frequency and intensity dependent refractive index – group velocity dispersion – self-phase modulation - Kerr effect – chirping - stimulated Raman scattering – stimulated Brillouin scattering – self-steepening – self-focusing – self-defocusing –

concept of solitons – formation of solitons – kdV equation - Nonlinear Schrödinger equation for solitons – soliton switching – soliton laser- advantages of soliton based communication.

Books for study:

1. Ajoy Ghatak and K. Thyagarajan, Introduction to fiber optics, 6th Edition, Cambridge University press, 2006.
2. John M. Senior, Optical fiber communications: Principles and practice, 2nd edition , PHI.
3. Govind P. Agrawal, Fiber-Optic communication systems, John Wiley, 2003.
4. Waves called solitons: concepts and experiments, Springer Verlag, 1992.
5. Gerd Keiser, Optical fiber communications,5th edition, McGra-Hill Education Pvt. Ltd., New Delhi, 2013.

Books for reference:

1. B.B. Laud,Lasers and Non-Linear optics, New Age International, New Delhi.
2. Akira Hasegawa and Yujiodama, Solitons in optical communications, oxford Press, 1995.
3. Robert W Boyd, Nonlinear fiber optics, 2nd Edition, Elsevier, 2006.

PAPER-2

C. NON LINEAR OPTICS

Unit I: Lasers

Gas lasers – He-Ne, Az + ion lasers – Solid state lasers – Ruby – Nd: YAG, Ti Sapphire – Organic dye laser – Rhodamine – Semiconductor lasers – Diode laser, p-n-junction laser, GaAs Laser.

Unit II: Introduction to Nonlinear Optics

Refractive index – frequency dependent and intensity dependent refractive index - Wave propagation in an anisotropic crystal – Polarization response of materials to light – Second harmonic generation – Sum and difference frequency generation – Phase matching –four wave mixing - Third harmonic generation – self focusing – Parametric amplification – bistability.

Unit III: Multiphoton Processes

Two photon process – Theory and experiment – Three photon process parametric generation of light – Oscillator – Amplifier – Stimulated Raman scattering – Intensity dependent refractive index optical Kerr effect – photorefractive, electron optic effects.

Unit IV: Nonlinear Optical Materials

Basic requirements – Inorganics – Borates – Organics – Urea, Nitro aniline – Semi organics –Thiourea complex – X-ray diffraction, FTIR and FT-NMR qualitative study – Kurtz test – Laser induced surface damage threshold.

Unit V: Fiber Optics

Step – Graded index fibers – wave propagation – Fiber modes – Single and multimode fibres – Numerical aperture – Dispersion – Fiber bandwidth – Fiber loss – Attenuation coefficient – Material absorption-Bending Losses, inverse square law losses-core and cladding losses.

Books for study:

1. Subir kumar Sarkar, Optical fibers and fiber Optic communication system, S. Chand & company Ltd, New Delhi.
2. D.L. Mills, Nonlinear Optics – Basic Concepts Springer, Berlin, 1998.

Books for Reference

1. B.B. Laud, Lasers and Nonlinear Optics, 2nd Edition, New Age International (P) Ltd., New Delhi, 1991.
2. Robert W. Boyd, Nonlinear Optics, 2nd Edition, Academic Press, New York, 2003
3. Govind P. Agarwal, Fiber-Optics Communication Systems, 3rd Edition, John Wiley & Sons, Singapore, 2003.
4. William T. Silvast, Laser Fundamentals, Cambridge University Press, Cambridge 2003.

SEMESTER III

PAPER-7

SPECTROSCOPY

UNIT-I: Microwave spectroscopy

Pure rotational spectra of diatomic molecules - Polyatomic molecules - Study of linear molecules and symmetric top molecules - Hyperfine structure and quadruple moment of linear molecules - Experimental techniques - Molecular structure determination - Stark effect - inversion spectrum of ammonia - Applications to chemical analysis.

UNIT-II: Infrared spectroscopy

Vibrational spectroscopy of diatomic and simple polyatomic molecules - Harmonic Oscillator - Anharmonic Oscillator - Rotational vibrators - Normal modes of vibration of Polyatomic molecules - Experimental techniques - Applications of infrared spectroscopy - H_2O and N_2O molecules - Reflectance spectroscopy.

UNIT-III: Raman Spectroscopy

Classical theory of Raman Scattering - Raman effect and molecular structure - Raman effect and crystal structure - Raman effect in relation to inorganic, organic and physical chemistry - Experimental techniques - Coherent anti-Stokes Raman Spectroscopy - Applications of infrared and Raman spectroscopy in molecular structural confirmation of water and CO_2 molecules - Laser Raman Spectroscopy.

UNIT-IV: NMR and NQR Spectroscopy

Theory of NMR - Bloch equations - Steady state solution of Bloch equations - Theory of chemical shifts - Experimental methods - Single Coil and double coil methods - Pulse Method - High resolution method - Applications of NMR to quantitative measurements. Quadruple Hamiltonian of NQR - Nuclear quadruple energy levels for axial and non-axial symmetry - Experimental techniques and applications.

UNIT-V: ESR and Mossbauer Spectroscopy

Quantum mechanical treatment of ESR - Nuclear interaction and hyperfine structure - Relaxation effects - Basic principles of spectrographs - Applications of ESR method - Mossbauer Effect - Recoillness emission and absorption - Mossbauer spectrum – Experimental methods - Mossbauer spectrometer - Hyperfine interactions - Isomer shift - Magnetic hyperfine interactions - Electric quadruple interactions - Simple biological applications.

Books for Study:

1. C.N. Banwell, E.M. Mc Cash, Fundamentals of Molecular Spectroscopy, 4th Edition, Tata McGraw-Hill Publications, New Delhi, 1994.
2. G. Aruldas, Molecular Structure and Spectroscopy, Prentice - Hall of India Pvt.Ltd., New Delhi, 2001.
3. D.N. Satyanarayana, Vibrational Spectroscopy and Applications, New Age International Publications, New Delhi, 2004.
4. Raymond Chang, Basic Principles of Spectroscopy, Mc Graw-Hill Kogakusha, 1980.

Books for Reference:

1. Straughn and Walker, Spectroscopy, Vol I &II Chapman and Hall, 1967.
2. Atta Ur Rahman, Nuclear Magnetic Resonance, Spinger Verlag, New York, 1986.
3. Towne and Schawlow, Microwave Spectroscopy, McGraw-Hill, New York, 1995.
4. Raymond Chang, Basic Principles of Spectroscopy, Mc Graw-Hill, Kogakusha, Tokyo, 1980.
5. D.A. Lang, Raman Spectroscopy, Mc Graw-Hill International, New York.
6. John Ferraro, Introductory Raman Spectroscopy, Academic Press, New York, 2008.
7. Raj kumar, Atomic and Molecular Spectra: Laser, Kedar Nath Ram Nath, Meerut, New Delhi, 2015.

PAPER-8

NUCLEAR AND PARTICLE PHYSICS

UNIT I: Nuclear Interactions

Nuclear forces – Exchange forces - Two body problem – Ground state of deutron - Magnetic moment – Quardrupole moment - Tensor forces – Nucleon – Nucleon interaction –Meson theory of nuclear forces – Nucleon-Nucleon scattering – Effective range theory – Spin dependence of nuclear forces – Charge independence and charge symmetry of nuclear forces – Isospin formalism.

UNIT II: Nuclear Reactions

Types of reactions and conservation laws – Energetics of nuclear reactions –Dynamics of nuclear reactions – Q-value equation – Scattering and reaction cross sections – Compound nucleus reactions – Direct reactions – Resonance scattering – Breit-Wigner one level formula.

UNIT III: Nuclear Models

Liquid drop model – Bohr-Wheeler theory of fission – Experimental evidence for shell effects – Shell model – Spin-orbit coupling - Magic numbers – Angular momenta and parities of nuclear ground states – Qualitative discussion and estimate of transition rates – Magnetic moments and Schmidt lines – Collective model of Bohr and Mottelson.

UNIT IV: Nuclear Decay

Beta decay – Fermi theory of beta decay – Shape of the beta spectrum – Total decay rate - Mass of the neutrino – Angular momentum and parity selection rules – Allowed and forbidden decays – Comparative half-lives – Neutrino physics – Non-conservation of parity – Gamma decay – Multipole transitions in nuclei – Angular momentum and parity selection rules – Internal conversion – Nuclear isomerism.

UNIT V: Elementary Particle Physics

Types of interaction between elementary particles – Hadrons and leptons – Symmetries and conservation laws – Elementary ideas of CP and CPT invariance – Classification of hadrons – SU(2) and SU(3) multiplets –- Gell-Mann-Okubo mass formula for octet and decuplet hadrons – Quark model- Types of quarks.

Books for study:

1. K. S. Krane, Introductory Nuclear Physics, Wiley, New York, 1987.
2. D. Griffiths, Introduction to Elementary Particle Physics, Harper & Row, New York, 1987.
3. R. R. Roy and B.P. Nigam, Nuclear Physics, New age Intl. New Delhi, 1983.
4. M.L. Pandya and R.P.S. Yadav, Elements of Nuclear Physics 7th Edition, Kedar Nath Ram Nath, Delhi, 1995.
5. D.C. Tayal, Nuclear Physics, 5th Edition, Himalaya Publishing House, Bombay, 1997.
6. R. C. Sharma, Nuclear physics, Kedar Nath & Co, Meerut.

Books for reference:

1. H. A. Enge, Introduction to Nuclear Physics, Addison-Wesley, Tokyo, 1983.
2. Y. R. Waghmare, Introductory Nuclear, Physics, Oxford-IBH, New Delhi, 1981.
3. Ghoshal, Atomic and Nuclear Physics, Vol. 2
4. J. M. Longo, Elementary particles, McGraw-Hill, New York, 1971.
5. R. D. Evans, Atomic Nucleus, McGraw-Hill, New York, 1955.
6. I. Kaplan, Nuclear Physics, Narosa, New Delhi, 1989.
7. B. L. Cohen, Concepts of Nuclear Physics, TMH, New Delhi, 1971.
8. M. K. Pal, Theory of Nuclear Structure, Affl. East-West, Chennai, 1982.
9. W. E. Burcham, M. Jobes, Nuclear and Particle Physics, Addison-Wesley, Tokyo, 1995.

PAPER-9

MICROPROCESSOR AND MICROCONTROLLER

UNIT-I: 8085 Architecture and Programming

8085 Architecture - Programmer's model - ALU - Registers and Flags - Stacks - Complete instruction set of Intel 8085 - State transition and timing diagrams - T States - Machine cycles - Instruction cycles - Timing diagram for memory read and memory write cycles - Addressing modes - Maskable and Non-maskable Interrupts - Assembly language programs – time delay subroutines and delay calculations.

UNIT-II: Interfacing Memory and I/O devices

Interfacing memory and devices – I/O and Memory mapped I/O – Simple polled I/O and Handshaking operations - Programmable keyboard / display interface 8279 - Programmable peripheral device 8255A - 8253 Timer Interface – DAC and ADC interface - Wave form generation (Sine, square, triangular and ramp wave) - Programmable communication interface 8251 (USART).

UNIT-III: Microcontroller 8051

Introduction – 8 and 16 bit Microcontroller families –Flash series – Embedded RISC Processor – 8051 Microcontroller Hardware – Internal registers – Addressing modes – Assembly Language Programming – Arithmetic, Logic, Sorting operations and BCD to binary and binary to BCD conversion.

UNIT IV: Interfacing I/O and Memory With 8051

Interfacing I/O Ports, External memory, counters and Timers - Serial data input/output, Interrupts – Interfacing 8051 with ADC, DAC, LED display, Keyboard, Sensors and Stepper motor.

UNIT V: Embedded Microcontroller

Embedded microcontroller system – types of embedded operating system – Micro chip PIC 16C6X /7X family – features – Architecture – Memory Organization – Register file map – I/O ports – Data and flash program memory – asynchronous serial port – Applications in communication and industrial controls.

Books for Study

1. R.S. Gaonkar, Microprocessor Architecture, programming and Application with the 8085, 3rd Edition, Penram International Publishing, Mumbai, 1997.
2. V.Vijayendran, Fundamentals of Microprocessor 8085 - Architecture, programming and interfacing, Viswanathan Publication, Chennai, 2002.
3. Kenneth J. Ayala – The 8051 Micro Controller Architecture, Programming and Applications. 3rd Edition , Penram International
4. John B. Peatman, Design with PIC Microcontrollers, 7th Indian reprint, Pearson Education, 2004.
5. K. V. Shibu, Introduction to Embedded System, Tata Mc Graw-Hill Education Private Limited , New Delhi.
6. Raj Kumar, Embedded System, Tata Mc Graw-Hill Education Private Limited, New Delhi.

Books for Reference

1. B. Ram, Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai publications, New Delhi.
2. R. Thiagarajan, S. Dhanasekaran, S.Dhanapal, Microprocessor and its applications, New Age International, New Delhi.
3. Muhammed Ali Mazidi, Janice Gillespie Mazidi, The 8051 Microcontroller and Embedded Systems, Fourth Indian Reprint, Pearson Education , 2004.
4. Raj Kamal, Introduction to Embedded Systems, TMS, 2002.

ELECTIVE

PAPER-3

(to choose 1 out of 3)

A. CRYSTAL GROWTH AND THIN FILMS

UNIT I: Nucleation and Growth

Nucleation – Different kinds of nucleation - Concept of formation of critical nucleus – Classical theory of nucleation - Spherical and cylindrical nucleus - Growth Kinetics of Thin Films – Thin Film Structure.

UNIT II: Growth Techniques

Solution Growth Technique: Low temperature solution growth: Solution - Solubility and super solubility – Expression of super saturation – Miers T-C diagram - Slow cooling and solvent evaporation methods - Constant temperature bath and crystallizer – Seed preparation and mounting.
Gel Growth Technique: Principle – Various types – Structure of gel – Liesegang rings - Importance of gel – Experimental procedure –Chemical reaction method – Single and double diffusion method — Advantages and disadvantages of gel method.

UNIT III: Melt Growth Techniques

Melt technique: Bridgman technique - Basic process – Various crucibles design - Thermal consideration –Vertical Bridgman technique –Crystal Pulling technique - Czochralski technique – Experimental arrangement – Growth process –Zone melting technique –Skull melting process –Verneuil Process.

UNIT IV: Thin Film Deposition Techniques

Thin Films – Introduction to Vacuum Technology - Deposition Techniques - Physical Vapour Deposition: Resistive Heating, Electron gun, Laser gun Evaporation and Flash Evaporations, Sputtering – D.C. Reactive Sputtering, RF Sputtering - Chemical vapour deposition (CVD): Spray Pyrolysis -– Preparation of Transparent Conducting Oxides.

UNIT V: Characterization Technique

X – Ray Diffraction (XRD) – Powder and single crystal - Fourier transform Infrared analysis (FT-IR) – Elemental analysis:Energy dispersive X-ray analysis (EDAX) – Scanning Electron Microscopy (SEM) – UV-Vis-NIR Spectroscopy – Etching (Chemical) – Vicker's Micro hardness –Dielectric studies – Second harmonic generation test.

Books for Study and Reference:

1. J.C. Brice, Crystal Growth Processes, John Wiley and Sons, New York, 1986.
2. P. SanthanaRagavan and P. Ramasamy, Crystal Growth Processes and Methods, KRU Publications, Kumbakonam, 2001.
3. A. Goswami, Thin Film Fundamentals, New Age International (P) Limited, New Delhi, 1996.
4. H.H. Willard, L.L. Merritt, J.A. Dean, F.A. Settle, CBS, Publishers and Distributors, New Delhi.
5. Douglas A. Skoog, James J. Leary, Principles of Instrumental Analysis, 4th Edition, Harcourt Brace College Publishers, New York, 1992.
6. B.D.Cullity, Elements of X-Ray Diffraction, 2nd Edition, Addison-Wesley Publishing Company, California, 1978.
7. Heniz K.Henisch, Crysals in Gels and Liesegang Rings, Cambridge University Press, Cambridge, 1988.
8. Anthony R.West, Solid State Chemistry and its Applications, John Wiley & Sons, NewYork, 2003.

PAPER 3

B. ADVANCED SPECTROSCOPY

UNIT I: UV Spectroscopy

Energy levels, Molecular orbitals – Theory of UV spectra – Franck Condon Principle – transition Probability, measurement of spectrum – Types of transition in Organic molecules – Types of absorption bands – transition in metal complexes – Selection rules – Electronic spectra in poly atomic molecules – Chromophore concept – Application of UV Spectroscopy.

UNIT II: Atomic absorption and Emission Spectroscopy

Atomic Absorption Spectroscopy (AAS): Principle of AAS– single beam Spectrophotometer –Applications of AAS - Atomic emission Spectroscopy – Principle of AES, Advantages - Instrumentation– Applications of AES –Difference between AAS and AES.

UNIT III: Surface Enhanced Raman Scattering (SERS) and FT Raman Spectroscopy

Surfaces for SERS study – Enhancement mechanism – Instrumentation and sampling techniques - Surface selection rules – SERS microprobe – SERS study of bio molecules – SERS in medicine –Use of Laser FT Raman Spectroscopy: Principle, Instrument, sample handling methods and applications.

UNIT IV: Surface Spectroscopy

Electron energy loss spectroscopy (EELS) – Reflectance Absorbance – IR spectroscopy (RAIRS) – Inelastic helium scattering – Photo electron spectroscopy (PES) – X ray photo electron spectroscopy (XPES).

UNIT V: Nonlinear Spectroscopic Phenomena

Nonlinear Raman phenomena – Hyper Raman effect – Experimental Technique – Stimulated Raman scattering – Inverse Raman effect – Photo acoustic Raman scattering – Multiphoton spectroscopy.

Books for study

1. N. Banwell and E. M. McCash, Fundamentals of Molecular Spectroscopy, 4th Edition, Tata Mc Graw-Hill, New Delhi, 1994.
2. G. Aruldhas, Molecular structure and spectroscopy, Prentice Hall of India Pvt. Ltd., New Delhi, 2001.
3. H.Kaur, Spectroscopy, 5th Edition, A Pragati Prakashan, 2009.
4. P. S. Sindhu, Molecular Spectroscopy, Tata Mc Graw-Hill, New Delhi, 1990.
5. D.N. Sathyanarayana, Vibrational Spectroscopy, New age International Publishers.

Books for Reference:

1. G. W. King, Spectroscopy and molecular structure, Hoit Rinchart and Winsten Inc, London, 1964.
2. T. A. Carlson, Photo electron and Auger spectroscopy, Plenum Press, 1975.
3. J . Loder, Basic Laser Raman spectroscopy, Hezdan and Son Ltd. , 1970.
4. T. P. Das, E. L. Hehn, NQR Spectroscopy, Academic Press, 1958.
5. Raymond Chang, Basic Principles of Spectroscopy Mc Graw-Hill Kogakusha, 1980.
6. Douglas A. Skoog, James J.Leary, Principles of Instrumental Analysis, 4th Edition, Harcourt Brace College Publishers, New York,1992.
7. Anthony R.West, Solid State Chemistry and its Applications, John Wiley & Sons, New York, 2003.
8. K.P. Rajappan Nair, Atomic spectroscopy MJP publication, Chennai.

PAPER-3

B. ADVANCED NUCLEAR PHYSICS

UNIT-I: Methods of investigating nuclear size

Classification of nuclei, nuclear size - methods to investigate nuclear size - Mesonic X-rays, Electron scattering, Coulomb energies of mirror nuclei, neutron scattering methods

UNIT-II: Discovery and Properties of neutron

Discovery of neutron, fundamental properties of neutron, neutron sources, - radioactive sources, Photo-neutron sources, accelerated particle sources – Detection of neutrons – General principles, slow neutron detectors by foil activation method, detection of fast neutrons by scintillation counter.

UNIT-III: Classification and interaction of neutron

Classification of neutrons according to energy, Neutron –electron interactions, slowing down of fast neutrons, slowing down time, slowing down density, resonance escape probability, neutron diffusion-solution to diffusion equation, diffusion of fast neutrons-Fermi-age equation

UNIT-IV: Reactor Physics

Condition of criticality of nuclear reactor, the critical equation and buckling, critical reactor dimensions, criticality of large thermal reactors- migration length, the reflector reactor, continuum theory of nuclear reactions, optical model theory of nuclear reactions, photo-nuclear reactions.

UNIT-V: Nuclear fusion: Thermonuclear energy

Nuclear fusion, the fusion reaction, thermonuclear reactions, sources of stellar energy, controlled thermonuclear reactions, the possibility of fusion reactor, cold fusion and transuranic elements.

Books for Study and Reference:

1. Robley D. Evans, The atomic nucleus, TMH, New Delhi, 1982.
2. M.L.Pandya, R.P.S Yadhav, Kedharnath, Ramnath, Elements of nuclear Physics, Meerut, 1995.
3. Irving Kaplan, Nuclear Physics, Narosha Publshers,New Delhi, 1989.
4. V. Devanathan, Nuclear Physics, Narosa Publishing House , New Delhi.
5. A.B Gupta, Modern Atomic and Nuclear Physics, Books and Allied Limited, Kolkata.

SEMESTER IV

PAPER-10

MATERIALS SCIENCE AND LASER PHYSICS

UNIT-I: Defects and dislocations

Point defects - Schottky and Frenkel defects - number of defects as a function of temperature - Diffusion in metals - Diffusion and ionic conductivity in ionic crystals - Dislocations - Edge and screw dislocations - Burgers vector - Plastic deformation - Slip - Motion of dislocations under uniform shear stress - Stress fields around dislocations - Density - Work hardening function- Effect of grain size on dislocation motion - Effect of solute atoms on dislocation motion.

UNIT-II: Optical Properties, Dielectric Properties and Ferro Electrics

Color centers - Photo conductivity - electronic transitions in photo conductors - Trap, Capture, recombination centers - General mechanism - Luminescence - Excitation and emission - Internal electric field in a dielectric - Clausius-Mossotti and Lorentz - Lorenz equations - Dielectric dispersion and loss - Ferroelectrics - Ferro electricity - General properties - Dipole theory - Ionic displacements and the behaviors of $BaTiO_3$.

UNIT-III: Elastic Behaviour, Polymer and Ceramics

Anelastic and visco elastic behaviour - Atomic model of elastic behaviour - rubber like elasticity - Anelastic deformation - Relaxation process - Model for visco elastic behaviour - Polymers - Polymerization mechanism - Polymer structures - Deformation of polymers - Behaviour of polymers. Ceramics:Ceramic phases - Structure - classes - Effect of structure on the behaviour of ceramic phases - composites.

UNIT-IV: Nano Material and Its Applications

Classification of Nanomaterials – Synthesis – Ball milling, Solgel and CVD methods – metal and semiconductor nanoparticles by colloidal route – microorganism method – Analytical methods: STM- TEM – Electrical, Magnetic and optical properties of nanoparticles – Applications Optoelectronic device– LED – Colourants and pigments – Nano biotechnology – DNA chips – DNA array devices – Drug delivery systems.

UNIT-V: Laser Physics

Introduction - Interaction of radiation - with matter - Spontaneous and stimulated emission - Conditions for oscillation - Frequency of oscillation of the system - Einstein co-efficient - Possibility of amplification - Population inversion - Laser pumping Rate equations - Three level and four level system - Optical resonator - Types and modes of resonator - Oscillation - Threshold condition. The confocal resonant cavity - theory - Spot size and beam divergence - quality factor (Q) of an optical cavity.

Books for Study:

1. G.K. Narula, K.S. Narula, and V.K. Gupta, Material Science, TMH, New Delhi, 1995.
2. A.J. Dekker, Solid State Physics, McMillan Co., 1981.
3. V.Ragavan, Material Science and Engineering, 4th Edition, Prentice Hall of India,New Delhi, 2003.
4. M. Arumugam, Materials Science, 3rd Edition, Anuradha Agencies, 2002.
5. Allen, Jones, Principles of Gas lasers, Butterworths, London, 1967.
6. K.R. Nambiar, Laser Principles, types and Application, New Age International, 2004.
7. K. Thyagarajan, A.K. Ghatak, Laser Theory and Applications, Macmillan India Ltd., 1997.

Books for Reference:

1. Lawrence H. Vlack, Elements of Materials Science and Engineering, 6th Edition, Second ISE reprint, Addison-Wesley, 1998.
2. H. Iabch, H. Luth, Solid State Physics, An introduction to principles of Material Science, 2nd Edition, Springer, 2001.
3. B.B. Laud, Lasers and Non linear optics, Wiley Eastern Ltd., 1991.
4. J.J. Verdayan, Laser Electronics, Prentice-Hall India, New Delhi, 1993.

PAPER-11

CONDENSED MATTER PHYSICS

UNIT-1 Crystal Physics

Types of lattices - Miller indices – symmetry elements and allowed rotations - simple crystal structures – Atomic packing factor - Crystal diffraction - Bragg's law –Scattered wave amplitude - Reciprocal lattice (sc, bcc, fcc) – Diffraction conditions - Laue equations – Brillouin Zone - Structure factor - Atomic form factor - Inert gas crystals - Cohesive energy of ionic crystals - Madelung constant - Types of crystal binding(general ideas).

UNIT-II: Lattice dynamics

Monoatomic lattices - Lattice with two atoms per primitive cell - First Brillouin zone - Group and phase velocities - Quantization of lattice vibrations - Phonon momentum - Inelastic scattering by phonons - Einstein's model and Debye's model of specific heat - thermal expansion - Thermal conductivity - Umklapp processes.

UNIT-III: Theory of metals and semiconductors

Free electron gas in three dimensions - Electronic heat capacity - Wiedmann-Franz law - Band theory of metals and semiconductors - Bloch theorem - Kronig-Penny model - Semiconductors - Intrinsic carrier concentration – Temperature dependence - Mobility - Impurity conductivity – Impurity states - Hall effect -Fermi surfaces and construction - Experimental methods in Fermi surface studies - de Haas Van Alphen effect.

UNIT-IV: Magnetism

Diamagnetism - quantum theory of Paramagnetism - Rare earth ion - Hund's rule - Quenching of orbital angular momentum - Adiabatic demagnetization - Quantum theory of ferromagnetism - Curie point - Exchange integral - Heisenberg's interpretation of Weiss field - ferromagnetic domains - Bloch Wall - Spin waves - Quantization - Magnons - thermal excitation of magnons - Curie temperature and susceptibility of ferrimagnets - Theory of anti ferromagnetism - Neel temperature.

UNIT-V: Super conductivity

Experimental facts: Occurrence - Effect of magnetic fields - Meissner effect – Critical field – Critical current - Entropy and heat capacity - Isotope effect - Energy gap - Type I and Type II superconductors. Theoretical explanation: Thermodynamics of super conducting transition - London equation - BCS Theory - Coherence length –- Cooper pairs - Single particle Tunneling - Josephson tunneling - DC and AC Josephson effects - High temperature super conductors - SQUIDS.

Books for Study:

1. C. Kittel, Introduction to Solid State Physics, 7th Edition, Wiley, New York, 1996.
2. M. Ali Omar, Elementary Solid State Physics-Principles and Applications, Addison-Wesley, London, 1974.
3. H.P. Myers, Introductory Solid State Physics, 2nd Edition, Viva Book, New Delhi, 1998.
4. S.O. Pillai, Solid State Physics, New Age International, New Delhi, 1997.

Books for Reference:

1. N.W. Aschroft, N.D. Mermin, Solid State Physics, Rhinehart and Winton, New York.
2. J.S. Blakemore, Solid State Physics, 2nd Edition, W.B. Saunder, Philadelphia, 1974.
3. A.J. Dekker, Solid State Physics, Macmillan India, New Delhi.
4. H.M. Rosenburg, The Solid State, 3rd Edition, Oxford University Press, Oxford, 1993.
5. S.O. Pillai, Problems and Solutions in Solid State Physics, New Age International, New Delhi, 1994.
6. S.L. Altmann, Band Theory of Metals, Pergamon, Oxford.
7. M.A. Wahab, Solid State Physics, Structure and Properties of Materials, Narosa, New Delhi, 1999.
8. J.M. Ziman, Principles of the Theory of Solids, Cambridge University Press, London, 1971.

PAPER-12

PROJECT WITH VIVA VOCE

Preamble

The concept of introducing the project will help the student community to learn and apply the principles of Physics and explore the new research avenues.

In the course of the project the student will refer books, Journals or collect literature / data by the way of visiting research institutes/ industries. He/she may even do experimental /theoretical work in his/her college and submit a dissertation report with a minimum of 40 pages not exceeding 50 pages.

Format for Preparation of Dissertation

The sequence in which the dissertation should be arranged and bound should be as follows

1. Cover Page and title Page
2. Declaration
3. Certificate
4. Abstract (not exceeding one page)
5. Acknowledgement (not exceeding one page)
6. Contents (12 Font size, Times new Roman with double line spacing)
7. List of Figures/ Exhibits/Charts
8. List of tables
9. Symbols and notations
10. Chapters
11. References

Distribution of marks for Dissertation (100 Marks)

(a) For Organization and presentation of Thesis - 60 marks
(b) For the novelty /Social relevance -10 marks
(c) Presentation of work /Participation in state/
(d) national level Seminar/publication - 5 marks
(e) Viva voce (Preparation, Presentation of work and Response to questions) - 25 marks

MAIN PRACTICAL

PAPER-3

ADVANCED GENERAL EXPERIMENTS

(Any 15 out of the given 20)

1. G.M. Counter - characteristics, Inverse square law.
2. G.M. Counter - Absorption co-efficient.
3. Michelson Interferometer -Wavelength and separation of wavelengths.
4. Michelson Interferometer - Thickness of mica sheet.
5. F.P. Etalon - using Michelson set up.
6. Hall Effect.
7. Molecular Spectra - AlO Band.
8. Molecular Spectra - CN Band.
9. Susceptibility of a liquid by Quincke's method.
10. Susceptibility of a liquid by Guoy's method.
11. Ultrasonic Diffraction - Velocity and Compressibility of a liquid.
12. Ultrasonic Interferometer - Velocity and Compressibility of a liquid.
13. B-H curve using CRO.
14. Spectral analysis of a salt.
15. Absorption Spectra.
16. Laser beam - Interference Experiments
    (a) Using an optically plane glass plate.
    (b) Using Lloyd's single mirror method.
17. Laser beam – Diffraction Experiments.
    (a) Diffraction at straight edge.
    (b) Diffraction at a straight wire.
    (c) Diffraction at a circular aperture.
18. Microwave experiment.
19. Determination of Planck's constant.
20. Spectrophotometer - Beer's law verification and absorption co-efficient.

MAIN PRACTICAL

PAPER-4

Microprocessor, Microcontroller and C Programming

(Any 20 out of the given 30)

Microprocessor 8085 programs

1. Number conversion - 8 bit and 16 bit: BCD to Binary, Binary to BCD, Hex to ASCII.
2. Square and square root of BCD and HEX numbers (both 8 and 16 bit).
3. Time delay subroutine and a clock programme.
4. Sum of simple series and arithmetic progression.
5. Interfacing (i) Op-amp 8 bit DAC R-2R network (ii) Switching an array of LEDs.
6. ADC and interfacing IC 0809 with MPU
7. Interfacing and programming IC 0800 with MPU – Unipolar and Bipolar.
8. Wave form generation – sine wave, square wave, triangular and ramp wave.
9. Analog to digital conversion using a DAC Comparator and MPU system.
10. Interfacing a DC stepper motor to the MPU system - clockwise and anticlockwise – full Stepping and half stepping
11. Parallel and Serial communication between two microprocessor systems.
12. Interfacing a HEX keyboard to the MPU system through I/O ports.

Microprocessor 8086 programs using MASM

13. Addition, subtraction
14. Multiplication and division.
15. Multibyte addition/ Subtraction
16. Computation of LCM
17. Sorting in ascending/ descending order.
18. Factorial of a number

Microcontroller 8051 experiments

19. Addition, Subtraction
20. Multiplication and Division.
21. Block transfer
22. BCD to Binary conversion and binary to BCD
23. Sorting in ascending and descending order.
24. LED interface and Stepper motor interface.

Computation methods – C programming

25. Lagrange interpolation with algorithm, flow chart, program and its output
26. Numerical integration by Simpson's rule with algorithm and flowchart, program and its output.
27. Numerical solution of ordinary first order differential equation -Euler's method with algorithm, flowchart, program and its output.
28. Numerical solution of ordinary first order differential equations by the Runge-Kutta IV method, with algorithm, flow chart, program and its output.
29. Curve fitting - Least square fitting with algorithm, flowchart, program and its output.
30. Matrix manipulation - Multiplication Transpose and Inverse with algorithm, Flow chart, program and its output.

ELECTIVE

PAPER-4

A. ADVANCED MICROPROCESSOR

UNIT-I 8086 Architecture and programming

Internal architecture of 8086 - Software model - Internal registers - Minimum mode and Maximum mode system - Instruction set - Addressing modes – Data transfer, Arithmetic, Logical, Shift and rotate instruction – Compare, Jump, Loop, String, Processor control, CALL - RET and stack instructions - Procedures - Assembler Macros - Assembler directives.

UNIT-II Software Programs of 8086

Assembly language Programming – Addition, subtraction and multiplication and division of two 16 bit numbers - Multibyte addition/subtraction – Ascending order – Sum of a series - Computation of LCM - Block transfer – Factorial of a number.

UNIT-III: Memory and Interrupt interface of 8086 Microprocessor

Memory interface - block diagram - Hardware organization of the memory address space - Memory control signals - The stack - Stack segment register and stack pointer - RAM interface - Dynamic RAM interfacing and refreshing - Types of interrupts - Interrupt and address pointer table - Interrupt instructions - Masking of interrupts - External hardware interrupt interface - Interrupt sequence - 8259 Programmable interrupt controller (PIC).

UNIT-IV: 80286, 386 and 486 Microprocessor

Introduction to Intel Processor and its architecture 80286/ 80386 and 80486 microprocessors – block diagram of 386 and 486 - comparison - Pentium Processor –block diagram (Pentium II, III and IV) and its salient features – Multitasking concepts - Operating system concepts and terms - DISK operating system (DOS) - Multitasking and multiprogramming operating system (UNIX).

UNIT-V: Data communication and applications

Centronix parallel interface of printers - Printer concepts - Interfacing ASCII keyboard - Concepts of secondary storage device like floppy disk and Hard disk – PCI bus architecture – AGP - USB - Data Communication methods and standard GPIB – IEEE-488, RS-232C, RS-422 and RS-423A - Temperature controller.

Books for Study:

1. Douglas V. Hall : - Microprocessors and Interfacing programming and Hardware (Tata Mc Graw Hill)
2. W.A. Triebel and Avatar Singh, The 8086 /8088 Microprocessors- Programming, Software, Hardware and application, Prentice Hall of India, New Delhi.
3. Badri Ram, Advanced Microprocessors and interfacing, Tata McGraw Hill, 2006.

Books for Reference:

1. B. Brey, Intel Microprocessors 8086/8088, 80186,80286,80486,80486, Architecture, Programming and Interfacing, 1995.
2. V. Vijayendran, Fundamentals of Microprocessor –8086- Architecture, Programming (MASM) and interfacing, Viswanathan, Chennai, 2002.
3. Yu – Cheng and Glenn A. Gibson, The 8086 / 8088 family Architecture, Programming and Design, Prentice-Hall of India.

PAPER-4

B. PROGRAMMING IN C AND MATLAB

UNIT-I: Data types, managing input and output operations

Basic structure of C programs – Character set – C tokens- Constants– keywords and identifiers – variables – data types - declaration of variables – Assigning values to variables – defining symbolic constants – Reading and writing a character – formatted inputs and outputs.

UNIT-II: Operators, Expressions and Arrays

Arithmetic, relational, logical, assignment, increment, decrement, conditional, bitwise special operators –Arithmetic expressions- evaluation of expressions, precedence of arithmetic operators-one dimensional arrays, two dimensional arrays, multi dimensional arrays- declaration and initialization of arrays.

UNIT-III Decision making, Branching and Looping

Simple if, If-else, If-else ladder, switch, go-to statements, While, DO, FOR statements, simple programs using these statements.

UNIT-IV: Functions and Application programs

Programs for finding square root of second degree algebraic equations-matrix addition, multiplication, diagonalisation and inversion-Solution of simultaneous equations- Gauss elimination method, Solution of first order differential equations- Euler's method, runge Kutta IV order method, numerical integration-Simpson's 1/3 rule.

UNIT-V: MATLAB

Basic Computations, Array operations, Solving Algebraic equations in MATLAB-Differentiation, Integration, Limits, sums and products, Taylor's series – Simple x-y plots – Matrices – Determinant, multiplication, transpose – Loops – Branching – Script M-file – Function M-files.

Books for study:

1. E. Balagurusamy, Programming in ANSI C, 4th Edition TMH, New Delhi, 2009.
2. S.S. Sastry, Introductory methods of Numerical analysis, 3rd Edition Prentice, Hall of India, New Delhi, 2003.
3. E. Balagurusamy, Numerical methods, Tata Mc-Graw Hill, New Delhi.
4. Gilat, MATLAB: An introduction with Applications, John Wiley & Sons, Inc 2004.

Books for Reference:

1. MATLAB 7.0 Basics, P. Howard, spring, 2005.
2. http://www.maths.tamu.edu/~phoward/308/matbasics.pdf
3. S.S. Kuo, Numerical Methods, and Computer, Addison-Wesley, 1996.
4. W.H. Press, Numerical Recipes in C, 2nd Edition, Cambridge University Press, 1992.

PAPER-4

C. NUMERICAL METHODS AND PROGRAMMING in C

UNIT-I: Errors and the measurements

General formula for errors – Errors of observation and measurement – Empirical formula –Graphical method – Method of averages – Least square fitting – curve fitting –parabola, exponential.

UNIT-II: Numerical solution of algebraic and transcendental equations

The iteration method – The method of false position – Newton-Raphson method – Convergence and rate of convergence – C program for finding roots using Newton – Raphson method - Simultaneous linear algebraic equations - Gauss elimination method – Jordon's modification – Gauss–Seidel method of iteration – C program for solution of linear equations.

UNIT-III: Interpolation

Linear interpolation – Lagrange interpolation Gregory – Newton forward and backward Interpolation formula – Central difference interpolation formula – Gauss forward and backward interpolation formula – Divided differences – Properties – Newton's interpolation formula for unequal intervals – C programming for Lagrange's interpolation.

UNIT-IV: Numerical differentiation and integration

Newton's forward and backward difference formula to compute derivatives – Numerical Integration: the trapezoidal rule, Simpson's rule – Extended Simpson's rule – C program to evaluate integrals using Simpson's and trapezoidal rules.

UNIT-V: Numerical Solutions of ordinary differential equations

Nth order ordinary differential equations – Power series approximation – Pointwise method – Solutions of Taylor series – Euler's method – Improved Euler's method – Runge-Kutta method – second and fourth order – Runge-Kutta IV method for solving first order differential equations – C program for solving ordinary differential equations using Runge-Kutta IV method.

Books for study and Reference:

1. S.S. Sastry, Introductory Methods of Numerical analysis, Prentice, 3rd Edition, Hall of India, New Delhi, 2003.
2. M.K. Venkataraman, Numerical Methods in Science and Engineering, The National Publishing Co. Madras, 2001.
3. E. Balagurusamy, Numerical methods ,Tata Mc Graw Hill, New Delhi, 2008.
4. A. Singaravelu, Numerical Methods, Meenakshi Agency, Chennai.
5. B.P.Flannery, S.A.Teukolsky, W.T. Vetterling, Numerical Recipes in C, W.H. Press, Cambridge University, 1996.
6. K.P.N. Murthy, Monte Carlo : Basics, ISRP, Kalpakkam, 2000.
7. Veerarajan,Numerical Methods in C and C++, S.Chand, New Delhi, 2006.

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THIRUVALLUVAR UNIVERSITY

PART-IV

SOFT SKILL

SYLLABUS
(For all UG Degree Courses)

(with effect from 2017-2018)

UNIT I

1.1. Skills in Listening and Writing

1.2. Skills in Reading and Understanding

UNIT II

2.1. Skills to Read and Respond to Instructions

2.2. Skills of Interpretation and Transcoding Information

UNIT III

3.1. Skills in Seeking and Responding to Information

3.2. Skills of Day-to-Day communication

UNIT IV

4.1. Grammatical skills and Spelling rules

4.2. Career skills

UNIT V

5.1. Skills of formal and in-formal expressions

5.2. Skills of non-verbal communication

Note: The contents of the previous book for 'Soft Skills' by Trinity Publication for I year UG students have not been changed. However, the titles of the contents have been modified.

THIRUVALLUVAR UNIVERSITY

PART-IV

VALUE EDUCATION

SYLLABUS
(For all UG Degree Courses)

(with effect from 2017-2018)

SEMESTER II

UNIT-I

Value Education - Definition - relevance to present day - Concept of Human Values - self introspection - Self esteem.

UNIT-II

Family values - Components, structure and responsibilities of family - Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-III

Ethical values - Professional ethics - Mass media ethics - Advertising ethics - Influence of ethics on family life - psychology of children and youth - Leadership qualities - Personality development.

UNIT-IV

Social values - Faith, service and secularism - Social sense and commitment - Students and Politics - Social awareness, Consumer awareness, Consumer rights and responsibilities - Redressal mechanisms.

UNIT-V

Effect of international affairs on values of life/ Issue of Globalization - Modern warfare - Terrorism. Environmental issues - mutual respect of different cultures, religions and their beliefs.

Reference Books

1. T. Anchukandam and J. Kuttainimathathil (Ed) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995)
2. Mani Jacob (Ed) Resource Book for Value Education, Institute for Value Education, New Delhi 2002.
3. DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value Education, Secunderabad, 2002.
4. Daniel and Selvamony - Value Education Today, (Madras Christian College, Tambaram and ALACHE, New Delhi, 1990)
5. S. Ignacimuthu - Values for Life - Better Yourself Books, Mumbai, 1991.
6. M.M.M.Mascaronhas Centre for Research Education Science and Training for Family Life Promotion - Family Life Education, Bangalore, 1993.

WEBSITES AND e-LEARNING SOURCES:

www.rkmissiondhe/.org/education.html/

www.clallam:;org/lifestyle/education.html/

www.sun.com/../edu/progrmws/star.html/

www.infoscouts.com

www.secretofsuccess.com

www.1millionpapers.com

http://militarlyfinance.umuc.edu/education/edu-network.html/

THIRUVALLUVAR UNIVERSITY

BACHELOR OF ARTS

B.A. ENGLISH

DEGREE COURSE

CBCS PATTERN

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER I									
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3	III	Core Theory	Paper-1	5	3	Indian writing in English	25	75	100
4	III	Core Theory	Paper-2	5	3	Advanced English Grammar	25	75	100
5	III	ALLIED -1	Paper-1	6	3	Literary forms and glossary of terms	25	75	100
6	III	PE	Paper-1	6	3	**Professional English I**	25	75	100
7	IV	Environmental Studies		2	2	Environmental Studies	25	75	100
				36	**22**		**175**	**525**	**700**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English (CE)	Paper-2	4	4	**Communicative English I**	25	75	100
10	III	Core Theory	Paper-3	5	3	British Literature I	25	75	100
11	III	Core Theory	Paper-4	5	3	American literature (classical and modern literature)	25	75	100
12	III	ALLIED-1	Paper-2	6	5	Social History of England	25	75	100
13	III	PE	Paper-2	6	3	**Professional English II**	25	75	100
14	IV	Value Education		2	2	Value Education	25	75	100
15	IV	Soft Skill		2	1	Soft Skill	25	75	100
				36	**25**		**200**	**600**	**800**

THIRUVALLUVAR UNIVERSITY
B.A. ENGLISH

SYLLABUS
UNDER CBCS
(With effect from 2020-2021)

SEMESTER I

PAPER - 1

INDIAN WRITING IN ENGLISH

OBJECTIVES:

To understand the various features of Indian Literature in English.
To get a glimpse of the regional literatures in English.
To make the students be aware of the superstitious practices in Indian culture.
To inculcate the spiritual and moral values from the Indian Sages.
To analyze the aspects of Indianness in Indian writing in English.

SYLLABUS

Unit -1 :Poetry
1. A very Indian poem in Indian English- Nissim Ezekiel
2. Coromandel Fishers - Sarojini Naidu
3.Home Coming-R.Parthasarathy.

Unit-2:Poetry
1.Of Mothers,among other things-A.K.Ramanujam
2.An Old Woman – ArunKolatkar
3.Immigrant Song- Tishani Dhoshi

Unit-3:Prose
1.The Child's Return- Rabindranath Tagore
2.The Portrait of a Lady-Kushwant Singh
3.Vivekananda's World Mission-Bhabani Bhattacharya

Unit-4: Drama
1.Nagamandala-Girish Karnad

UNIT-5: NOVEL
1.The White Tiger – Aravind Adiga

COURSE OUT COME

UNIT I

Students will be able to examine the concepts of Indian English Poetry.
Students will be able to comment on the humor in A Very Indian Poem in English.
Students will be able to understand the life of fishermen community
Students will be able to grasp the in-depth ideas about the poem Home Coming.
Students will be able to know about Autobiographical Poem.

UNIT II

Students will be able to appreciate the poem Of Mother, among other Things.
Students will be able to identify different images of the Mother.
The students will be able to understand the sense of loss of identity in immigrants
Students will be able to analyze the reality of a beggar Old Woman.
Students will be able to understand the style of Indian Poetry.

UNIT III

Students will be able to scrutinize the writing style adopted by Kushwant Singh.
Students will be able to understand Tagore as a short story writer.
Students will be able to identify the writing style of BhabiniBhatachariya .
Students will be able to inculcate the moral ideas of Swami Vivekananda.
Students will be able to evaluateBhabiniBhatachariya as an essayist.

UNIT IV

Students will be able to analyze the plot Nagamandala.
Students will be able to know about the writing style of GirishKarnad.
Students will be able to understand the superstitious beliefs in Indian culture .
Students will be able to know about the significance of marital relationship .
Students will become familiar with popular myth.

UNIT V

Students will be able to understand the concept of globalization.
Students will be able to absorb the importance of family.
Students will be made aware of corruption in India

WEB SOURCES:

https://khanindradutta.wordpress.com/2019/02/27/nissim-ezekiels-poem-very-indian-poem-in-indian-english-complete-poem/
https://www.poetrynook.com/poem/homecoming-0
http://e4english-corner-sasha.blogspot.com/2013/11/an-old-woman-by-arun-kolatkar-poem-and.html#:~:text=In%20Arun%20Kolatkar's%20poem%2C%20%22An,land%20from%20which%20she%20comes.&text=The%20old%20woman%20'tightens%20her,She%20is%20persistent.

http://www.ncert.nic.in/ncerts/l/kehb101.pdf
https://archive.org/details/in.ernet.dli.2015.463117/page/n13/mode/2up
https://archive.org/details/whitetigernovel00adig/page/n9?q=the+white+tiger+arvind+adiga

REFERENCE TEXT BOOKS

Karnad, Girish Raghunath. Nagamandala. Oxford University Press, 1990.

CORE THEORY
PAPER – 2

ADVANCED ENGLISH GRAMMAR

OBJECTIVES

Students will be able to understand the basics of Grammar.
To understand how to use Grammar correctly.
To learn to be confident in using advanced Grammar.
To write English without grammatical errors.
To gain confidence in learning English.

UNIT 1

Parts of speech –Noun –Pronoun-Adjective-Verb-Adverb-Conjunction-Preposition-Interjection-Definition-Types-Examples

UNIT 2

Types Of Sentences-Statement-Interrogative-Exclamatory-Imperative

UNIT 3

Sentence Pattern-Types-SV-SVO-SVC-SVA-SVOO-SVOC-SVOA

UNIT 4

Tenses- Subject -Verb-Concord

UNIT5

Phrases And Clauses-Definition And Types

REFERENCE TEXTBOOKS

1. DR. M R Kumaraswamy, C.Chidambaram, P.Karthi. Grammar and Composition. Madurai: Print, 2019.
2. Hewings, Martin. Advanced English Grammar. New Delhi: Cambridge University Press, 1999.

COURSE OUTCOMES

UNIT I

Students will be able to get distinct ideas on all the parts of speech.
Students will be able to understand Parts of Speech and their types.
Students will be able to use Parts of Speech with relevant Examples.

Students will be able to examine the usage of Parts of Speech in various contexts.
Students will be able to identify the different ways to adopt Parts of Speech.

UNIT II

Students will be able to know about the Types of sentences.
Students will be able to understand Statement sentence with illustrations.
Students will be able to know Interrogative sentence with illustrations.
Students will be able to identify Imperative sentence with illustrations.
Students will be able to understand Exclamatory sentence with illustrations.

UNIT III

Students will be able to know about Sentence Pattern and its types.
Students will be able to recognize the different types of Sentence Pattern.
Students will be able to identify the different ways to adopt Sentence Pattern.
Students will be able to examine the correct usage of Sentence Pattern.
Students will be able to distinguish the Sentence Pattern with the help of illustrations.

UNIT IV

Students will be able to know about Tense and its kinds.
Students will be able to understand and use Tenses in day to day life.
Students will be able to know about Subject and its Usage.
Students will be able to be familiar with Concord.
Students will be made aware of Verb and its Kind.

UNIT V

Students will be able to understand Phrases.
Students will be able to absorb noun, verb, adjectival and prepositional phrases.
Students will be made aware of Definitions of Clauses and its types.
Students will be able to comprehend Clauses with illustrations.
Students will be able to distinguish Clauses with the help of illustrations.

ALLIED – 1
PAPER – 1

LITERARY FORMS AND TERMS

OBJECTIVES

To expose the learners to the most common elements of literature.
To examine different genres of literature.
To scrutinize the various Literary Forms
To understand the characteristics of Poetry, Prose, Drama and Novel.
To Understand different literary terms.

UNIT I: POETRY

1. What is Poetry?
2. The Lyric
3. The Sonnet
4. The Elegy
5. The Epic
6. The Ode

UNIT II : PROSE

1. The Essay
2. The Short Story
3. Biography
4. Autobiography

UNIT III: DRAMA

1. The Tragedy
2. The Comedy
3. Tragi-Comedy
4. The One-act play
5. The Absurd Drama

UNIT IV: NOVEL

1. Historical Novel
2. The Picaresque Novel
3. The Stream of consciousness Novel

UNIT V: LITERARY TERMS

Allegory, Comic Relief, Dramatic Monologue, Farce, Euphemism, Expressionism, Satire, Plot, Melo Drama, Irony, Soliloquy.

BOOKS FOR STUDY AND REFERENCE:

1. Prescribed text – A Glossary of Literary Terms. M.H. Abrams – Macmillan Publishers India Ltd. (Trinity -Laxmi Publications, Chennai)
2. Nair, K R Ramachandran. *Literary Forms*. Chennai: Emerald, 1995. print.

COURSE OUTCOMES

UNIT I

Students will be able to understand how poetry requires a different writing style.
Students will be able to get,in-depth ideas of Poetry.
Students will be able to understand the traits of Lyric, Ode, and Sonnet.
Students will be able to examine Elegy and Epic.
Students will be able to scrutinize different kinds of Poetry.

UNIT II

Students will be able to understand prose aswriting with distinct style.
Students will be able to know the characteristics of Short Story.
Students will be able to understand the ideas behind Essay.
Students will be able to understand the basic traits of Biography.
Students will be able to know about Autobiography in detail.

UNIT III

Students will be able to understand Drama as a genre with distinct style.
Students will be able to distinguish Tragedy and Comedy as a separate genre.
Students will be able to understand Tragi - Comedy.
Students will be able to examine characteristics of One Act Play.
Students will be able to absorb the principles of the Absurd Drama .

UNIT IV

Students will be able to understand novel'scharacteristics.
Students will be able to know about Historical Novel.
Students will be able to be familiar with Picaresque Novel.
Students will be made aware of The Stream of Consciousness Novel.
Students will be able to absorb the characteristics of various types of Novels

UNIT V

Students will be able to understand few important Literary Terms.
Students will be able to absorb the basic ideas of Plot, Melodrama and Irony.
Students will be made aware of Euphemism, Expressionism and Satire.
Students will be able to comprehend Allegory, Comic Relief and Dramatic Monologue.
Students will be able to identify the usages of Literary Terms.

SEMESTER II

CORE THEORY
PAPER – 3

BRITISH LITERATURE I

OBJECTIVES

1. To expose the students to the beginning of modern literature
2. To introduce students to metaphysical and neoclassical poetry
3. To know the style of Bacon's essays
4. To expose the students to the social life of 17th century people
5. To learn the form ,allegorical novel .

UNIT 1:Poetry

The hymn to God, the Father-John donne
Song for St.Cecilia's Day-John Dryden
The Collar – George Herbert

UNIT 2:Poetry

How soon hath time-John Milton
Ode to Solitude-Alexander Pope
On My First Sonnet – Ben Jonson

UNIT 3:Prose

Of Friendship
Of Studies
Of Books -FrancisBacon

UNIT 4:Drama

The Shoemaker's holiday -Thomas Dekker

UNIT 5:Novel

The Pilgrim's Progress - John Bunyan

COURSE OUT COME

UNIT I

The students will be able to

1. Identify the characteristic features of metaphysical poetry
2. Critically appreciate the poem, "Hymn to God, the Father"
3. Analyse the theme of "Song for St. Cecilia's Day"
4. Identify the neoclassical elements found in the prescribed poems
5. Understand Dryden as a neoclassical poet

UNIT II

The students will be able to

1. Understand Milton's greatness as a poet
2. Understand how one has to wait for the right time to accomplish great works
3. Appreciate the grand style of Milton
4. Understand Pope as the representative poet of neoclassicism
5. Appreciate the value of simple life

UNIT III

The students will be able to

1. Understand the three fruits of friendship
2. Know the purpose of studying
3. Understand the advantages of studying
4. Understand the greatness of books
5. Appreciate the style of Bacon

UNIT IV

The students will be able to

1. Understand the social life of 17^{th} century England
2. Critically appreciate the play, The Shoemaker's Holiday"
3. Analyse the characters of the Play
4. Know how war leads to disability of persons
5. Understand the class system of English People

UNIT V

The students will be able to

1. Understand Pilgrims Progress as an Allegory
2. Appreciate the theme of salvation.
3. Understand that the road to Heaven is not easy, the cost is great,
4. Know that the true Christian must be willing to pay the cost no matter what.
5. Know that man is full of sin, but this does not keep him from attaining glory.

WEB SOURCES:

1. https://www.poetryfoundation.org/poems/44115/a-hymn-to-god-the-father
2. https://www.poetryfoundation.org/poems/44185/a-song-for-st-cecilias-day-1687
3. https://www.poetryfoundation.org/poems/44360/the-collar

4. https://www.poetryfoundation.org/poems/44744/sonnet-7-how-soon-hath-time-the-subtle-thief-of-youth
5. https://www.poetryfoundation.org/poems/46561/ode-on-solitude
6. https://www.poetryfoundation.org/poems/44455/on-my-first-son
7. https://www.fulltextarchive.com/page/Essays2/
8. https://www.fulltextarchive.com/page/Essays3/
9. https://emed.folger.edu/sites/default/files/EMEDWorkshop-ShoeHol.pdf
10. http://bunyanministries.org/books/pp_full_text.pdf

CORE THEORY
PAPER – 4

AMERICAN LITERATURE

OBJECTIVES

1. To introduce the major works of American authors and their intellectual philosophies to students of Literature.
2. To portrait different periods and movements of American Literature
3. To make our students familiar with American thoughts and lifestyle .
4. 4.To direct students' ardent attention towards the development of their knowledge about American Literature
5. To project their fancy for lyrical gaiety of top American poets
6. To channelize their academic vision to grasp more about the American Drama and Fiction

UNIT-1: Poetry

1. Robert Lowell – Children of Light, The Holy Innocents
2. Carl Sandburg – Chicago
3. William Stanley Merwin - Green Fields, Another River
4. Robert Frost – Stopping by Woods on a Snowy Evening

UNIT-2: Poetry

1. Walt Whitman - Passage to India
2. Emily Dickinson – I Felt a Funeral in My Brain
3. Edgar Allan Poe – Sonnet – Silence
4. Wallace Stevens – Anecdote of the Jar

UNIT-3: Prose

1. Henry David Thoreau – The Battle of the Ants
2. Martin Luther King – I have a Dream
3. Ralph Waldo Emerson – Self-Reliance

UNIT-4: Drama

1. Arthur Miller – Death of a Salesman

UNIT-5: Fiction

1. Ernest Hemingway – The Old Man and the Sea

TEXT BOOKS

UNIT-1:

1. American Poetry of the Twentieth Century, Edited by Richard Gray, Cambridge University Press
2. A textbook of American Literature, Edited by Board of Editors, Sarah Publishers

UNIT-2:

1. An Anthology of Poems, Edited by C. Subbaian, Emerald Publishers

UNIT-3:

1. American Literature, An Anthology of Prose, Edited by Dr. P. Marudanayagam, Emerald Publishers
2. American Literature, Edited by Prof. G. Venkatesalu, Manimekala Publishing House

UNIT-4

1. Death of a Salesman :Arthur Miller , Penguin UK Edition
2. A Student Handbook to The Plays of Arthur Miller ,Bloomsbury Publishing India Ltd.

UNIT-5:

1. The Old Man and the Sea, Ernest Hemingway, Maple Press Classics Publishers – Complete and Unabridged
2. Ernest Hemingway's The Old Man and the Sea , P.G. Rama Rao – The New Atlantic Critical Studies

REFERENCE ITEMS: BOOKS, JOURNAL

1. A Text Book of The Old Man and the Sea , Dr. V. Alexander, Mahaam Publishers
2. American Literature, Edited by Prof. G. Venkatesalu, Manimekala Publishing House
3. A Short History of American Literature, Krishna Sen and AshokeSengupta, Orient Black Swan Publisher
4. American Literature, NandanaDutta, Edited by Pramod K Nayar, Orient Black Swan Publisher
5. Studies in American Literature,MalikaarjunPatil, Atlantic Publishers
6. Modern American Literature, Edited by RajeshwarMittapalli and Claudio Gorlier, Atlantic Publishers
7. Walt Whitman – Selected Poems : A Critical Evaluation, Dr. S. Sen, Unique Publishers
8. A History of American Literature, Sathish Kumar, LakshmiNarainAgarwal Publishers
9. The Oxford Companion to American Literature, James D. Hart, 6th Edition, Oxford University Press
10. A Short History of American Literature, Edited by William Peterfield Trent, Cambridge University Press

E- MATERIALS

1. https://www.theatlantic.com/w.s.merwin
2. https://www.poetryfoundation. org/w.s.merwin
3. https://www.poem hunter.com/w.s.merwin
4. https://www.poeticside.com/poets/w.s.merwin
5. https://www.cliffnotes.com/americanwriters

6. https://www.poeticside.com/poets/w.s.merwin
7. https://www.poemanalysis.com/americanpoets
8. https://www.whitmanarchive.org
9. https://www.enotes.com/americanwriterspoets
10. https://www.bl.uk.collections
11. https://www.beamingnotes.com/americandramatists
12. https://www.britannia.com/americanliterature
13. https://www.sparknotes.com/americanpoets
14. https://www.imagination.com/americanliterature
15. https://www.gradesaver.com/americanwriters

COURSE OUTCOME

UNIT-1

1. the student will be able to grasp the lyrical richness embedded in American Poetry
2. the student will be able to understand the modern American writer like Merwin and his thoughts related to Environment
3. the student will come to know the great American Poets like Frost, Lowell and Sandburg and their works.
4. the student will be able to develop a taste of American poetry and thus he or she further reads and understands
5. the student will search in web, related poems written by these great poets to develop further knowledge on poetry

UNIT-2

1. the student will be able to admire and try to emulate the literary expertise of Walt Whitman, Emily Dickinson, Edgar Allan Poe and Wallace Stevens
2. the student will come to know the literary terms available in the American poetry
3. the student will get inspiration from Walt Whitman and his knowledge about India
4. the student will read further about these great poets
5. the student will develop a taste to study the lifestyle of American people

UNIT-3

1. the student will be able to judge the supremacy of American output
2. the student will come to know the great prose writers of American Literature Emerson, Thoreau and Martin Luther King
3. the student will understand the real thoughts of the American writers
4. the student will get inspiration through these works and it will kindle him or her to read more
5. the student will understand the philosophy of these writers.

UNIT-4

1. the student will be able to judge the supremacy of American drama
2. the student will come to know the great dramatist of American Literature Arthur Miller

3. the student will understand the real thoughts of the American dramatists in general
4. the student will get inspiration through this drama and it will kindle him or her to read more dramas of American Literature
5. the student will understand the usage of language in the drama

UNIT-5

1. the student will be able to judge the supremacy of American fiction
2. the student will come to know the great fiction writers of American Literature Ernest Hemingway
3. the student will understand the real thoughts of the American fictions and Sea life
4. the student will get inspiration through this fiction and it will kindle him or her to read more fictions of American Literature
5. the student will understand the real concept of lifestyle of Americans.

ALLIED –1
PAPER – 2

THE SOCIAL HISTORY OF ENGLAND

OBJECTIVE

To provide a profound background to the UG programme: B A English Literature. Literature being a mirror of life with an extensive knowledge of English social life, English literature could be appreciated, relished and enjoyed. So, with this view this paper is designed and it focuses on the major trends which have moulded the English society.

UNIT I

A brief history of the early inhabitants of England, The Hundred Years of War (1337-1453) The war of the Roses. The Black Death & The Peasants Revolt.
Emergence of a Strong Monarchy –The Church – The Monasteries - The grammar schools, public schools, Education - The status of Women – Love and Marriage - The Printing Press – Its Significance

UNIT II

Social Life of During:
The Renaissance, The Reformation, The Spanish Armada - The Elizabethan - Theatre and Audience – The Rule of Queen Elizabeth I – A Golden Period – The East India Company - The Puritan Age & Restoration England

UNIT III

Colonization, The Stuarts – King James Authorized Version of the Bible – The Civil War, The Puritan Rule, The Restoration England - The Royal Society – The Glorious Revolution

UNIT IV

Queen Anne's England – The War of American Independence – Religious Movements – Humanitarian Movements – The French Revolution – Social Condition of England in the 18th Century

UNIT V

The Victorian Age – Reform Bills – The Chartist Movement - The Modern Age – The Cold War – Life in Sixties, Seventies, Eighties – The Origin and Growth of Political Parties in England.

OUT COME:

This Comprehensive Paper enables the students to understand the subject thoroughly and provides them the scope of their study. Helps them in the long run should go for their higher studies and appear for competitive examinations such as (NET, SET, TET Etc)

TEXT BOOKS

1. The Social History of England, Dr. A. Shanmugakani., Ph.D. Manimekala Publishing House
2. An Introduction to The Social History of England by A.G Xavier Viswanathan, S., Printers & Publisher Pvt Ltd.

REFERENCE:

1. Trevelyan, G.M English Social History, Longmans, London, 1958,
2. Subramaniam, M.V Social History of England, Wardha Publishing House, Madras 1972.

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The Course of Study and the Scheme of Examinations

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER I									
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	5	3	Indian writing in English	25	75	100
4.	III	Core Theory	Paper-2	5	3	Advanced English Grammar	25	75	100
5.	III	ALLIED -1	Paper-1	6	3	Literary forms and glossary of terms	25	75	100
6.	III	PE	Paper-1	6	3	**Professional English I**	25	75	100
7.	IV	Environmental Studies		2	2	Environmental Studies	25	75	100
Sem. Total				**36**	**22**		**175**	**525**	**700**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
8.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9.	II	English (CE)	Paper-2	4	4	**Communicative English I**	25	75	100
10.	III	Core Theory	Paper-3	5	3	British Literature I	25	75	100
11.	III	Core Theory	Paper-4	5	3	American literature (classical and modern literature)	25	75	100
12.	III	ALLIED-1	Paper-2	6	5	Social History of England	25	75	100
13.	III	PE	Paper-2	6	3	**Professional English II**	25	75	100
14.	IV	Value Education		2	2	Value Education	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
Sem. Total				**36**	**25**		**200**	**600**	**800**

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
16.	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-5	4	4	British literature II	25	75	100
19.	III	Core Theory	Paper-6	5	4	Introduction to English Phonetics	25	75	100
20.	III	ALLIED-2	Paper-3	5	3	History of English literature I	25	75	100
21.	IV	Skill based Subject	Paper-1	2	2	Skills for Employment	25	75	100
22.	IV	Non-major elective	Paper-1	2	2	Language skills and communication I	25	75	100
			Sem. Total	**30**	**23**		**175**	**525**	**700**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
23.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
24.	II	English	Paper-4	6	4	English	25	75	100
25.	III	Core Theory	Paper-7	5	4	British literature III	25	75	100
26.	III	Core Theory	Paper-8	4	3	History of English Language	25	75	100
27.	III	ALLIED-2	Paper-4	5	5	History of English Literature II	25	75	100
28.	**IV**	**Digital Skills for Employability**	**Paper-2**	**2**	**2**	**Office Fundamentals**	**25**	**75**	**100**
29.	IV	Non-major elective	Paper-2	2	2	Language skills and communication II	25	75	100
			Sem. Total	**30**	**24**		**175**	**525**	**700**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
30.	III	Core Theory	Paper-9	5	4	British literature IV	25	75	100
31.	III	Core Theory	Paper-10	6	4	Shakespeare	25	75	100
32.	III	Core Theory	Paper-11	6	4	Literary Criticism.	25	75	100
33.	III	Core Theory	Paper-12	6	4	Subaltern Literature	25	75	100
34.	III	Internal Elective	Paper-1	4	3	**(to choose one out f two)** A. Children Literature B. Journalism	25	75	100
35.	IV	Skill based Subject	Paper-3	3	2	Content writing	25	75	100
			Sem. Total	**30**	**21**		**150**	**450**	**600**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
36.	III	Core Theory	Paper-13	5	4	Contemporary Literature	25	75	100

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
37.	III	Core Theory	Paper-14	5	4	Indian literature in translation	25	75	100
38.	III	Core Theory	Paper-15	5	3	New Literatures in English	25	75	100
39.	III	Compulsory Project	Paper-16	5	5	Group / Individual Project	25	75	100
40.	III	Internal Elective	Paper-2	4	3	**(to choose one out f two)** A. English for Information Technology B. Film appreciation and book review	25	75	100
41.	III	Internal Elective	Paper-3	3	3	**(to choose one out f two)** A. Writing for Specific Purpose B. Creative Writing	25	75	100
42.	IV	Skill based Subject	Paper-4	3	2	English Language Teaching	25	75	100
43.	V	Extension Activities		-	1		100	-	100
44.		**Employability Readiness**	-	-	-	**(choose any one)** • **Naandi** • **Unnati** • **Quest** • **Izpay** • **IBM Skills build**	-	-	-
Sem. Total				**30**	**25**		**275**	**525**	**800**
Grand Total					**140**				**4300**

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English & English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Electives	3	3	9	100	300
	Core	15	(3-5)	54	100	1500
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	**43**		**140**		**4300**

THIRUVALLUVAR UNIVERSITY

B.A. ENGLISH SYLLABUS

CBCS PATTERN

(With effect from 2020 - 2021)

SECOND YEAR

SEMESTER III

CORE PAPER - 5

BRITISH LITERATURE II

Objectives

1. To acquaint the students with the transformation of literature from neoclassicism to Romanticism
2. To make the students familiar with the poems of Romantic age
3. To understand the essays of Charles Lamb and Oliver Goldsmith
4. To understand the characteristic features of Anti Sentimental Comedy
5. To expose the students to genres, Travelogue and Bildungsroman

UNIT - I: POETRY

1. Lines written a few Miles above Tintern Abbey - William Wordsworth

2. Ode to The West Wind - P B Shelly

UNIT - II: POETRY

1. Ode on a Grecian Urn - John Keats

2. Kublakhan - Samuel Taylor Coleridge

UNIT - III: PROSE

1. A Dissertation Upon Roast Pig - Charles Lamb

2. A City Night Piece - Oliver Goldsmith

UNIT - IV: DRAMA

1. The Rivals - Richard Brinsley Sheriden

UNIT - V: NOVEL

1. Robinson Crusoe - Daniel Defoe

2. Jane Eyre - Charollette Bronte

Course Outcome:

Unit I

The students will be able to understand :

1. William Wordsworth as a Nature Poet
2. Autobiographical element found in Tintern Abbey
3. P.B. Shelly as a Revolutionary Romantic poet
4. Literary devices used in Ode to the West Wind
5. The theme of regeneration in Ode to the West Wind

Unit II

The students will be able to

1. Characteristic features of Romantic age
2. Appreciate Keats as a poet who is Known for his Odes
3. Understand "beauty is Truth, truth beauty" with reference to Ode on a Grecian Urn
4. Understand Samuel Taylor Coleridge as a romantic poet
5. Analyze the supernatural element in Kublakhan

Unit III

The students will be able to

1. Know the essayists of the Romantic Age
2. Appreciate Charles Lamb as an essayist
3. Analyze the humour in "A Dissertation Upon Roast Pig
4. Understand Oliver Goldsmith as an essayist
5. Critically analyze the essay, "A City Night Piece"

Unit IV

The students will be able to understand

1. Rivals as an anti sentimental comedy
2. Why Lydia wants to marry a poor man
3. The idea of malapropism

4. The concept of duel
5. How does Falkland's plan backfire

Unit V

The students will be able to

1. Analyze Robinson Crusoe as a travelogue
2. Know whether Robinson Crusoe changed at the end of the novel
3. Critically analyze Jan Eyre as a gothic novel
4. Undersand how Jane Eyre fits into romantic Literature
5. Analyze the character of Jane Eyre

Text Book and Reference material

Palgrave , F.T Palgrave's Golden Treasury, Oxford Publisher,1997

Web Source:

https://www.poetryfoundation.org/poems/45527/lines-composed-a-few-miles-above-tintern-abbey-on-revisiting-the-banks-of-the-wye-during-a-tour-july-13-1798

https://www.poetryfoundation.org/poems/45134/ode-to-the-west-wind

https://www.poetryfoundation.org/poems/44477/ode-on-a-grecian-urnhttps://www.poetryfoundation.org/poems/43991/kubla-khan

https://www.bartleby.com/380/prose/491.html

http://www.blupete.com/Literature/Essays/Best/GoldsmithCity.htm

http://www.gutenberg.org/files/24761/24761.txt

https://www.planetebook.com/free-ebooks/robinson-crusoe.pdf

https://www.gutenberg.org/files/1260/1260-h/1260-h.htm

CORE PAPER - 6

INTRODUCTION TO ENGLISH PHONETICS

Objectives

1) Students are exposed to the Evaluation of English Language at a deeper level, updating communication using Language, Spoken medium and Written medium.
2) Students enrich information about understanding English phonetics with information on general phonetics.
3) Illustrations facilitating readers comprehension of the subject both in orthography and in Phonetic transcription.
4) Student gets knowledge about medium of speech medium of writing.
5) Students attempt to the represent written language using marks on paper sounds used in spoken Language.
6) Students are thought about intricacies of articulating English sounds enabling them to speak better.
7) Students are thought about different levels of Linguistic analysis thereby preparing them to become effective speakers of English Language.
8) Students are exposed to the use of modern technology stressing the importance of speech using mobile phone, radio, tape recorder, multimedia, etc.,

SYLLABUS

UNIT - I

Introduction to Language - Arbitrariness - Duality - Displacement - Cultural Transmission.

UNIT - II

Phonetics - Phonology - Branches of Phonetics - Organs of Speech.

UNIT – III

Phonatory System and Articulatory System - Classification of Speech Sound - Consonants - Vowels.

UNIT - IV

Syllable and Syllabic Structure - Onset - Nucleus - Coda - Syllabic Consonants - Consonant Clusters - Abutting Consonants - Word accent - Rhythm and intonation.

UNIT - V

Place and Manner of articulation - Phonemic transcription.

References:

1. S. K. Verma and N. Krishnaswamy Modern Linguistics: An Introduction. New Delhi : OUP, 1989.28
2. H. A. Gleason: Linguistics and English Grammar. New York: Holt, Rinehart & Winston.Inc., 1965.
3. Radford A, Atkinson M, Britain D, Clahsen H and Spencer A: Linguistics - An Introduction. Cambridge University Press, Cambridge, 1999
4. Robins R H: General Linguistics: An Introductory Survey, Longman Group Limited, London:1971
5. Fasold R. W. And Connor-Linton J (ed.): An Introduction to Language and Linguistics, Cambridge University Press, Cambridge, 2006.
6. Daniel Jones: The Pronunciation of English. New Delhi: Blackie and Sons, 1976 A. C. Gimson. An Introduction to the Pronunciation of English. London: Methuen, 1980.
7. J. D. O'Conner. Better English Pronunciation. New Delhi: CUP, 2008. T. Balasubramanian. A Textbook of English Phonetics for Indian Students. New Delhi:Macmillan, 1981.
8. T. Balasubramanian. English Phonetics for Indian Students: A Workbook. New Delhi: Macmillan.
9. ABERCROMBIE, D., Elements of General Phonetics, Edinburgh, Edinburgh University Press, 1967.
10. BANSAL, R.K. AND J.B. HARRISON, Spoken English for India, Second Edition, Madras, Orient Longman, 1972.
11. GIMSON, A.C., An Introduction to the Pronunciation of English, London, Edward Arnold, 1962.
12. HEFFNER, R., General Phonetics, Madison, University of Wisconsin Press, 1949.
JONEW, DANIEL, The Pronunciation of English, Eight Edition, Cambridge, Cambridge University Press, 1956.
13. _____, The Phoneme: Its Nature and Use, Cambridge, Heffer,1950.
14. _____, An English Pronouncing Dictionary, London, Dent, 1917; ELBS, 1968.
15. LADEFOGED, P., A Course in Phonetics, New York, Harcourt Brace Jovanovich, 1975.
16. Vir Aggarwal & V.S.Gupta., Handbook of Journalism and Mass Communication. Concept Publishing Company, New Delhi.
17. Puri. G.K. Competition Success: Review Communication. New Delhi: Sudha Publication.
18. Roy, Baron, Beginner's Guide to Journalism, New Helhi: Pushtak Mahal, 2003.
19. Parthasarathy, Rangaswami. Basic Journalism, Macmillan Publications, New Delhi, 1984 Print.

ALLIED -2

PAPER- 3

HISTORY OF ENGLISH LITERATURE I

Course Objectives

1 To provide an extensive background to the course

2 To introduce the eminent writers of English Literature

3 To expose the students to the magnum opuses of the literary masters

4 To prepare the students to undergo the course thoroughly

5 To provide the nuances of the history of English Literature

UNIT - I

Introduction to English Literature - Old English Secular Poetry Beowulf - Old English War Poems - Old English Prose Writings - Old English Grammar - Old English dialects, The Age of Chaucer - Geoffrey Chaucer - His Life and Career - The Canterbury Tales, The Sonneteers - Wyatt - Surrey - Daniel , Dryden - Spenser as a Sonneteer and Shakespeare's Sonnets - Major poets in the Elizabethan Age - Spenser and Shakespeare - Their works

UNIT - II

Prose in Elizabethan Age: Roger Ascham - The Chronicles of the tutor period - Hall - Holinshed - The Bible - Wycliffe, Tyndale, Coverdale - King James I' s authorized version of the Bible. Francis Bacon - Literary Criticism - Sir. Philip Sydney's Apologie for Poetry - Puritanism - Ben Jonson - - The origin and growth of English Drama - Mysteries, Miracles, Moralities, Interludes - The first English Comedy and Tragedy.

UNIT - III

The University Wits - George Peale- Thomas Kyd - Christopher Marlowe - Robert Greene - Thomas Nash - Thomas Lodge - John Lyly - William Shakespeare - Life of Shakespeare - The four periods of Shakespeare's dramatic career - His contemporaries and successors - Elizabethan Prose Fiction, The Puritan Writers - John Bunyan, John Milton, George Herbert, Sir Thomas Browne - The Metaphysical poets - John Donne & Others

UNIT - IV

The Restoration Age: Poetry: John Dryden & Samuel Butler: Drama: The Comedy of Manners - William Congreve - Wycherley - Thomas Shadwell - Dryden. Augustan Age - Alexander Pope as a poet , Critic - Addison and Steele - Doctor Johnson, Goldsmith - Sheridan - Henry Fielding - Tobias Smollett, Lawrence Sterne, Horace Walpole

UNIT - V

Pre Romantic and the Romantic Age: Goldsmith - Thompson - Gray - Burns - Blake - William Wordsworth - S.T Coleridge - Lord Bryon - P.B Shelley and Keats - Charles Lamb - Hazlitt, De Quincey , Jane Austen, Sir Walter Scott.

Text Books

1. A History of English Literature by DR. A. Shanmugakani, Harrows Publications
2. An Outline History of English Literature by W.H Hudson, Mahaam Publishers
3. A.C Ward: Twentieth Century English Literature
4. Authur Compton - Rickett: History of English Literature

Reference Items: Books, Journal

An Outline History of English Literature by Hudson, Mahaam Publishers

E - Materials

Course out Come:

1. Students are able to have a vast knowledge in History of English Literature down the ages
2. Students are exposed to the major movements, changes and impacts in history.
3. The students gain confidence in their course of study.
4. It helps them in the long run to take up the competitive examination.
5. It enables them to pass in the entrance tests when they go for higher studies.

SKILLS BASED SUBJECT

PAPER - 2

SKILLS FOR EMPLOYMENT

Course Objectives

1. Learn what a group in and how individuals interact in a group
2. Know why interviews are held and what they and looking for
3. Have a good understanding of what your own priorities are in a job
4. Appreciate the importance of etiquette for a successful cause
5. Examine how work attitudes relate to job performance.

UNIT - I

1. Skills for Group Discussion
2. Leadership and problem-solving skills

UNIT - II

1. Purpose of Interviews
2. Before and after the Interview

UNIT - III

1. Preparing a Resume
2. Writing a cover Letter
3. Answering FAQs about you and your family

UNIT - IV

1. Answering FAQs about likes and dislikes
2. Answering FAQs on justifying candidature
3. Answering FAQs on priorities, attitudes and biases

UNIT – V

1. Workplace etiquette
2. Values and Ethics
3. Culture
4. Gender equality

Course out Come

Student is able to prepare her\him self

Unit - I

1. The student will be able to know types of GD
2. The student will be able to know about GD
3. The student will be able to know how to prepare for GD
4. The student will be able to understand leadership and problem solving skills
5. The student will be able to develop leadership and problem solving skills

Unit - II

1. The student will be able to discuss the purpose of interviews
2. What are the technique the student will be able to follow at the time of interviews
3. The student will be able know their strengths and weakness
4. The students will be able to focus purpose of interviews
5. The student will be able to concentrate do and don'ts while attending the interviews

Unit - III

1.The students will be able to Know how to lay out the details in a CV
2.The student will be able to learn how to organize in formation in an cover letter
3.The student will be able come to know how to write a covering letter
4.The student will be able to know FAOS about their family members
5.The student will be able to learn how to answer question about yourself and your family

Unit - IV

1.The students will be able to grasp the workplace etiquette.
2.The student will come to know values and Ethics
3.The student will be able to discuss culture issues.
4.The students will be able to know equal rights of boys and girls
5.The students will come to know empowerment of women

Unit - V

1.The students will be able to know ones likes and dislikes
2.The student will be able to understand their attitude.
3.They will be become familiar with things they need to talk about to answer a question.
4.They will be able to answer the question about the suitability of the job.
5.The student will be able to understand positive qualities that are valued at work.

Reference

Co, Lina Mukhopadhyay &. *Polyskills: A course in communication skills and life skills*. Chennai: Foundation, 2012. print.

NON-MAJOR ELECTIVE

PAPER - 1

LANGUAGE SKILLS AND COMMUNICATION I

Course Objectives

To improve the ability of speaking skills.
To provide training in developing the interpersonal skills.
To develop communicative skills
To make students confident in dealing with communicative skills
To facilitate students practical social knowledge through conversations

UNIT - I

1. Meeting people
2. Exchanging greetings
3. Introducing, others, giving personal information, taking about people animals and places

UNIT - II

1. Answering telephone, asking for someone
2. Making enquiries on the phone
3. Dealing with wrong number
4. Taking and leaving messages

COURSE OUTCOMES

UNIT - I

1. Students will be able to know how to behave while meeting people.
2. Students will be able to understand the ways of exchanging greetings.
3. Students will be able to introduce them to a group of people.
4. Students will be able to understand how to introduce others in anysuitation.
5. Student will be able to understand how to give personal information in a coherent way.

UNIT - II

1. Students will be able to know how to converse over phone.
2. Students will be able to know how to enquire over phone in formal suiation
3. Students will be able to know how to deal with wrong numbers in telephone.
4. Students will be able to know how to take and leave message after a telephonic conversation.
5. Students will be able to develop the skill of answering over phone.

Text books:

Mastering communication skills and soft skills

N.Krishnaswamy, ManjuDariwal, LalithaKrishnaswamy(Bloomsbury)

SEMESTER IV

CORE PAPER - 7

BRITISH LITERATURE III

Objectives

The students learn

1. what makes the Victorian period unique in literature
2. the key themes of Victorian literature
3. to appreciate the plays of Victorian age
4. why this age is considered as the age of novels
5. to appreciate the novels of Dickens, Thomas Hardy and George Eliot.

SYLLABUS

UNIT - I: POETRY

1. Ulysses - Alfred Tennyson
2. The Scholar Gypsy - Mathew Arnold

UNIT - II: POETRY

1. Dover Beach - Mathew Arnold
2. My Last Duchess -Robert Browning

UNIT - III: POETRY

1. On Falling in Love-R.L. Stevenson
2. On Liberty-John Stuart Mill

UNIT - IV: DRAMA

1. The Importance of Being Ernest - Oscar Wilde

UNIT - V: NOVEL

1. Pickwick Papers -Charles Dickenson
2. The Mayor of Casterbridge- Thomas Hardy
3. Silas Marner - George Eliot

Course outcome:

Unit I

The students will be able to understand

1. the theme of Ulysses
2. Ulysses as a dramatic monologue
3. Character of Ulyses
4. What does the scholar gypsy symbolize
5. The "strange disease of modern life"

Unit II

The students will be able to understand

1.My Last Duchess as a dramatic monologue

2. critical appreciation of the poem My Last Duchess

3. Describe the social custom according to "My Last Duchess " - Ferrara by Robert Browning

4. Theme of Darkling Thrush

5.Mood of the poem Darkling Thrush

Unit III

The students will be able to

1. Know the novelist R.L.Stevenson as a poet
2. Critically appreciate the poem On Falling in Love.
3. Analyze the poem On Liberty
4. Comprehend the style of John Stuart Mill's Poetry
5. Understand the social life of 19th Century.

Unit IV

The students will be able to

1. Identify targets of Wilde's satire and analyze the treatment of these targets.
2. Discuss the idea of art for art's sake.
3. Identify the pun central to the play and analyze its meaning
4. Who is the blocking figure in The Importance of Being Earnest?
5. What precisely is a Bunburyist?

Unit V

The students will be able to:

1. Identify who Charles Dickens was.
2. Summarize the characters and events of The Pickwick Papers.
3. understand that true happiness is achieved only through reciprocated love
4. See the tremendous impact that one person's life can have on the many people with whom he comes in contact.
5. Consider whether man or fate controls one's destiny.

Text Book and Reference material

Palgrave , F.T Palgrave's Golden Treasury, Oxford Publisher,1997

Web Source

https://www.poetryfoundation.org/poems/43606/the-scholar-gipsy

https://www.poetryfoundation.org/poems/43588/dover-beach

https://www.poetryfoundation.org/poems/43768/my-last-duchess

https://deriv.nls.uk/dcn6/7869/78693125.6.pdf

https://www.gutenberg.org/files/34901/34901-h/34901-h.htm

https://www.gutenberg.org/files/844/844-h/844-h.htm

http://www.gutenberg.org/files/580/580-0.txt

https://www.fulltextarchive.com/page/The-Mayor-of-Casterbridge-by-Thomas-Hardy/

http://www.gutenberg.org/files/550/550-0.txt

CORE PAPER - 8

HISTORY OF ENGLISH LANGUAGE

Objectives

The students are expected to know

1. General characteristics of English language
2. Development of vocabulary and change of meaning
3. Foreign influences on English language
4. Evolution of American English and standard English
5. Development of English as World language

SYLLABUS

UNIT - I

1. Characteristic features of English Language
2. Indo European Family of Languages

UNIT - II

1. The Growth of English Vocabulary
2. Change of Meaning

UNIT - III

1. History of English Spelling, Pronunciation and Dictionaries
2. Growth of Standard English

UNIT - IV

1. Contribution of Foreign languages
a. Latin
b. Greek
c. French
2. American English

UNIT - V

1. American English
2. English as world language

Course Outcome:

Unit I

The studedents will be able to know the

1. Characteristic features of English language like heterogeneousness, effect of loss of inflexions, simplicity of inflexions, gender system of English and development of periphrases
2. Indo European family of languages
3. Grimm's law
4. Verner's law
5. English as part of Indo European family of languages

Unit II

The students will be able to understand

1. various methods of development of vocabulary
2. words coined by imitation, abbreviation, initials, back formation
3. words coined by suffixes and prefixes, syncopation, telescoping, metaanalysis, etc.
4. various methods of change of meaning
5. change of meaning listed by F.T. Wood,,

Unit III

The students will be able to understand

1. the impact of influences of foreign languages
2. the influence of Latin language
3. greek influence
4. French influence

Unit IV

The students will be able to understand

1. The history of English spelling
2. Reason for descrepency between spelling and pronunciation
3. Development of dictionaries
4. Growth of Standard English
5. Received pronunciation

Unit V

The students will be able to understand

1. The reason for the development of American English
2. New coinages
3. Differences between American English and British English'
4. Evolution of English as world Language
5. Impact of English as universal language

ALLIED -2

PAPER - 4

HISTORY OF ENGLISH LITERATURE II

Course Objectives

1. To provide an extensive background to the course

2. To introduce the eminent writers of English Literature

3 .To expose the students to the magnum opuses of the literary masters

4 .To prepare the students to undergo the course thoroughly

5 .To provide the nuances of the history of English Literature

SYLLABUS

UNIT - I

1. The Victorian Age:
2. Poetry: Tennyson, Browning, Arnold and Hopkins.
3. Prose: Macaulay calyces Ruskin - Arnold - Walter Pater - R.L Stevenson:
4. Drama: Oscar Wilde
5. Fiction: Dickens, Thackeray - Mrs. Gaskell - Willkie Collins, Charlotte Bronte - George Eliot - Thomas Hardy - Author Canonon Doyle - Rudyard Kipling

UNIT - II

1. The Pre- Raphaelite Movement: Dante Gabriel Rossetti - Morris - Swinburne:
2. Georgian Poets: John Masefield, Walter de la More, Blunden, Housman, W.H Davies; Lascelles Abercrombie

UNIT - III : TWENTIETH CENTURY

1. Poetry: W. B Yeats, T. S Eliot - W. H Adden - Stephen Spender - Dylan Thomas - C.D Lewis, Ted Hughes - Philip Larkin
2. Prose: G.K Chesterton, Robert Lynd - A.G Gardiner, Lytton Strachey - T.E Lawrence - Hilairie Belloc.

UNIT - IV : **DRAMA**

1. Drama: Bernard Shaw - John Galsworthy - J. M Synge - Sean O' Casey - J.M Barrie - T.S Eliot - Christopher Fry - Beckett - John Osborne - Harold Pinter

2. Fiction: Arnold Bennett - H.G Wells - Graham Greene - Joseph Conrad - Somerset Maugham - E.M Forster - D.H Lawrence - Aldus Huxley - James Joyce - Virginia Wolf - George Orwell - P.G Wodehouse - Kinsley Amis - John Braine - William Golding

UNIT - V : 21ST CENTURY

1. **Poetry**: Carol Ann Duffy, Kathleen Raine, Edward Bond
2. **Prose**: Monica Ali, Martin Louis Amis, Diana Athill
3. **Fiction**: Margaret Allen, Paul Adam, Douglas Adam, J.K Rowling, Salmon Rushdie
4. **Drama**: Samantha Ellis, Christine Dennison, Alan Bennett & Angela Clarke

Course out Come

1. Students are able to have a vast knowledge in History of English Literature down the ages
2. Students are exposed to the major movements, changes and impacts in history.
3. The students gain confidence in their course of study.
4. It helps them in the long run to take up the competitive examination.
5. It enables them to pass in the entrance tests when they go for higher studies.

Text Books

Unit - 1,2,3,4:

A History of English Literature by DR. A. Shanmugakani, Harrows Publications

An Outline History of English Literature by W.H Hudson, Mahaam Publishers

A.C Ward: Twentieth Century English Literature

Authur Compton - Rickett: History of English Literature

Unit - 5

https://oxfords.com

https://www.britanica.com

Reference Items: Books, Journal

An Outline History of English Literature by W.H Hudson, Mahaam Publishers

E - Materials

https://oxfords.com

https://www.britanica.com

SKILL BASED SUBJECT

PAPER - 2

Writing for Specific Purpose

Course Objectives

1. To create a passion for writing in English for special purposes
2. Enable students to learn the techniques of writing
3. To learn the situations and choose the right type of words and wages
4. To create develop creative interest and encourage them to write or them own
5. To help them become more competent and confident writers

SYLLABUS

UNIT - I

- Getting started
- Gaining control
- Writing for a Diverse Audience
- Organizing your thought
- Managing the purpose of writing
- Overcoming the writes Block.

UNIT - II

- Making your message Accessible
- The subject time
- Beginning
- Endings
- Headings
- Graphic Devices
- Bullets

UNIT - III

- An easy to read style
- Strengthening a weak memo
- Writing for special purpose
- The executive summary
- Clear Instructions

UNIT - IV

- Good well letters
- Letter of congratulations
- Thank you notes
- Letter of apology
- Letter of recommendation
- Delivering welcome news

UNIT - V

- Letter of complaint
- Responses to letters of complaint
- Letter of request
- Persuasion : some practical pointer
- Shaping a persuasion message
- The sales letter
- International correspondence
- Message for email

Course Out Comes :

Student is able to prepare her\him self

Unit I

1. To start with work
2. Learns the methodical approach
3. Able to focus on the task
4. Gains control and get involved in the specific work
5. Understands the need of the reading
6. Gain control one writing and get involved in the specific work

Unit II

1. Learn to organize ideas and write
2. Known how to draft the message
3. Write the revised message
4. Known to edit the draft after proof-reading
5. Learn to overcome the writes block.

Unit III

1. Construct subject line the key lines of the message in a captive way.
2. Include the punctuation marks in the right place
3. Learn to use the tens in the items in the menu bar like headings endings bullets and graphic devices
4. Makes the message accessible
5. Learn to incorporate the special effect

Unit IV

1. Read their writing and make it clear
2. Analyze the structure and word choice
3. Able to give helpful information
4. Known to write quick clean and direct
5. Learn to write an easy to read style.

Unit V

1. Learn to deliver un- welcome news
2. Responses to letter of complaints
3. Shape a persuasive message
4. Draft sales letters
5. Interact with international correspondence

Text Book :

Reference: Effective business writing Maryann PIOTROWSKI, Harper Collins publisher. Inc. NY 10022

NON-MAJOR ELECTIVE

PAPER - 2

LANGUAGE SKILLS AND COMMUNICATION II

Course Objectives

1. To enable the students to improve both ability to communicate and linguistic competence in the language.
2. To study a language and various transferable skills as a part of this course

UNIT - I:

1. Getting people's attention and interrupting
2. Giving instructions and seeking clarification
3. Making requests, asking for directions and giving directions.

UNIT - II:

1. Inviting, accepting and refusing invitation.
2. Apologizing and responding to an apology.
3. Congratulating and responding to congratulations.
4. Asking for, giving and refusing permission.

COURSE OUTCOMES

UNIT I

1. Students will be able to use expression to get someone's attention.
2. Students will be able to mention connecting word while giving instruction.
3. Students will be able to know the ways of making request, asking for directions, and also giving directions.
4. Students will be able to know how to give instruction and seek clarification.
5. Student will be able to grasp the procedures while present dialogues for any situation.

UNIT II

1. Students will be able to know how to invite, accept and refusing invitation.
2. Students will be able to develop the formal and informal ways for accepting and declining invitation.
3. Students will be able to know how to congratulate and how to respond to congratulations.
4. Students will be able to know how to ask, give and refuse permission in both formal and informal situations.
5. Students will be able to learn how to apologize and respond to apologize.

Text books:

KamleshSadam and SusheelaPunitha. Spoken English:
A Foundation Course (Part I). Orient black swan. 2014

SEMESTER V

CORE PAPER - 9

BRITISH LITERATURE IV

Course Objectives

1. To introduce the twentieth century British literature.
2. To comprehend the development of trends in British literature.
3. To view British literature in its socio-cultural and political contexts.
4. To understand the theme, structure and style in twentieth century British literature.
5. To learn interpretative techniques like modernism and post-modernism in order to apply in the literary texts of various genres.

SYLLABUS

UNIT - I: POETRY

1. Second Coming - W.B Yeats
2. Tollund Man - Seamus Heaney
3. A Prayer for My Daughter- W.B.Yeats

UNIT - II: POETRY

1. God's Grandeur - Gerald Manley Hopkins
2. The Hound of heaven- Francis Thompson

UNIT - III: PROSE

1. The function of a Teacher- Betrand Russell
2. Bookshop Memories - George Orwell
3. Notes on the English character - E.M.Foster

UNIT - IV: DRAMA

1. Pygmalion - G.B.Shaw

UNIT - V: NOVEL

1. Lord of the Flies - William Golding

2. 1984 - George Orwell

COURSE OUTCOMES

Unit - I

1. Students will be able to understand the coming of a new ominous reality.
2. Students will be able to understand the themes of the poems of W.B.Yeats with reference to "The Second Coming".
3. Students will be able to know the background of Irish literature with reference to Seamus Heaney.
4. Students will be able to understand the violence and murders in Northern Ireland with reference to "TollundMan".
5. Students will be able to recognize the love of a father for his daughter through the poem "Prayer for My Daughter".

Unit - II

1. Students will be able to understand the theme of the poems of G.M.Hopkins.
2. Students will be able to appreciate the literary genre sonnet.
3. Students will be able to understand man's lack of awareness and his insensitivity to nature.
4. Students will be able to classify the poem, "Hound of Heaven" as an ode.
5. Students will be able to understand the pursuit of a sinner by a loving God.

UNIT - III

1. Students will be able to understand the role of a teacher in the society.
2. Students will be able to appreciate the responsibility of a teacher.
3. Students will be able to understand various kinds of people and their behaviour.
4. Students will be able to understand the idea of undeveloped heart.
5. Students will be able to understand the ways and means of expressing emotions through characters.

Unit - IV

1. Students will be able appreciate G. B. Shaw as a Dramatist
2. Students will be able to understand various social issues in the plays of G.B. Shaw with reference to "Pygmalion"
3. Students will be able to understand the teacher- student relationship
4. Students will be able to recognize the sense of humour in the plays of G. B. Shaw.
5. Students will be able to understand the distinct social class system.

Unit - V

1. Students will be able to know the theme of the novels of William Golding with reference to "Lord of the Flies."

2. Students will be able to understand the concept of beastial instinct and savagery.
3. Students will be able to understand the suitability of the novel for film making.
4. Students will be able to understand the concept of totalitarianism
5. Students will be able to understand how the views in the novels are relevant in the current scenerio.

TEXT BOOKS AND E- MATERIALS

Poetry down the Ages 2004. Orient Longman

George Bernard Shaw's **Pygmalion**. New York: Chelsea House **Publishers**, 1988.

Golding, William, and Edmund L. Epstein. **Lord of the Flies**: A **Novel**. New York: Perigee, 1954.

Orwell, George. **1984**. London: Secker and Warburg, 1949.

https://www.gradesaver.com/the-second-coming/study-guide/poem-text

https://www.poetryinternational.org/pi/poem/23607/auto/0/0/Seamus-Heaney/THE-TOLLUND-MAN/en/tile

https://www.poetryfoundation.org/poems/44395/gods-grandeur

https://www.bartleby.com/236/239.html

http://www.askliterature.com/prose/functions-of-a-teacher-by-bertrand-russell/

https://orwell.ru/library/articles/bookshop/english/e_shop

https://sex-british.com/notes-on-the-english-character-e-m-forster/

CORE PAPER - 10

SHAKESPEARE

Objectives

1. To make students understand the characteristics of Shakespearean tragedy
2. To stress the significance of filial love
3. To enable the students to appreciate the qualities of Shakespearean comedy
4. To show how Shakespeare excels as poet
5. To give a brief introduction to Shakespearean criticism

SYLLABUS

UNIT - I & II - King Lear

Unit III - A Midsummer Night' Dream

Unit IV - Sonnet 116, 130

Unit V - Shakespeare Criticism:

A Midsummer Night' Dream: The Round Table Characters of Shakespeare's Plays

A C Bradley Lecture VII

Course Outcome

Unit I and II

Students will be able to

1. grasp how Lear suffers from children's ingratitude
2. appreciate the innocence of Cordelia
3. aPPreciate the significance of fool
4. understand how hamartia leads to fall
5. understand the role of fate

UNIT - III

Students will be able to understand

1. Characteristic features of a romantic comedy
2. To appreciate the world of magic
3. The significance of love
4. Appreciate the role of Puck
5. Appreciate the role of songs

UNIT - IV

Students will be able to understand

1. To understand the characteristics of sonnets
2. Shakespeare's views on love
3. Shakespeare's affection for the dark lady
4. The poetic language of Shakespeare

UNIT - V

Students will be able to understand

1. Hazlitt as a critic
2. Greatness of Shakespeare as playwright
3. Critically appreciate Midsummer Night's Dream as a comey
4. Dequincy's views on Macbeth
5. Why the porter Scene is introduced after Duncan's death

CORE PAPER - 11

LITERARY CRITICISM

Objectives

1. Understand the relationship between literature and what criticism
2. Understand Aristotles's concept of Tragedyt
3. Understand that the end result of novel is the whole man alive
4. Understand T.S. Eliot as a modern critic
5. Understand current literary theory

UNIT - I

- Poetics - Aristotle

UNIT - II

- Preface to Lyrical Ballads -William Wordsworth

UNIT - III

- Why the Novel Matter- D.H.Lawrence
- Tradition and the Individual Talent -T.S.Eliot

UNIT - IV

- New Criticism Structuralism- Post structuralism

UNIT - V

- Feminist Criticism - Post-Colonialism - Eco criticism

Course Outcome:

Unit I

The students will be able to understand

1. Aristotle's concept of tragedy
2. six formative element in tragedy
3. Aristotle's Plot, character and tragic hero
4. Functions tragedy

Unit II

The students will be able to

1. understand the genesis of the Preface to the Lyrical Ballads
2. know key concepts conversed in the Preface to the Lyrical Ballads
3. have Wordsworth's views on themes, subject matter, function & diction of poet

Unit III

1.Why does the novel matter?
2. How Lawrence highlight the superiority of the novel over other forms of literature
3. What according to Lawrence are the supreme old novels
4.The relation between tradition and individual talent
5.The concept of objective correlative

Unit IV

The students will be able to understand

1. John Crowe Ransom as a pioneer of New Criticism
2. The theory of new criticism
3. Ferdinand de Saussure as forerunner of Structuralism
4. The difference between new criticism and structuralism
5. The theory of post structuralism
   - Unit V Feminist Criticism - Post-Colonialism - Eco criticism

The students are able

1. to assess the different concept of Feminist Criticism
2. To get identify the different impact of post colonialist features in literature
3. Get introduce to Eurocentric concepts of criticism
4. To distinguish between impact of orientalism and European imperialism.
5. To understand the parallel between feminist criticism and eco criticism.

TEXTS

Reference books:

- Barry, Peter.*Beginning Theory.Manchester University Press 2009.*
- Hans Bertens. *Literary Theory: The Basics*, 2013
- M.H. Abrams et al. *A Glossary of Literary Terms* 11th Edition.
- English Literary Criticism and Theory by M.S .Nagarajan
- BOOK: English Critical Texts : D.J Enright Ernst De Chickera

CORE PAPER - 12

SUBALTERN LITERATURE

Objectives

1. To know the themes of subaltern poetry
2. To critically analyse the poems of subaltern literature
3. To know the theme of marginalization in Chinua Achebe's The Sacrificial Egg and Mahaswetha devi's Draupadhi .
4. To appreciate the plays of subaltern playwrights, Asif Currimbhoy and Wole Soyinka
5. To know the theme of hegemony in the novels of Amitav Ghosh and Khalid Hosseini

SYLLABUS

UNIT - I

Poetry

1. The Dying Eagle by E.J. Pratt
2. Why have you left the Horse Alone by Mahmoud Darwish
3. Telephone Converstion by Wole Soyinka

UNIT - II

Non Fiction

Nickel and Dimed by Barbara Ehrenreich

UNIT - III

Short stories

1. The Sacrificial Egg by Chinua Achebe
2. Draupadhi by Mahaswetha Devi

UNIT - IV

1. Dumb Dancer by Asif Currimbhoy
2. Death and the King's Horseman by Wole Soyinka

UNIT - V

1. Hungry Tide by Amitav Ghosh
2. The Kite Runner by Khalid Hosseini

Course Outcomes

Unit I

The students will be able to

1. Analyze the theme of loss of power
2. Know the inevitability of younger generatins overthrowing the older ones
3. Analyse myth and history in Mahmoud Darwish's poem, "Why have you left the horse alone"
4. Understand the pain of exile
5. Understand the theme of racial discrimination

Unit II

The students will be able to

1. understand the complications that arise from trying to survive on a minimum-age job they are immediately facing destitution.
2. Realize that work is not a way out of poverty, but a physically and emotionally damaging state in which the economic laws of supply and demand often simply don't apply.
3. Understand that low-wage workers are forced to fight an uphill, or even impossible, battle:
4. understand that their problems stem not from individual weaknesses or laziness but from entrenched structural issues that make working your way out of poverty excruciatingly difficult.

Unit III

The students are able to understand

1. the tug-of-war between Western influences and native traditions and beliefs.
2. Through Julius, that even decades of colonialism are incapable of erasing the rituals and beliefs of a people
3. The concept of emptiness and loss.
4. That Draupadi is an ironic tale of exploitation and struggle faced by a woman for being born in a low birth
5. And explore the traumas undertaken by the women protagonists to resist and survive.

Unit IV

The students are able to understand

1. How the psychological thriller,Dumb Dancers incorporate the element of valour from the Mahabharata,
2. the stigma and struggle attached with mental illnesses, expressed though the traditional ***dance*** form, kathakali.
3. the mingling of Western and Yoruban elements in Death and the King's Horseman
4. the universality of the theme of cultural responsibility
5. The values of Yoruban society

Unit V

The students will be able to understand

1. The Environmental problems which are often underestimated by the majority of mankind in Hungry Tide.
2. Corruption and bureaucracy.as disease, which develops quickly, but takes a lot of time, efforts and determination to recover from it
3. The necessity of Responsibility.
4. The theme of betrayal The Kite Runner
5. The life of guilt moving towards redemption

Text Book and Web Source

1. https://www.k-state.edu/english/westmank/spring_00/SOYINKA.html
2. https://english2302.files.wordpress.com/2016/08/the-sacrificial-egg.pdf
3. Currimboy, Asif. Dumb Dancers. Culcutta: Writers Workshop, 1992.
4. Ehrenreich, Barbara. Nickel and Dimed. Picador, n.d.
5. Gosh, Amitav. The Hungry Tide. Harper Collins, n.d.
6. Hosseini, Khaled. The Kite Runner. Bloomsbury Publishing , n.d.

INTERNAL ELECTIVE

PAPER - 1

(to choose one out of two)

A. CHILDREN LITERATURE

Objectives

1. To make the students read a broad range of children's literature from Fairy tales to recent books
2. it gives students appreciation about their own cultural heritage as well as those of others;
3. it helps students develop emotional intelligence and creativity;
4. to explore new vocabulary, to internalize grammar and linguistic structures,
5. to motivate the students to develop the habit of reading

SYLLABUS

UNIT - I

1.Little Women - Louisa May Alcott

UNIT - II

1.Anna of Green Gables (Book I)- Anne Montgommz

UNIT - III

1.Harry Potter and the Philosopher's Stone -J . K.Rowling

UNIT - IV

1.The Ugly Duckling - Hans Christian Andersen

2.Hansel and Gretel - Grimm's Fairy Tales

UNIT - V

1. C.S.Lewis- On Three ways of Writing for Children

2. Philip Pullman - On Children's Literature and the Critics Who Disdain It (From Daemon Voices: On Stories and Storytelling).

Course outcome:

Unit I

The students learn

1. Young woman's struggle between familial duty and personal wor
2. The danger of gender stereotyping
3. To find happiness through daily activities and dreams

4. The importance of being genuine
5. What they deserve depends on how hard they work

Unit II

The students are able to understand

1. How being good leads to problems
2. The traditional roles and propriety
3. The underlying moral character of Anne
4. How new moral codes perplex the traditional ones
5. Anne's vision of future

Unit III

The students are able to understand

1. How Harry learns that he is awizard
2. Harry's first experience of wizarding
3. The character of Hermione Ganger and Professor Quirrell
4. The Significance of Harry's eleventh birthday
5. The importance Harry's vision on the Mirror Erised

Unit IV

The students will be able to:

1. identify and describe the moral of the story, The Ugly Duckling
2. analyze the characters of the story.
3. analyzethe elements of a fairy tale.
4. Understand how to manage problematic situations
5. compare and contrast fairy tales

Unit V

The students understand

1. it's in the fantasy literature that we find a sense of sub-creating a world and the tales that inhabit it that both reveal and delight.
2. that it is a wrong conception that one is behind in his reading and one is ahead,
3. that there isn't a complete and unbridgeable gap between the books of the children, and the grown-
4. That we grow up by moving along a sort of timeline, like a monkey climbing a stick.
5. They should not criticize anyone for reading children's fiction

Web Source:

https://www.catholicculture.org/culture/library/view.cfm?recnum=9117

Alcott, Louisa May. Little Women. Fingerprint Publishing, n.d.
Montgomery, L M. Anna of Green Gables. Penguin UK, n.d.
Rowling, J K. Harry Potter and the Philosopher's Stone. Bloomsbury Press, n.d.

INTERNAL ELECTIVE

PAPER - 1

B. JOURNALISM

Objectives:

1) To give students a better understanding on the history development of journalism in global and Indian context.
2) Introduce students the concept related to News and Journalistic practice
3) Ignites knowledge of professional Journalism and helps students to strengthen the underpinnings of journalism.
4) Stimulates the students on getting knowledge about how newspaper encourages photo-journalism development.
5) Prepares students has a good reporter and capable interpreted of society
6) Imparts knowledge of sciences and history of arts to make one's way up in a world to meet out increasingly demanding competence in the field of journalism.
7) Modality prepares a student to learn how to write editorials columns and feature articles.

SYLLABUS

UNIT - I

History - Definition of News - News sources - News Values - Role and functions of Journalism - Canons of Journalism.

UNIT - II

Reporter - News Editor - Sub Editor - Anatomy of Editing - Language and Style - Organisation and Structure of the News paper.

UNIT - III

Introduction to Copy Editing - Preliminary Copy Editing - Design and Specimen Pages.

UNIT - IV

On Screen Copy Editing - Preparing Text for typesetter - Illustrations - Proof**.**

UNIT - V

House Style

- House Style and Preliminary Pages
- Cross references
- Date and Time
- Spelling and Punctuations
- Tittle Page
- Content List
- List of Illustrations

Literary Material

- Running Heads
- Page Number
- Heading
- Footnotes and Endnotes
- Tables
- Appendixes
- Glossaries

References:

1. Mencher, Melvin; News Reporting and Writing; 7th edition; (1997); Columbia Univ.Press
2. Ed. Boyce, George; Curran, James; Wingate, Pauline; Newspaper History from the 17th century to the present day; (1978); Sage
3. Wilson, John; Understanding Journalism; (1996); Routledge
4. Mazumdar, Aurobindo; Indian Press and Freedom Struggle; (1993); Orient Longman
5. Parthasarthy, Ramaswamy; Here is the News; (1994); Streling
6. Brumley and O'Malley; A Journalism Reader, (1997); Routledge
7. Howard, T; New: A Reader; (1991); OUP
8. Williams, Framcos; Dangerous Estate: (1957); Longman
9. Dhavan, Rajeev; Only the Good News; (1987); bharat Enterprises
10. Sarkar, R.C.S; The press in India; (1984); S. Chand & Co. Ltd.

11. Raghavan, G. N. S; PTi Story; (1987); Indraprastha Press
12. Rao, Amiya and Rao, B.G.; The Press she could not whip; (1977); Popular Prakashan
13. Srinivasan. R.; Crusaders of the 4th Esate; (1989); Bhartiya Vidya Bhavan
14. Smith, Anthony; The News an International History; (1979); Thames and Hudson
15. Hohenberg; The professional Journalist
16. Ahuja, B.N., Theory and Practice of Journalism, Surject Publications, Delhi,1979
17. Gunning, Robert, The Technique of Clear Writing, McGraw-Hill Book Co., New York.
18. Johnson, Stanley and Julian Hariss, The Complete Reporter, The MacMillan Co., New York, 1942.
19. Lent, John A. (ed), The Asian Newspaper's Reluctant Revolution, The State University Press, Ames Iowa, 1977.
20. Murthy, Nadig Krishna, Indian Journalism, Prasaranga, University of Mysore, 1966.
21. Natrajan, J., History of Indian Journalism. The Publications Division Government of India.
22. Parikh, R.D., The Press and Society, Popular Prakshan, Bombay, 1965.
23. Parthasarathy, Rangaswami, A Hundred Years of the Hindu; The epic story of Indian Nationalism, Kasturi and Sons Ltd., Madras/
24. Sahni, J.N., Truth About the Indian Press, Allied Publishers, Bombay, 1974.
25. Sethi, Patanjali, Professional Journalism, Orient Longman, Bombay,1974.
26. Wolseley, Roland E. (ed.), Journalism in Modern India, Asia Publishing House, Bombay, 1964.

Web Source:

copac.ac.uk:

copac@mimas.ac.uk

SKILL BASED PAPER SUBJECT

PAPER - 3

CONTENT WRITING

Course Objective

Expose students of English literature to the world of 'ideation and creation'. By providing a platform for writing contents for Advertisement, Websites, Product descriptions and Social media contents (for clients to express, inform, entertain or persuade the audience/ readers) enhances the artistic and analytic function of the student.

Course Outcome

Content Writing will play a vital role in the era of "start ups". With technical expertise along with good writing skill scan provide a great career opportunity to a student.

Unit I

Introduction

Writing for special purpose- nuances of technical writing- digital age writings- SEO- target identification and focus- various platforms. Types of Content Ads., Blogs, E-Books etc., Publication Platforms.

Unit II

Writing Tools, Tips, & Techniques.

Unit III

Advertising Objectives- Category of Ads. - Strategy - layout- language.

Unit IV

Social media and present day platforms.Social media tools.

Unit V

Content Writing Exercises, Commercials, Social Advertisements, Short films, Projects as teams.

Text Book

Reference Books.

- **Kristina Halvorson.** *Content Strategy for the Web***.**
- **Mark W. Schaefer.** ***The Content Code: Six essential strategies*****. 2015.**
- **Goddard Angelo.** *The language of Advertising***. 1998.**
- **Caston Julia.** *Creative writing: A Practical Guide***. 1998.**
- **Krikpan John.** *Good Style writing for Science*. 1992.

SEMESTER VI

CORE PAPER -13

CONTEMPORARY LITERATURE

Course Objectives

1. To introduce a wide range of contemporary literature.
2. To understand the variety of existing literary culture.
3. To expose the students to know the development of English language.
4. To expose the students to know to variety of characters
5. To promote the students to read contemporary literature.

Syllabus

UNIT - I: POETRY

1. Rain - Don Patterson

2. Wedding - Alice Oswald

UNIT - II: POTERY

1. Though My Mother was Already Two Years Dead (Long Distance II)- Tony Harrison

2. Lonely Moon- Sandra Feldman

UNIT - III: PROSE

1. Through the Tunnel- Doris Lessing

2. Once Upon a Time- Nadine Gordimer

UNIT - IV: DRAMA

1. The Humans- Stephen Karam

2. England People Very Nice- Richard bean

UNIT - V: NOVEL

1. Life of pi- Yann Martel

2. The Alchemist- Paulo Coelho

COURSE OUTCOMES

UNIT I

1. Students will be able to understand contemporary American poetry with reference to Don Patterson.
2. Students will be able to analyze why Patterson love all films that starts with rain.
3. Students will be able to understand the poetic techniques used by Alice Oswald.
4. Students will be able to know how art attempts to make a sense of the transformation after wedding.
5. Students will be able to understand the transformation that love creates in one's life.

UNIT II

1. Students will be able to understand contemporary English literature with reference to Toni Harrison.
2. Students will be able to recognize the universality of motherhood.
3. Students will be able to understand how dead people live in the memories of people alive.
4. Students will be able to critically analyze the theme of loneliness.
5. Students will be able to have a glimpse of Jewish literature with reference to Sandra Feldman.

UNIT III

1. Students will be able to understand contemporary English short story with reference to Doris Lessing.
2. Students will be able to know the historical context of the short story "Through the Tunnel".
3. Students will be able to know the psychological implications of imaginary fears.
4. Students will be able to understand the South African literature with reference to Nadine Gordimer.
5. Students will be able to fix the story, "Once Upon A Time" in the frame work- bed time stories.

UNIT IV

1. Students will be able to understand the contemporary British drama with reference to Richard Bean.
2. Students will be able to know the existing racism among ethnic groups.
3. Students will be able to understand the theatre techniques used.
4. Students will be able to understand the contemporary American drama with reference to Stephen Karam.
5. Students will be able to know the concept of familial drama.

UNIT V

1. Students will be able to know the contemporary Canadian literature with reference to Yann Martel.
2. Students will be able to appreciate the story of an Indian teen ager with a Bengal Tiger in a life boat after a ship wreck.
3. Students will be able to understand the contemporary Brazilian literature with reference to Paulo Coelho.
4. Students will be able to comprehend the role of symbols and omens in one's life.
5. Students will be able to understand the suitability of the novels for film making.

TEXT BOOKS AND E- MATERIALS

https://poets.org/poem/rain-0

https://www.poetrybyheart.org.uk/poems/wedding/

https://poets.org/poem/long-distance-ii

https://www.poemhunter.com/poem/lonely-moon-5/

https://www.bartleby.com/topics/through-the-tunnel

https://archive.org/stream/GordimerOnceUponATime/Gordimer_Once_Upon_a_Time_djvu.txt

Martel, Yann. **Life of Pi**. New York: Harcourt, Inc., 2001.

Coelho, **Paulo**. **The Alchemist**. San Francisco: HarperSanFrancisco, 1998. Print.

CORE PAPER -14

INDIAN LITERATURE IN TRANSLATION

Course Objectives

1. To introduce the student to the polyphony of modern Indian literature in translation.
2. To understand the multi-faceted nature of cultural identities in the various Indian literature in translation.
3. To compare literary texts produced across Indian regional landscapes to seek similarities and differences in thematic and cultural perspectives.
4. To explore images in literary productions that express the writer's views on their society.
5. To enable the students to understand and appreciate the richness and complexities of the respective languages and their literature.

Syllabus

UNIT - I: POETRY

1. Kurunthogai Verse 40 (poem: "**Red Earth and pouring rain"**):What could my mother be to yours)- Translated by Dr. JayanthasriBalakrishnan

2.The modern woman by Bharathiyar. (puthumai Pen)

3. Thirukkural - The Possession of love

UNIT - II: NON-FICTION

The five steps to success by Yandamoori Veerandranath

UNIT - III

1. Chemmeen - ThakazhiSivasankaraPillai (Translated by Anita Nair)
2. GracharGochar -VivekShenbag (Translated by SrinathPrerur)

UNIT - IV

1. Sakunthalam - Kalidasa
2. EvamIndrajith - Badal Sarkar (Translated by GirishKarnad)

UNIT - V

1. Bridges - Sivashankari (Translated by Krisnan)
2. The Bait - Mahim Bora (Translated by LalithSaika)

COURSE OUTCOMES

UNIT I

Students will be able to

1. Learn the universal qualities of pure love irrespective of caste, creed and society.
2. Appreciate the poetic style and the indigenous metaphor
3. The concept of modern woman by Bharathiya
4. The significance of selfless love
5. Thiruvalluvar as universal poet

UNIT II

Students will be able to know

1. how to overcome anger, laziness , fear and complexes
2. How to develop their leadership qualities
3. How to develop their relationships
4. Indian culture and tradition
5. Able to face life with confidence

UNIT III

1.Students will be able to understand the myths about chastity.

2.Students will be able to understand the customs, taboos, beliefs and rituals of fishermen community.

3.Students will be able to understand the socio-cultural background of India with reference to VivekShenbag.

4.Students will be able to face problems after marriage.

5.Students will be able to raise voice against domestic violence.

UNIT IV

1. Students will be able to understand the importance of culture depicted in the epic *Mahabaratha*.
2. Students will be able to develop a taste for language and literature with reference to *Sakuntalam*.
3. Students will be able to understand the sign of true love.
4. Students will be able to learn the genre absurd play and the stream of consciousness technique.
5. Students will be able to explore Sartrean existentialism.

UNIT V

1. Students will be able to understand Assamese literature with reference to Mahim Bora.
2. Students will be able to visualize the concept of first love.
3. Students will be able to know the importance of rural life.
4. Students will be able to know the practices and rituals of the Tamil ancestors.
5. Students will be able to understand the concept of birth and death.

TEXT BOOKS AND E MATERIALS

https://www.worldcat.org/title/sins-of-appus-mother/oclc/309143

https://talesntunes.wordpress.com/2017/12/11/book-review-chemmeen-english-translation/

https://indianreview.in/fiction/indian-review-assamese-literature-the-bait-mahim-bora-translated-lalit-saikia/

https://www.worldcat.org/title/kalidas-abhigyan-shakuntalam/oclc/643914898

Badal Sarkar, EvamIndrajith - translated by GirishKarnad. Oxford University Press, London 1974 Print.

https://www.worldcat.org/title/bridges-paalangal/oclc/229343130

https://www.academia.edu/9958506/TRANSLATION_OF_CLASSICS

CORE PAPER -15

NEW LITERATURES IN ENGLISH

Course Objectives

1. To introduce the finest works in English belonging to various countries.
2. To give insight into the dogma free world of spiritualism.
3. To enable the students to analyze literary works from different environment and different cultures.
4. To show how English language has become a tool against colonialism.
5. To give an objective view of dichotomies in society.

UNIT - I: POETRY

Australia - A.D.Hope

Your Children are Not Your Children - Khalil Ghibran

UNIT - II: POETRY

A Far Cry From Africa - Derek Walcot

House and Land - Allen Curnow

UNIT - III: PROSE

A Black Grand Mother - Sally Morgan

Novelist as a Teacher - Chinua Achebe

UNIT - IV: DRAMA

Death and the King's Horseman - Wole Soyinka

UNIT - V: NOVEL

Cry, the Beloved Country - Allen P

COURSE OUTCOMES

UNIT I

1. Students will be able to understand the background of Australian literature with reference to A.D.Hope.
2. Students will be able to understand the satire in the poems of A.D.Hope.
3. Students will be able to understand the use of symbolism through the poem "Australia".

4. Students will be able to understand parental narcissism as a toxic quality through the poem "Your Children are not Your Children".
5. Students will be able to know importance of children's individual views and independent ideologies not influenced by their parents.

UNIT II

1. Students will be able to understand the feelings of displacement through the poem "House and Land".
2. Students will be able to know the New Zealand literature.
3. Students will be able to feel the state of immigrants.
4. Students will be able to understand the racial and cultural tensions in Africa.
5. Students will be able to understand the concept of colonialism.

UNIT III

Students will be able to understand how race plays an important role in works of African writers.

Students will be able to know the definition of emotional journey.

Students will be able to understand the importance of journey and its benefits.

Students will be able to understand how a writer takes up the role of a teacher.

Students will be able to differentiate post-colonial and western writers.

UNIT IV

1. Students will be able to understand the richness of the African literature.
2. Students will be able to develop taste for the techniques of drama with reference to *Death and the King's Horseman*.
3. Students will be able to understand the concepts of anti-colonialism.
4. Students will be able to understand the background and rituals of Yoruba community.
5. Students will be able to analyze that the play as a bridge between African and European culture.

UNIT V

1. Students will be able to witness the background status of South Africa.
2. Students will be able to know the international attention to South Africa's tragic history.
3. Students will be able to capture the extremes of human emotions.
4. Students will be able to comprehend African's hope for their freedom from hatred, poverty and fear.
5. Students will be able to understand that the novel is a journey from rural life to urbanization.

TEXT BOOKS AND E MATERIALS

Soyinka, Wole. Death and the King's Horseman Norton critical edition.New York : Norton, 2003.

Paton, **Alan**. **Cry, the Beloved Country**. New York, N.Y: Scribner, 2003. Print.

https://www.studymode.com/subjects/a-black-grandmother-by-sally-morgan-page1.html

http://mrhuman.weebly.com/uploads/2/1/5/1/21516316/thenovelistasteacher.pdf

https://cdn.auckland.ac.nz/assets/press/all-books/pdfs/2017/Appendix%20to%20Allen%20Curnow%20Collected%20Poems.pdf

https://poets.org/poem/far-cry-africa

https://sahyadriliterature.blogspot.com/2018/08/poem-analysis-of-australia-by-a.html

https://poets.org/poem/children-1

INTERNAL ELECTIVE

PAPER - 2

(to choose one out of two)

A. ENGLISH FOR INFORMATION TECHNOLOGY

Objectives:

1. To make students familiar with internet and its usage
2. To help them learn the basic ways of exploring internet
3. To enhance their knowledge of using multimedia.
4. To improve their knowledge of computer in learning and teaching English
5. To enable them create their own blogs and web page

UNIT - I

1. World Wide Web & Email, Internet
2. Searching the Internet & Search FAQ's
3. The Internet as Resource Bank and classroom tool

UNIT - II

1. Introduction to NET (I)
2. Introduction to NET (II)
3. Writing Projects
4. Email projects and discussion lists

UNIT - III

Activities

1. Making news
2. Eco-tourism
3. Mystery Postcards
4. Classified ads
5. Puzzle Maker
6. Reviewing a website

UNIT - IV

Tools for Online works

1. Blogs and Wikis
2. Web Quest
3. Recent multimedia applications in everyday life.

UNIT - V

1. Professional development online
2. Listserv FAOs

3. Teaching online
4. Teaching development resources

Course Outcome:

Unit 1:

1 Student is able to use internet.
2 Learn to send and receive e-mails
3 Identify similar problems and know the ways to solve through FAO's
4 Incorporate the required material from the web resource bank in learning English
5 Exchange ideas using e-mail

Unit 2:

1 Learn the history of computer and its gradual development till date.
2 Get educated in online quiz and enrich their knowledge
3 Get their educational resource materials.
4 Involve in creating and publishing their articles.
5 Know to participate in online discussion and get their doubts clarified

Unit 3:

1 Students are able to compose news and upload
2 They are able to locate popular places of tourism and learn their ecological significance
3 Learn to create postcards and develop related knowledge
4 Learn to draft classified ads for practical benefits
5 They are able to construct puzzles and derive English language knowledge

Unit 4:

1 To create blogs and wikis
2 Know to use web page
3 Learn to apply multimedia in their web based activities
4 Learn to edit content in wikis
5 Know to operate playstore and download different apps

Unit 5:

1 Analyse content wise websites
2 Know to browse profession related websites
3 Have discussion and exchange ideas
4 Get educated new techniques in teaching learning
5 Improve their teaching learning in class rooms situation
6 Get familiarized with ICT

Prescribed Text

The Internet and the Language Classroom - A Practical Guide for Teachers - II Edition - Gavin Dudency , Cambridge University Press, 2007.

INTERNAL ELECTIVE

PAPER - 2

B. FILM - APPRECIATION AND BOOK REVIEW

Objective:

1 To sensitize students in the nuances of cinema.
2 To introduce the semiotics of cinema to students
3 To introduce theories relevant to film appreciation
4 To expose students to the world of film language
5 To direct the massive influence of cinema towards the positive
6 To enhance their ability to analyse appreciate and write reviews

UNIT - I

1. Film appreciation : An introduction
2. Reading the visual and visualizing the text: Film Language

UNIT - II

1. Cinema : Aesthetics, Religion and politics

2. A Classic film is a critique of the medium

UNIT - III

1 What's in a Name?
2 Brevity is the soul of wit
3 How you say a thing
4 Acting is believing

UNIT - IV

1. Watching the recommended movies and writing reviews

UNIT - V

Reading books and writing Reviews

1. Becoming by Michelle Obama
2. A walk to remember by Nicholas Sparks
3. Three women , three ponds by Sudha Murthy
4. One Indian girl by Chetan Bhagat

Course outcome

UNIT I:

1. Students is able to get an overall view of cinema as a massive influence in the society
2. Understand semi-idiomatic expressions coined through movies

3. Differentiate regional movies from World Cinema
4. Classify the important feature of cinema
5. Learn to appreciate film language

UNIT II:

1 Learn the basics of film - language and venture on to higher level.
2 Become knowledgeable in the trained areas of signs, codes and syntax of film- language
3 Identify the circuit of film experience connected to different fields of social political and religious life
4 Become more knowledgeable at cultural, social and political levels
5 Encouraged to write scripts for film
6 Learn how myths are used in cinema.
7 Comprehend the potentialities of cinema by concentrating on the sub-text
8 Examine how the marginalized are portrayed through cinema
9 Understand how colours are used to highlight different ideas.
10 Appreciate the interactive process between the visual and the viewer

UNIT III:

1.Differentiate the main text from multiple sub- texts.
2. Understand that cinema is used not only on entertainment but as laughter therapy
3. Develops positive attitude
4. Establish revolutionary ideas against the odds of life
5. Appreciate the effects of sound and music

UNIT IV:

1. Interpret the different concepts of the movie.
2. Apprehend the art and culture depicted through movie
3. Enlist the number of techniques used in cinema.
4. Get trained to choose apt titles and catchy phrases to be used.
5. Analyse the plot- structure of the movie
6. Able to infuse valuable points through dialogues and impress audience
7. Develop to write reviews for movies.

UNIT V:

1. Develop the habit of book reading
2. Know the nuances and techniques of reading
3. Identify the difference from plot and structure
4. Learn their intricacies of characterization
5. Critically analyse the elements of the novel
6. Able to write reviews fluently on their own

Text Prescribed

1. Prof.N,Ilango,*Film- Appreciation for Beginners*, Manimekala Publishing House, Madurai, 2017.

BOOK RECOMMENDED:

1 Becoming by Michelle Obama
2 A walk to remember by Nicholas Sparks
3 Three women , three ponds by Sudha Murthy
4 One Indian girl by Chetan Bhagat

Movies Recommended:

1. Harry Potter, goblet of Fire directed by mike Newell
2. The Chronicle of Narnia directed by Andrew Adamson
3. Jungle Book, directed by Jon Favreau
4. Gandhi ,directed by Richard Attenborough
5. Ten Commandment directed by Cecil B.Demille
6. The Hound of Baskervilles directed by Sidney Lanfield
7. Schindler's List directed by Steven Spielberg

INTERNAL ELECTIVE

PAPER - 3

(to choose one out of two)

A. WRITING FOR SPECIFIC PURPOSE

Course Objectives

1. To create a passion for writing in English for special purposes
2. Enable students to learn the techniques of writing
3. To learn the situations and choose the right type of words and wages
4. To create develop creative interest and encourage them to write or them own
5. To help them become more competent and confident writers

UNIT - I

- Getting started
- Gaining control
- Writing for a Diverse Audience
- Organizing your thought
- Managing the purpose of writing
- Overcoming the writes Block.

UNIT - II

- Making your message Accessible
- The subject time
- Beginning
- Endings
- Headings
- Graphic Devices
- Bullets

UNIT - III

- An easy to read style
- Strengthening a weak memo
- Writing for special purpose
- The executive summary
- Clear Instructions

UNIT - IV

- Good well letters
- Letter of congratulations
- Thank you notes
- Letter of apology
- Letter of recommendation
- Delivering welcome news

UNIT - V

- Letter of complaint
- Responses to letters of complaint
- Letter of request
- Persuasion : some practical pointer
- Shaping a persuasion message
- The sales letter
- International correspondence
- Message for email

Reference: Effective business writing Maryann PIOTROWSKI, Harper Collins publisher. Inc. NY 10022

Course Out Comes (five outcomes for each units should be mentioned)

Student is able to prepare her\him self

Unit - I

1. To start with work
2. Learns the methodical approach
3. Able to focus on the task
4. Gains control and get involved in the specific work
5. Understands the need of the reading
6. Gain control one writing and get involved in the specific work

Unit II

1. Learn to organize ideas and write

2. Known how to draft the message
3. Write the revised message
4. Known to edit the draft after proof-reading
5. Learn to overcome the writes block.

Unit III

1. Construct subject line the key lines of the message in a captive way.
2. Include the punctuation marks in the right place
3. Learn to use the tens in the items in the menu bar like headings endings bullets and graphic devices
4. Makes the message accessible
5. Learn the incorporate the special effect

Unit IV

1. Read their writing and make it clear
2. Analyze the structure and word choice
3. Able to give helpful information
4. Known to write quick clean and direct
5. Learn to write an easy to read style.

Unit V

1. Learn to deliver un- welcome news
2. Responses to letter of complaints
3. Shape a persuasive message
4. Draft sales letters
5. Interact with international correspondence

INTERNAL ELECTIVE

PAPER - 3

B. CREATIVE WRITING

Course Objectives

1. To know the process of beginning and growth of English language.
2. To know about various innovative ways of using English language in verbal and non-verbal communications.
3. To write clearly effectively and creatively and adjust writing style appropriately, to the content the context and nature of the subject
4. To write travelogues and advertisements
5. To write scripts for TV and Radio programmes

UNIT - I

1Various kinds of writing

2.The creative Impulse, Creative ability

3.Tools and Techniques

UNIT - II

1.Poetry

2.Prose

3.Features and non - features

4.Writing for the Media

UNIT - III

1.Sketching the plot, conflict, climax,resolution

2.Character Sketch

3.Action Description

4.Dialogue

UNIT - IV

1.Travelogue

2.Writing Advertisements

3.Writing for Newspapers

i) News ii) Articles

UNIT - V

1.Writing Documentaries

2.Writing for Television and Radio

Course Outcomes (five outcomes for each units should be mentioned)

Unit I

1. The student will be able to know various dimensions of creativity
2. The student will be able to develop creative impulse ability Geniuses and talent
3. The student will be able to grap the tools and techniques of creative writing
4. The student will be able to appreciate the tools and techniques of writing
5. The student will be able to appreciate the talent of geniuses

Unit II

1. The student will be able to grasp the lyrical richness of the poetry
2. The student will come to know the liter any devices of the poetry
3. The student will be able to understand the features of prose
4. The student will be able of fours the multiple features of creative writing?
5. The student will be able to know the principles of writing for digital media.

Unit III

1. The student will be able to understand the different elements and attributes of drama
2. The student will be able to understand various genres of fiction
3. The student will be able to analyze the character speech
4. The student will be able to form dramatic devices used in conjunction with the episodic and climactic plot forms
5. The student will be able to forms action description in creative writing.

Unit IV

1. The students will be able to write a Photographic Description of places
2. The students will be able to highlight the Various Attractions.
3. The students will be able to give some cultural background of the places
4. the students will be able to write catchy advertisements
5. the students will be able to write articles for newspapers

Unit V

1. Students will be able to understand documentaries
2. Students will be able to write documentaries
3. The Students will be able to write scripts for Television programmes
4. The students will be able to write scripts for radio programmes
5. The students will be able to organize TV and Radio programmes.

References

Creative writing - Person by Dev

Ailsa Cox: Writing Short Stories.

Thomas S. Kane: The Oxford Essential Guide to Writing.

William Strunk, Jr. and E. B. White: The Elements of Style.

William Zinsser: On Writing Well: The Classic Guide to Writing Nonfiction.

SKILL BASED SUBJECT
PAPER - 4

ENGLISH LANGUAGE TEACHING - ELT

Course Objectives

1. To acquaint the learner with the theories and practices of teaching English.

2. To explain various methods of teaching and learning the English language.

3. To make familiar our students with teaching processes involve in English language teaching.

4. To learn the natural approach in communicative English

5. To make the student learn the competence based language teaching

6. To channelize their academic vision towards the language teaching and learning in a better way

UNIT - I

1. A Brief History of Language Teaching

2. Language Teaching Innovations

3. Objectives of Teaching English

UNIT - II

1. Interference and Transfer from the Mother Tongue

2. Listening Activities

3. Techniques in Teaching - Speaking

4. Barriers of Effective Communication

UNIT - III

1. Methods and Approaches in Teaching English
2. Translation Methods
3. Direct Methods
4. Bilingual Approaches
5. Situational Approaches
6. Eclectic Approaches

UNIT - IV

1. Communicative Language Teaching
2. Cooperative Language Teaching
3. Content - Based Language Teaching
4. Task-Based Language Teaching

UNIT - V

1. English Language Teaching in India
2. English as a World Language
3. English for Specific Purposes
4. Technological Influences on English
5. Media and Cyber Influences on English

Text Books

Unit-I:

1. Howatt, A. P. R., A History of English Language Teaching, Oxford: OUS
2. Stern, H. H., Fundamental Concepts of Language Teaching. Oxford: OUS

Unit-II:

1. David Nunan, Language Teaching Methodologies, Prentice Hall Publishers
2. Mackay, Ray. A Basic Introduction to English Language Teaching. Oxford: OUS

Unit III:

1. Jack. C. Richards and Theodore S. Rogers, Approaches and Methods in Language Teaching, 2nd Edition, Cambridge: Cambridge University Press
2. Halliday, M. A. K. Language on Social Semiotic, London : Edward Arnold

Unit- IV:

1. S P Dhanavel. English Language Teaching in India - The Shifting Paradigms. McGraw Hill Education Publisher
2. Slavin, R. Cooperative Learning: Theory, Research and Practice. 2nd Ed. New York: Prentice Hall

Unit - V:

1. Widdowson, H. Learning Purpose and Learning Use. Oxford: OUS
2. Wrenn, C.L. The English Language. Delhi: Vikas Publishing House Pvt Ltd.

Reference Items: books, Journal

1. Penny Ur, A Course in English Language Teaching. Cambridge: Cambridge University Press
2. Diane Larsen - Freeman and Marti Anderson. Techniques & Principles in Language Teaching. Oxford: OUS

3. Navita Arora. English Language Teaching - Approaches and Methodologies. Mcgrawhill Publisher
4. Dr. Praveen M Jain. Methodology of Teaching English - Tools, Techniques and Methods. Raj Publications
5. Dr. Meena Sehrawat and Dr. Subodh K. Jha. English Language Teaching. Lakshi Publishers
6. M L Tickoo. Teaching and Learning English - A Sourcebook for Teachers and Teacher - Learners. Orient Blackswan Publishers
7. Widdowson, H.G., Teaching Language as Communication. Oxford: OUS
8. Ashok Kumar. English Language Teaching: New Perspectives. Oxford: OUS
9. Jeremy Harmer. The Practice of English Language Teaching - 5th Ed with DVD. Pearson Publishers
10. Dr. Adi Ramesh Babu. English Language Teaching and Learning - Problems and Remedies. Pointer Publishers.

E- Materials

1. https://eltbylinablog.wordpress.com
2. https://eltnotes.wordpress.com
3. https://medium.com.eltnotes
4. https://talimenam.blogspot.com
5. https://www.eltnotes.blogspot.com
6. https://www.teachingenglish.org.uk.
7. https://www.scribd.com
8. https://opencourse.uoa.org
9. https://news.collindelt.com
10. https://en.mwikipedia.org
11. https://www.eltresearchbites.com
12. https://eltnotesfrombelow.org
13. https://shop.scholastic.co.uk.elt
14. https://eltaypwip.org.webnotes
15. https://www.cambridge.org.elt

Course Out Comes

After studying

Unit - I

1. the student will be able to understand the brief history of language learning
2. the student will be able to know that language can be acquired as a skill not as a knowledge
3. the student will come to know the various innovative methods available in learning and teaching the language
4. the student will be able to develop a taste for language learning and teaching

5. the student will understand the objectives of teaching and learning English

Unit - II

1. the student will be able to understand the mother tongue influence on the English language and how to avoid this as this is a major problem for non native English speakers
2. the student will come to know the various listening activities as listening plays a very vital role in learning any language
3. the student will get inspiration to learn native English language with correct accent
4. the student will learn the techniques of spoken English
5. the student will remove the barriers that come across in effective communication

Unit - III

1. the student will be able to understand the methods and approaches in teaching English
2. the student will understand the translational method to learn the language
3. the student will get inspiration through the direct methods of learning the language
4. the student will understand the bilingual, situational and eclectic approaches of learning the language
5. the students by learning these approaches and methods easily learn the language.

Unit - IV

1. the student will be able to learn various methods of learning the language
2. the student will come to know the basis of communicative language teaching
3. the student will understand the cooperative language teaching
4. the student will get inspiration through the task-based and content-based teaching of English language
5. the student will be able to approach the learning of a language in an easy manner through learning these teaching methodologies

Unit - V

1. the student will be able to understand the status of English in the world as English has become a world language
2. the student will come to know the usage of English language in specific purposes related to all fields
3. the student will understand the methods of approaches practiced in India to teach the English language
4. the student will get inspiration through the various influences like technology, media and cyber on the English language
5. the student will be able use the language in all specific purposes

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF ARTS

B.Com.

DEGREE COURSE

CBCS PATTERN

(With effect from 2020 -2021)

The Course of Study and the Scheme of Examinations

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER I									
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	5	3	Financial Accounting -I	25	75	100
4.	III	Core Theory	Paper-2	5	3	Business Organization	25	75	100
5.	III	ALLIED -1	Paper-1	6	3	**(to choose 1 out of 3)** 1. Indian Economy I 2. Elements of Insurance 3. Consumerism	25	75	100
6.	III	PE	Paper-1	6	3	**Professional English I**	25	75	100
7.	IV	Environmental Studies		2	2	Environmental Studies	25	75	100
				36	**22**		**175**	**525**	**700**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
8.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9.	II	English (CE)	Paper-2	4	4	**Communicative English I**	25	75	100
10.	III	Core Theory	Paper-3	5	3	Financial Accounting –II	25	75	100
11.	III	Core Theory	Paper-4	5	3	Office management	25	75	100
12.	III	ALLIED-1	Paper-2	6	5	**(to choose 1 out of 3)** 1. Indian Economy II 2. Merchant banking 3. Business Mathematics	25	75	100
13.	III	PE	Paper-2	6	3	**Professional English II**	25	75	100
14.	IV	Value Education		2	2	Value Education	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
				36	**25**		**200**	**600**	**800**

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
16.	III	Core Theory	Paper-5	6	5	Corporate Accounting I	25	75	100
17.	III	Core Theory	Paper-6	5	4	Legal Aspects of Business	25	75	100
18.	III	Core Theory	Paper-7	4	3	Business Correspondence	25	75	100
19.	III	Core Theory	Paper-8	4	3	Business Statistics and Operation Research	25	75	100
20.	III	ALLIED-2	Paper-3	6	3	Business EconomicsI	25	75	100
21.	IV	Skill based Subject	Paper-1	3	2	Computer Applications in Business	25	75	100
22.	IV	Non-major elective	Paper-1	2	2	General commercial Knowledge	25	75	100
				30	**22**		**175**	**525**	**700**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
23.	III	Core Theory	Paper-9	5	4	Corporate AccountingII	25	75	100
24.	III	Core Theory	Paper-10	5	4	Business Management	25	75	100
25.	III	Core Theory	Paper-11	5	3	Company Law	25	75	100
26.	III	Core Theory	Paper-12	4	3	Modern banking	25	75	100
27.	III	ALLIED-2	Paper-4	6	5	Business Economics II	25	75	100
28.	**IV**	**NMSDC : Digital Skills for Employability**	**Paper-2**	**2**	**2**	**Office Fundamentals**	**25**	**75**	**100**
29.	IV	Non-major elective	Paper-2	2	2	Advertising and Salesmanship	25	75	100
				30	**23**		**175**	**525**	**700**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
30.	III	Core Theory	Paper-13	6	4	Cost accounting I	25	75	100
31.	III	Core Theory	Paper-14	5	4	Practical Auditing	25	75	100
32.	III	Core Theory	Paper-15	6	5	Management Accounting	25	75	100
33.	III	Core Theory	Paper-16	6	4	Income Tax Law and Practice I	25	75	100
34.	III	Elective	Paper-1	4	3	**(to choose 1 out of 3)** 1. Entrepreneurial Development 2. Business Environment 3. Management Information System	25	75	100
35.	IV	Skill based Subject	Paper-3	3	2	Principles of marketing	25	75	100
				30	**22**		**150**	**450**	**600**

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
							CIA	Uni. Exam	Total
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
36.	III	Core Theory	Paper-17	5	4	Cost accounting II	25	75	100
37.	III	Core Theory	Paper-18	5	4	Income Tax law and practice II	25	75	100
38.	III	Core Theory	Paper-19	5	4	Financial management	25	75	100
39.	III	Compulsory Project	Paper-20	5	5	Individual / Group Project	25	75	100
40.	III	Elective	Paper-2	4	3	(To choose one out of 3) 1. Innovation management 2. Logistics management 3. Service Marketing	25	75	100
41.	III	Elective	Paper-3	4	3	(To choose one out of 3) 1. Customs and GST 2. Investment Management 3. Financial services	25	75	100
42.	**III**	**NMSDC : Digital Banking and Audit Essentials for Employability**	**Paper-4**	**2**	**2**	**Fintech Course**	**25**	**75**	**100**
43.	V	Extension Activities		-	1		100	-	100
				30	**26**		**275**	**525**	**800**
TOTAL					**140**				**4300**

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	2	4	8	100	200
Part II	Communicative English	2	4	8	100	200
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Electives	3	3	9	100	300
	Core	19	(3-5)	70	100	1900
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	**43**		**140**		**4300**

SEMESTER III

CORE PAPER - 5

CORPORATE ACCOUNTING -I

Objectives:

1. To help the students to understand the basic concepts relating to issue and redemption of shares.
2. To enable the students to prepare company final accounts and to understand accounting treatment on acquisition of business.

UNIT - I

ISSUE OF SHARES

Issue of Shares - Introduction -Meaning and types of shares- Features and Kinds of Companies-Under Subscription and Over Subscription-Issue of shares at par ,premium and at discount-Calls-in-arrears-Calls-in-advance-Forfeiture of Shares - Reissue of Forfeited shares-Balance Sheet (Revised Schedule VI).

UNIT - II

REDEMPTION OF PREFERENCE SHARES

Introduction - Meaning - Provision of the Companies Act Section 80 and 80A -Steps Involved in Redemption of Preference Shares - Balance Sheet (Revised Schedule VI).

UNIT- III

ACQUISITION OF BUSINESS

Introduction-Meaning- Accounting treatment for acquisition of business in the books of vendor and purchaser -When new set of books are opened- Debtors and Creditors taken over on behalf of vendors-When same set of books are continued-When Debtors and Creditors are not taken over.

UNIT - IV

PROFITS PRIOR TO INCORPORATION

Introduction - Meaning-Methods of Ascertaining profit or loss prior to incorporation-Basis of Apportionment of Expenses.

UNIT - V

FINAL ACCOUNTS OF COMPANIES

Introduction -Preparation of statement of profit and loss (Part II of Revised Schedule VI) - Preparation of Balance Sheet (Part I of Revised Schedule VI)-Managerial Remuneration.

TEXTBOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	R.L.Gupta and M.Radhaswamy	Advanced Accountancy (Volume I)	Sultan Chand & Sons-New Delhi.
2.	Shukla MC, Grewal TS & Gupta SC	Advanced Accounts, Vol. II,	S. Chand & Company Ltd, New Delhi

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	S.P.Jain and K.L.Narang,	Corporate Accounting (Volume I)	Kalyani Publishers-Ludhiana.
2.	T.S.ReddyandA.Murthy	Corporate Accounting (Volume I)	Margham Publications-Chennai.
3.	S.P.Iyengar	Advanced Accountancy (Volume I),	Sultan Chand & Sons-New Delhi.
4.	Dr .R. Rangarajan and Dr. V. Chandrasekaran, S.Viswanathan	Corporate Accounting	(Printers and Publishers) Pvt. Ltd.,-Chennai.

E-Material

1.*www.universityofcalicut.info* › syl › bcomiiisem197

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Understand the basic concepts relating to issue of shares and make accounting entries.
Unit - II	After studied unit-2, the student will be able to	Make accounting entries for and redemption of preference shares.
Unit - III	After studied unit-3, the student will be able to	Be acquainted with accounting treatment for acquisition of business.
Unit - IV	After studied unit-4, the student will be able to	Understand the accounting procedures related to Profits Prior to Incorporation
Unit - V	After studied unit-5, the student will be able to	Prepare Company Final Accounts & Company Balance Sheet.

CORE PAPER - 6

LEGAL ASPECTS OF BUSINESS

Objectives

1. To make the students to gain the Basic Knowledge in Business Law.
2. To enable the students to understand and deal with various contracts in his day-to-day life, be if for his business or profession.

UNIT -I

INDIAN CONTRACT ACT 1872(INTRODUCTION AND ESSENTIAL ELEMENTS)

Law - Meaning - Objectives - Need for the Knowledge of Law. Law of Contract - Contract-Definition - Agreement and its Enforceability - Consensus Ad Idem - Essential Elements of a Valid Contract - Classification of Contracts.Offer and Acceptance - Legal Rules as to Offer and Acceptance - Communication of Offer, Acceptance and Revocation.

UNIT -II

INDIAN CONTRACT ACT 1872(OTHER ESSENTIAL ELEMENTS)

Consideration - Definition - Meaning - Legal Rules as to Consideration - Valid Contracts without Consideration. Capacity to Contract - Agreements with Minor - Minor's Liability for Necessaries Free Consent - Coercion - Undue Influence - Fraud - Misrepresentation - Mistake. Agreements Opposed to Public Policy.

UNIT -III

INDIAN CONTRACT ACT 1872 (SPECIAL CONTRACTS)

Contingent Conttract-Modes of Discharge of Contract -Remedies for Breach of Contract - Quasi ContractSpecial Contracts: Bailment and Pledge - Indemnity and Guarantee-

UNIT -IV

SALE OF GOODS ACT 1930

Goods-Classification of Goods-Contract of Sale-Sales and Agreement to Sell-Conditions and Warranties -Performance of Contract of Sale-Doctrine of Caveat Emptor" - Rights of Unpaid Seller.

UNIT -V

CONSUMER PROTECTION ACT, 1986

Introduction- Objectives of the Act-Definitions-Deficiency in services-Role of Central and State Consumer Protection Council - Consumer Disputes Redressal Agencies: District Forum, State Commission and National Commission: Jurisdiction - Composition - Appeal.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	N.D.kapoor	Business Law	Sultan Chand, New Delhi.
2.	R.S.N. Pillai and Bagavathi	Business Law	Chand & co, New Delhi.

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	P.C. Tulsian	Business Law	Tata McGraw Hill, New Delhi.
2.	P. Saravanavel& S. Sumathi	Legal Aspects of Business	Himalaya publication, New Delhi.
3.	M.R. Sreenivasan	Business Law	Margham publication, Chennai.
4.	AkhilashwarePathek	Legal Aspects of Business	Tata MCGraw Hill, , New Delhi.
5.	M.C. Kuchal	Business Law	Vikas Publication, , New Delhi.

E-Material

1. https://www.icai.org/post.html?post_id=13821 - e material
2.https://www.dphu.org/uploads/attachements/books/books_3498_0.pdf- e material
3 .https://www.youtube.com/watch?v=8zaTVt0Qf9c- Indian Contract Act, 1872 by CA ShivangiAgrawal- e content
4. https://www.youtube.com/watch?v=HIuiDzdIInM-sale of goods act 1930 full lecture

Course Out Comes:

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Know the framework of Indian Contract Act 1872.
Unit - II	After studied unit-2, the student will be able to	Understand the other essential elements of Indian Contract 1872.
Unit - III	After studied unit-3, the student will be able to	Aware the provisions of Special Contracts and Modes of Discharge.
Unit - IV	After studied unit-4, the student will be able to	Acquire Knowledge of Sale of Goods Act 1930.
Unit - V	After studied unit-5, the student will be able to	Consciousness on Consumer Protection Act 1986 .

CORE PAPER - 7

BUSINESS CORRESPONDENCE

Course Objectives

1. To acquire knowledge about basic concepts of business Correspondence
2. To quire knowledge about business communication.
3. To understand structure and layout business letter
4. To acquire the knowledge of types of business letter
5. To gain knowledge about the Letters of Application with CV, Resume.
6. To enable the business report and its types

UNIT-I

INTRODUCTION

Features of business communication - Importance of effective communication in business - classification of communication - characteristics and Guidelines of effective business communication.

UNIT-II

BUSINESS LETTERS-(LAY OUT)

Preparation of business letters - Basic principles in drafting - Appearance, structure and layout - letter style

UNIT-III

TYPES OF BUSINESS LETTERS

Various Types of Business Letters - Letters of Enquiry - Offers, Quotations, orders, and complaints

UNIT-IV

Letters of Application

Letters of application - Essential Qualities - Letters of Application with CV, Resume - Application in response to an advertisement.

UNIT-V

BUSINESS REPORT

Business Reports - Importance - Characteristics - Types - Reports by individuals and committees

Text Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Ramesh and Pattanchetti.R	Business Communication	Chand&Co
2.	Rajendra Pal and J.S.Korlahall	Essentials of Business communication	
3.	Dr.K.Sundar and Dr.A.Kumara raj	Business Communication	Vijay Nicoles Imprints Pvt., Ltd.,
4.	Herta Murphy	Effective business Communication	McGraw Hill Education
5.	MadhukantJha	Business Communication	Gyan books.

Course Out Comes

Units		CO Statement
Unit - I	After studied unit-1, the student will be able to	The student will be able to understand the basic concepts of business correspondence.
Unit - II	After studied unit-2, the student will be able to	The students will be able to prepare the business letter and letter style.
Unit - III	After studied unit-3, the student will be able to	The students will be able to know the different types of business letter's, offers, orders and complaints.
Unit - IV	After studied unit-4, the student will be able to	The students will able to acquire the knowledge of preparing letters of application with cv, resume etc.
Unit - V	After studied unit-5, the student will be able to	The students will be able to understand the types and characteristics of business report.

CORE PAPER - 8

BUSINESS STATISTICS AND OPERATIONAL RESEARCH

Course Objectives

1. To develop skills in analysis and interpretation of data.
2. How to measures Central Tendency and their application in business.
3. To measure the degree and direction of relationship between the variables inbusiness.
4. Index Numbers and Time series are the most important widely used statistical device, students get familiarize
5. To solve challenging problems by using appropriate statistical tools.

UNIT-I

Statistics -Definitions -Scope and Limitations -Collection of Data -Primary and Secondary Data - Questionnaire -Classification and Tabulation -Diagrammatic and graphical representation of data- Measures of Central tendency -Mean -Median -Mode -Combined Mean.

UNIT-II

Measures of Dispersion -Range -Quartile deviation -Mean Deviation -Standard Deviation - Coefficient of Variation-Lorenz Curve - Measures of Skewness -Karl Pearson's and Bowlay's Coefficient of Skewness- Kurtosis -Characteristics of Kurtosis -Measures -Calculation.

UNIT-III

Correlation -Definition - Karl Pearson's Coefficient of Correlation - Rank Correlation - Regression Analysis - Simple regression- Regression equations.

UNIT-IV

Index Number -Definition -Uses -Weighted Index -Laspeyre'sPaasche, DorbishBowley's - Marshall Edge worth, Fisher Ideal Index -Time and Factor Reversal Test -Cost of Living Index - Time Series -Definition and Uses -Components -Semi Average, Moving Average -Method of Least Square -Seasonal Variation -Simple Average Method.

UNIT-V

Linear programming- Formation of LPP- Graphical method - Simplex method- Maximization Function- Minimization Function (Simple Problems only)- Transportation problems- North West Corner Method - Least Cost Method- Vogel's Approximation Method - Assignment problem- Balanced Hungarian Assignment Method.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr. S.P. Gupta	Business Statistics & Operation Research	Sultan Chand.
2.	PA. Navanitham	Business Statistics & Operation Research	Jai Publications, Trichy.
3.	S.P. Rajagopalan& R. Sattanathan	Business Statistics & Operation Research 3rd Edition	Vijay Nicole Publications, Chennai.

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr. S.P. Gupta	Statistical Methods	Sultan Chand.
2.	R.S.N. Pillai&Bhagavathi	Statistics.	
3.	J.K. Sharma	Business Statistics	Pearson Education.
4.	B. Agarwal	Basic Statistics	Wiley Eastern.

E MATERIALS

www.southaampton.ac.uk

www.quora.com

www.pondiuni.edu.in

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Acquired skills in analysis and interpretation of data.
Unit - II	After studied unit-2, the student will be able to	Gained knowledge on measures of Central Tendency and theirapplication in business
Unit - III	After studied unit-3, the student will be able to	Learned about Correlation and Regression
Unit - IV	After studied unit-4, the student will be able to	Get familiarized aboutIndex Numbers and Time series
Unit - V	After studied unit-5, the student will be able to	Solved challenging problems by using appropriate statistical tools.

ALLIED - 2

PAPER - 3

BUSINESS ECONOMICS – I

Course Objectives

1. The main objective of this paper is to apply in business decision making, demand, utility, demand forecasting and production.
2. The students understand the role and responsibilities of Business.
3. Understands Utility concept.
4. The students acquires the knowledge of the Demand forecasting and methods of Forecasting.
5. Gains knowledge of production function and returns to scale.

UNIT: I Introduction

Introduction to Business Economics - Objectives of Business - Profit maximization – Importance of Business – Scope of Business - Social responsibility of Business.

UNIT: II Demand Analysis

Demand analysis – Demand Function - Demand schedule - Demand curve - Different types of Elasticity of demand - Measurement - Importance of elasticity of demand.

UNIT: III Utility Analysis

Utility analysis - Cardinal - Ordinal - The law of diminishing marginal utility - Equi-Marginal utility - Indifference curve analysis.

UNIT: IV Demand Forecasting

Demand Forecasting – Meaning – Objectives – Purpose – Steps involved in Demand Forecasting - Types of Demand Forecasting.

UNIT: V Production

Production - Production function - The law of variable proportions - Economies of scale - Law of returns to scale.

Text Books

Unit-I: S. Sankaran, Business Economics, Margham Publications, Chennai
Unit-II: S. Sankaran, Business Economics, Margham Publications, Chennai.
Unit-III: S. Sankaran, Business Economics, Margham Publications, Chennai.
Unit-IV: S. Sankaran, Business Economics, Margham Publications, Chennai
Unit-V: S. Sankaran, Business Economics, Margham Publications, Chennai

Reference Books:

1. K.P.M Sundaram and E.N. Sundaram, Business Economics, Sultan & Chand, New Delhi.
2. H.L. Ahuja,Business Economics, S.Chand, New Delhi.
3. Mote; Samuel Paul and G.S.Gupta, Managerial Economics, Concepts & Cases, Tata McGraw Hill.
4. Cauvery. , Managerial Economics, S. Chand & Co. New Delhi.
5. H.L.Ahuja, Managerial Economics,S Chand and Co ltd,NewDelhi.Sankaran,. S, Managerial Economics, Margham Publication.

E - Resources

1. www.tutorialspoint.com/managerial_economics/...
2. www.yourarticlelibrary.com/managerial-economics/...
3. economicsconcepts.com/managerial_economics.htm
4. www.tutorialspoint.com/managerial_economics/...
5. www.economicsdiscussion.net/managerial-economics/notes...
6. www.simplynotes.in/managerial-economics/characteristics...
7. www.managerial-economics-club.com/managerial...
8. www.ebookphp.com/managerial-economics-epub-pdf
9. www.simplynotes.in/importance-managerial-economics
10. www.scholarpol.com/nature-and-scope-of-managerial-economics

Course Out Comes

1. After studied unit-1, the student will be able to understand the concept of Business Economics, Objectives and scope.

2. After studied unit-2, the student will be able to gain knowledge of the demand and elasticity of demand.

3. After studied unit-3, the student will be able to gain knowledge on Utility concept .

4. After studied unit-4, the student will be able to acquire Knowledge of Demand forecasting and Demand Forecasting methods.

5. After studied unit-5, the student will be able to gain knowledge of Production Function and Returns to scale

SKILL BASED SUBJECT
PAPER -1
COMPUTER APPLICATIONS IN BUSINESS

Course Objectives

1.Indentify computer concepts terminology and concepts, basic operating system functionality and terminology
2.To apply basics and advanced formatting techniques, skills to produce word processing documents
3.Demonstrate basic skills involving working with MS excel sheet functions, create formulas, charts and graphs, manipulate data and generate reports
4.Develop a database; create and format tables, queries and reports; enter and modify table data.
5.Develop and deliver business presentations using presentation

UNIT -I

Introduction to computer- characteristics of computer- history of computer- computer generation -hardware - software- system software and application software.

UNIT - II

MS - word processing: starting MS word- ms word environment - working with word documents.

UNIT - III

Ms excel -ms excel sheet-ms excel environment - working with excel workbook - worksheet-formulas and functions - inserting charts - printing in excel - free worksheet(ms excel)- ms power point - starting ms power point -ms power point environment- working with power point - working with different views - designing , presentation & printing in power point.

UNIT - IV

Programming under a DBMS environment - the concept of the data base management system; data field, records, and files, sorting and indexing data; searching records. Designing queries, and reports; linking of data files ; understanding programming environment in DMBS ; developing menu drive applications in query languages(MS- Access).

UNIT - V

Electronic commerce - types -advantages and disadvantages - electronic data interchange (EDI) working of EDI- EDI benefits & limitation - future of EDI - FEDI- smart card - smart card application.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Anathishehasaayee	Computer Application in Business and Management	Margam Publication.
2.	leon& Leon	Computer Applications in Business	VjayNicholes imprint pvt.ltd- Chennai.

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	R.K.Taxali,	Pc Software for Windows Made Simple	Tata Mcgraw Hill publications - India 2010
2.	Hebert Schildt	Windows 2000 Programming from the ground up	Tata McGraw Edition 2000
3.		ComadexComputer Course Kit, Training Kit For Windows 98/me , word , excel, access 2000 and internet dream tech press.	

E- MATERIALS

www.ggu.ac.in

www.ddegjust.ac.in

www.scribd.com

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Gainedbasic knowledge about computer concept and terminology
Unit - II	After studied unit-2, the student will be able to	Acquired skills to produce word processing documents
Unit - III	After studied unit-3, the student will be able to	Demonstrated basic skills involving MS excel sheet
Unit - IV	After studied unit-4, the student will be able to	Acquired skills on data base
Unit - V	After studied unit-5, the student will be able to	Enhanced knowledge on business presentation by using presentation software.

NON-MAJOR ELECTIVE
GENERAL COMMERCIAL KNOWLEDGE
PAPER -1

Course Objective

1. To enable the students of gain basic knowledge of Trade,Commerce and Industry.

UNIT - I
Business - Commerce -Industry- Trade - Profession - Meaning-Scope - Importance-Kinds-Economic Basis of Commerce.

UNIT - II
Forms of Business organization - Sole Trade- Partnership Firm-Features-Merits-Demerits - Co-Operative Societies -Features-Types-Advantages.

UNIT - III
Joint stock Company-Features-Memorandum and Articles-Contents-Prospectus.

UNIT - IV
Stock Exchange - Function - Types - Regulation of Stock Exchanges in India.

UNIT-V
Trade association - Chamber of commerce - Functions - Objectives - Working in India.

Note: Questions in Sec. A, B & C - 100 % Theory.

Text Books:

S.no	Authors	Title	Publishers
1	Ghosh and Bhushan	General Commercial Knowledge	Sultan Chand & Sons, New Delhi.
2.	R.N. Gupta	Business organization & Management	S. Chand & Co. New Delhi.

Reference Books:

S.No	Authors	Title	Publishers
1.	P.N.Reddy&S.S.Gulshan	Commerce - Principles & Practice	S. Chand & Co. New Delhi.
2.	C.D.Balaji&Dr.G.Prasad	Business organization	Margham Publications, Chennai.

Reference journals:

1. Arabian Journal of Business and Management Review,
2. International Public Management Journal,
3. International Small Business Journal,
4. Journal of Business and Psychology,
5. journal of International Management,

E-Materials:

1. E-book Business organization by H. E Morgan
2. Business Organisation - sbpd publication

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To gain knowledge about Commerce, Trade, Industry.
Unit - II	After studied unit-2, the student will be able to	To learn about Forms of Business organization.
Unit - III	After studied unit-3, the student will be able to	To acquire knowledge about Company.
Unit - IV	After studied unit-4, the student will be able to	To know about Stock Exchange
Unit - V	After studied unit-5, the student will be able to	To impart effective knowledge about Trade association and Chamber of commerce

SEMESTER IV

CORE PAPER - 9

CORPORATE ACCOUNTING -II

Objectives:

1. To enable the students to acquire knowledge in valuation of shares and goodwill.
2. To enable the students to understand the Liquidation, accounting procedure and various business combinations.

UNIT - I

VALUATION OF GOODWILL AND SHARES

Goodwill-Introduction-Meaning-Definition-Need-Factors Affecting Value of Goodwill-Methods-Average profit method-Weighted Average-Super profit method-Annuity method-Capitalization Method. Shares-Introduction-Meaning-Definition-Need-Factors affecting valuation of shares-Methods-Net asset method-Yield method-Fair value method.

UNIT- II

ALTERATION OF SHARE CAPITAL AND INTERNAL RECONSTRUCTION

Introduction-Meaning-Different kinds of alteration of share capital-Capital reduction-Procedure for reduction of share capital.

UNIT- III

AMALGAMATION, ABSORPTION AND EXTERNAL RECONSTRUCTION

Amalgamation-Introduction-Meaning (Accounting Standard 14)-Types of amalgamation-Amalgamation in the nature of Merger-In the nature of Purchase-Computation of Purchase Consideration- Entries in the books of the transferor and transferee-Absorption-Meaning-Accounting treatment-External Reconstruction- -Meaning-Accounting treatment (Intercompany holding excluded).

UNIT - IV

HOLDING COMPANIES

Meaning and definition of Holding and Subsidiary - Capital Profit-Revenue profit-Minority Interest-Goodwill/Capital reserve-- Elimination Of Common Transactions -Unrealised profit - Revaluation of Assets and Liabilities - Bonus Shares -Preparation of consolidated balance sheet (As per Revised Schedule VI).

UNIT - V

BANKING COMPANY ACCOUNTS

Accounts of Banking Companies - Rebate on bill discounted-Non - Performing assets and their treatment - Provision for doubtful debts- Preparation of profit and loss accounts (Form 'B' of Schedule III) and Balance Sheet (Form 'A' of Schedule III).

TEXTBOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	R.L.Gupta and M.Radhaswamy	Advanced Accountancy	Sultan Chand & Sons-New Delhi.
2.	Shukla MC, Grewal TS & Gupta SC	Advanced Accounts, Vol. II	S. Chand & Company Ltd, New Delhi

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	S.P.Jain and K.L.Narang	Corporate Accounting (Volume II)	Kalyani Publishers-Ludhiana.
2.	T.S.ReddyandA.Murthy	Corporate Accounting (Volume II)	Margham Publications-Chennai.
3.	S.P.Iyengar	Advanced Accountancy (Volume I),	Sultan Chand & Sons-New Delhi.
4.	Dr .R. Rangarajan and Dr. V. Chandrasekaran, S.Viswanathan	Corporate Accounting	(Printers and Publishers) Pvt. Ltd.,-Chennai.

E-Material

1.www.universityofcalicut.info › syl › bcomiiisem197

Course OutComes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Impart the knowledge of valuing shares and goodwill of the company.
Unit - II	After studied unit-2, the student will be able to	Understand the accounting procedures related to Alteration of share capitaland Internal Reconstruction.
Unit - III	After studied unit-3, the student will be able to	Be acquainted with accounting procedures for Mergers and acquisitions.
Unit - IV	After studied unit-4, the student will be able to	Prepare consolidated financial statements of Holding company and itssubsidiary companies.
Unit - V	After studied unit-5, the student will be able to	Know the accounting procedures related to preparation of bank accounts.

CORE PAPER - 10

BUSINESS MANAGEMENT

Objectives:
1. To familiarize the students with the concepts and principles of management.
2. To provide opportunities to apply the general functions of management in day.

UNIT - I

INTRODUCTION TO MANAGEMENT
Meaning, Definition,Importance,Nature,Management and administration, Functions of Management. Levels of management, roles of manager, Management as a Science or Art, Contribution to management by F.W.Taylor, Henry Fayol, Elton Mayo, Peter F. Drucker and C. K. Prahalad.

UNIT- II

PLANNING
Planning - Meaning, Definition, importance, process, types, methods (Objectives- Policies-Procedures - Strategies &Programmes). Obstacles to effective planning.Decision making - Steps, Types, Decision Tree.

UNIT -III

ORGANISING AND STAFFING
Organization - Importance - Principles of Organisation. Delegation & Decentralization - Departmentation - Span of Management. Organizational structure: line & staff and functional - organizational charts and manual-making organizing effective-Staffing-recruitment -selection-Training, promotion and appraisal.

UNIT- IV

DIRECTING AND MOTIVATING
Function of directing - Motivation - Theories of motivation (Maslow, Herzberg and Vroom's theories) Motivation techniques. Communication - Function - Process - Barriers to effective communication. Leadership-Definition-Theories and approach to leadership-styles of leadership-Types

UNIT - V

CO-ORDINATION AND CONTROL

Meaning, Definition, Nature - Problems of effective coordination. Control - Nature - Basic control process - control techniques (traditional and non-traditional)-Use of Computers in managing information - Concepts of keizen- six sigma.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	C. B Gupta	Business Management	Sultan Chand & Sons, New Delhi.
2.	Dinkarpagare	Principles of management,	Sultan Chand and sons, New Delhi.

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Koontz, O'Donnell, Weirich	Essentials of Management	Tata McGraw Hill Publishing Company Ltd., New Delhi.
2.	Sherlekar&Sherlekar	Principles of Business Management	Himalaya Publishing House, New Delhi.
3.	L.M.Prasad	Principles and Practices of Management	Sultan Chand and sons, New Delhi.

Course OutComes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Knowledge pertaining to Fundamentals of management
Unit - II	After studied unit-2, the student will be able to	Knowledge pertaining to develop planning
Unit - III	After studied unit-3, the student will be able to	Understand organising and staffing
Unit - IV	After studied unit-4, the student will be able to	Knowledge pertaining to motivation structures.
Unit - V	After studied unit-5, the student will be able to	Advanced Programming techniques using control and coordination

CORE PAPER - 11

COMPANY LAW

Course Objective

1. To enlighten the students on the Provisions governing the Company Law.
2. To make the students aware on the recent amendments to Companies Act.

UNIT-I

Introduction - Meaning and Definition of a Company - Characteristics of a Company - Advantages - Limitations - Types of Companies - Distinction between a Private Ltd. Company and a Public Ltd. Company.

UNIT-II

Formation of a Company - Memorandum of Association - Meaning - Contents - Purpose - Articles of Association - Meaning - Contents - Distinction between Memorandum and Articles.

UNIT-III

Prospectus - Meaning - Requirements of a Prospectus - Objects of Issuing a Prospectus - Contents - Civil and Criminal Liability for mis-statement of prospectus -Statement in Lieu of Prospectus.

UNIT-IV

Members of a Company - Meaning and Definition - Who can become a Member?- Rights of the Members - Liabilities of the Members - Termination of Membership.

UNIT-V

Directors of a Company - Definition - Eligibility to become a Director - Number of Directorships - Appointment of Directors - First Directors - Subsequent Directors -Removal of Directors - Powers, Duties and Liabilities of Directors - Winding up of a Company - Meaning - Methods of Winding up.

Note: Questions in Sec. A, B & C - 100 % Theory.

Text Books:

S.no	Authors	Title	Publishers
1	N.D.Kapoor	Company Law	Sultan & Chand, New Delhi.
2.	P.P.S.Gogna	Company Law	S. Chand, New Delhi

Reference Books:

S.No	Authors	Title	Publishers
1.	Dr.N. Premavathy	Company Law	Sri Vishnu Publications, Chennai
2.	Gaffoor and Thothadri	Company Law, 2nd Edition	Vijay Nicholes Imprint Pvt. Ltd., Chennai.
3.	Kathiresan and Radha	Company law	Prasanna Publishers, Chennai.

Related Journals:

1. Intellectual Property Rights,
2. Political Sciences & Public Affairs,
3. Sociology and Criminology,
4. Journal of Corporate Law Studies,
5. Australian Journal of Corporate Law,
6. India Business Law Journal,
7. Corporate and Commercial Law Journals,
8. Journal of Business Law

E-Materials:

1. ndkapoor company law free download
2. company law icsi 2019
3. company law pdf 2017
4. general principles of company law
5. company law lpu
6. mc kuchhal corporate law

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To learn about Nature, Scope and Kinds of Company
Unit - II	After studied unit-2, the student will be able to	To gain effective knowledge about Formation of a Company
Unit - III	After studied unit-3, the student will be able to	To effectively impart knowledge about Prospectus of company

Unit - IV	After studied unit-4, the student will be able to	To know about Members of Company
Unit -V	After studied unit-5, the student will be able to	To learn about Directors of Company and Winding up of Company

CORE PAPER - 12

MODERN BANKING

Course Objectives

1. To understand the basic Concepts banking
2. To have knowledge about Central Banking
3. Toknown the SBI
4. To acquire knowledge in development Bank.
5. To acquire the recent trend in e-banking

UNIT- I

INTRODUCTION

Brief history of banking - Unit banking - branch banking - structure of Indian financial system - Mixed banking - functions and importance of commercial banks - credit creation of commercial banks

UNIT- II

CENTRAL BANKING

Central banking (special reference to India) - functions - measures / methods of credit control - Quantitative and Qualitative credit control measures

UNIT- III

STATE BANK OF INDIA

State bank of India - Organization - functions - management - Regional Rural Banks (RRBS)

UNIT - IV

DEVELOPMENT BANKING

Development Banking - Industrial Finance Corporation of India (IFC) - Industrial Credit and Investment Corporation of India (ICICI) - Industrial Development of Bank of India(IDBI)

UNIT- V

E-Banking

Electronic Banking: Traditional Banking Vs E-Banking-Facets of E-Banking -E-Banking transactions -Automatic Teller Machine(ATM) at home -Electronic Fund Transfer(EFT)-uses -

computerization in clearing houses- Tele banking- Banking on home computers -Electronic Money Transfer -uses of EMT.

Text Books

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr.S.Gurusamy	Banking Theory Law and Practice	Vijay Nicole Imprints Pvts Ltd.,
2.	Dr.V.Balu	Banking and Financial System,	Sri Venkateswara Publications,
3.	B.Santhanam	Banking and Financial System	Sri Margham Publications.
4.	K.P.M.Sundaram and E.N.Sundaram	Modern Banking	Sultan Chand and Sons.
5.	Dr.Gupta	Banking Law and Practice in India	SahityaBhawan Publication.

Reference Items:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	O.P.Agarwal,	Modern Banking	Himalaya Publishing house
2.	K.C.Shekher	Banking Theory and Practice,	Vikas Publishing.
3.	A.Gajendran	Banking Law and practice	Vrinda Publications (P) Ltd
4.	D.Muraleedharan	Modern Banking Theory and Practice,	Prentice hall India Learning Private Limited.
5.	S.Natarajan and R.Parameswaran	Indian Banking	S.Chand.

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	The students will be able to acquire the knowledge of different types of banking.
Unit - II	After studied unit-2, the student will be able to	The students will be able to know the measures and methods of credit control in central bank.
Unit - III	After studied unit-3, the student will be able to	The students will be able to understand the concept of SBI.
Unit - IV	After studied unit-4, the student will be able to	The students will be able to study the different types of development banking in India.
Unit - V	After studied unit-5, the student will be able to	The students will be able to acquire the new concepts of E-Banking.

ALLIED - 2

PAPER - 4

BUSINESS ECONOMICS - II

Course Objectives

1. The main objective of this paper is to apply in business Cost and Revenue analysis.
2. The students understand the pricing of perfect competition, monopoly and monopolistic competition.
3. Understands Distribution and Theories of Distribution.
4. The students acquires the knowledge of the capital budgeting.
5. Gains knowledge on the decision making under certainty and uncertainty.

UNIT: I Cost and Revenue Analysis

Cost and Revenue analysis - Different types of cost and their relations to each other - Average cost - Marginal cost - Various types of revenue curves short term and long term - Diagrammatic representation.

UNIT: II Market Structure and Pricing

Market structure and pricing - Pricing under perfect computation – Assumptions of perfect competition - Pricing under monopoly – Assumptions of monopoly - Pricing under monopolistic competition – Assumption of monopolistic competition.

UNIT: III Distribution

Distribution – Meaning – Marginal Productivity theory of Distribution – Modern theory of Distribution - Theories of profits.

UNIT- IV – Capital Budgeting

Capital Budgeting: Need for Capital Budgeting- Forms of Capital Budgeting- Nature of Capital Budgeting Problem.

UNIT- V – Decision Making

Decision Making: Risk and Uncertainty- Elements of Decision Theory- Classification of Managerial Decision Problem- Decision Taking Under Certainty and Uncertainty.

Text Books

Unit-I: S. Sankaran, Business Economics, Margham Publications, Chennai

Unit-II: S. Sankaran, Business Economics, Margham Publications, Chennai.

Unit-III: S. Sankaran, Business Economics, Margham Publications, Chennai.

Unit-IV: S. Sankaran, Business Economics, Margham Publications, Chennai

Unit-V: S. Sankaran, Business Economics, Margham Publications, Chennai

Reference Books:

1. K.P.M Sundaram and E.N. Sundaram, Business Economics, Sultan & Chand, New Delhi.

2. H.L. Ahuja,Business Economics, S.Chand, New Delhi.

3. Mote; Samuel Paul and G.S.Gupta, Managerial Economics, Concepts & Cases, Tata McGraw Hill.

4. Cauvery. , Managerial Economics, S. Chand & Co. New Delhi.

E - Resources

1. www.tutorialspoint.com/managerial_economics/...
2. www.yourarticlelibrary.com/managerial-economics/...
3. economicsconcepts.com/managerial_economics.htm
4. www.tutorialspoint.com/managerial_economics/...
5. www.economicsdiscussion.net/managerial-economics/notes...
6. www.simplynotes.in/managerial-economics/characteristics...
7. www.managerial-economics-club.com/managerial...
8. www.ebookphp.com/managerial-economics-epub-pdf
9. www.simplynotes.in/importance-managerial-economics
10. www.scholarpol.com/nature-and-scope-of-managerial-economics

Course Out Comes

1. After studied unit-1, the student will be able to understand the Cost and Revenue analysis in Business.

2. After studied unit-2, the student will be able to gain knowledge of the pricing of perfect competition, monopoly and monopolistic competition.

3. After studied unit-3, the student will be able to gain knowledge of Theories of Distribution.

4. After studied unit-4, the student will be able to acquire Knowledge on the capital budgeting.

5. After studied unit-5, the student will be able to gain knowledge decision making under certainty and uncertainty

SKILL BASED SUBJECT
PAPER - 2
E-COMMERCE

Objectives:
- To impart the students with knowledge of web technology and their role in doing business.
- To help the students to Gain an understanding of the legal frame work of E-commerce.

UNIT- I

E-COMMERCE - INTRODUCTION
Introduction to E-Commerce - E-Trade - E-Business -E-Market -Advantages and Disadvantages of E-Commerce - E-Business Models - Introduction to Mobile Commerce.

UNIT- II

E-MARKETING
E- Marketing -Meaning - Channels- E-Marketing Mix - Web Salesmanship - online shopping avenues- Advertising on Network.

UNIT - III

E-PAYMENT SYSTEM
E-Payment System- Types- Business Issues and Economic implications - Components of an effective E-Payment System.

UNIT- IV

ELECTRONIC DATA INTERCHANGE
EDI - Definition - Objectives- Standards -Applicability - Approving authority- Cross Index and related documents.

UNIT- V

LEGAL FRAMEWORK
Legal Framework for E-Commerce - Net Threats - Cyber Laws - Aims and Salient Features of Cyber Laws in India- Cyber Crimes.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	L.T.Joseph	E-Commerce A managerial perspective	Printice Hall Publications, 2004.
2.	Addison Wesley	Frontiers of E-Commerce	Pearson Publications, 2004.

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	David Whitley	E-Commerce Strategy, Technology and Application	Tata McGraw Hill Publications, 2004.
2.	Dennis P.Curtin	E-Commerce Principles and Introduction Technology	Tata McGraw Hill Publication, 2004
3.	Greenstein, Feinman	E-Commerce	Tata McGraw Hill Publications, 2001

Course Out Comes

Units	CO Statement	
Unit- I	After studied unit-1, the student will be able to	To understand the knowledge of E-Commerce.
Unit - II	After studied unit-2, the student will be able to	Gaining knowledge on E-Marketing.
Unit - III	After studied unit-3, the student will be able to	Know the E-Payment systems.
Unit - IV	After studied unit-4, the student will be able to	Knowledge on Electronic Data Interchanges (EDI)
Unit - V	After studied unit-5, the student will be able to	Conceive an idea of legal framework for E-Commerce.

NON-MAJOR ELECTIVE
PAPER - 2

ADVERTISING AND SALESMANSHIP

Course Objectives

1. To understand the concept of advertising
2. To enable the students to have practical knowledge about advertising agencies
3. To familiarize about recent trends in advertising
4. To have knowledge on fundamental concept of salesmanship
5. To understand the duties and responsibilities of salesmanship

UNIT-I

Definition of Advertising- Origin and Development of Advertising -Objectives -Nature-Scope of Advertising- -Functions -Types -Benefits.

UNIT-II

Advertisement copy - Advertising media- Advertising Agencies.

UNIT-III

Recent trends in advertising - Economic aspects of Advertising- Social and Ethical aspects of Advertising.

UNIT-IV

Definition of Salesmanship -Features -Objectives- Recruitment of a salesman- Qualities of Good Salesman

UNIT-V

Advantages of Salesmanship- Distinction between Salesmanship and Advertising- Types of Salesmanship- Functions, Duties and Responsibilities of a Salesmanship.

TextBooks:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	R.S.N. Pillai&Bagavathi	Modern Marketing (Principles and Practices)	S. Chand & Co. New Delhi
2.	S Rajkumar, V Rajagopalan	Sales and Advertisement Management	S. Chand & Company Pvt. Ltd.
3.	Sahu and Raut	Salesmanship and Sales Management	Vikas Publishing House, Chennai.
4.	CL Tyagi&Arun Kumar	Sales Management	Atlantic publishers.

Reference Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Chunawalla K.C. Sethia	Advertising (Principles and Practices)	Chunawalla K.C. Sethiax
2.	Dr. M.M. Varma, R. K. Agarwal	Advertising Management	Forward 300K Depot, New Delhi.
3.	Mahendra Mohan	Advertising Management	Tata Mcgraw-hill Publishing Company Limited,NewDelhi,India.
4.	G.R. Basotia N. K Sharama	Advertising Marketing and Sales Management	Mangal Deep Jaipur.
5.	Dr. K. Sundar	Essentials of Marketing	Vijay Nicholes Imprint Pvt. Ltd., Chennai.

E- MATERIALS

www.slideshare.net

www.himpub.com

www.ves.ac.in

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Impart knowledge on advertising
Unit - II	After studied unit-2, the student will be able to	Get familiarized about advertising agencies
Unit - III	After studied unit-3, the student will be able to	Get familiarized about recent trends in advertising
Unit - IV	After studied unit-4, the student will be able to	Acquired knowledge on fundamental concept of salesmanship
Unit - V	After studied unit-5, the student will be able to	Impart knowledge on duties & responsibilities of salesmanship

SEMESTER V
CORE PAPER - 13
COST ACCOUNTING- I

Course Objectives

1. To understand the basic concepts and methods of Cost Accounting.
2. To enable the students to learn the various methods of cost elements.
3. To understand the basic concepts and processes used to determine product costs.
4. To be able to interpret cost accounting statement.
5. To be able to analyze and evaluate information for cost ascertainment, planning, control and decision making.
6. To be able to solve simple cases.

UNIT-I

NATURE AND SCOPE OF COST ACCOUNTING

Cost Accounting: Nature and Scope - Objectives, Advantages and Limitations - Financial Vs. Cost Accounting - Costing System - Types of Costing and Cost Classification - Cost Sheet and Tenders - Cost Unit - Cost Centre and Profit Centre.

UNIT-II

Material Purchase and Control

Purchase Department and its Objectives - Purchase Procedure - Classification and Codification of Materials, Material Control: Levels of Stock and EOQ - Perpetual Inventory System, ABC and VED Analysis - Accounting of Material Losses.

UNIT-III

Methods of pricing of Material Issues

Cost Price Methods: FIFO, LIFO, Average Price Methods: Simple and Weighted Average Price Methods, Notional Price Methods: Standards Price, and Market Price Methods

UNIT - IV

Labour Cost Control

Labour Turnover: Causes, Methods of Measurement and Reduction of Labour Turnover - Idle and Over Time - Remuneration and Incentive: Time and Piece Rate - Taylor's, Merricks and Gantt's Task - Premium Bonus System - Halsey, Rowan and Emerson's Plans - Calculation of Earnings of Workers.

UNIT-V

Overheads

Classification of Overhead Costs - Departmentalization of Overheads - Allocation Absorption and Appointment of Overhead Costs - Primary and Secondary Distribution of Overheads - Computation of Machine Hour Rate and Labour Hour Rate.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory andProblems.

Text Books:

S.no	Authors	Title	Publishers
1	S.P.Jain and Narang	Cost Accounting	Kalyani Publishers, New Delhi
2.	T.S. Reddy &Hari Prasad Reddy	Cost Accounting	Margham Publications, Chennai.
3.	S.P. Iyangar	Cost Accounting	Sultan Chand & Sons, New Delhi.

Reference Books:

S.No	Authors	Title	Publishers
1.	A. Murthy and S. Gurusamy,	Cost Accounting	Vijay Nicole Imprints Private Ltd., Chennai.
2.	Tulsian	Cost Accounting	Tata McGraw Hills.
3.	S.N.Maheswari	Principles of Cost Accounting	Sultan Chand & sons, New Delhi

Reference Journal

1. Business and Economics Journal,
2. Global Economics,
3. Accounting & Marketing,
4. Accounting Research Journal,
5. Asian Review of Accounting,
6. Asia-Pacific Journal of Accounting and Economics,
7. Journal of Accounting and Organizational Change,
8. Journal of Contemporary Accounting and Economics

E- Materials

1. www.icwai.org
2. www.nasbaregistry.org.

Course Out Comes

Units		CO Statement
Unit- I	After studied unit-1, the student will be able to	To taught the Nature and Scope of Cost Accounting, and Computation of Cost Sheet and Tenders.
Unit- II	After studied unit-2, the student will be able to	To learn the preparation of Material Purchase and Control.
Unit - III	After studied unit-3, the student will be able to	To impart knowledge about Methods of pricing of Material Issues.
Unit- IV	After studied unit-4, the student will be able to	To study about preparation of Labour Cost Control.
Unit-V	After studied unit-5, the student will be able to	To gain knowledge about Distribution of Overheads.

CORE PAPER - 14

PRACTICAL AUDITING

Course Objectives

1. Understand meaning, types of audit, and difference between auditing and book keeping.
2. Know the meaning of internal control, internal check and audit.
3. Identify different types of vouchers.
4. Understand qualification, Duties, Rights, and different types of auditors.
5. Identify Meaning, Features & Qualifications of Cost and Management auditor and audit reports.

UNIT-I

INTRODUCTION

Meaning and Definition of Auditing - Nature and Scope of Auditing - Accountancy and auditing, Auditing and Investigation - Objectives of auditing - Limitations of audit - Advantages of audit - classification of audit.

UNIT-II

AUDIT PROGRAMME AND INTERNAL CONTROL

Meaning and definition of audit program - Advantage and disadvantage - audit file, audit note book, audit working papers - purposes and importance of working papers - Internal check - meaning , objectives of Internal check - features of good Internal check system - Internal Control - meaning, objectives and features of good Internal control .

UNIT-III

VOUCHING

Vouching - meaning of vouching - Importance - objects - Vouching of cash transactions - Verification of assets and liabilities - meaning of verification - objectives - Distinction between vouching and verification - distinction between Valuation and Verification.

UNIT-IV

COMPANY AUDITORS

Company auditors - Qualification and Disqualification of an auditor - Appointment and Removal of an auditor - Powers and Duties of auditors - Liabilities of an auditor

UNIT-V

AUDITOR'S REPORT

Auditor's Report - Importance of auditor's report - contents of audit report - Kinds of reports.

Text Books

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	B.N. Tandon	A hand book of practical Auditing.	S.Chand
2.	T.R.Sharma	Auditing	SahityaBhavan, Agra.
3.	B.N.TandonSudharsanam, Sundharababu	Practical Auditing	S.Chand,.
4.	Dr.K.Sundar and K.Parri	Practical Auditing	Vijay Nicole Imprints Pvt., Ltd.,
5.	S.K.Basu	Auditing and Principles and Techniques	Pearson

Reference Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr.L.Natarajan	Practical Auditing	Margham Publications
2.	Kamal Gupta and Ashok Arora	Fundamentals of Auditing	Tata Mc.,Graw Hill.
3.	R.G.Saxena.	Auditing	Himalaya Publishing House
4.	S.N.Maheshwari	Banking Theory , law and practice	Kalyani Publications.

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	The students will be able to acquire the basic concepts of auditing.
Unit - II	After studied unit-2, the student will be able to	The students will be able to the meaning and importance of internal audit, internal check and control.
Unit - III	After studied unit-3, the student will be able to	The students will be able to understand the verification of vouchers and vouching.
Unit - IV	After studied unit-4, the student will be able to	The students will be able to study the auditors appointment, removal, qualification and disqualification.
Unit - V	After studied unit-5, the student will be able to	The students will be able to identify the auditors reports and its kinds.

CORE PAPER - 15

MANAGEMENT ACCOUNTING

Course Objective

To introduce students to the various tools and techniques of management Accounting.

- To enlighten students on Financial Statement Analysis with the emphasis on the preparation of fund flow and cash flow statement.
- Is to impart knowledge of financial statements and their analysis and interpretations.
- To emphasize on application of theoretical knowledge and help managers in decision making.
- To familiarize the students with managerial financial decisions which are taking place in organizations.
- To appreciate the importance of financial information for decision making process.

UNIT-I

Management Accounting: Definition - objectives - Functions - Advantages and limitations - Financial Statement Analysis - Comparative and Common size statements - Trend Analysis.

UNIT-II

Ratio Analysis: Definition - Significance and Limitations - Classification - Liquidity, Solvency, Turnover and Profitability ratios - Computation of Ratios from Financial Statements - Preparation of Financial Statement from Ratios.

UNIT-III

Fund Flow and Cash Flow Analysis: Concept of Funds, Sources and Uses of Funds - Fund Flow Statement - Concept of Cash Flow - Cash Flow Statement as Per AS3.

UNIT-IV

Marginal Costing: Definition - Advantages and Limitation - Break Even Point - Margin of Safety - P/V Ratio - Key factor - Make or Buy Decision - Selection of Product Mix - Changes in Selling Price - Foreign Market Offer - Desired Level of Profit.

UNIT-V

Budget and Budgetary Control: Definition - Objectives - Essentials - Uses and Limitations - Preparation of Material Purchase, Production, Sales, Cash and Flexible Budget - Zero Base Budgeting.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory andProblems.

Text Books:

S.no	Authors	Title	Publishers
1	S.N. Maheswari	Management Accounting	Sultan Chand & Sons, New Delhi.
2.	T.S. Reddy &Hari Prasad Reddy	Management Accounting	Margham Publications, Chennai.

Reference Books:

S.No	Authors	Title	Publishers
1.	A. Murthy & S. Gurusamy,	Management Accounting	Vijay Nicole Imprints Private Ltd., Chennai.
2.	S.P.Gupta	Management Accounting	Sultan Chand & Sons, New Delhi.

Reference Journal

1. The Chartered Accountant Monthly
2. Journal of Human Values Three time in Year
3. Indian Journal of Marketing Monthly
4. Abhigyan: Journal of Management Monthly
5. Smart Manager Quaterly
6. IUP Journal of Operation Management Quaterly
7. IUP Journal of Business Strategy Quaterly
8. IUP Journal of Management Research Quaterly
9. Prabandhan: Indian Journal of Management Monthly
10. Arthashastra: Indian Journal of Economics & Research Monthly
11. India Green File Monthly
12. Management and Change

E- Materials

1. Indian institute of materials management
2. association for healthcare resource & materials management (AHRMM)
3. management accounting
4. **material** management
5. **introduction to** management accounting

6. **functions of material** management
7. **cost and** management accounting
8. https://www.freebookcentre.net/business-books-download/Management-Accounting.html

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To learn the preparation of Financial Statement Analysis.
Unit - II	After studied unit-2, the student will be able to	To gain effective knowledge about Ratio Analysis
Unit - III	After studied unit-3, the student will be able to	To impart knowledge about Fund Flow and Cash Flow Analysis.
Unit - IV	After studied unit-4, the student will be able to	To study about Marginal Costing techniques.
Unit - V	After studied unit-5, the student will be able to	To know about the preparation of Budget and Budgetary Control

CORE PAPER - XVI

INCOME TAX LAW AND PRACTICE I

Course Objectives

1. To acquire Knowledge of Different Income Tax Concepts
2. The Main Objective of Taxation is Economic Development
3. To Overcome the Scarcity of Capital, Taxes are regarded as effective means to Control Inflation
4. To Control Cyclic Fluctuations
5. Reduction of Balance of Payments Difficulties
6. To ensure Price Stability

UNIT - I

INTRODUCTION

Income Tax Act 1961- Basic Concepts - Assessment Year - Previous Year - Person -Assessee- Income - Agricultural Income - Capital and Revenue Receipts - Capital and Revenue Expenditures - Exempted Incomes u/s 10.

Residential status of an individual- Residential status of a HUF - Residential status of a firm and association of persons - Residential status of a company - incidence of tax liability.

UNIT- II

INCOME FROM HOUSE PROPERTY

Annual value - Determination of annual value- Income from let out house property - Income from self-occupied house property - Deductions allowed from Income from house property u/s 24.

UNIT- III

SALARIES

Meaning and features of Salary - Allowances - Perquisites - Profits in lieu of Salary - Provident Fund and its types - payments exempted u/s 10: Leave travel concession; gratuity; pension; leave encashment; retrenchment compensation; VRS - Deductions from salary: EA and professional tax- deduction u/s 80C- taxable salary

UNIT - IV

PROFIT AND GAINS OF BUSINESS OR PROFESSION AND DEPRECIATION

Meaning of business and profession - deductions expressly allowed - expenses expressly disallowed - treatment/ admissibility of certain expenses and incomes - income from business- income from profession.Meaning of depreciation - conditions for depreciation - actual cost - written down value- computation of allowable depreciation.

UNIT- V

INCOME TAX AUTHORITIES

CBDT - powers - Director General of income tax - Chief commissioner of income tax - Assessing officer - appointment - Jurisdiction - powers relating to search and seizure.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory andProblems.

Text Books

S.No	Authors	Title	Publishers
1.	Gaur &Narang	Income Tax Law & Practice	Kalyani Publishers
2.	Dr. A. Murthy	Income Tax Law & Practice	Vijay Nicole Imprints Pvt.Ltd. Chennai
3.	Reddy,T.S. &HariprasadReddy, Y	Income Tax Theory, Law& Practice	Margham Publications, Chennai.

Reference Books

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Mehrotra	Income Tax Law & Accounts	SahithiyaBhavan Publications
2.	Vinod,K.Singhania	Students Guide to Income Tax	Taxman Publications Pvt. Ltd
3.	Anita Raman	Income Tax Law & Practice	McGraw Hill

Reference Journal

1. Indian Journal of Tax Law
2. Taxman.com/Journal
3. Vision Journal of Indian Taxation
4. Income Tax Reports, Company Law, Institute of India PvtLtd,Chennai

E- Materials

1. GST and Income Tax Fortnightly E Magazine
2. Capital Gain Clear Tax
3. India filing.com
4. Clear Tax.in
5. Income Tax Management.com

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To understand the basic level of Income tax Act.
Unit - II	After studied unit-2, the student will be able to	To know the tax calculation on house property income
Unit - III	After studied unit-3, the student will be able to	To achieve knowledge on tax calculation of salaried people.
Unit - IV	After studied unit-4, the student will be able to	To obtain knowledge on income tax of business/ professional income.
Unit -V	After studied unit-5, the student will be able to	To understand the administrative set up of income tax department and their powers

INTERNAL ELECTIVE
(to choose one out of 3)
PAPER - 1

A. ENTREPRENEURIAL DEVELOPMENT

Objectives
1. To make and create interest among the students to become an Entrepreneur.
2. To facilitates the students to avail the incentives and schemes available for MSMEs.

UNIT- I

INTRODUCTION
Entrepreneurship: Meaning- Nature-Importance-Theories- Entrepreneur: Meaning-Definition-Characteristics-Qualities-Types and Roles of an Entrepreneur-Entrepreneur vs.Intrapreneur-Factors Promoting an Entrepreneur - Women Entrepreneur-Problems of Women Entrepreneurs - Role of entrepreneurs in India's Economic Development

UNIT- II

ENTREPRENEURSHIP DEVELOPMENT PROGRAMMES
Meaning-Needs-Objectives -Course Contents and Curriculum-Phases of EDP-Problems and Constraints of EDP- Organisations providing Entrepreneurship Development Programmes.

UNIT- III
NEW VENTURE
Meaning - Promoting New Venture -Sources of Business Ideas - Idea Generation Techniques-Project Identification-Project Selection.- Procedures to Start a New Venture- Project : Meaning-Types-formulation of Project report -Project Appraisal- Network Analysis.

UNIT- IV

INSTITUTIONAL SUPPORT AND SUBSIDIES
Sources of Raising Funds for an Entrepreneur- Need for Institutional Finance- Various Institutions supporting Entrepreneurial growth - Incentives and Subsidies: Meaning-Needs-Incentives and Subsidies available to Entrepreneurs0- DIC- Industrial Estates

UNIT- V
MICRO , SMALL AND MEDIUM ENTERPRISES (MSMES)
Introduction- Classification of Enterprises- Memorandum of MSMEs-Registration of MSMEs-MUDRA Scheme, Prime Minister's Employment Generation Programme (PMEGP), STAND-UP INDIA and START-UP INDIA: Objectives-Purpose-Loan facilities available-Applying Procedures.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr.S.S Khanka	Entrepreneurial Development	Sultan chand company Ltd.
2.	AbhaJaiswal	Micro Small & Medium Enterprises Development Act, (Law, Policies & Incentives),	Bharat Law House Pvt. Ltd

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Vasant Desai	Small-Scale Industries and Entrepreneurship	Himalaya Publishing House, 2017
2.	Prasanna Chandra	Project Preparation , Appraisal, Implementation	Tata McgrawHill, New Delhi.
3.	G.N.Pande	A Complete Guide To Successful Entrepreneurship-	VikasPublishingHouse, New Delhi
4.	C B Gupta &Srinivasan	Entrepreneurship Development in India	Sultan Chand.
5.	A Gupta	Indian Entrepreneurial Culture	New Age International.

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Understand the basic concepts and theories of entrepreneurship.
Unit - II	After studied unit-2, the student will be able to	Exemplify knowledge on course contents, curriculum and constraints of EDP.
Unit - III	After studied unit-3, the student will be able to	Conceive business ideas and convert them into business projects.
Unit- IV	After studied unit-4, the student will be able to	Become familiar with institutions support various forms of assistances and subsidies.
Unit - V	After studied unit-5, the student will be able to	Learn the MSMEs schemes provided to budding entrepreneurs .

INTERNAL ELECTIVE
PAPER - 1

B. BUSINESS ENVIRONMENT

Course Objectives

1. The basic objective of the course is to develop understanding and provide knowledge about business environment to the commerce students.
2. To understand the fundamentals of Business Environment
3. To promote basic understanding on the Economic environment of business.
4. The provide knowledge about the political environment of business .
5. To know the Social Environment of business.
6. To acquire the knowledge Technological environment Indian Business

UNIT-I

INTRODUCTION
An overview of Business environment - types - Internal and External, Micro and Macro - Environmental Analysis and strategies management - Techniques of environmental analysis - steps and approaches.

UNIT-II

ECONOMIC ENVIRONMENT OF BUSINESS
Significance and elements of economic Environment, economic systems and business environment, Economic planning in India, Government policies - Industrial policy.

UNIT-III

POLITICAL AND LEGAL ENVIRONMENT OF BUSINESS
Monopoly and Restrictive Trade Practices (MRTP) Act, Foreign Exchange Management Act (FEMA), Consumer Protection Act, Patent Laws.

UNIT-IV

SOCIO, CULTURAL & INTERNATIONAL ENVIRONMENT
Social responsibility of business, Characteristics, Components, Scope, relationship between society and business, Socio-cultural business Environment, Social Groups, World Trade Organisation (WTO), International Monetary Fund (IMF), Foreign Investment in India

UNIT-V

TECHNOLOGICAL ENVIRONMENT

Concept, Online Channels, Online Services, Advantage of Online services, E-commerce, Indian conditions of E-commerce and Franchise.

Text Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Francis Cherunilam	Business Environment	Himalaya Publishing House,
2.	K.Aswathappa	Business Environment	Himalaya Publishing House,
3.	Dr.S.Sankaran	Business Enironment	Margham Publication
4.	Sheik Saleem	Business Environment	Pearson Education.
5.	Dr.N.Premavathy	Business Environment	Sri Vishnu Publications

References Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Keith Davis William, C.Frederik,	Business and Society,	McGraw Hill International Books Co.,
2.	Dr.M.Dhanabhakyam and M.Kavitha	Business Environment	Vijay Nicole Imprints, Pvt., Ltd.,
3.	Pailwar.V.K	Business Environment	Prentice Hall India LearningPvt.,Ltd.,
4.	SarojUpadhyay	Business Environment,	Asian Books Pvt.,Ltd.,
5.	PankajMehra	Aspects of Business Environment	Omega Publication.

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	The students will be able to know the concept of external, micro macro of business environment.
Unit - II	After studied unit-2, the student will be able to	The students will be able to study the economic policies and conditions in India.
Unit - III	After studied unit-3, the student will be able to	The students will be able to understand the concept of natural and technological environment.
Unit - IV	After studied unit-4, the student will be able to	The students will be able to acquire the knowledge of social environment and consumer protection.
Unit - V	After studied unit-5, the student will be able to	The students will be able to study the concept of globalization of Indian business.

INTERNAL ELECTIVE
PAPER - 1

C. MANAGEMENT INFORMATION SYSTEM

Course Objectives

1.To have knowledge on fundamental principles of management information system
2.Relate the basic concepts and technologies used in the field of management information system
3.Compare the process of developing and implementing information systems
4.To enable students to understand computer and information processing
5.Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization

UNIT - I

Definition- Management Information System - MIS Support for Planning, Organizing and Controlling - Structure of MIS- Information for Decision Making

UNIT - II

Concept of System - Characteristics of System - System Classification - Categories of Information System - Strategic Information System and Competitive advantage.

UNIT - III

System Analysis and Design -SDLC- Role of System - Analyst- Functional Information System - Personnel ,Production, Material, Marketing.

UNIT - IV

Computer and Information Processing - Classification of Computer - Input Devices- Storage Devices - Batch and Online Processing- Hardware - Software - Database Management Systems.

UNIT -V

Development - Maintenance of MIS- Operations of manual information system- Role of Computer In MIS - Data Base Concept - Expert System - System Audit.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Kenneth Claudonand June P Laudon	Management Information System	Prentice Hall of India

2.	M. Assam	Fundamentals of Management Information system	Fundamentals of Management Information system
3.	Jawadekar W.S	Management Information System	Tata McGraw Hill Publishing Company Ltd., 2002.

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Mudrick& Ross	Management Information System	Prentice- Hall of India
2.	Sadagopan	Management Information System	Prentice Hall of India
3.	Murthy CSV	Management Inforation System	Himalaya Publishing House

E-MATERIALS:

www.dbtra.com
www. itword.com
www. icisa. cag. gov. in

Course Out Comes

Units	CO Statement	
Unit- I	After studied unit-1, the student will be able to	Understand the fundamental principles of MIS
Unit - II	After studied unit-2, the student will be able to	Basic knowledge about Concepts and Technologies used in MIS
Unit - III	After studied unit-3, the student will be able to	Acquired knowledge on process of developing and implementing information system
Unit - IV	After studied unit-4, the student will be able to	Impart knowledge on Information Processing
Unit - V	After studied unit-5, the student will be able to	Enhanced knowledge on DBMS.

SKILL BASED SUBJECT
PAPER - 3
PRINCIPLES OF MARKETING

Objectives

1. To enable the students to understand the elements of Marketing Mix and bases for Market segmentation
2. To make him to appreciate the need for marketing science in the modern business world.

UNIT - I

INTRODUCTION

Market- Meaning- Definition- Classification of markets. Marketing - Meaning - Definition- Evolution - Approaches - Modern marketing concepts - Marketing Mix with Extended 7Ps and 10 Ps- Meaning-Concepts - Role of Marketing in Economic Development-Market Segmentation- Definition -Requirements -Bases for Market Segmentation.

UNIT- II

PRODUCT

Meaning- Features-Classification of products- Product Mix- Product Innovation-New Product Development-Product Life Cycle- Branding- Meaning- Advantages and Limitations. Packaging - Meaning - Kinds - Labeling - Meaning-Advantages and Limitation.

UNIT - III

PRICING

Price - Meaning - Pricing- Importance - Objectives- Factors affecting pricing decisions Pricing Policies- Procedure for price determination- Kinds of Pricing.

UNIT- IV

DISTRIBUTION CHANNELS

Meaning-Importance-Marketing and Distribution- Middlemen in distribution -Function and Kinds of Middlemen - Agents and Merchant Middlemen-Wholesalers -Types - Services rendered by wholesalers - Retailers- Types - Requisites - Services rendered by retailers- Introduction to Supply Chain and Logistic Management - Introduction to Networking Marketing and Niche Marketing.

UNIT- V

PROMOTION

Sales Promotion - Personal Selling - Meaning - Purpose - Types - Advantages - Limitations - Factors to be considered on Personal Selling. Advertising- Meaning and definition- Medias - Advantages- Limitations -Advertising copy -Definition - Elements of an Advertisement copy - Introduction to Cinema Advertising, Social Media Advertising, Web Advertising, and Mobile Advertising.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	R.S.N.Pillai&Bagavathi	Modern Marketing principles & practices	S. Chand & co ltd., New Delhi.
2.	Gary Armstrong & Philip Kotler	Marketing an Introduction	PearsonPrentice Hall, New Delhi.

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Stanton William CherlesFutrell	Fundamentals of Marketing	TataMc Grew Hill, New Delhi.
2.	Dr.Rajan Nair &SanjithR Nair	Marketing	S. Chand & co ltd, New Delhi.
3.	Edward W Cudiff	Fundamentals of Modern Marketing	Prentice Hall of India, New Delhi.
4.	Philip Kotler	Marketing Management	Prentice Hall of India, and New Delhi.
5.	Dr. N. Rajan Nair	Marketing an Introductory Text	Sultan Chand & Sons, New Delhi.

E-Material

1.Online Study Material for Commerce courses - LPU Distance

Course OutComes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Know the basic principles and practices of marketing.
Unit - II	After studied unit-2, the student will be able to	Be aware of the importance of products, standards of branding, packing and quality management.
Unit - III	After studied unit-3, the student will be able to	Understand the pricing mechanism of marketing.
Unit - IV	After studied unit-4, the student will be able to	Know the basic aspects of the channels of distribution and buyers' behaviours.
Unit - V	After studied unit-5, the student will be able to	Articulate sales Promotional techniques used in modern marketing.

SEMESTER VI
CORE PAPER - 17
COST ACCOUNTING II

Course Objectives

1. To make the students to understand the process of ascertaining, classification and controlling cost.
2. To enable the students for higher studies like CA, ICWA and ACS with ease and confidence.

UNIT-I

Job, Batch, Contract Costing: Job Costing - definition - Features - Procedure - WIP - Cost Accumulation, Batch Costing - EBQ, Contract Costing - Definition, Features, Work Certified and Uncertified - Incomplete Contract - Escalation Clause - Cost Plus Contract - Contract Account.

UNIT-II

Process Costing: Definition - Features - Job Vs Process Costing - Process Account - Losses - By Products and Joint Products - WIP - Equivalent Units and its Calculation - Closing WIP with or without Process Loss.

UNIT-III

Operating Costing (Transport Costing): Cost Unit - Cost Classification - Operating Cost sheet.

UNIT-IV

Standard Costing - Variance Analysis - Material -Labour- Overheads - Fixed - Variable -Sales Variance.

UNIT-V

Reconciliation of Cost and Financial Accounts.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory andProblems.

Text Books:

S.no	Authors	Title	Publishers
1	S.P.Jain and Narang	Cost Accounting	Kalyani Publishers, New Delhi
2.	S.N.Maheswari	Principles of Cost Accounting	Sultan Chand & sons, New Delhi
3.	S.P. Iyangar	Cost Accounting	Sultan Chand & Sons, New Delhi.

Reference Books:

S.No	Authors	Title	Publishers
1.	A. Murthy and S. Gurusamy,	Cost Accounting	Vijay Nicole Imprints Private Ltd., Chennai
2.	Tulsian	Cost Accounting	Tata McGraw Hills.

Reference Journal

1. Accounting Research Journal,
2. Asian Review of Accounting,
3. Asia-Pacific Journal of Accounting and Economics,
4. Journal of Accounting and Organizational Change,
5. Journal of Contemporary Accounting and Economics

E- Materials

1. www.icwai.org
2. www.nasbaregistry.org.

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To taught the Computation of Job, Batch, Contract Costing
Unit - II	After studied unit-2, the student will be able to	To learn the preparation of Process Costing.
Unit - III	After studied unit-3, the student will be able to	To impart knowledge about calculation of Operating Costing
Unit - IV	After studied unit-4, the student will be able to	To study about preparation of Standard Costing.
Unit - V	After studied unit-5, the student will be able to	To gain knowledge about Reconciliation of Cost and Financial Accounts.

CORE PAPER - 18
INCOME TAX LAW AND PRACTICE II

Course Objectives

1. To acquire Knowledge of Different Income Tax Concepts
2. The Main Objective of Taxation is Economic Development
3. To Overcome the Scarcity of Capital, Taxes are regarded as effective means to Control Inflation
4. To Control Cyclic Fluctuations
5. Reduction of Balance of Payments Difficulties
6. To ensure Price Stability

UNIT- I

CAPITAL GAINS

What are capital assets? - What are not capital assets? - kinds of capital assets - transfer u/s 2 (47) - cost of acquisition - cost of improvement - computation of short term capital gain - computation of long term capital gain - exemptions from capital gains.

UNIT - II

INCOME FROM OTHER SOURCES

Specific incomes chargeable to tax - general incomes chargeable to tax - Interest on securities - Interest exempt from tax u/s 10 (15) - deductions allowed from Income from other sources - computation of income from other sources.

UNIT- III

CLUBBING OF INCOMES AND SET OFF AND CARRY FORWARD OF LOSSES

Income transfer without asset transfer - cross transfer -transfer for the benefit of son's wife - capital gain on an asset gifted before marriage - gifted money used for construction of house by spouse - income including losses - clubbing of business income - clubbing of minor's income - computation of total income.Provisions relating to set off of losses- Provisions relating to set off and carry forward of losses - unabsorbed depreciation - order of set off - computation of total income.

UNIT- IV

AGRICULTURAL INCOME AND DEDUCTIONS FROM GROSS TOTAL INCOME

Meaning of agricultural income - types of agricultural income - income from growing and manufacturing rubber - income from growing and manufacturing coffee - income from growing

and manufacturing tea - income of a sugar mill growing its own sugarcane- computation of tax of an assessee having agricultural income.Permissible deductions from gross total income - section 80C, 80CCC, 80CCD, 80D, 80DD, 80DDB, 80E, 80G, 80GG, 80GGA, 80QQB, 80RRB, 80U.

UNIT - V

ASSESSMENT OF INDIVIDUALS AND ASSESSMENT PROCEDURES

Sources of income of an individual - computation of total income and tax liability of an individual.Filing of returns - permanent account number (PAN) -Usage of PAN - TDS - types of assessment - self assessment - Best judgement assessment - Income escaping assessment (reassessment) - Advance payment of tax

Note: Questions in Sec .A, B & C shall be in the proportion of 20:80 between Theory andProblems.

Text Books

S.no	Authors	Title	Publishers
1	Gaur &Narang	Income Tax Law & Practice	Kalyani Publishers
2.	Reddy,T.S. &HariprasadReddy ,Y	Income Tax Theory, Law&Practice	Margham Publications, Chennai.
3	Dr. A. Murthy	Income Tax Law & Practice	Vijay Nicole Imprints Pvt.Ltd. Chennai

Reference Books

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Mehrotra	Income Tax Law & Accounts	SahithiyaBhavan Publications
2.	Vinod,K.Singhania	Students Guide to Income Tax	Taxman Publications Pvt. Ltd
3.	Anita Raman	Income Tax Law & Practice	McGraw Hill

Reference Journals

1. Indian Journal of Tax Law
2. Taxman.com/Journal
3. Vision Journal of Indian Taxation
4 Income Tax Reports,Chennai

E- Materials

1. GST and Income Tax Fortnightly E Magazine

2. Capital Gain Clear Tax

3. India filing.com

4. Clear Tax. in

5. Income Tax Management.com

Course OutComes

Units		CO Statement
Unit - I	After studied unit-1, the student will be able to	To know the calculation of taxes for gain on capital asset.
Unit - II	After studied unit-2, the student will be able to	To know the tax on other source and its calculation.
Unit - III	After studied unit-3, the student will be able to	To know the adjustment of carry forward Income/Expenditure.
Unit - IV	After studied unit-4, the student will be able to	To Expertise in preparation of total income of individual/ firm etc.
Unit - V	After studied unit-5, the student will be able to	To gain knowledge on filing of income tax returns.

CORE PAPER - 19

FINANCIAL MANAGEMENT

Course Objectives

- To provide expert knowledge on setting financial objectives & goals.
- To manage Financial Resource, financial risk management and through understanding of investment portfolios and financial instruments.
- To Maximize the Cost of Capital by Developing a Sound and Economical combinations of Corporate Securities
- Proper Estimation and Requirement for Expansion and Growth
- To Ensure adequate Return on Investment
- To Maintain Proper Cash Flow Creating Reserves and Goodwill

UNIT- I

Nature and Importance of Finance Functions - Organizing Finance Functions - Functions of Finance Manager - Objectives of Finance Function - Methods and Sources of Raising Finance - Critical Appraisal of the Various Sources of Finance.

UNIT- II

Goals of Finance Function - Financing Decisions - Financial Planning - Financial Forecasting - Capital Structure Decisions - Net Income Approach, NOI Approach and MM Approach-Capitalization - Cost of Capital - Computation of Cost of Capital-Dividend Policy-Factors Determining Dividend Policy.

UNIT- III

Investment Decisions - Estimation of Cash Flows - Evaluation of Alternative Investment Proposals like NPV, ARR, IRR Methods - Decision Making Under Risk and Uncertainty - Inflation and Investment Decisions

UNIT- IV

Working Capital - Meaning, Concept, Types and Significance-Gross and Net Working Capital - Determinants of Working Capital - Sources of WC - Credit and Collection Policies.

UNIT- V

Security Analysis and Portfolio Management - Leverages -Meaning, Types of Leverage.Degree of Operating and Financial Leverage - Financial Ratio Analysis.

Text Books

S.No	Authors	Title	Publishers
1.	Dr. S.N.Maheswari	Financial Management	Sultan Chand & Sons, New Delhi
2.	Dr. A.Murthy	Financial Management	MarghamPublications,Chennai.
3.	Dr. J. Srinivasan, Sridhar and Ramalingam	Financial Management	Vijay Nicole Imprints Pvt .Ltd. Chennai
4.	R.K.Sharma	Financial Management	Kalyani Publishers, New Delhi

Reference Books

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	I.M.Pandey	Financial Management	VikasPublision house Pvt Ltd. Noida
2.	Prasanna Chandra	Financial Management 10ed.	McGraw hill education Pvt. Ltd India
3.	Subirkumar Banerjee	Financial Management	PHI Learning Pvt Ltd
4.	VyuptakeshSharan	Fundamentals of Financial Management	Pearson Education
5.	Dr .N. Premavathy	Financial Management	Sri Vishnu Publications, Chennai.
6.	S.C. Kuchhal	Financial Management	Chaitanya
7.	P.V. Kulkarni& B.G. Satyaprasad	Financial Management	HimalayaPublishingHouse

Reference : Journals

1. Indian Journal of Business Finance and Accounting
2. Journal of Financial Reporting and Accounting
3. Asian Academy Management Journal of Accounting and Finance
4 Review of Accounting and Finance

E- Materials

1. Economic Times.Com

2. Financial Express

3. Reserch gate.net

4. Entrepreneur.com

5. The Hindu businessline

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To understand the basic Principles and practices of Financial management.
Unit- II	After studied unit-2, the student will be able to	Determining the amount of Capital, Organization and Structure. Reduce cost of Capital and Operating Risks
Unit - III	After studied unit-3, the student will be able to	To have the knowledge and practice of arriving financial Decision makings
Unit - IV	After studied unit-4, the student will be able to	To acquire practical knowledge on Calculation of working capital
Unit - V	After studied unit-5, the student will be able to	To gain knowledge on leverage and portfolio management

INTERNAL ELECTIVE
Paper - 2
(to choose one out of 3)
A. INNOVATION MANAGEMENT

Objectives
1. To help students understand, describe and explain the phenomenon of Innovation.
2. To present students a toolkit to successfully navigate complex landscape that surrounds the innovation process.

UNIT- I

INNOVATION AND COMPETITIVE ADVANTAGE
Innovation -Introduction, meaning, definition, concepts, nature, importance, early-stage of innovation - identifying opportunities-Discovering new points of differentiation.Innovation drivers- State - Technology - Types of innovations; Descriptions of technological, marketing and organization.

UNIT- II

INNOVATION AND CREATIVITY
Creativity - meaning, definition, need for and importance of creativity - Factors influencing creativity. Individual - Self-evaluation of individual - SWOT Analysis - Team - Group dynamics -Meaning**, Characteristics, Stages, Types, Factors affecting group behavior and team building**- Leadership - Meaning and nature - Creating Breakthroughs in innovation. Perception - meaning, Definition, Perceptual process, Factors affecting perception and techniques to improve perception.

UNIT- III

INNOVATION THEORIES
Major contemporary theories: Disruptive-Networked-Open; Alternative theories: Evolutionary-Uncontested- Adaptive - Green Initiatives.

UNIT- IV

INNOVATION PROCESS
New Product Development-Criticality of the Value Proposition, Differentiation - Paths to Market-Systems of Ideation, Experimentation and Prototyping - Innovation Labs.

UNIT- V

SUCCESS AND INNOVATION
Transformation of Business - Business processes - Recognition and Execution strategies-Designing a Winning Innovative Culture - Patents - Intellectual property - successful innovation case studies (any two).

Text Books

S.No	Authors	Title	Publishers
1.	Tidd Joe, and Bessant John	Managing Innovation	John Wiley and Sons, Chichester, UK
2.	J. Christopher Westland	Global innovation Management, A strategic Approach	Palgrave Macmillan
3.	J. Christopher Westland	Global Innovation Management	Macmillan International Higher Education

Reference Books

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Moore, G.A	Dealing with Darwin: How Great Companies Innovate at Every Phase of theirEvolution, Capstone.	Random House.
2.	Collins, J.	How the Mighty Fall: And Why Some Companies Never Give In	Random House.
3.	Prahalad C.K. and Krishna	The New Age of Innovation: Driving Concreted ValueThrough Global Networks	M.S. McGraw Hill.

E-Material

1. www.eui.upm.es › ModuloIIPDF Basic Concepts of Innovation and Innovation Management
2. https://www.coursehero.com › file Innovation_Management_404_v1.pdf - Innovation Management Developed By Prof
3. What is INNOVATION MANAGEMENT? What does INNOVATION MANAGEMENT mean? YouTube app · The Audiopedia

Course Outcomes:

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Perceive the basics of innovation
Unit - II	After studied unit-2, the student will be able to	Appreciate the value of creativity
Unit - III	After studied unit-3, the student will be able to	Gain exposure to various theories of innovation
Unit - IV	After studied unit-4, the student will be able to	Apprehend the innovation process.
Unit - V	After studied unit-5, the student will be able to	Inculcate the Shade of innovation for the success of business

INTERNAL ELECTIVE
Paper - 2
B. LOGISTICS MANAGEMENT

Course Objectives

- To enable students understand the importance and dynamics of a firm's physical distribution function and management of its supply chain.
- To understand how warehouse functions in logistics fits into logistics & supply chain management.

UNIT- I

Logistics - meaning - definition- scope- importance - function- objectives- of logistics management- customer service and logistics.

UNIT- II

Supply chain intermediaries - Meaning, Importance, Objectives, Functions- Types of Intermediaries- Selection of Channel Member- Motivation, Training and Evaluation of Channel Members.

UNIT- III

Supply Chain Management- Meaning, Definition, Function, Need- Marketing Forces affecting Supply Chain Activities- Supply Chain Activities in India.

UNIT- IV

Meaning, Characteristics of Warehousing -Functions of Warehousing -Types of Warehousing- Selection of Transportation- Warehouse Locations-Packaging and Material Handling- Documents relating to warehousing- Warehousing in India.

UNIT - V

Government Policies And Regulations- Motor Vehicles Act - Carriage By Air, Sea Multi- modal Transportation - Documentation - Airways Bill, Mate Receipt, Railway Receipt, Lorry Receipt, Bill of Lading.

Text Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1	Sathish k. Kappor and purvakamal	Basis of Distribution Management	Printice Hall of India, New Delhi
2.	Sunil chopra	Supply chain management strategic planning and operation	Pearson Education
3	Nanthakumar .B	Logistics and supply chain management	Vijay Nicoles Imprint Pvt. Ltd

Reference Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Vinod V. Sople	Logistics Management	Pearson Education
2.	Satis c, Ailawadi, Rakesh Singh	Logistics Management	Prentice Hall of India New Delhi
3.	Taylor	supply chain manager's guide	Person Education
4.	RonaLH.Ballou	Business Logistics /supply chain management	Pearson education prentice hall, New Delhi

Course Outcomes:

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To understand the basic concepts of logistic management
Unit - II	After studied unit-2, the student will be able to	To explore the supply chain intermediaries
Unit - III	After studied unit-3, the student will be able to	To explore the supply chain strategies
Unit - IV	After studied unit-4, the student will be able to	To identify the warehousing strategies in logistic management
Unit - V	After studied unit-5, the student will be able to	To perceive the legal frame work of logistic management.

INTERNAL ELECTIVE
PAPER - 2
C. SERVICE MARKETING

Objectives

a) To enable students to acquire knowledge of service marketing
b) To understand the concepts relating to service quality, pricing and demand for services
c) To impart knowledge about insurance services in service marketing
d) To develop practical knowledge about service marketing.
e) To create new ideas in service marketing.

UNIT - I

Marketing of Services - Introduction - Growth of the Service Sector - The Concept of Service - Characteristics of Services Classification of Services -Using Technology - Developing Human Resources.

UNIT - II

Marketing mix in services marketing - The seven Ps - Product Decisions - Pricing Strategies- Promotion of Services and Distribution Methods for Services - Additional Dimensions in Services Marketing- Internet as a service channel.

UNIT - III

Strategic Marketing Management for Services - Matching Demand and Supply through Capacity Planning and Segmentation - Internal Marketing of a Service - External versusInternal Orientation of Service Strategy.

UNIT - IV

Delivering Quality Services - Causes of Service-Quality Gaps - The Customer Expectations versus Perceived Service Gap - Factors and Techniques to Resolve this Gaps in Service - Quality Standards, Factors and Solutions.

UNIT - V

Marketing of Services with special reference to Health Services - HospitalityServices including Travel, Hotels, and Tourism.

Text Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1	Dr. L. Natarajan	Services Marketing	Margahm Publications, Chennai
2.	M. K. Rampal&S.L.Gupta	Services Marketing	Galgotta Publications
3	Geethabansal, AmandeepKaur&Bhavna	Services Marketing	Kalyani Publications

Reference Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	RamneetKaur, Parampalsingh	Services Marketing	Kalyani Publications
2.	S.M. Jha	Services Marketing	Himalaya Publications
3.	Dr. B. BaLy	Services Marketing	S. Chand and Co. Publications
4.	VasanthiVenugopal& Raghu V.N	Services Marketing	Himalaya Publications

Course Outcomes:

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Understand the concepts and evolution of service marketing.
Unit - II	After studied unit-2, the student will be able to	Explore the 4 Ps of service marketing.
Unit - III	After studied unit-3, the student will be able to	To Perceive the strategies in service marketing.
Unit - IV	After studied unit-4, the student will be able to	To explore the quality issues of service marketing.
Unit - V	After studied unit-5, the student will be able to	To understand the different services organizations.

E- Material

1. http://www.sasurieengg.com/e-course-material/MBA/II-Year Sem3/BA7013%20SERVICE_MARKETING.pdf

2. http://www.pondiuni.edu.in/storage/dde/downloads/markiv_sm.pdf

INTERNAL ELECTIVE
PAPER - 3
(to choose one out of 3)

A. CUSTOMS AND GOODS AND SERVICE TAX

Objectives

To enable the students to understand basic concepts of goods and service tax.

To analyze the assessment returns and refund of goods and service tax

UNIT - I

CUSTOMS ANDEXCISE DUTY

Introduction-Customs act 1962- Objectives of Customs Act, Levy and collection of Customs duty , classification of goods , Goods Exempted from Customs duty, Searches ,seizures, confiscation and penalties. Central excise duty 1944- Nature of excise duty, levy and collection of excise duty - Type of excise duty , valuation of goods- clearance of goods- clearance of samples- registration and exemption from registration.

UNIT - II

INTRODUCTION TO GOODS AND SERVICE TAX

Goods and Service Tax - Meaning, History of Goods and Service Tax, Features, Objectives, Challenges, Types - SWOT (Strength, Weakness, Opportunities, and Threats of Goods and Service Tax), Scope of Goods and Service Tax - Difference between Indirect Tax and Goods and Service Tax - Advantages and Disadvantages of Goods and Service Tax - Dimension of Goods and Service Tax - Effects of Goods and Service Tax in Indian Economy - Impact of Goods and Service Tax and its Implication.

UNIT- III

GOODS AND SERVICE TAXREGISTRATION

Meaning, Importance, Types, Procedure for Resident and Non- Resident - Application Process and Enrolment process under Goods and Service Tax - Documents required - Penalties - Cancellation of Registration - Revocation of Cancellation of Registration.

UNIT- IV

LEVY AND COLLECTION OF GST

Supply - Meaning, Place of Supply, Time of Supply, Value of Supply, Methods of Valuation - Goods and Service Tax on Exports.

UNIT- V

ASSESSMENT RETURNS AND REFUND OF GOODS AND SERVICE TAX

Assessment - Meaning and types - Accounts and Other Records - Periods of Retention of Accounts. Returns - Types of returns and their due dates -Furnishings of details of Outward Supply - Claim of Input tax credit and Provisional Acceptance thereof - Matching and Reversal and Reclaim at Reduction in Output tax liability. Payments of Goods and Service Tax -TDS and TCS under Goods and Service Tax - Refund of Goods and Service Tax.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	CA HemantNarang	Goods and Service Tax Simplified, A Complete Guide to New Model GST Law	Computech Publications Limited , New Delhi.
2.	RakeshKumar	Goods and Service Tax	Diamond Pocket Books (P) Ltd., New Delhi.
3.	Dr.H.C.MehrotraProf.V.P.Agarwal	Goods and Service Tax	SahityaBhawan Publication New Delhi(2020).

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	T S Reddy and Hari Prasad Reddy	Business Taxation	Margham Publication.
2.	Dr. Vinod and K. SinghaniaMonicSinghania	Students Guide To goods and service Tax	Taxmann Publications, New Delhi.
3.	Datey, V.S.	Indirect Tax Law and practice	Taxmann Publications Pvt. Ltd., Delhi,

Course OutComes

Units	CO Statement	
Unit- I	After studied unit-1, the student will be able to	Understand the basics of Customs and Excise duty.
Unit- II	After studied unit-2, the student will be able to	Know the fundamental concepts of Goods and Service Tax (GST).
Unit - III	After studied unit-3, the student will be able to	Understand the Goods and Service Tax Registration.
Unit- IV	After studied unit-4, the student will be able to	Analyze the procedures of Levy and Collection of GST.
Unit - V	After studied unit-5, the student will be able to	Understand the Assessment Returns and Refund of Goods and Service Tax.

INTERNAL ELECTIVE
PAPER - 3
B. INVESTMENT MANAGEMENT

Objectives

1. To enable the students toapply various tools and techniques of Investment and risk management.
2. To provide knowledge on various investment avenues that benefitsthe individual and nation.

UNIT- I

INTRODUCTION TO INVESTMENT

Investment Meaning- Investment Vs. Speculation- Investment Vs Gambling- Important factors favorable for investment program- stages in investment - investors classification

UNIT - II

SECURITY INVESTMENT

Meaning- Bonds- Preference Shares- Equity shares- Derivatives- Options- Swaps- Futures- Mutual funds

UNIT - III

NON SECURITY INVESTMENT

Meaning- Government Securities- Life Insurance- UTI- Commercial banks- Provident fund- Post office schemes- National Savings Schemes- Fixed Deposit Schemes.

UNIT - IV

RISK AND RETURN

Meaning- Historical and Expected return- Types of risk- Measurement of risk

UNIT - V

FUNDAMENTAL AND TECHNICAL ANALYSIS

Meaning- Economy, Industry and Company Specific analysis- Tools for technical analysis- Charts, Support and Resistant level analysis.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Preeti Singh	Investment Management	Himalaya Publishing House. New Delhi. 2014
2.	Prasanna Chandra	Investment Analysis and Portfolio Management,	Tata McGraw - Hill Publishing Company Limited, New Delhi.

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS

1.	Natarajan L	Investment Management Security Analysis and Portfolio Management	Margham Publication, Chennai.
2.	Avadhani VA	Investment and Securities Market in India	Himalaya Publishing House, Mumbai.
3.	Bhalla VK	Investment Management, Security Analysis and Portfolio Management	S.Chand and Company Ltd, New Delhi

E-Material

1. www.universityofcalicut.info › ...PDF Investment Management - University of Calicut
2. www.pondiuni.edu.in › ddePDFSecurtiy Analysis and Portfolio Management
3. https://www.cfainstitute.org › ...PDF the future of investment management - CFA Institute

Course OutComes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Understanding the Fundamentals of Investment
Unit - II	After studied unit-2, the student will be able to	Knowledge pertaining to Security Investment.
Unit - III	After studied unit-3, the student will be able to	Knowledge about Non Security Investment.
Unit - IV	After studied unit-4, the student will be able to	Scientific reasoning about Risk and Return.
Unit - V	After studied unit-5, the student will be able to	Reflective thinking through Fundamental and Technical Analysis.

INTERNAL ELECTIVE
PAPER - 3
C. FINANCIAL SERVICES

Course Objective

1. To enable the students to gain knowledge of business financial services.
2. Financial system of a country is closely related to the economic development.
3. There is drastic change in the functioning of financial system in this era of liberalization, privatization and globalization.
4. The purpose of including Indian Financial system as a subject is to give a clear understanding and knowledge of Financial system in the present scenario.

UNIT-I

Financial services - meaning - Financial services and economic environment - legal and regulatory framework - financial institutions and other participants in the financial services sector - capital and money markets - Instruments - Government - Securities market - SWAP Analysis

UNIT-II

Introduction to leasing - legal and tax aspects - lease evaluation - Merits and Demerits - Accounting and Reporting for Lease - lease funding - Types of lease - Lease agreement - Hire purchase Vs lease - Legal aspects of Hire purchase - rights and duties of hire vendor and hire purchaser.

UNIT-III

Factoring - Types and feature of factoring agreement - Factoring Vs Bills discounting - Services of factor - Consumer Finance and credit card services - forfeiting.

UNIT-IV

Venture capital - meaning and characteristics - criteria for assistance - schemes and guidelines - infrastructure financing - assessment of risk - legal aspects.

UNIT-V

Mutual funds - SEBI Guidelines - Features and types - Management structure and performance evaluation - Growth and recent trends - Investor services - Credit rating agencies - CRISIL, CARE, ICRA - Services - Criteria for rating - Symbols.

Note: Questions in Sec. A, B & C - 100 % Theory.

Text Books:

S.No	Authors	Title	Publishers
1	Dr.S.Gurusamy	Financial Services	Vijay Nicholes Imprint Pvt. Ltd., Chennai
2.	Dr.V.Balu	Merchant Banking & Finance Services	Sri Venkateswara Publication, Chennai

Reference Books:

S.No	Authors	Title	Publishers
1.	Dr. N. Premavathy	Financial Services and Stock Exchange	Sri Vishnu Publications, Chennai.
2.	Dr.S.Gurusamy	Financial Services and Systems	Vijay Nicholes Imprint Pvt. Ltd., Chennai

Related Journals:

1. Journal of Finance.
2. The Review of Financial Studies.
3. Journal of Financial Economics.
4. Journal of Accounting and Economics.
5. Journal of International Money and Finance.
6. Journal of Business Finance & Accounting.
7. Journal of International Financial Management and Accounting.
8. Journal of Financial Services Research

E-Materials:

1. "Financial Services: Getting the Goods". IMF. 28 March 2012. Retrieved 8 September2015.
2. "Access to a financial account or services". Our World in Data. Retrieved 15 February2020.
3. "Bill Summary & Status 106th Congress (1999 - 2000) S.900 CRS Summary - Thomas (Library of Congress)". Retrieved 2011-02-08.
4. Roberts, Richard (2008). The City: A Guide to London's Global Financial Centre. Economist. p. 2.
5. "Research and statistics FAQ". The City of London. Archived from the original on 26 September 2011. Retrieved 23 February 2012.
6. "Triennial Central Bank Survey - Foreign exchange and derivatives market activity in 2004"

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To gain knowledge about Financial Services, Capital and Money Markets
Unit - II	After studied unit-2, the student will be able to	To gain effective knowledge about leasing.
Unit - III	After studied unit-3, the student will be able to	To impart knowledge about Factoring.
Unit - IV	After studied unit-4, the student will be able to	To know about Venture capital.
Unit - V	After studied unit-5, the student will be able to	To learn about Mutual funds.

SKILL BASED SUBJECT

PAPER - 4

HUMAN RESOURCES MANAGEMENT

Objectives

1. To enable the students to understand the Human resource management concepts and principles.
2. To create an awareness about the existing HR practices of the companies in India.

UNIT - I

INTRODUCTION TO HUMAN RESOURCES MANAGEMENT

Definition - Meaning, Nature, Scope and Objectives, Functions, Importance.Qualities and Role of HR Manager - Problems and Challenges of HR Manager - Changing Environment of HRM, Changing role of HRM.

UNIT - II

HUMAN RESOURCE PLANNING

Definition, Need and Importance, HRP Process, Problems And Barriers To HRP, HRP Effectiveness. Job Analysis - meaning, process, Job Description and Job Specification.Job Design meaning and methods.

UNIT - III

RECRUITMENT AND SELECTION

Meaning and Definition, Objectives, Sources of Recruitment, Process, Methods and Recruitment Practices In India.Selection- Meaning and Definition, Objectives,Process and preparation of Curriculum Vitae.

UNIT - V

TRAINING AND DEVELOPMENT, PERFORMANCE APPRAISAL

Meaning - Nature, Principles, Assessing The Needs Of Training, Inputs And Gaps In Training - Training And Development As Source Of Competitive Advantage - Methods Of Training, Evaluation Of Effectiveness Of Training Programme, Making The Training Effective-HR Culture In MNCs.Performance and Potential Appraisal - Meaning, Purpose-Process - Methods - Traditional and Modern Methods - Problems. Human Resource Accounting- Methods of valuation of Human resources, Controlling costs of Human Resources.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr.S.S. Khanka	Human Resource Management (Text & Cases)	S. Chand Publishing, New Delhi, 5th edition (2013).
2.	L.M. Prasad	Human Resource Management (Text & Cases)	Sultan Chand and sons, New Delhi, 3rd edition (2014).

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	K. A. Aswathappa	Human Resource Management	Himalaya Publishing House, 8th edition.
2.	C. B. Mamoria	Personnel Management	Himalaya Publishing House Pvt., Ltd, 13th edition (2019).
3.	P. C. Tripathi	Personnel Management and industrial relations	Sultan Chand and sons, New Delhi, 21st edition (2013).
4.	P.SubbaRao	Personnel and Human Resource Management	Himalaya Publishing House.

E-Material

1.Online Study Material for Commerce courses - LPU Distance

Course OutComes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Understanding the basics of Human Resource Management.
Unit - II	After studied unit-2, the student will be able to	Ability to plan Human resource.
Unit - III	After studied unit-3, the student will be able to	Knowledge about leadership qualities through Recruitment and Selection.
Unit - IV	After studied unit-4, the student will be able to	Comprehension about Training and Development.
Unit - V	After studied unit-5, the student will be able to	Awareness about Performance and Potential Appraisal.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF ARTS

B.COM.

DEGREE COURSE

CBCS PATTERN

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER I									
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3	III	Core Theory	Paper-1	5	3	Financial Accounting -I	25	75	100
4	III	Core Theory	Paper-2	5	3	Business Organization	25	75	100
5	III	ALLIED -1	Paper-1	6	3	**(to choose 1 out of 3)** 1. Indian Economy I 2. Elements of Insurance 3. Consumerism	25	75	100
6	III	PE	Paper-1	6	3	**Professional English I**	25	75	100
7	IV	Environmental Studies		2	2	Environmental Studies	25	75	100
				36	**22**		**175**	**525**	**700**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English (CE)	Paper-2	4	4	**Communicative English I**	25	75	100
10	III	Core Theory	Paper-3	5	3	Financial Accounting –II	25	75	100
11	III	Core Theory	Paper-4	5	3	Office management	25	75	100
12	III	ALLIED-1	Paper-2	6	5	**(to choose 1 out of 3)** 1. Indian Economy II 2. Merchant banking 3. Business Mathematics	25	75	100
13	III	PE	Paper-2	6	3	**Professional English II**	25	75	100
14	IV	Value Education		2	2	Value Education	25	75	100
15	IV	Soft Skill		2	1	Soft Skill	25	75	100
				36	**25**		**200**	**600**	**800**

B.COM. GENERAL

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 1: To excel with the much needed business education, to ensure that students to be more competitive for employment and higher education.

PEO 2: To develop a broad range of business skills and knowledge, development of general and specific capabilities to meet the current and future expectation of business, industries and economy at the national and global level.

PROGRAMME OUTCOMES (POs)

PO 1: To have comprehensive knowledge of finance, accounting, taxation, economics and business laws.

PO 2: To equip with professional, inter-personal and entrepreneurial skills for economic and social growth.

PO 3: To gear up with updated knowledge in implementing business practices.

PO 4: To acquire effective skills like communication, decision making, problem solving in business activities.

PO 5: To blend knowledge, skill and attitude that will sustain an environment of learning and creativity.

PO 6: To impart value based and job oriented education, which ensures that the students are trained into up-to-date.

THIRUVALLUVAR UNIVERSITY
B.COM. (GENERAL)

SYLLABUS
UNDER CBCS
(With effect from 2020-2021)

SEMESTER I

PAPER - 1

FINANCIAL ACCOUNTING I

OBJECTIVES

1. To understand the basic Principles and practical Applications of Accounting
2. To have practical knowledge in the preparation of Double Entry System
3. To draft the Final Accounts as per the Accounting standards
4. To acquire knowledge about Depreciation accounting
5. To gain expertise in preparation of Single Entry System
6. To gain knowledge about importance of Tally

UNIT-I: Introduction

Meaning of accounting – objectives– advantages -limitations - Accounting concepts and conventions - Methods of accounting - Journal - Ledger– Trial Balance - Rectification of Errors with and without suspense a/c.

UNIT-II: Final accounts

Meaning of final accounts – adjustments in preparation of final accounts – preparation of trading, profit & loss account and balance sheet of sole proprietorship concern.

UNIT-III: Depreciation

Meaning of depreciation – causes– need– Methods of calculating depreciation: straight line method and written down value method (change in method of depreciation is excluded) – Methods of recording depreciation: by charging depreciation to assets account or by creating provision for depreciation account.

UNIT-IV: Single entry system

Meaning of single entry system – features and limitations of single entry system – Distinction between single entry system and double entry system - Methods of calculation of profit:

Statement of affairs method and Conversion method – Distinction between statement of affairs and balance sheet.

UNIT-V: Introduction to Tally

Accounts Basics- Accounts Basics - Understanding the Components of Computer, Classification of Softwares - Challenges associated with accounting on computers and solutions there on - Software training to enhance employability - Growth of Tally.

Note: Questions in Sec .A, B & C shall be in the proportion of 20:80 between Theory and Problems.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1	T.S. Reddy & Dr. A.Murthy	Financial Accounting	Margham Publications Chennai.
2.	Jain &Narang,	Financial Accounting	Kalyani Publishers
3	S.N. Maheshwari	Financial Accounting	S.Chand Publications

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Hanif and Mukherjee	Financial Accounting	McGraw-Hill Publications
2.	Murugadoss, Jaya, Charulatha and Baskar	Financial Accounting	Vijay Nicholes Imprint Pvt. Ltd., Publications
3.	Shukla & Grewal	Advanced Accounting	S.Chand & Co. Publications
4.	Parthasarathy.S. &Jaffarulla,	Financial Accounting	Kalyani Publishers, NewDelhi
5.	Gupta, R.L & Gupta V.K,	Advanced Accounting	Sulthan chand and sons Publications
6.	Ashok Sehgal &Deepak Sehgal	Fundamental of Financial Accounting	Taxman Publications
7.	Tulsian	Financial Accounting	Pearson Publications

COURSE OUT COMES

Units	CO Statement	
Unit1	After studied unit-1, the student will be able to	Understand the basic fundamentals of Double Entry System Accounting
Unit2	After studied unit-2, the student will	Prepare Final Accounts

	be able to	
Unit3	After studied unit-3, the student will be able to	Understand the depreciation accounting
Unit4	After studied unit-4, the student will be able to	Prepare the accounts in Single Entry system
Unit 5	After studied unit-5, the student will be able to	Understand the importance of Tally Accounting

CORE THEORY
PAPER – 2

BUSINESS ORGANIZATION

OBJECTIVES:

1. To enable the students to understand the basic concepts of Business Organization.
2. To make the students to know the functioning of MNC's in India.

UNIT – 1

Introduction

Business – Meaning – Characteristics - Objectives - Criteria for Success in Modern Business – Classification of Business-Profession - Meaning-Distinction between Business and Profession - Social Responsibility of Business.

UNIT – 2

Forms of Business Organisation

Sole Trader, Partnership Firm, Limited Liability Partnership , Cooperative Societies and Joint Stock Company: Definition – Meaning – Characteristics – Advantages – Limitations - One Man Company- Virtual Organization- Private and Public Limited Company – Government Companies – Public Utilities.

UNIT – 3

Location of Industry

Plant Location: Meaning - Theories of Location - Factors Influencing Location - Plant Layout: Definition - Meaning – Objectives - Characteristics of Good Layout - Size of Firm: Meaning - Concept of Size - Measures of Size.

UNIT-4

Business Combination

Definition - Meaning – Advantages and Limitations – Types of Combination – Chamber of Commerce: Meaning – Advantages and functions – Trade Associations: Features and functions.

UNIT-5

Multinational Corporations (MNC's)

Definition - Distinction among IC, MNC, GC and TNC - Characteristics of MNC's-cultural impact of MNC's. Factors contributed for the growth of MNC's – Advantages and Disadvantages of MNC's – Control over MNC's – Organization Design and Structure of MNC, s – Relationship between Headquarters and Subsidiaries – MNC's in India.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dinkar Pagare	Business Organization & Management	Sultan Chand & Sons, New Delhi.
2.	C.B. Gupta	Business Organization & Management	Sultan Chand & Sons, New Delhi.

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	P.N. Reddy & S.S. Gulshan	Business Organization	Eurasia Publishing House (Pvt.) Ltd, New Delhi.
2.	Prof. C.D. Balaji& Dr. G. Prasad	Business Organization	Margham Publications, Chennai.
3.	Kathiresan & Dr. Radha	Business Organization	Prasana Publishers, Chennai.
4.	Y.K. Bhushan	Fundamentals of Business Organization & Management	Sultan Chand & Sons, New Delhi.
5.	Dr. P. Subba Rao	International Business – Text and Cases	Himalaya Publishing house, New Delhi.

COURSE OUTCOMES

UNITS	CO STATEMENT	
Unit1	After studied unit-1, the student will be able to	Knowledge about Business and Profession
Unit2	After studied unit-2, the student will be able to	Understand the different Forms of Business Organization.
Unit3	After studied unit-3, the student will be able to	Explore the theories of Plant Location and characteristics of Layout.
Unit4	After studied unit-4, the student will be able to	Know the concept of Business Combinations and functions of Chamber of commerce, Trade Association.
Unit 5	After studied unit-5, the student will be able to	Understand the basic Concepts of MNCs

ALLIED – 1
(To choose any 1 out of the given 3)
PAPER –1
1. INDIAN ECONOMY - I

Course Objectives:

1. The salient objective of this paper is to introduce the students to understand the main concepts of the Indian Economy.
2. The concepts which help to the students to assess gain knowledge on various Economic Policies of the Government and also students should know that India is a fifth largest economy.
3. The students become aware of the Agriculture and Agriculture Labour.
4. The students become aware of the various challenges of the Indian economy.
5. Students are able to analyse current economic scenario in India.
6. To impart knowledge about the functioning of industries.

UNIT: I Introduction

Features of developing Economies - Economic and Non-Economic factors impeding Economic development - Concept of growth and development.

UNIT: II Human Development, Poverty and Unemployment.

Human development – Components of human development – HD Index – Population Growth – Measures to control population - Recent Population Policy – Poverty Alleviation Programmes – Unemployment – Types – Causes and Effects.

UNIT: III Agriculture

Indian Agriculture – Contribution to Economic Development – Agricultural Productivity – Land Reforms – Green Revolution II.

UNIT: IV Agricultural labour

Agricultural labour – Definition – Features - Problems – Remedies - Agricultural Credit - Grameen Bank.

UNIT: V Industry

Meaning and Definition of Industry – Role of Industries – Industrial Policy of 1991 and recent changes – Role of Small Scale Industry in economic development – Large Scale Industry in India – Industrial Development Under Five Year Plans.

Text Books
Unit- I : Indian Economy Sankaran.S Margham Publications 7th edition 2014

Unit-II: Indian Economy Ruddar Dutt & Sundaram KPN Sulan Chand Publishing 7th edition 2016

Unit-III: Indian Economy Sankaran.S Margham Publications 7th edition 2014

Unit-IV: Indian Economy Sankaran.S Margham Publications 7th edition 2014

Unit- V: Indian Economy Sankaran.S Margham Publications 7th edition 2014

Reference Books:

1.Ruddar Dutt & Sundaram KPN Indian Economy S Chand Publishing7thedition

2016

2. Sankaran .S.IndianEconomy Margham Publications 7th 2014

3. Dhingra I.C. Indian Economy Manakin Press Sultan Chand & Sons 28th edition.

4.Puri V.K &Misra S.K Indian Economy Himalaya Publishing House 35th 2017

5. Agarwal A.NIndian Economy New Age 41st 2016

6. KK Dewett JD Varma & M SharmaIndian Economy S Chand & Company Pvt Ltd 1st 2016

7. Jhingan M.L Economics of Development & Planning Vrinda Publication 41st 2016

E- Materials

1. www.studydhaba.com/indian-economy-study-material-pdf
2. www.examrace.com/IEcoS/IEcoS-Study-Material
3. www.winmeen.com/tnpsc-indian-economy-study-materials
4. www.jagranjosh.com/articles/ias-prelims-2015-gs...
5. www.governmentexams.co.in/tnpsc-indian-economy-notes
6. www.clearias.com/ias-study-materials
7. www.tnpscshouters.com/2019/02/tnpsc-indian...
8. www.hirensir.com/indian-economy-in-gujarati-pdf

Course Out Comes

1. After studied unit-1, the student will be able to understand the various indicators of economic development.
2. After studied unit-2, the student will be able to understand the importance, causes and impact of population growth.

3. After studied unit-3, the student will be able to gain knowledge about the role of agriculture in economic development.

4. After studied unit-4, the student will be able to gain knowledge about the role of agriculture labour problems and remedies .

5. After studied unit-5, the student will be able to understand the industrial development during plan periods.

ALLIED – 1
PAPER –1

2. ELEMENTS OF INSURANCE

OBJECTIVES

1. To aims to educate students about the significance and purpose of insurance.
1. To enable the Knowledge about the Insurance.
2. To acquire skills about the Life Insurance and its types.
3. To know about the Fundamental principles of fire insurance.
4. To know about the Fundamental principles of marine insurance.
5. To gain insights in E insurance.

UNIT-1: Introduction

Insurance- purpose and Need - Benefits of Insurance - Functions of Insurance -Importance of Insurance - Principles of Insurance - Nature of Insurance Contract -Types of Insurance Contract - Fundamentals of Insurability - Classification of Insurance.

UNIT-2: Life Insurance

Life Insurance - Definitions of Life Insurance, Advantages of Life Insurance -Fundamental principles of life Insurance - Procedure of taking Life Policy - Meaning of Whole life policy and Endowment policy - Policy conditions, procedure for the settlement of claims - Nomination and assignment - Annuity- Medical policy & Accident Insurance Policy.

UNIT 3: Marine insurance

Marine Insurance - Definition of Marine Insurance contract- Procedure of taking marine policy - Fundamental principles of marine insurance - Warranties in marine insurance - Types of warranties- Types of marine policies, Marine policy conditions.

UNIT 4: Fire Insurance

Fire Insurance- Definition of Fire Insurance contract - Procedure of taking fire policy - Fundamental principles of fire insurance - Types of fire insurance policies - Policy conditions - Implied express conditions.

UNIT 5: E-insurance in India

The Insurance Regulatory and Development Authority (IRDA) – Benefits of e- insurance- challenges of e- insurance- Problems with e-insurance policies and how to deal with them- Companies are providing e-insurance programs - IRDA guidelines for e-insurance policies.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr. A.Murthy	Element of Insurance	Margham Publisation

2.	E.Gordon and P.K.Gupta	Banking and Insurance	Himalaya Publishing house
3.	P.K.Gupta,	Legal Aspects of Insurance	Himalaya Publishing house
4.	Dr.Sunil kumar	Banking and insurance	Calcotia Publishing Company
5.		https://business.mapsofindia.com/articles/e-insurance-in-india-policy-and-procedures.html	

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	M.N.Mishra and S.B.Mishra	Insurance principles and practice,	S.Chand
2.	GauravVarshney	Insurance Law	Lexis Naxis.
3.	Neelam C. Gulati	Banking and Insurance Practices	Excel Books
4.	Dr.Biswa Mohana Jena	Principles of Banking and Insurance	Shree Vinayak Publication.
5.	O.P.Agarwal	Banking and Insurance	Himalaya Publishing House

COURSE OUTCOMES

UNITS	CO STATEMENT	
Unit1	After studied unit-1, the student will be able to	Understand the basic fundamentals of Insurance
Unit2	After studied unit-2, the student will be able to	Apply the fundamentals of Life Insurance
Unit3	After studied unit-3, the student will be able to	Understand the fundamentals of Life Insurance
Unit4	After studied unit-4, the student will be able to	Apply the fundamentals of Marine Insurance
Unit 5	After studied unit-5, the student will be able to	Understand the procedure of E- insurance

ALLIED – 1
PAPER –1

3. CONSUMERISUM

OBJECTIVES

1. To make students to acquire knowledge of consumerism.
2. To understand the fundamentals of Consumerism.
3. To known the Consumer Protection Act, 1986.
4. To acquire the Consumer Protection Act 2006 (Amendments.)
5. To gain knowledge Consumer Protection Council.
6. To enable the Redressal of consumer grievances.

UNIT – I: Introduction

Consumerism- Concept - Need and Scope of Consumerism- Origin of Consumer Movement – Consumer movement in India- Consumerism in India - Consumer of goods and services - Professional services - Medical, legal, educational and welfare services- Rights and Responsibilities of Consumerism- Unfair Trade Practices

UNIT – II: Consumer Protection Act, 1986

Consumer Protection Act, 1986 – Objectives – Definition of Terms – complainant, consumer dispute, defect, deficiency in service, service, unfair trade practices, restrictive trade practices - UN guidelines for Consumer Protection. Emergence of new Consumer Movements: Green Consumerism.

UNIT – III: Consumer Protection Act 2006

Consumer Protection Act 2006 (Amendments) – Salient features - Objectives -Definitions of the term: - Consumer – Types of Consumer Appropriate authority – Complainant – Consumer dispute – Restrictive Trade Practice. The various Consumer Rights: - Right to Safety, Right to Information, Right to Choose, Right to be heard – Right against exploitation – Right to Consumer Education

UNIT – IV: Consumer Protection Council

Consumer action groups, consumer resistance, consumer boycotts, lobbying, consumer guidance - Nature and Functions - Role and working of Consumer Voluntary Organisations in Grievance Settlement-Composition and Powers of National Commission, State Commission and District Consumer Forum.

UNIT – V: Consumer redressal

Redressal of consumer grievances-Goods & Services covered under Consumer Protection Act-Procedure for filing of complaints with District Forum, State Commission , National Commission.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr. Rega Surya Rao	Lecture on Torts and Consumer Protection Laws	Asia Law House, Hyderabad.
2.	Prof. Rakesh Khanna	Consumer Protection Laws	Central – Law Agency.
3.		Consumer Protection (Amendment) Act, 2002.	S. Chand & Sons.2012.

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr. V.K. Agarwal	Consumer Protection (Law & Practice)	Bharat Law House Pvt. Ltd.
2.	H.D. Pithawalla, c. Jamnadas & co	The Consumer Protection Act 2019	
3.	Avtar Singh	Consumer Protection (Law & Practice)	Eastern Book Co.

COURSE OUTCOMES

UNITS	CO STATEMENT	
Unit1	After studied unit-1, the student will be able to	Understand the basic fundamentals of Consumerism
Unit2	After studied unit-2, the student will be able to	Apply the fundamentals Consumer Protection Act
Unit3	After studied unit-3, the student will be able to	Understand the Amendments of Consumer Protection Act
Unit4	After studied unit-4, the student will be able to	Apply the fundamentals Consumer Protection Council
Unit 5	After studied unit-5, the student will be able to	Understand the procedure of Consumer Redressal

SEMESTER II

CORE THEORY
PAPER – 3

FINANCIAL ACCOUNTING II

OBJECTIVES

1. To gain knowledge about the different systems of Accounting
2. To understand the branch accounts and its types
3. To have practical knowledge in the preparation departmental accounting
4. To draft the Hire purchase and Installment purchase systems
5. To acquire practical knowledge in Partnership accounts
6. To gain expertise in preparation of Tally -ERP

UNIT-I Branch accounts

Meaning – objects of branch accounts – accounting in respect of dependent branches: debtors system; stock and debtors system; wholesale branch system and final accounts system - Independent branches – incorporation of branch trial balance in head office books

UNIT – II: Departmental Accounting

Meaning of departments and departmental accounting – Distinction between departments and branches- need for departmental accounting – advantages of departmental accounting - Apportionment of indirect expenses – Inter departmental transfers at cost and selling price - preparation of departmental trading, profit & loss account and balance sheet.

UNIT - III: Hire purchase and Installment purchase systems

Meaning and features of hire purchase system - calculation of interest – books of hire purchaser and books of hire vendor - default and repossession (Hire purchase trading account excluded) Meaning of instalment system -distinction between hire purchase system and instalment system - calculation of interest – books of buyer and books of seller.

UNIT - IV: Partnership accounts

Introduction- Admission of a partner – Retirement of a partner – Death of a partner – treatment of goodwill as per AS 10- Dissolution of a firm – insolvency of a partner (Garner Vs Murray rule) – Insolvency of all the partners

UNIT - V: Basics of Tally:

ERP - Introduction to ERP 9 Advantages and Salient Features of Tally.ERP 9 - Company Creation Ledger Creation with predefined Primary Groups, Predefined Sub Groups and New Sub Groups

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS

1.	T.S. Reddy & Dr. A.Murthy,	Financial Accounting	MarghamPublications, Chennai.
2.	Jain &Narang,	Financial Accounting	Kalyani Publishers
3.	S.N. Maheshwari	Financial Accounting	S.Chand

REFERENCES BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Hanif and Mukherjee	Financial Accounting	McGrawhill.
2.	Murugadoss, Jaya, Charulatha and Baskar	Financial Accounting	Vijay Nicholes Imprint Pvt. Ltd.,
3.	Shukla & Grewal	Advanced Accounting	S.Chand & Co.
4.	Parthasarathy.S. & Jaffarulla	FinancialAccounting	KalyaniPublishers, NewDelhi
5.	Gupta, R.L & Gupta V.K	Advanced Accounting	Sulthan chand and sons
6.	AshokSehgal &Deepak Sehgal	Fundamental of Financial Accounting	Taxman Publication
7.	Tulsian	Financial Accounting	Pearson

COURSE OUTCOMES

UNITS	CO STATEMENT	
Unit1	After studied unit-1, the student will be able to	Understand the basic fundamentals of branch accounting
Unit2	After studied unit-2, the student will be able to	Understand the basic fundamentals of Departmental accounting
Unit3	After studied unit-3, the student will be able to	Understand the Hire purchase and Installment System of accounting
Unit4	After studied unit-4, the student will be able to	Prepare the accounts partnership
Unit 5	After studied unit-5, the student will be able to	Understand the basics of Tally Accounting

CORE THEORY
PAPER – 4

OFFICE MANAGEMENT

OBJECTIVE

Understand the range of responsibilities and skills required by the office manager

1. Apply various approaches when dealing with the management of tasks, teams and individuals
2. Apply techniques to plan and manage workload effectively and achieve objectives
3. Create and apply a checklist of systems and procedures to aid the smooth running of the office
4. Apply assertive communication and problem-solving skills

UNIT-I

Meaning and Scope -Function and Qualifications of Office Manager -Poor and Good Organization Departments -Flow of Work -Organization Charts and manual.

UNIT-II

Administrative arrangements and physical conditions - Centralization and Decentralization of Office services - Office Accommodation and Layout -Office Furniture - Meaning of Various terms - Basic pattern of work -Sub-division - Standardization and Standards - Work Measurement and control

UNIT-III

Office equipments - Reproduction equipments - Typewriter - Duplicators - Photo Copier - Franking Machine - Communication Equipments - Dictaphone - Intercom - Telephone - Telex – Tele printers - PABX - PBX - STD - Storage equipment - Filling Cabinets - Time Clocks - Use of Computers in Office Management

Office System - Procedure - Routine - And methods - Paper work in office Filling functions - essentials of good filling systems - Central vs. Departmental Filling classification - Methods of filling Old and Modern - Micro filing - Indexing Types.

UNIT-IV

Mail service and communication - Office Correspondence - Central vs. Departmental Correspondence - Handling Mail - Postal Services - Postbag and Post Box Numbers -

Registered and Insured Posts - VPP Communications - Oral written - Internal and external communication - Records Management Types - Forms Controls - Principles - Foremost - Continuous stationery

UNIT-V

Office Supervisor - Meaning and characteristics of Supervisor - Status - Place and Role of Supervisor - Effective Supervisor - Qualification - Knowledge and skill of Supervisor.

Note: Questions in Sec. A, B & C - 100 % Theory.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1	R.S.N.Pillai & Bhagwathi. V	Office Management	S.Chand, New Delhi.
2.	Arora S.P	Office Management	Vikas Publications Pvt. Ltd., Chennai.

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Balachandiran.V & Chandrasekaran	Office Management	Vijay Nicole imprints Private Limited, Chennai

REFERENCE JOURNALS

1. Journal of Accounting & Marketing
2. Journal of Business & Financial Affairs
3. Journal of Defense Studies and Resource Management
4. Journal of Entrepreneurship & Organization Management

E- MATERIALS

1. Office management
2. Elements Of Office Management
3. office management skills
4. Business organization and office management

COURSE OUTCOMES

UNITS	CO STATEMENT	
Unit1	After studied unit-1, the student will be able to	To gain knowledge about nature and scope of organization.
Unit2	After studied unit-2, the student will	To gain effective knowledge about

	be able to	Administrative arrangements and physical conditions
Unit3	After studied unit-3, the student will be able to	To gain a knowledge of Office equipments and Office System
Unit4	After studied unit-4, the student will be able to	To know about Office Correspondence
Unit 5	After studied unit-5, the student will be able to	To learn about Office Supervisor

ALLIED – 1
(To choose any 1 out of the given 3)
PAPER –2

1. INDIAN ECONOMY - II

Course Objectives:

1. To acquire sufficient knowledge about India's Economic Development and fundamental Concept about National Income in India.
2. The knowledge acquired through this paper will help the students to know the current changes towards economic development.
3. To equip the students to enhance their knowledge about the economic progress and problems of our country.
4. To impart the knowhow of planning and its methodologies.
5. To understand the importance of logistics and movement of people through various transport system.
6. To bring awareness on Information Technology and its impact on Economic Development.

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UNIT: I National Income

National Income – Definitions – Concepts – Methods of measuring National Income – Difficulties in the Measurement of National Income – Trends in National Income Growth and Structure – Limitations of National Income estimation in India.

UNIT: II Planning

Planning in India – Objectives – Importance – Evaluation of Economic Planning – Strategy of India's development Plan's – Regional Planning in India –Assessment of Indian Planning – Establishment of NITI Aayog and its functions.

UNIT: III Economic Reforms and Liberalisation

Economic Reforms since 1990's – Appraisal of Economic Reforms – Liberalization: Meaning – Advantages and Disadvantages – Privatization: Meaning and Scope – Globalization – its impact on Indian Economy – Merits and Demerits of Globalization.

UNIT: IV Transport System in India

Transport – Importance of Transport (Roadway, Railways, Shipping and Civil Aviations) to Economic Development – Evaluation of Government in Policy in relation to privatisation policy - Transport Coordination.

UNIT: V Information Technology

Role of Technology - Information Technology BPO in India - their impact on Economic Development – Cyber Crime.

Text Books

Unit-I: Sankaran.S Indian Economy Margham Publications 7th edition 2014

Unit-II: Ruddar Dutt& Sundaram Indian Economy KPN Sulan Chand Publishing 7thedition 2016

Unit-III: Sankaran.S Indian Economy Margham Publications 7th edition 2014

Unit-IV: Sankaran.S Indian Economy Margham Publications 7th edition 2014

Unit-V: Sankaran.S Indian Economy Margham Publications 7th edition 2014

Reference Books:

S.No	Title	Authour	Publisher	Edition	Year
1.	Indian Economy	RuddarDutt& Sundaram KPM	S.Chand Publishing	7TH	2016
2.	Indian Economy	Sankaran S	Margham Publications	7th	2014
3.	Indian Economy	Dhingra I.C	Manakin Press	21ST	2013
4.	Indian Economy	Misra S.K &PuriV.K	Himalaya Publishing House	35TH	2017
5.	Indian Economy	Sanjiv Verma	Unique Publishers	8th	2019
6.	Indian Economy	Agarwal A.N	New Age	41ST	2016
7.	Economics of Development & Planning	Jhingan M.L	Vrinda Publication	41ST	2016

E- Materials

1. www.studydhaba.com/indian-economy-study-material-pdf
2. www.examrace.com/IEcoS/IEcoS-Study-Material
3. www.winmeen.com/tnpsc-indian-economy-study-materials
4. www.jagranjosh.com/articles/ias-prelims-2015-gs...
5. www.examrace.com/NTA-UGC-NET/NTA-UGC-NET-Study...
6. www.governmentexams.co.in/tnpsc-indian-economy-notes
7. www.tnpscshouters.com/2019/02/tnpsc-indian...

Course Out Comes

1. After studied unit-1, the student will be able to understand the formation of National Income.

2. After studied unit-2, the student will be able to acquire knowledge about the planning in India.

3. After studied unit-3, the student will be able to clarify the economic reforms and LPG policy.

4. After studied unit-4, the student will be able to understand the transport system and policy in India.

5. After studied unit-5, the student will be able to understand the information technology in India.

ALLIED – 1
PAPER –2

2. MERCHANT BANKING

OBJECTIVE

To enable the students to understand Merchant banking and its services to corporate sector.

1. To familiarize the students with the concepts of Financial Management
2. Managing investment in primary market and secondary market
3. To acquaint the students in respect to the investment decisions related to Derivative market.
4. Establishing appropriate investment objectives, developing optimal portfolio strategies, estimating risk-return tradeoffs, evaluating investment performance and portfolio revision technique

UNIT-I

Merchant Banking – Definitions and Functions – Regulatory Framework – Registration of Merchant Bankers – Procedure Capital Adequacy Requirement – Lead Merchant Banker Appointment, Restrictions and Responsibilities.

UNIT-II

Public Issue Management – Functions and Mechanism – Categories of Issue – Issue Manager – Category and Restrictions Activities Involved in Public Issue Management – Marketing of New Issues – Methods – Pricing of Rights and Other Public Issues.

UNIT-III

Post Issue Management – Allotment / Dispatch of Shares / Refunds – Basis of Allotment – Procedure – Listing Requirements of Stock Exchanges – Advantages – Listing Requirements of OTCEI.

UNIT-IV

Capital Market Instruments – Meaning and Types – Commercial Paper – Issue of Commercial Paper – Usance – E-nomination – Ceiling – Mode of Issue – Credit Syndication – For Long Term and Working Capital.

UNIT-V

Port Folio Management – Functions – Registration of Port-folio Managers – Obligation – Investment of Client Funds – Maintenance of Book and Accounts – Reports to be Furnished – Code of Conduct.

Note: Questions in Sec. A, B & C - 100 % Theory.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1	Dr.S.Gurusamy	Merchant Banking	Vijay Nicholes Imprint Pvt. Ltd., Chennai
2.	Dr.V.Balu	Merchant Banking & Finance Services	Sri Venkateswara Publication, Chennai

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	H.R. Machiraju	Merchant Banking	New Age International, New Delhi
2.	Dr. J.C.Verma	A Manual of Merchant Banking	Baharat Law House, New Delhi.

JOURNALS

1. Merchant banking India: Recent development in merchant banking (2016),ISSN-2455-6602.
2. Performance evaluation of merchant banking in India-A study of SBI capital market limited (2015), ISSN-2347-9671.
3. Recent development in merchant banking and challenges ahead in India,(2016), E-ISSN:2455-295X.
4. A literature review of merchant banking in india (2019), ISSN-2349-5162.
5. https://www.businessmanagementideas.com/financial-management/merchantbanking/top-7-developments-in-merchant-banking-establishment-in-india/4174

E-MATERIALS

1. "Business Finance and Financial Management". UpFina. Retrieved 2015-11-04.
2. “Capital Structure Definition | Investopedia". Investopedia. Retrieved 2015-11-04.
3. ‘Nobanee, Haitham; Abraham, Jaya (2015). "Current assets management of small enterprises". Journal of Economic Studie.
4. "What are fixed assets? | The e-conomic Accounting Glossary". www.e-conomic.co.uk. Retrieved 2015-11-04.

5. "Current Asset Definition - AccountingTools". www.accountingtools.com. Retrieved 2015-11-04.
6. "The Top 4 Cash Flow Forecasting Mistakes". Entrepreneur. Retrieved 2015-11-04.

COURSE OUTCOMES

UNITS	CO STATEMENT	
Unit1	After studied unit-1, the student will be able to	To gain knowledge about Merchant Banking .
Unit2	After studied unit-2, the student will be able to	To impart effective knowledge about Public Issue Management.
Unit3	After studied unit-3, the student will be able to	To learn about Post Issue Management.
Unit4	After studied unit-4, the student will be able to	To gain knowledge about Capital Market Instruments.
Unit 5	After studied unit-5, the student will be able to	To learn about Port Folio Management.

ALLIED – 1
PAPER –2

3. BUSINESS MATHEMATICS

Course Objectives

1. To develop skills in sets and operation on sets.

2. How to solve simultaneous equations using matrices.

3. To measure the Simple and compound interests as well as annuities in business.

4. Students get familiarizeon Discount on Bills-Present value, Bankers Discount- Profit and Loss, Roll, wages, overtime Gross salary.

5. To find maxima and minima - applications in businessproblemsusing differentiations.

UNIT-I

Sets: Finite and infinite sets - equality of sets - Disjoint sets - universal set – setoperation Union of sets, intersection of sets - difference of sets - complement of sets -venn diagram - De-Morgan's law - Cartesian product.

UNIT-II

Matrices - type of matrices - matrix operation - Determinant of matrix - Singularand Non Singular matrices - adjoint, inverse of matrix - solving simultaneous linearequations - matrix inversion method and method of reduction.

UNIT-III

Mathematics for Finance - Simple and Compound Interest – Annuities, present value of intermediate, deferred and perpetuity

UNIT-IV

Discount on Bills-Present value, Bankers Discount- Profit and Loss, Roll, wages, overtime Gross salary

UNIT-V

Differentiations - limits - derivatives of standard function x^n, e^x, $\log_e x$trigonometric functions - Rules of Differentiation - Differentiation on different types offunctions - successive Differentiation - maxima and minima - applications in businessproblems.

Note: The proportion between theory and problems shall be 20:80

Reference Books:

1. P.R. Vittal, Business Mathematics & Statistics, Margham Publishers, Chennai.

2. S.P.Gupta, Statistical Methods, S.Chand& Co.,

3. Chandran&Agarwal, Business Mathematics.

4. Raghavachari, Mathematics for Management,

5. Raja Gopalan and Sattinathan, Business Mathematics, Vijay Nicole Publications,

Chennai.

Course Out Comes

Units CO Statement

Unit1 After studing unit-1, the student will be able to Acquired skills in sets and operation on sets.
Unit2 After studing unit-2, the student will be able to measure the Simple and compound interests as well as annuities in business.
Unit3 After studing unit-3, the student will be able tosolve problems Discount on Bills- Present value, Bankers Discount- Profit and Loss, Roll, wages, overtime Gross salary.
Unit4 After studing unit-4, the student will be able to Get familiarized on Discount on Bills- Present value, Bankers Discount- Profit and Loss, Roll, wages, overtime Gross salary.
Unit 5 Afterstuding unit-5, the student will be able to find maxima and minima - applications in business problemsusing differentiations.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF ARTS

B.COM. (COMPUTER APPLICATION)

DEGREE COURSE

CBCS PATTERN

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER I									
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3	III	Core Theory	Paper-1	5	3	Financial Accounting – I	25	75	100
4	III	Core Theory	Paper-2	5	3	Business Applications & Accounting Software	25	75	100
5	III	ALLIED -1	Paper-1	6	3	**(To choose one out of 3)** 1. Indian Economy – I 2. Business Statistics – I 3 . Consumer Protection and Consumer Rights	25	75	100
6	III	PE	Paper-1	6	3	**Professional English I**	25	75	100
7	IV	Environmental Studies		2	2	Environmental Studies	25	75	100
				36	**22**		**175**	**525**	**700**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English (CE)	Paper-2	4	4	**Communicative English I**	25	75	100
10	III	Core Theory	Paper-3	5	3	Financial Accounting – II	25	75	100
11	III	Core Theory	Paper-4	5	3	Software & Tally Lab	25	75	100
12	III	ALLIED-1	Paper-2	6	5	**(To choose one out of 3)** 1. Indian Economy – II 2. Logistic Management 3. Business Statistics – II	25	75	100
13	III	PE	Paper-2	6	3	**Professional English II**	25	75	100
14	IV	Value Education		2	2	Value Education	25	75	100
15	IV	Soft Skill		2	1	Soft Skill	25	75	100
				36	**25**		**200**	**600**	**800**

THRUVALLUVAR UNVERSITY
B.COM (COMPUTER APPLICATION)
SYLLABUS
UNDER CBCS
(With effect from 2020-2021)
SEMESTER I
CORE PAPER - 1
FINANCIAL ACCOUNTING – I

Objective:

To gain knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Introduction

Meaning of accounting – objectives of accounting – advantages and limitations of accounting- Accounting concepts and conventions - Methods of accounting - Rules of debit and credit- Journal - Ledger accounts– Trial Balance - Errors and their rectification - Rectification of Errors without suspense a/c - Rectification errors with suspense a/c (effect of rectification on profit and rectification during subsequent accounting year are excluded) - Bank Reconciliation Statement.

Unit - II: Depreciation, Provisions and Reserve

Meaning of depreciation – causes for depreciation – need for charging depreciation – Methods of calculating depreciation: straight line method and written down value method (change in method of depreciation is excluded) – Methods of recording depreciation: by charging depreciation to assets account or by creating provision for depreciation account.

Unit - III: Bills of exchange

Meaning of bill of exchange - features and advantages of bill of exchange- types of bill of exchange: Trade bills and accommodation bills - Accounting treatment of trade bills (accommodation bills are excluded).

Unit - IV: Final accounts

Meaning of final accounts – adjustments in preparation of final accounts – preparation of trading, profit & loss account and balance sheet of sole proprietorship concern.

Unit V: Accounts from incomplete records

Meaning of single entry system – features and limitations of single entry system – Distinction between single entry system and double entry system - Methods of calculation of profit: Statement of affairs method and Conversion method – Distinction between statement of affairs and balance sheet.

Note: Questions in section A, B and C shall be in the proportion of 20: 80 between theory and problems

Text books

1. Jain &Narang, Financial Accounting, Kalyani Publishers, New Delhi.
2. T.S. Reddy & Dr. A. Murthy, Financial Accounting, Margham Publications, Chennai.

Reference books

1. Gupta, R.L & Gupta,V.K, Advanced Accounting, Sulthan Chand & Sons, New Delhi.
2. Shukla & Grewal, Advanced Accounting, S. Chand & Co. New Delhi.
3. Parthasarathy, S. & Jaffarulla, A. Financial Accounting, Kalyani Publishers, New Delhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER - 2

Business Application & Accounting Software

UNIT – I Word and Excel

MS Word: Creating and Editing Documents –Menus, Commands, Toolbars and Icons—Formatting document – Creating Tables – Mail Merger.
MS Excel: Spreadsheet Overview – Menus, Toolbars, Icons-Creating worksheets – Editing and Formatting – excel Formulas and Functions – Creating a Chart Data Forms, Sort, and Filter.

UNIT – II PowerPoint and Access

MS Power Point – Introduction – Menus – Toolbars – Text and Formats – Animation, Art and Sound – Making the presentation template.
MS Access: Database overview – Creating a database – Modifying table and Creating Form – Query – Creating reports – Mailing Labels.

UNIT-III Tally introduction

Introduction to Tally – Company Creation – Alter – Display – Accounts info – Ledger Creation – Voucher Creation – Bank Reconciliation Statement – Bill wise Details – Cost Centre and Cost Category – Multi Currency – Interest calculation – Budgets and Credit Limits – Day Book.

UNIT-IV Inventory

Inventory info – Stock Group – Stock Category – Stock Item – Unit of Measures – Godowns – Inventory vouchers – Re-order level and status – Batch-wise Details – Bill of Material.

UNIT-V Taxation

Statutory and Taxation – Value Added Tax (VAT) – Tax Deducted at Source (TDS) – Tax Collected at Source (TCS) – Service Tax – Security Control and Tally audit – Export and Import – Backup and Restore – Open Database Connectivity.

Text Books:

TEXT

BOOKS:

1. MS Office 2000 for Every One - Vikas Publishing House Pvt. Ltd., Sanjay Saxena.
2. MS Office 2000 Professional Fast & Easy – June Slton, BPB publications.
3. Guide to MS Office 2000 PH. - I Loura Acklen.
4. The ABC & MS Office Professional Edition - Guy Hart-Davis.
5. Tally 9.0 – A complete Reference – Tally Solutions (P) Limited.

ALLIED – 1
(To choose any 1 out of the given 3)
PAPER –1
1. INDIAN ECONOMY - I

Course Objectives:

1. The salient objective of this paper is to introduce the students to understand the main concepts of the Indian Economy.
2. The concepts which help to the students to assess gain knowledge on various Economic Policies of the Government and also students should know that India is a fifth largest economy.
3. The students become aware of the Agriculture and Agriculture Labour.
4. The students become aware of the various challenges of the Indian economy.
5. Students are able to analyse current economic scenario in India.
6. To impart knowledge about the functioning of industries.

UNIT: I Introduction

Features of developing Economies - Economic and Non-Economic factors impeding Economic development - Concept of growth and development.

UNIT: II Human Development, Poverty and Unemployment.

Human development – Components of human development – HD Index – Population Growth – Measures to control population - Recent Population Policy – Poverty Alleviation Programmes – Unemployment – Types – Causes and Effects.

UNIT: III Agriculture

Indian Agriculture – Contribution to Economic Development – Agricultural Productivity – Land Reforms – Green Revolution II.

UNIT: IV Agricultural labour

Agricultural labour – Definition – Features - Problems – Remedies - Agricultural Credit - Grameen Bank.

UNIT: V Industry

Meaning and Definition of Industry – Role of Industries – Industrial Policy of 1991 and recent changes – Role of Small Scale Industry in economic development – Large Scale Industry in India – Industrial Development Under Five Year Plans.

Text Books

Unit- I : Indian Economy Sankaran.S Margham Publications 7th edition 2014

Unit-II: Indian Economy Ruddar Dutt & Sundaram KPN Sulan Chand Publishing 7th edition 2016

Unit-III: Indian Economy Sankaran.S Margham Publications 7th edition 2014

Unit-IV: Indian Economy Sankaran.S Margham Publications 7th edition 2014

Unit- V: Indian Economy Sankaran.S Margham Publications 7th edition 2014

Reference Books:

1.Ruddar Dutt & Sundaram KPN Indian Economy S Chand Publishing7thedition

2016

2. Sankaran .S.IndianEconomy Margham Publications 7th 2014

3. Dhingra I.C. Indian Economy Manakin Press Sultan Chand & Sons 28th edition.

4.Puri V.K &Misra S.K Indian Economy Himalaya Publishing House 35th 2017

5. Agarwal A.NIndian Economy New Age 41st 2016

6. KK Dewett JD Varma & M SharmaIndian Economy S Chand & Company Pvt Ltd 1st 2016

7. Jhingan M.L Economics of Development & Planning Vrinda Publication 41st 2016

E- Materials

1. www.studydhaba.com/indian-economy-study-material-pdf
2. www.examrace.com/IEcoS/IEcoS-Study-Material
3. www.winmeen.com/tnpsc-indian-economy-study-materials
4. www.jagranjosh.com/articles/ias-prelims-2015-gs...
5. www.governmentexams.co.in/tnpsc-indian-economy-notes
6. www.clearias.com/ias-study-materials
7. www.tnpscshouters.com/2019/02/tnpsc-indian...
8. www.hirensir.com/indian-economy-in-gujarati-pdf

Course Out Comes

1. After studied unit-1, the student will be able to understand the various indicators of economic development.
2. After studied unit-2, the student will be able to understand the importance, causes and impact of population growth.

3. After studied unit-3, the student will be able to gain knowledge about the role of agriculture in economic development.

4. After studied unit-4, the student will be able to gain knowledge about the role of agriculture labour problems and remedies .

5. After studied unit-5, the student will be able to understand the industrial development during plan periods.

ALLIED - 1

PAPER - 1

2. BUSINESS STATISTICS – I

Objective

To understand and apply statistical tools in business.

UNIT-I

Statistics - Definitions - Scope and Limitations - Collection of Data - Primary and Secondary Data - Questionnaire - Classification and Tabulation - Diagrammatic and graphical representation of data.

UNIT-II

Measures of Central tendency - Mean - Median - Mode - Harmonic Mean and Geometric Mean,

UNIT-III

Measures of Dispersion - Range - Quartile deviation - Mean Deviation - Standard Deviation - Coefficient of Variation - Lorenz Curve.

UNIT-IV

Measures of Skewness - Karl Pearson's and Bowlay's Coefficient of Skewness - Kurtosis - Characteristics of Kurtosis - Measures - Calculation.

UNIT-V

Statistical Quality Control - Control Charts - X, P, C, R - Charts - Acceptance sampling only.

(Weightage of Marks = Problems - 80%, Theory - 20%)

Text Books:

1. Dr. S.P. Gupta, Business Statistics & Operation Research - Sultan Chand.
2. PA. Navanitham, Business Statistics & Operation Research, Jai Publications, Trichy.
3. S.P. Rajagopalan & R. Sattanathan, Business Statistics & Operation Research 3rd Edition, Vijay Nicole Publications, Chennai.

Reference Books:

1. Dr. S.P. Gupta, Statistical Methods - Sultan Chand.
2. R.S.N. Pillai & Bhagavathi, Statistics.
3. J.K. Sharma, Business Statistics - Pearson Education.
4. B. Agarwal, Basic Statistics - Wiley Eastern.

ALLIED - 1

PAPER - 1

3. CONSUMER PROTECTION AND CONSUMER RIGHTS

Objective:

To make students to acquire basic knowledge of consumer laws, consumer rights and consumer welfare and protection.

Unit - I

Introduction of Consumer Protection Act 1986 – Objectives - Consumer Protection Act 2006 (Amendments) – Salient features.

Unit - II

Definitions of the term: - Consumer – Types of Consumer Appropriate authority – Complainant – Consumer dispute – Restrictive Trade Practice.

Unit - III

The various Consumer Rights: - Right to Safety, Right to Information, Right to Choose, Right to be heard – Right against exploitation – Right to Consumer Education.

Unit - IV

Consumer Production Council: - Composition and Powers of National Commission, State Commission and District Consumer Forum.

Unit - V

Redressal of consumer grievances-Goods & Services covered under Consumer Protection Act-Procedure for filing of complaints with District Forum, State Commission , National Commission.

Books for reference

1. Lecture on Torts and Consumer Protection Laws by Dr. Rega Surya Rao – Asia Law House, Hyderabad.
2. Consumer Protection Laws – By Prof. RakeshKhanna – Central – Law Agency.
3. Consumer Protection (Amendment) Act, 2002. S. Chand & Sons.2012.

SEMESTER – II

CORE PAPER - 3

FINANCIAL ACCOUNTING – II

Objective:

To gain a knowledge of accounting in general and to understand the system of Financial Accounting.

Unit - I: Branch accounts

Meaning – objects of branch accounts – accounting in respect of dependent branches: debtors system; stock and debtors system; wholesale branch system and final accounts system - Independent branches – incorporation of branch trial balance in head office books.

Unit - II: Departmental Accounting

Meaning of departments and departmental accounting – Distinction between departments and branches- need for departmental accounting – advantages of departmental accounting - Apportionment of indirect expenses – Inter departmental transfers at cost and selling price - preparation of departmental trading, profit & loss account and balance sheet.

Unit - III: Hire purchase and Instalment purchase systems

Meaning and features of hire purchase system - calculation of interest – books of hire purchaser and books of hire vendor - default and repossession (Hire purchase trading account excluded)

Meaning of instalment system -distinction between hire purchase system and instalment system - calculation of interest – books of buyer and books of seller.

Unit - IV: Partnership accounts (fundamentals and reconstitution of partnership)

Meaning and features of partnership – Partnership deed - calculation of Interest on capital and interest on drawings – preparation of profit & loss appropriation account – preparation of capital accounts (fixed and fluctuating) – admission of a partner – retirement of a partner – death of a partner – treatment of goodwill as per AS 10.

Unit - V: Partnership Accounts (Dissolution of partnership firms)

Dissolution of a firm – insolvency of a partner (Garner Vs Murray rule) – Insolvency of all the partners – Piecemeal distribution: proportionate capital method and maximum loss method.

Note: Questions in section A, B and C shall be in the proportion of 20: 80 between theory and problems.

Text books

1. Jain & Narang, Financial accounting, Kalyani publishers, New Delhi.
2. T.S. Reddy & Dr. A.Murthy, Financial accounting, Margham publications, Chennai.

Reference books

1. Gupta, R.L & Gupta, V.K, Advanced Accounting, Sultan Chand & Sons, New Delhi.
2. Shukla & Grewal, Advanced Accounting, S.Chand & Co.New Delhi.
3. Parthasarathy, S.& Jaffarulla, A.Financial Accounting, Kalyani Publishers, New Delhi.
4. Murugadoss, Jaya, Charulatha and Baskar, Financial Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER - 4
SOFTWARE & TALLY LAB

MS.WORD:

1. a. Starting MS-WORD, Creating, Saving, Printing (with options), Closing and Exiting.
   b. Study of Word – Menu / toolbars.
2. a. Create a document, save it and edit the document as follows:
      i) Find and Replace options.
      ii) Cut, Copy, Paste options.
      iii) Undo and Redo options.
   b. Format the document:
      i) Using Bold, Underline and Italic.
      ii) Change Character size sing the font dialog box.
      iii) Formatting paragraph: Center, Left aligns & Right align
      iv) Changing paragraph and line spacing, Using Bullets and Numbering in Paragraphs.
      v) Creating Hanging Paragraphs.
3. Using tap settings enhancing the documents (Header, Footer, Page Setup, Border, Opening & Closing Toolbars, Print Preview).
4. Creating Tables in a document, Selecting Rows & Column sort the record by using tables format painter and Auto Format.
5. Drawing flow chart using (creating main document, data source, inserting merge fields and veiwing merge data, viewing and printing merged letter, using mail merge to print envelope creating mailing labels).

MS-EXCEL

1. a. Create a worksheet, moving/ copying/ inserting/ deleting rows and columns (usage of cut, paste, commands, copying a single cell, copying a range of data, filling up a cell. Undo command, inserting a row, column, deleting rows and columns).
   b. Formatting work sheets.
      1. Bold style.
      2. Italic style.
      3. Font size changing.
      4. Formatting numbers (Auto fill, Selection Command, Currency format, Currency)
      5. Specifying percentage (%) Scientific notations.
      6. Drawing border around cells.
      7. Printing a work sheet (Pring preview, Margin Setting, Header, Footer).
2. a. Database Concept: database, record field and filed name – creating and sorting a data base and maintaining a database (data form).
   b. Using auto filter, advanced filter
   c. Creating subtotals and grad totals - using database fucntions.

3. Creating charts
    i) Using chart wizard (five steps)
    ii) Changing the chart type (Pie,Bar, Line)
    iii) Inserting titles for the axes X. Y
    iv) Changing colors.
    v) Printing charts.

4. a. Using date, time, maths functions:
    i) entering current data.
    ii) Using date arithmetic (adding and subtracting dates)
    iii) Date functioins (day, month, second)

   b. Math Functions
    i) SUM, COUNT, AVERAGE
    ii) MAX, MIN
    iii) STDDEV, VAR
    iv) ABS, EXP, INT
    v) LOG 10 AND LOG
    vi) MOD, ROUND, SORT
    vii) Using auto sum

   c. Logical and Financial Functions
    i) Logical (IP / AND / OR / NOT)
    ii) Financial (PMD, FV, NPER, RATE)
5. i) Creating and running a macro.
    ii) Assigning button to a defined macro.
    iii) Editing a macro.

MS-POWER POINT:

1. Creating a presentation using auto content wizard.
2. Different views in power point presentation.
3. Setting animation effects / grouping / ungrouping / cropping power / point objects.
4. Printing a presentation / Importing – Exporting files
5. Creating an organisation chart in Power Point.

TALLY:

1. Company Information

a. Company creation
b.Select Company
c. Shut Company
d. Alter Company
e. Split Company Data
f. Backup and Restore

2. Gateway of Tally

a. Accounts info

i) Groups

ii) Ledgers

iii) Voucher Types

b. Inventory info

i) Stock Group

ii) Stock Category

iii) Stock item

iv) Unit of Measures

v) Godown

c. Accounting Vouchers

d. Inventory Vouchers

3. Statutory and Taxation

a. Value Added Tax (VAT)

b. Tax Deducted at Source (TDS)

c. Tax Collected at Source (TCS)

d. Service Tax

4. Display

a. Trial Balance

b. Day Book

c. Accounts Book

d. Statement of Accounts

e. Inventory Books

f. Statement of Inventory

g. Statutory Info

h. Statutory Reports

i. Cash flow and Fund flow

ALLIED – 1
(To choose any 1 out of the given 3)
PAPER –2

1. INDIAN ECONOMY - II

Course Objectives:

1. To acquire sufficient knowledge about India's Economic Development and fundamental Concept about National Income in India.
2. The knowledge acquired through this paper will help the students to know the current changes towards economic development.
3. To equip the students to enhance their knowledge about the economic progress and problems of our country.
4. To impart the knowhow of planning and its methodologies.
5. To understand the importance of logistics and movement of people through various transport system.
6. To bring awareness on Information Technology and its impact on Economic Development.

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UNIT: I National Income

National Income – Definitions – Concepts – Methods of measuring National Income – Difficulties in the Measurement of National Income – Trends in National Income Growth and Structure – Limitations of National Income estimation in India.

UNIT: II Planning

Planning in India – Objectives – Importance – Evaluation of Economic Planning – Strategy of India's development Plan's – Regional Planning in India –Assessment of Indian Planning – Establishment of NITI Aayog and its functions.

UNIT: III Economic Reforms and Liberalisation

Economic Reforms since 1990's – Appraisal of Economic Reforms – Liberalization: Meaning – Advantages and Disadvantages – Privatization: Meaning and Scope – Globalization – its impact on Indian Economy – Merits and Demerits of Globalization.

UNIT: IV Transport System in India

Transport – Importance of Transport (Roadway, Railways, Shipping and Civil Aviations) to Economic Development – Evaluation of Government in Policy in relation to privatisation policy - Transport Coordination.

UNIT: V Information Technology

Role of Technology - Information Technology BPO in India - their impact on Economic Development – Cyber Crime.

Text Books

Unit-I: Sankaran.S Indian Economy Margham Publications 7th edition 2014

Unit-II: Ruddar Dutt& Sundaram Indian Economy KPN Sulan Chand Publishing 7thedition 2016

Unit-III: Sankaran.S Indian Economy Margham Publications 7th edition 2014

Unit-IV: Sankaran.S Indian Economy Margham Publications 7th edition 2014

Unit-V: Sankaran.S Indian Economy Margham Publications 7th edition 2014

Reference Books:

S.No	Title	Authour	Publisher	Edition	Year
1.	Indian Economy	RuddarDutt& Sundaram KPM	S.Chand Publishing	7TH	2016
2.	Indian Economy	Sankaran S	Margham Publications	7th	2014
3.	Indian Economy	Dhingra I.C	Manakin Press	21ST	2013
4.	Indian Economy	Misra S.K &PuriV.K	Himalaya Publishing House	35TH	2017
5.	Indian Economy	Sanjiv Verma	Unique Publishers	8th	2019
6.	Indian Economy	Agarwal A.N	New Age	41ST	2016
7.	Economics of Development & Planning	Jhingan M.L	Vrinda Publication	41ST	2016

E- Materials

1. www.studydhaba.com/indian-economy-study-material-pdf
2. www.examrace.com/IEcoS/IEcoS-Study-Material
3. www.winmeen.com/tnpsc-indian-economy-study-materials
4. www.jagranjosh.com/articles/ias-prelims-2015-gs...
5. www.examrace.com/NTA-UGC-NET/NTA-UGC-NET-Study...
6. www.governmentexams.co.in/tnpsc-indian-economy-notes
7. www.tnpscshouters.com/2019/02/tnpsc-indian...

Course Out Comes

1. After studied unit-1, the student will be able to understand the formation of National Income.

2. After studied unit-2, the student will be able to acquire knowledge about the planning in India.

3. After studied unit-3, the student will be able to clarify the economic reforms and LPG policy.

4. After studied unit-4, the student will be able to understand the transport system and policy in India.

5. After studied unit-5, the student will be able to understand the information technology in India.

ALLIED - 2

PAPER - 2

2. LOGISTIC MANAGEMENT

Objective:

To understand the comprehensive nature of Logistics Management.

UNIT-I

Logistics - definition - scope - functions - objectives of Logistics Management - customer service and logistics.

UNIT-II

Supply Chain - components - role of logistics in supply chain - Warehousing - functions - types - warehouse layout - material handling and logistics - Inventory Management.

UNIT-III

Transportation - infrastructure - freight management - transportation network - route planning - containerization.

UNIT-IV

Logistical packaging - logistics information needs - logistics design for distribution channels - logistics outsourcing.

UNIT-V

Government policies and regulations - Motor Vehicles Act, carriage by air, sea, multi-modal transportation etc., Documentation - Airway Bill, Railway Receipt, Lorry Receipt, Bill of Lading etc.

Text Books:

1. Ronal H. Ballou, Business Logistics / Supply Chain Management, Pearson Education, Prentice Hall, New Delhi - 2001.

Reference Books:

1. Vinod V. Sople, Logistics Management, Pearson Education (Singapore) P. Ltd.,
2. Satis C. Ailawadi, Rakesh Singh, Logistics Management, Prentice Hall of India, New Delhi - 110 001.
3. Sunil Chopra & Peter Meindi, Supply Chain Management / Strategy, Planning and Operation - Pearson Education Asia, New Delhi.
4. B. S. Sahay, Supply Chain Management for Global Competitiveness, Macmillan India Ltd., Delhi.

ALLIED - 2

PAPER - 2

3. BUSINESS STATISTICS – II

Objective

To understand and apply statistical tools in Business.

UNIT-I

Correlation - Definition - Karl Pearson's Coefficient of Correlation - Rank Correlation.

UNIT-II

Regression Equations – Properties of Regression Lines and Coefficients – Standard Error of Estimate.

UNIT-III

Index Number - Definition - Uses - Unweighted Index Number - Simple Aggregate Price Index, Simple Average of Price Relatives Index - Weighted Index - Laspeyre'sPaasche, DorbishBowley's - Marshall Edgeworth, Fisher Ideal Index - Time and Factor Reversal Test - Cost of Living Index.

UNIT-IV

Time Series - Definition and Uses - Components - Semi Average, Moving Average - Method of Least Square - Seasonal Variation - Simple Average Method.

UNIT-V

Probability - Addition and Multiplication Theorem - Permutation and Combination - Baye's Theorem.

(Weightage of Marks = Problems - 80%, Theory - 20%)

Text Books:

1. Dr. S.P. Gupta, Business Statistics & Operation Research - Sultan Chand.
2. PA. Navanitham, Business Statistics & Operation Research, Jai Publications, Trichy.
3. S.P. Rajagopalan& R. Sattanathan, Business Statistics & Operation Research 3rd Edition, Vijay Nicole Publications, Chennai.

Reference Books:

1. Dr. S.P. Gupta, Statistical Methods - Sultan Chand.
2. R.S.N. Pillai&Bhagavathi, Statistics.
3. J.K. Sharma, Business Statistics - Pearson Education.
4. B. Agarwal, Basic Statistics - Wiley Eastern.

THIRUVALLUVAR UNIVERSITY

BACHELOR OF ARTS

B.COM. (COMPUTER APPLICATIONS)

DEGREE COURSE

CBCS PATTERN

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S.NO	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER I									
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	5	3	Financial Accounting – I	25	75	100
4.	III	Core Theory	Paper-2	5	3	Business Applications & Accounting Software	25	75	100
5.	III	ALLIED -1	Paper-1	6	3	**(To choose one out of 3)** 1. Indian Economy – I 2. Business Statistics – I 3 . Consumer Protection and Consumer Rights	25	75	100
6.	III	PE	Paper-1	6	3	**Professional English I**	25	75	100
7.	IV	Environmental Studies		2	2	Environmental Studies	25	75	100
				36	**22**		**175**	**525**	**700**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
8.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9.	II	English (CE)	Paper-2	4	4	**Communicative English I**	25	75	100
10.	III	Core Theory	Paper-3	5	3	Financial Accounting – II	25	75	100
11.	III	Core Practical	Practical-1	5	3	Software & Tally Lab	25	75	100
12.	III	ALLIED-1	Paper-2	6	5	**(To choose one out of 3)** 1. Indian Economy – II 2. Logistic Management 3. Business Statistics – II	25	75	100
13.	III	PE	Paper-2	6	3	**Professional English II**	25	75	100
14.	IV	Value Education		2	2	Value Education	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
				36	**25**		**200**	**600**	**800**
SEMESTER III							**CIA**	**Uni.**	**Total**

S.NO	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
								Exam	
16.	III	Core Theory	Paper-4	6	4	Corporate Accounting - I	25	75	100
17.	III	Core Theory	Paper-5	5	4	Business Law	25	75	100
18.	III	Core Theory	Paper-6	4	3	Banking Theory, Law & Practice	25	75	100
19.	III	Core	Paper-7	5	4	Management Information Systems (MIS)	25	75	100
20.	III	ALLIED-2	Paper-3	6	3	Merchant Banking	25	75	100
21.	IV	Skill based Subject	Paper-1	2	2	Elements of Insurance	25	75	100
22.	IV	Non-Major Elective	Paper-1	2	2	Elements of Accountancy	25	75	100
				30	**22**		**175**	**525**	**700**
SEMESTER IV									
23.	III	Core Theory	Paper-8	6	4	Corporate Accounting - II	25	75	100
24.	III	Core Theory	Paper-9	5	4	Principles of Marketing	25	75	100
25.	III	Core Theory	Paper-10	5	4	RDBMS	25	75	100
26.	III	Core Practical	Paper-2	4	3	RDBMS Lab	25	75	100
27.	III	ALLIED-2	Paper-4	6	5	E-Commerce & Its Applications	25	75	100
28.	**IV**	**NMSDC : Digital Skills for Employability**	**Paper-2**	**2**	**2**	**Office Fundamentals**	**25**	**75**	**100**
29.	IV	Non-Major Elective	Paper-2	2	2	Advertising and Salesmanship	25	75	100
				30	**24**		**175**	**525**	**700**
SEMESTER V									
30.	III	Core Theory	Paper-11	6	4	Cost Accounting - I	25	75	100
31.	III	Core Theory	Paper-12	6	4	Management Accounting	25	75	100
32.	III	Core Theory	Paper-13	6	4	Business Management	25	75	100
33.	III	Core Theory	Paper-14	6	4	Internet & Its Applications	25	75	100
34.	III	Internal Elective	Paper-1	4	3	**(To choose one out of 3)** 1. Entrepreneurial Development 2. Practical Auditing 3. Income Tax Law & Practice - I	25	75	100
35.	IV	Skill based Subject	Paper-3	2	2	Financial Management	25	75	100
				30	21		**150**	**450**	**600**
SEMESTER VI									
36.	III	Core Theory	Paper-15	5	4	Cost Accounting - II	25	75	100

S.NO	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
37.	III	Core Theory	Paper-16	6	4	Web Technology	25	75	100
38.	III	Core Practical	Paper-3	5	4	Web Technology Lab	25	75	100
39.	III	Compulsory Project	Paper-17	5	5	(Individual / Group Project)	25	75	100
40.	III	Internal Elective	Paper-2	4	3	**(To choose one out of 3)** 1. Income Tax Law & Practice – II 2. Business Environment 3. Services Marketing	25	75	100
41.	III	Internal Elective	Paper-3	4	*3*	**(To choose one out of 3)** 1. Software Engineering 2. Data Mining 3. Internet of Things	25	75	100
42.	**III**	**NMSDC : Digital Banking and Audit Essentials for Employability**	**Paper-4**	**2**	**2**	**Fintech Course**	**25**	**75**	**100**
43.	V	Extension Activities		-	1		100	-	100
				30	**26**		**275**	**525**	**800**

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	2	4	8	100	200
Part II	Communicative English	2	4	8	100	200
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Electives	3	3	9	100	300
	Core	16	(3-5)	60	100	1600
	Core Practical	3	(3-4)	10	10	300
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	**43**		**140**		**4300**

THRUVALLUVAR UNVERSITY
B.COM (COMPUTER APPLICATION) SYLLABUS

UNDER CBCS
(With effect from 2020-2021)

SEMESTER - III

CORE PAPER - 4

CORPORATE ACCOUNTING - I

Objective:

To gain comprehensive understanding of all aspects relating to corporate accounting.

UNIT - I
Share capital

Meaning and types of shares - Issue and allotment of equity and preference shares- issue at par, premium and at discount - calls in advance - calls in arrears - forfeiture of shares - reissue of forfeited shares - redemption of preference shares - underwriting of shares (Determining the liability of underwriters - firm underwriting)

UNIT - II
Debentures

Meaning and types of debentures - Issue of debentures at par, premium and at discount - writing off discount on issue of debentures - issue of debentures as collateral security - issue of debentures for consideration other than cash - redemption of debentures - methods - open market buying - conversion of debentures into shares - sinking fund method - insurance policy method.

UNIT - III
Acquisition of Business

Meaning of Acquisition of business - accounting treatment - new set of books to be opened - same set of books to be continued - profit prior to incorporation

UNIT - IV
Final accounts

Preparation of Statement of profit & loss and Balance sheet (as per revised schedule VI)

UNIT - V
Amalgamation, Absorption, External and Internal reconstruction

Purchase consideration - methods - Amalgamation in the nature of merger or purchase - absorption (AS 14). Alteration of share capital - reduction of share capital (scheme of capital reduction is excluded).

Note: Questions in Sec.A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text Books

1. Jain,S.P & Narang,N.L., Advanced Accounting, Kalyani Publications.
2. ReddyT.S.& Murthy,A, Corporate Accounting, Margham Publications, Chennai.

Reference Books

1. Gupta,R.L & Radhaswamy,M, Advanced Accounts, Sulthan Chand, NewDelhi.
2. Shukla & Grewal & Gupta, Advanced Accounting, S. Chand &Co.,N ew Delhi.
3. Palaniyappan, Corporate Accounting, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER - 5

BUSINESS LAW

Objective:

To gain a comprehensive knowledge on all aspects of law as applied to business.

UNIT - I

Contract - Formation and Essential Elements of Contract - Types of Contract and Agreements - Rules as to offer, Acceptance and Consideration - Capacity to Contract - Lawful Object and Free Consent - Quasi Contract.

UNIT - II

Performance of Contract - Devolution of Joint Rights and Liabilities - Discharge of Contract - Breach of Contract and Remedies.

UNIT - III

Indemnity and Guarantee - Features and Distinctions - Extent of Surety's Liability - Rights and Discharge of Surety - Bailment and Pledge - Features - Difference - Rights and Duties of Bailor and Bailee - Law Relating to Lien and Finder of Lost Goods - Rights and Duties of Pawnor and Pawnee - Pledge by Non-Owner.

UNIT - IV

Contract of Agency - Definition and Meaning - Creation - Ratification and Requisites - Rights of Principal and Agent - Relation of Principal with Third Parties - Personal Liability of Agent - Termination of Agency - Irrevocable Agency.

UNIT - V

Sale of Goods Act 1930 - Definition of Sale - Sale Vs Agreement to Sell - Subject Matter - Express and Implied Conditions and Warranties - Caveat Emptor and Exceptions - Performance of Contract - Transfer of Property - Rights of an Unpaid Seller - Sale by Non-owner - Auction Sale.

Text Books:

1. N.D.Kapoor, Business Laws, Sultan Chand & Sons, New Delhi.
2. R.S.N.Pillai & Bagavathi, Business Laws, S. Chand & Co., New Delhi.

Reference Books:

1. M.C.Dhandapani, Business Laws, Sultan Chand & Sons, New Delhi.
2. M.C.Shukla, Mercantile Law, S. Chand& Co., New Delhi.
3. P.C. Tulsian, Business Laws, Tata McGraw Hill, New Delhi.
4. Dr.N.Premavathy, Business Law, Sri Vishnu Publications, Chennai.
5. Dr.N.Premavathy, Business Law (in Tamil), Sri Vishnu Publications, Chennai.
6. Balachandran. V and Thothadri. R, Business Law, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

CORE PAPER - 6
BANKING THEORY, LAW AND PRACTICE

Objective:

To study in detail about the Central Bank and Commercial Banking System including the latest directives and decisions of Reserve Bank of India. To study the recent developments in Indian banking system.To acquire the basic knowledge about the banking transactions.

UNIT - I

Origin of banks - Banking Regulation Act, 1949 - Roll of Banks and Economic Development - Central Banking and Role of RBI and their functions - Credit Control Measures of Central Bank.

UNIT - II

Commercial Banks - Functions - E-Banking - ATM Cards, Debit cards, Personal Identification Number - Online enquiry and update facility - Electronic Fund Transfer - Electronic Clearing System - Credit Creation and Credit Control - Role of SBI in the Economic Development of India.

UNIT - III

Types of Bank Accounts - Savings Account, Current Account - Types of Deposit Account - Fixed and Recurring Deposits Account - Procedure for opening of an Account - Types of customers (Individuals, firms and Companies) - Importance of CRM - Customer grievances and redressal - Ombudsman.

UNIT - IV

Negotiable instruments - Promissory Note - Bills of Exchange, Cheque, Draft - Definitions, Features - Crossing - Endorsement - Material Alteration - Dishonour of Cheques - Paying Banker - Rights, Duties and Statutory Protection to Paying Banker - Collecting banker - Rights and Duties.

UNIT - V

Principles of lending - Types of Loans - Precautions to be taken by a banker while lending against LIC Policies, Shares, Gold, Silver Ornament and Jewellery.

Text Books:

1. Banking Law Theory and Practice - Sundaram and Varshney - Sultan Chand Co.
2. Banking and Financial Systems - B. Santhanam, Margham Publishers.
3. Banking Law Theory and Practice - S.N. Maheswari - Kalyani Publications.
4. Banking Theory Law and Practice, Dr. S. Guruswamy, 3rd Edition, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books:

1. Indian Banking - Parameswaran - S. Chand and Co.
2. Financial Services - Dr. S. Gurusamy, Tata McGraw-Hill Education India.
3. Banking Theory Law Theory and Practice - Dr. S. Gurusamy, Tata McGraw-Hill Education India.

CORE PAPER - 7

MANAGEMENT INFORMATION SYSTEM

UNIT - I

Management Information - Meaning of Information - Information needs of Managers - Web Data basis - Data warehousing - Knowledge management - Information system for decision making.

UNIT - II

Types of Information System - Transaction Processing System - Office Automation System - Decision Support System - Executive Support System - MIS - Evolution of MIS - Computer and MIS.

UNIT - III

System Analysis - System Planning and Mutual Investigation - System Design - The Process and Stages of System Design - Input / Output forms Design - File Organisation - System Implementation.

UNIT - IV

Management Information Needs and Communication links for Marketing system, Production System, Accounting System, Manufacturing System, Inventory Control System and Budget Control System - IS Organisation - Top Management Responsibility - Processing Group Responsibility.

UNIT - V

Development - Maintenance of MIS - Operation of manual Information System - Role of Computer in MIS - Data base Concept - Expert Systems - System Audit.

Text Book:

1. M. Assam - Fundamentals of Management Information System - Vijay Nicole Imprints Private Ltd., Chennai.
2. Effy Oz, "Management Information Systems", Second edition, Thomson Learning Course Technology, 2002.
3. Jawadekar W.S, "Management Information Systems", Tata McGraw Hill Publishing Company Ltd, 2002.
4. Kenneth.C Laudon and Jane P. Laudon, "Management Information Systems", Prentice Hall of India Ltd, 2002.

Reference Books:

1. David Knoenke (1989), "Management Information Systems", Tata McGraw Hill, New Delhi.
2. Iandon K.C and Landon J.P (2001), "Management Information Systems',

Maxwell Macmillan Publishing Company.
3. Murdic Rose and Elaggett, “Information System for Modern Management, Prentice Hall.
4. Robert Schultheis, Mary Sumner, “Management Information Systems” - The Manager’s View, Fourth edition, Tata McGraw Hill Edition, 1999

ALLIED - 3

PAPER - 3

MERCHANT BANKING

UNIT-I

Merchant Banking – Definitions and Functions – Regulatory Framework – Registration of Merchant Bankers – Procedure Capital Adequacy Requirement – Lead Merchant Banker Appointment, Restrictions and Responsibilities.

UNIT-II

Public Issue Management – Functions and Mechanism – Categories of Issue – Issue Manager – Category and Restrictions Activities Involved in Public Issue Management – Marketing of New Issues – Methods – Pricing of Rights and Other Public Issues.

UNIT-III

Post Issue Management – Allotment / Dispatch of Shares / Refunds – Basis of Allotment – Procedure – Listing Requirements of Stock Exchanges – Advantages – Listing Requirements of OTCEI.

UNIT-IV

Capital Market Instruments – Meaning and Types – Commercial Paper – Issue of Commercial Paper – Usance – E-nomination – Ceiling – Mode of Issue – Credit Syndication – For Long Term and Working Capital.

UNIT-V

Port Folio Management – Functions – Registration of Port-folio Managers – Obligation – Investment of Client Funds – Maintenance of Book and Accounts – Reports to be Furnished – Code of Conduct.

Text Books:

1. Dr.S.Gurusamy, "Merchant Banking" Vijay Nicholes Imprint Pvt. Ltd., Chennai

2. Dr.V.Balu, "Merchant Banking & Finance Services" Sri Venkateswara Publication, Chennai

Reference Books:

1. H.R. Machiraju, "Merchant Banking" New Age International, New Delhi.

2. Dr. J.C.Verma, "A Manual of Merchant Banking" Baharat Law House, New Delhi.

SKILL BASED SUBJECT

PAPER - 1

ELEMENTS OF INSURANCE

Objective:

To gain a knowledge of insurance and its importance.

UNIT - I

Definition of insurance - classification of Contracts of insurance - marine and non-marine - general principles of law as applied to non-marine insurance.

UNIT - II

Life Assurance - objects of life Assurance - principles of life Assurance - different plans of life Assurance and annuities - policy condition and privilege - assignment and nomination - lapses and revivals - surrender values and loans - claims - double insurance.

UNIT - III

Marine insurance - principles of marine insurance - functions of marine insurance - proximate clause - subrogation and contribution

UNIT - IV

Types of marine policy - clauses in general use - warranties - kinds of marine losses - reinsurance and double insurance.

UNIT - V

Fire insurance - principles of law as applied to fire insurance - the subject matter of fire insurance - fire waste - hazard types of fire policy - cover notes - surveys and inspection average - re-insurance - renewals.

Text and Reference Books:

1. Dr. B. Vardharajan - Insurance Vol 1 and 2. - Tamil Text Book.
2. R.S. Sharma - Insurance Principle & Practice - Vara Bombay, 2006.

A. Murthy - Elements of Insurance Risk management & Insurance - Harrington, 2006 - Tata McGraw Hill pub.

NON-MAJOR ELECTIVE

PAPER - 1

ELEMENTS OF ACCOUNTANCY

Objectives:

To facilitate the non- commerce students to have a basic knowledge in Book-Keeping and Accounting.

UNIT - I

Need for Accounting - Definition (AICPA) - Steps - Objectives - Double Entry System - Meaning of Debit and Credit - Advantages - Limitations - Types of Accounts - Accounting Rules - Accounting Terminology - Accounting Concepts and Conventions - Meaning and Types - Accounting Equation.

UNIT - II

Journal - Ledger Accounts - Trial Balance.

UNIT - III

Subsidiary Books - Meaning - Types (no problems from Bills Receivable Book and Bills Payable Book but only theory) - Advantages over Journal - Ledger Accounts - Trial Balance.

UNIT - IV

Errors - Classification - Rectification (Rectification after the preparation of final account is excluded) - Suspense Account - Meaning and Need.

UNIT - V

Closing and Adjustment Entries - Final Accounts with simple Adjustments.

(Weightage: Theory: 25%, Problems: 75%)

Text Books

1. Jain,S.P & Narang, N.L., AdvancedAccounting, KalyaniPublications.
2. Jaya Charulatha and Baskar, Introduction to Accountancy, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books

1. Gupta,R.L & Radhaswamy,M, AdvancedAccounts, SulthanChand, NewDelhi.
2. Shukla & Grewal & Gupta, AdvancedAccounting, S.Chand & Co., NewDelhi.

SEMESTER - IV

CORE PAPER - 8

CORPORATE ACCOUNTING - II

Objective:

To gain accounting knowledge in advanced corporate accounting.

UNIT - I

Valuation of goodwill and shares

Methods of Valuation of Goodwill - Average Profit Method - Super Profit Method - Capitalisation Method. Methods of Valuation of Shares - Net Assets Method - Yield Method - Fair Value Method.

UNIT - II

Liquidation of companies

Order of Payments - Preferential Creditors - Liquidator's Remuneration - Liquidator's Final Statement of Account - Statement of Affairs and Deficiency Account.

UNIT - III

Bank and Insurance Company accounts

NPA - Interest on Doubtful Debts - Rebate on Bills Discounted - Preparation of Bank Profit & Loss Account and Balance Sheet. Life insurance - Ascertaining Correct Assurance Fund - Revenue Account - Valuation Balance Sheet - Profit & Loss account - Balance Sheet (new format). General Insurance - Revenue Account - Profit & Loss Account - Balance Sheet (new format).

UNIT - IV

Holding company accounts

Capital Profit - Revenue Profit - Cost Of Control - Minority Interest- Elimination Of Common Transactions - Unrealised Profit - Revaluation of Assets and Liabilities - Bonus Shares - Consolidated Balance Sheet (Intercompany Investment is Excluded).

UNIT - V

Inflation accounting (Accounting for price level changes)

Limitations of Historical Accounting - Meaning of Inflation Accounting - Methods of Inflation Accounting - CPP Method; Gain or Loss on Monetary Items; Valuation of Cost of Sales and Closing Inventory - CCA Method: COSA; MWCA; Depreciation Adjustment; Gearing Adjustment.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text Books

1. Jain,S.P & Narang,N.L., Advanced Accounting, Kalyani Publications.
2. ReddyT.S. & Murthy,A, Corporate Accounting, Margham Publications, Chennai.

Reference Books

1. Gupta, R.L & Radhaswamy, M, Advanced Accounts, Sulthan Chand, New Delhi.
2. Shukla & Grewal & Gupta, Advanced Accounting, S. Chand & Co., New Delhi.

CORE PAPER - 9

PRINCIPLES OF MARKETING

Objectives:

To enable the students to understand the concept and importance of marketing and the developments that have taken place in the field of marketing in the global scenario.

UNIT - I
Introduction

Meaning of market - classification of markets - meaning and definition of marketing - features of marketing - importance of marketing - difference between marketing and selling - Evolution of marketing concepts - functions of marketing.

UNIT - II
Market Segmentation and Consumer Behaviour

Meaning and definition of market segmentation - different patterns of market segmentation - Bases for segmenting consumer markets - benefits and limitations of market segmentation. Definition of consumer behaviour - consumer behaviour theories - factors determining consumer behaviour.

UNIT - III
Marketing Mix and Product policy

Definition and components of marketing mix - four P's of marketing mix - definition of product - features of a product - classification of products - stages in new product development - product life cycle - Branding - advantages of branding a product - packaging - functions of package - labelling - functions of labelling - kinds of labels.

UNIT - IV
Pricing policy, Channel of distribution and Promotion Mix

Meaning of price - factors affecting price decision - Types of pricing strategies - definition of channel of distribution - features of marketing channels - types of Channel of distribution - factors determining Channel of distribution - functions of wholesalers - types of retailers - promotion mix - Advertising - types of advertising - personal selling - qualities of a good salesman - sales promotion - kinds of sales promotion.

UNIT - V
Recent trends in Marketing

Social marketing - De-marketing - Re - marketing - Over marketing - Meta marketing - E- Marketing - online retailing - shopping malls.

Text Books:

1. Rajan Nair, Marketing, Sultan Chand & Sons, New Delhi
2. Varshney, Marketing Management, Sultan Chand & Sons, New Delhi.

Reference Books:

1. Jaisankar, Marketing, Margham Publications, Chennai
2. L. Natarajan, Marketing, Margham Publications, Chennai
3. Dr. K. Sundar, Essentials of Marketing, Vijay Nicole Imprints Private Ltd., Chennai.

CORE PAPER - 10

RELATIONAL DATABASE MANAGEMENT SYSTEMS

Objective:

1. The students are able to understand database concepts and database management system software and have a high-level understanding of major DBMS components and their function.
2. The students are able to understand the E R model and relational model.
3. The students are able to be able to write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.
4. The students are able to Understand Functional Dependency and Functional Decomposition.
5. The students are able to understand the architecture of database management system and also understand the various different architecture such as server system architecture, parallel sytems and distributed database systems.

Course Outcomes:

CO1 - Describe the database architecture and its applications Sketch the ER diagram for real world applications Uses various ER diagram for a similar concepts from various sources.

CO2 - Discuss about the relational algebra and calculus Construct various queries in SQL and PL/SQL Compiles various queries in SQL, Relational Calculus and Algebra.

CO3 - Describe the various normalization forms Apply the normalization concepts for a table of data Practices a table and implement the normalization concepts.

CO4 - Explain the storage and accessing of data.

CO5 - Illustrate the query processing in database management. Define the concurrency control and deadlock concept

UNIT- I

DATABASE ARCHITECTURE AND ER DIAGRAM

Database system applications - Purpose of database systems - View of data- Database languages - Database architecture - Database users and administrators - History of database systems-Entity relationship modeling: entity types, entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, sub classes; super classes, inheritance, specialization and generalization

UNIT - II

RELATIONAL DATA MODEL

Relational model concepts, Relational constraints, Relational Languages : Relational Algebra, The Tuple Relational Calculus - The Domain Relational Calculus - SQL: Basic Structure - Set Operations - Aggregate Functions-Null Value-Nested Sub Queries -

Views Complex QueriesModification Of Database - Joined Relations - DDL - Embedded SQL - Dynamic SQL - Other SQL Functions - Integrity and Security.

UNIT - III

DATA NORMALIZATION

Pitfalls in relational database design - Decomposition - Functional dependencies - Normalization - First normal form - Second normal form - Third normal form - Boyce - codd normal form - Fourth normal form - Fifth normal form

UNIT - IV

STORAGE AND FILE ORGANIZATION

Disks - RAID -Tertiary storage - Storage Access - File Organization - organization of files - Data Dictionary storage

UNIT - V

QUERYPROCESSING AND TRANSACTION MANAGEMENT

Query Processing - Transaction Concept - Concurrency Control -Locks based protocolDeadlock Handling -Recovery Systems

TEXT BOOK:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, Mc.Graw Hill, 2010. 2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition, 2002

REFERENCES

1. Bipin Desai, An Introduction to database systems, Galgotia Publications, 2010. 2. Ramez Elamassri, Shankant B-Navathe, Fundamentals of Database Systems, Pearson, 7th Edition, 2015

E - REFERENCES

1. NPTEL, Introduction to database desigh, Dr P Sreenivasa Kumar Professor CS&E, Department, IIT, Madras
2. 2. NPTEL, Indexing and Searching Techniques in Databases Dr. Arnab Bhattacharya, IIT Kanpur

CORE PRACTICAL - 2

RDBMS LAB

Objectives:

1. To understand the concepts of DDL/DML/DCL/TCL commands.
2. To understand the concepts of Join queries.
3. To understand the concepts of exception handling.
4. To understand the concepts of cursors.
5. To understand the concepts of packages.

Course Outcomes:

CO1 - Design and Implement a database schema for a given problem domain.
CO2 - Populate and Query a database using SQL DDL/DML Commands.
CO3 - Build well formed in String Date/Aggregate Functions.
CO4 - Design and Implement a database query using Joins, Sub-Queries and Set Operations.
CO5 - Program in SQL including Objects (Functions, Procedures, Triggers)

LAB EXERCISES:

1. Execute a single line query and group functions.
2. Execute DDL Commands.
3. Execute DML Commands
4. Execute DCL and TCL Commands.
5. Implement the Nested Queries.
6. Implement Join operations in SQL
7. Create views for a particular table
8. Implement Locks for a particular table.
9. Write PL/SQL procedure for an application using exception handling.
10. Write PL/SQL procedure for an application using cursors.
11. Write a PL/SQL procedure for an application using functions
12. Write a PL/SQL procedure for an application using package

ALLIED - 2
PAPER - 4
E-COMMERCE AND ITS APPLICATIONS

UNIT - I:

Introduction to E-Commerce - Meaning - Working of E-Commerce - Electronic Business - Categories of E-Commerce Application - Global Trading Environment and Adoption of E-Commerce - Product suitability - Comparison between Traditional and Electronic Commerce - Advantages and Disadvantages of E-Commerce.

UNIT - II:

Business Models of E-Commerce - Introduction - Major challenges of B2C E-Commerce - Meaning of B2B Exchange - Development of B2B E-Commerce - Types of B2B Markets - Difference between B2C and B2B Commerce.

UNIT - III:

Introduction to E-Hub Concept - Introduction to B2G Concept - E-filing.

UNIT - IV:

Internet - Internet Operation - Internet Explorer - Creation of E-mail ID, E-mail etiquettes.

UNIT - V:

Web Browsing - Role of Website in B2C E-Commerce, Website strategies and goals. Websites Design Principles for E-Commerce websites.

Text Books:

E-Commerce - SrinivasaVallabhan. S.V - Vijay Nicole Imprints Private Ltd.,

Chennai.

SKILL BASED SUBJECT
PAPER - 2
INDUSTRIAL ORGANIZATION

Objective:
To gain knowledge of the basic industrial structure and its working.

UNIT - I

Meaning of Industrial Organisation - Industrial Revolution - Industrial Growth - Aggregation, Consolidation, Integration - Mass Production - Importance, Advantages, Limitations - Specialisation - division of labour - its advantages and disadvantages - Industrial growth in India - major industries in India - current scenario.

UNIT - II

Industrial ownership - Sole Proprietorship - Features, merits and demerits - partnership - Features, merits and demerits - Joint Stock Company - Features, merits and demerits - Types - Public Ltd and Private Ltd companies.

UNIT - III

Physical facilities - plant location - need for selection of location - stages in selection of location - plant layout - definition, objectives, advantages, types - factors influencing plant layout - tools used for design of plant layout - principles of a good plant layout.

UNIT - IV

Production management - product design - characteristics of a good product design - design of production system - its types - design of work study - motion study - time study - production planning - objectives, levels - production control - factors determining production control operation - functions of production planning and control.

UNIT - V

Materials management - its meaning, objectives, advantages, functions - purchasing-types of purchasing policy - store keeping - organization of stores department - inventory control - its objectives, functions, benefits.

Text Book:

1. Dr. A. Murthy, Industrial Organisation, Margham Publications, Chennai.

Reference Books:

1. L Bethel, Atwater, Smith and Stackman, Industrial Organisational Management, McGraw Hill.
2. Kimball & Kimball, Principles of Industrial Organisation, McGraw Hill.
3. Lundy, Effective Industrial Management Eurasia Publishing House (Pvt.) Ltd., New Delhi.

NON-MAJOR ELECTIVE
PAPER - 2
ADVERTISING AND SALESMANSHIP

Objectives:

To study the concept of Advertisement and Salesmanship.

To gain knowledge about the role of Advertisement and Salesmanship in boosting the volume of sales.

To study the qualities to be imparted by a salesman in the present global competitive market.

UNIT - I

Origin and Development of Advertising - Objectives - Nature - Functions - Types - Benefits - Difference between Advertising and Publicity - Scope of Advertising - DAGMAR approach.

UNIT - II

Various media of Advertising - Print Media - Newspapers - Magazines - Advantages - Limitations - Radio and TV advertising - Advantages - Limitations.

UNIT - III

Advertisement copy - Characteristics - Clarification - Components - Salesmen Recruitment - Salesmen report - Types - Salesmanship and Psychology.

UNIT - IV

Salesmanship - Characteristics of Salesmanship - Objectives of Personal selling - Advantages - Limitations - Essentials of Effective selling - Advertising and Salesmanship.

UNIT - V

Qualities of Good Salesman - Sales Promotion - Kinds of Sales promotion - Importance of Salesmanship - Types of Salesmen - Methods of Remuneration - Qualities of successful Salesman.

Text Books:

1. Modern Marketing (Principles and Practises) R.S.N. Pillai&Bagavathi, S. Chand & Co. New Delhi
2. Sales and Advertisement Management S Rajkumar, V Rajagopalan, S. Chand & Company Pvt. Ltd.

Reference Books:

1. Advertising (Principles and Practise) ChunawallaK.C. Sethia, Himalaya Publishing House, Delhi.

2. Advertising Management Dr. M.M. Varma, R. K. Agarwal, Forward 300K Depot, New Delhi.
3. Advertising Management Mahendra Mohan, Tata Mcgraw-hill Publishing Company Limited,New Delhi, India.
4. Advertising Marketing and Sales Management G.R. Basotia N. K Sharama, Mangal Deep Jaipur.
3. Essentials of Marketing, Dr. K. Sundar, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

SEMESTER - V

CORE PAPER - 11

COST ACCOUNTING - I

Objective:

To understand the basic concepts and methods of Cost Accounting.

UNIT - I:

Nature and Scope of Cost Accounting

Cost Accounting : Nature and Scope - Objectives, Advantages and Limitations - Financial Vs. Cost Accounting - Costing System - Types of Costing and Cost Classification - Cost Sheet and Tenders - Cost Unit - Cost Centre and Profit Centre.

UNIT - II:

Material Purchase and Control

Purchase Department and its Objectives - Purchase Procedure - Classification and Codification of Materials, Material Control: Levels of Stock and EOQ - Perpetual Inventory System, ABC and VED Analysis - Accounting of Material Losses.

UNIT - III:

Methods of pricing of Material Issues

Cost Price Methods: FIFO, LIFO, Average Price Methods: Simple and Weighted Average Price Methods, Notional Price Methods: Standards Price, and Market Price Methods

UNIT - IV:

Labour Cost Control

Labour Turnover: Causes, Methods of Measurement and Reduction of Labour Turnover - Idle and Over Time - Remuneration and Inventive: Time and Piece Rate - Taylor's, Merricks and Gantt's Task - Premium Bonus System - Halsey, Rowan and Emerson's Plans - Calculation of Earnings of Workers.

UNIT - V:

Overheads

Classification of Overhead Costs - Departmentalization of Overheads - Allocation Absorption and Appointment of Overhead Costs - Primary and Secondary Distribution of Overheads - Computation of Machine Hour Rate and Labour Hour Rate.

Text Books: (Weightage of Marks = Problems 80%, Theory 20%)

1. T.S. Reddy & Hari Prasad Reddy - Cost Accounting - Margham Publications, Chennai
2. A.Murthy and S. Gurusamy, Cost Accounting 2nd Edition, Vijay Nicole Imprints Private Ltd., Chennai.
3. A.Murthy and S. Gurusamy, Cost Accounting, Tata McGraw-Hill Publishing Company Ltd. New Delhi.
4. Tulsian P.C. - Cost Accounting - Tata McGraw Hills.

Reference Books:

1. S.P.Jain and Narang - Cost Accounting - Kalyani Publishers, New Delhi
2. S.N.Maheswari - Principles of Cost Accounting - Sultan Chand & sons, New Delhi
3. A.Murthy and S. Gurusamy, Essentials of Cost Accounting, Vijay Nicole Imprints Private Ltd., Chennai.
4. S.P.Iyangar - Cost Accounting - Sultan Chand & Sons, New Delhi.

CORE PAPER - 12

MANAGEMENT ACCOUNTING

Objective:

To enable the students to gain knowledge in the application of accounting to Management.

UNIT - I

Management Accounting: Definition - objectives - Functions - Advantages and limitations - Financial Statement Analysis - Comparative and Common size statements - Trend Analysis.

UNIT - II

Ratio Analysis : Definition - Significance and Limitations - Classification - Liquidity, Solvency, Turnover and Profitability ratios - Computation of Ratios from Financial Statements - Preparation of Financial Statement from Ratios.

UNIT - III

Fund Flow and Cash Flow Analysis: Concept of Funds, Sources and Uses of Funds - Fund Flow Statement - Concept of Cash Flow - Cash Flow Statement as Per AS3.

UNIT - IV

Standard Costing - Variance Analysis - Material - Labour - Overheads - Fixed - Variable Sales Variance.

UNIT - V

Budget and Budgetary Control: Definition - Objectives - Essentials - Uses and Limitations - Preparation of Material Purchase, Production, Sales, Cash and Flexible Budget - Zero Base Budgeting.

(Weightage of Marks - Problems - 80%, theory - 20%)

Reference Books:

1. S.N.Maheswari, Management Accounting - Sultan Chand & Sons, New Delhi.
2. A.Murthy and S.Gurusamy, Management Accounting, Tata Mc-Graw Hill Publishing Company, New Delhi.

Reference Books:

1. Manmohan & Goyal, Management Accounting - SahithiyaBhavan, Agra.
2. S.P.Gupta, Management Accounting - Sultan Chand & Sons, New Delhi.
3. R.S.N.Pillai & Bhagavathi, Management Accounting - S. Chand & Co. Ltd., New Delhi.
4. T.S.Reddy & Hari Prasad Reddy, Management Accounting - Margham Publications, Chennai.

CORE PAPER - 13

BUSINESS MANAGEMENT

Objective:

To understand the basic principles of Business Management.

UNIT - I

Management - Meaning - Definition - Nature - Importance - Distinction between Administration and Management - Scope - Principles and Functions of Management.

UNIT - II

Planning - Meaning - Nature - Importance - Advantages and Limitations - Process of Planning - Types of Plans - MBO - Forecasting - Decision Making.

UNIT - III

Organising - Meaning - Definition - characteristics - Importance - Types - Authority and Responsibility - Centralisation and Decentralisation and Departmentation.

UNIT - IV

Directing - Meaning - Definition - Characteristics - Directing Process - Span of Supervision - Motivation - Leadership - Communication.

UNIT - V

Controlling - Definition - Principles - Controlling process - Types of Controls - Control Techniques - Coordination.

Reference Books:

1. Dr. C.B. Gupta, Business Management -Sultan Chand & Sons
2. Jayashankar, Business Management -Margham Publications, Chennai.

Reference Books:

3. Koontz, Weihrich and Aryasri, Principles of Management, Tata McGraw hill
4. Dr.H.C. Das Gupta, Principles & Practice of Management &SahityaBhawan. Agra
5. Lallan Prasad &S.S.Gulshan, Management principles and Practices &S. Chand& Co.
6. Dr.N.Premavathy, Principles of Management, Sri Vishnu Publications, Chennai.

CORE PAPER - 14

INTERNET AND ITS APPLICATIONS

UNIT - I

Introduction to Computers - Programming Language types - History of Internet - Personal Computers - History of World Wide Web - Micro Software .NET Java - Web resources.

UNIT - II

Web Browsers - Internet Explorer - Connecting to Internet - Types of Internet connection - Features of Internet Explorer6 - Searching the Internet - Online help and tutorials - File Transmission Protocol (FTP) - Browser settings.

UNIT - III

Attaching a file - Electronic Mail - Creating an E-mail ID - Sending and Receiving Mails - Attaching File - Instance Messaging - Other Web browsers.

UNIT - IV

Introduction to HTML headers - Linking - Images - Types of computer viruses - Ill-effect of Viruses - Remedy for Viruses.

UNIT - V

E-marketing - Consumer tracking - Electronic advertising search engine - CRM - Credit Card payments - Digital cash and e-wallets - Micro Payments - Smart Card.

Text Book:

Internet and World Wide Web, Third Edition, H.M. Deital, P.J. Deital and A.B. Goldberg - PHI

Reference Book:

Harley Hahn, The Internet - Complete Reference, Tata McGraw Hill.

INTERNAL ELECTIVE

(To choose any 1 out of 3)

PAPER - 1

A. ENTREPRENEURIAL DEVELOPMENT

Objective:

To encourage students to become entrepreneurs.

UNIT - I

Meaning of Entrepreneur - Entrepreneur and Enterprise - Entrepreneur and Manager - Entrepreneur and Intrapreneur - Qualities (Traits) of True Entrepreneur - Characteristics of Entrepreneur - Types of Entrepreneurs - Functions of an Entrepreneur - Roles of Entrepreneurs in the Economic Development.

UNIT - II

Establishing an Enterprise - Project Identification - Selection of the Product - Project Formulation - Assessment of Project Feasibility - Preparation of Project Report - Selection of Site (Location).

UNIT - III

Selection of Types of Organization - Sole Proprietorship - Partnership Joint Stock Company - Factors Influencing the Choice of Organization - Sources of Project Finance - Sources of Long Term Finance - Sources of Short Term Finance.

UNIT - IV

Incentives and Subsidies - Meaning of Incentives and Subsidies - Need and Problems - Incentives for Development of Backward Area - Incentives for SSI Units in Backward Areas - Taxation Benefits to SSI Units - Subsidies and Incentives in Tamil Nadu.

UNIT - V

Women Entrepreneurs - Concept - Functions and Role - Problems of Women Entrepreneurs - Suggestions for Development of Women Entrepreneurs - Rural Entrepreneurship - Need - Problems - How to Develop Rural Entrepreneurship.

Text Books:

1. C.B. Gupta, Entrepreneurship development in India - Sultan Chand.
2. Gupta C.B and SrinivasanN.P. Entrepreneurial Development, Sultan Chand & Sons, New Delhi.

Reference Books:

1. P Sarvanavel, Entrepreneurial development - Ess Pee kay Publishing House.
2. S.S. Khanka, Entrepreneurial Development, S. Chand & Co., New Delhi.

INTERNAL ELECTIVE
PAPER - 1
B. PRACTICAL AUDITING

Objective:

To gain knowledge of the principles and practice of auditing.

UNIT - I

Meaning and Definition of Auditing - Nature and Scope of Auditing - Accountancy and Auditing, Auditing and Investigation - Objectives of Auditing - Limitations of Audit - Advantages of Audit - Classification of Audit

UNIT - II

Meaning and Definition of Audit Programme - Advantages and Disadvantages - Audit File, Audit Note Book, Audit Working Papers - Purposes and Importance of Working Papers - Internal Check - Meaning, Object of Internal Check - Features of Good Internal Check System - Auditors duty with regards to Internal Check System - Internal Check and Internal Audit.

UNIT - III

Vouching - Meaning - Objects - Importance of Vouching - Meaning of Voucher - Vouching of Cash Receipts and Vouching of Cash Payments - Vouching of Trading Transactions.

UNIT - IV

Verification and Valuation of assets and liabilities - Meaning and objects of verification - Vouching and verification - Verification and Valuation of different kinds of Assets and Liabilities.

UNIT - V

The Audit of Limited Companies - Necessity of Company Audit - Qualification and Disqualification of Auditors - Appointment - Removal - Remuneration - Status of Auditors - Rights - Powers - Duties and Liability of Auditors - Auditor's Report - Importance and Contents.

Text Books:

1. B.N. Tandon, Sultan Chand - A handbook of practical auditing
2. B.N. Tandon, Sudharsanam, Sundharabahu - S Chand - Practical auditing.
3. Sundar. K and Pari. K, Vijay Nicole Imprints Private Ltd., Chennai.

Reference Books:

1. Sharma, SahityaBhavan, Agra - Auditing
2. Dr.N.Premavathy, Practical Auditing, Sri Vishnu Publications, Chennai.
3. Dr.N.Premavathy, Practical Auditing (in Tamil), Sri Vishnu Publications, Chennai.

INTERNAL ELECTIVE
PAPER - 1
C. INCOME TAX LAW AND PRACTICE - I

Objective:
To enable the students to have a knowledge of law of practice of Income tax.

UNIT - I

Introduction

Income Tax Act 1961- Basic Concepts - Assessment Year - Previous Year - Person - Assessee - Income - Gross Total Income - Total Income - Agricultural Income - Casual Income - Capital and Revenue Receipts - Capital and Revenue Expenditures - Exempted Incomes u/s 10. Residential status of an individual- Residential status of a HUF - Residential status of a firm and association of persons - Residential status of a company - incidence of tax liability.

UNIT - II

Salaries

Meaning and features of Salary - Allowances - Perquisites - Profits in lieu of Salary - Provident Fund and its types - payments exempted u/s 10: Leave travel concession; gratuity; pension; leave encashment; retrenchment compensation; VRS - Deductions from salary: EA and professional tax- deduction u/s 80C- taxable salary

UNIT - III

Income from House Property

Annual value - Determination of annual value- Income from let out house property - Income from self-occupied house property - Deductions allowed from Income from house property u/s 24.

UNIT - IV

Profit and Gains of Business or profession and depreciation

Meaning of business and profession - deductions expressly allowed - expenses expressly disallowed - treatment/ admissibility of certain expenses and incomes - income from business- income from profession. Meaning of depreciation - conditions for depreciation - actual cost - written down value - computation of allowable depreciation.

UNIT - V

Income tax authorities

CBDT - powers - Director General of income tax - Chief commissioner of income tax - Assessing officer - appointment - Jurisdiction - powers relating to search and seizure.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text books

1. Gaur & Narang, Income Tax Law & Practice, Kalyani Publishers.
2. Dr. A. Murthy, Income Tax Law & Practice, Vijay Nicole Imprints Pvt. Ltd. Chennai
3. Reddy, T.S. & Hariprasad Reddy,Y,Income Tax Theory, Law & Practice, Margham Publications, Chennai.

Reference books

1. Mehrotra - Income Tax Law & Accounts, Sahithiya Bhavan Publications.
2. Vinod, K. Singhania, Students Guide to Income Tax, Taxman Publications Pvt. Ltd.

SKILL BASED SUBJECT
PAPER - 3
FINANCIAL MANAGEMENT

Unit-I:

Nature and Importance of Finance Functions – Organizing Finance Functions – Functions of Finance Manager – Objectives of Finance Function – Methods and Sources of Raising Finance – Critical Appraisal of the Various Sources of Finance.

Unit-II:

Goals of Finance Function – Financing Decisions – Financial Planning – Financial Forecasting – Capital Structure Decisions – Net Income Approach, NOI Approach and MM Approach-Capitalization – Cost of Capital – Computation of Cost of Capital-Dividend Policy-Factors Determining Dividend Policy.

Unit-III:

Investment Decisions – Estimation of Cash Flows – Evaluation of Alternative Investment Proposals like NPV, ARR, IRR Methods – Decision Making Under Risk and Uncertainty – Inflation and Investment Decisions

Unit-IV:

Working Capital – Meaning, Concept, Types and Significance-Gross and Net Working Capital – Determinants of Working Capital – Sources of WC – Credit and Collection Policies.

Unit-V:

Security Analysis and Portfolio Management - Leverages –Meaning, Types of Leverage. Degree of Operating and Financial Leverage - Financial Ratio Analysis.

Text Books

1. Dr. S.N.Maheswari" Financial Management" - Sultan Chand & Sons, New Delhi
2. Dr. A.Murthy "Financial Management" - Margham Publications,Chennai.

   Dr. J. Srinivasan, Sridhar and Ramalingam "Financial Management" - Vijay Nicole Imprints Pvt .Ltd. Chennai
3. R.K.Sharma "Financial Management" - Kalyani Publishers, New Delhi

Reference Books

1. I.M.Pandey "Financial Management" - Vikas Publision house Pvt Ltd. Noida
2. Prasanna Chandra "Financial Management 10ed" - McGraw hill education Pvt. Ltd India
3. Subirkumar Banerjee "Financial Management" - PHI Learning Pvt Ltd
4. Vyuptakesh Sharan "Fundamentals of Financial Management" Pearson Education

5. Dr .N. Premavathy “Financial Management” - Sri Vishnu Publications, Chennai.
6. S.C. Kuchhal “Financial Management” – Chaitanya
7. P.V. Kulkarni & B.G. Satyaprasad “Financial Management” - Himalaya Publishing House

SEMESTER - VI

CORE PAPER - 15

COST ACCOUNTING - II

Objective:

To understand the basic concepts and methods of Cost Accounting.

UNIT - I

Job, Batch, Contract Costing: Job Costing - definition - Features - Procedure - WIP - Cost Accumulation, Batch Costing - EBQ, Contract Costing - Definition, Features, Work Certified and Uncertified - Incomplete Contact - Escalation Clause - Cost Plus Contract - Contract Account

UNIT - II

Process Costing : Definition - Features - Job Vs Process Costing - Process Account - Losses - By Products and Joint Products - WIP - Equivalent Units and its Calculation - Closing WIP with or without Process Loss.

UNIT - III

Operating Costing (Transport Costing): Cost Unit - Cost Classification - Operating Cost sheet.

UNIT - IV

Marginal Costing: Definition - Advantages and Limitation - Break Even Point - Margin of Safety - P/V Ratio - Key factor - Make or Buy Decision - Selection of Product Mix - Changes in Selling Price - Foreign Market Offer - Desired Level of Profit.

UNIT - V

Reconciliation of Cost and Financial Accounts.

Text Books :(Weightage of Marks = Problems - 80%, Theory - 20%)

1. T.S. Reddy & Hari Prasad Reddy - Cost Accounting - Margham Publications, Chennai
2. A.Murthy and S. Gurusamy, Cost Accounting 2nd Edition, Vijay Nicole Imprints Private Ltd., Chennai.
3. A.Murthy and S. Gurusamy, Cost Accounting, Tata McGraw-Hill Publishing Company Ltd. New Delhi.
4. Tulsian P.C. - Cost Accounting - Tata McGraw Hills.

Reference Books:

1. S.P. Jain and Narang - Cost Accounting - Kalyani Publishers, New Delhi
2. S.N. Maheswari - Principles of Cost Accounting - Sultan Chand & sons, New Delhi
3. S.P. Iyangar - Cost Accounting - Sultan Chand & Sons, New Delhi.

CORE PAPER - 16

WEB TECHNOLOGY

UNIT - I

Internet Basic - Introduction to HTML - List - Creating Table - Linking document Frames - Graphics to HTML Doc.

UNIT - II

Style sheet - Style sheet basic - Add style to document - Creating Style sheet rules - Style sheet properties - Font - Text - List - Color and background color - Box - Display properties.

UNIT - III

Introduction - Object in HTML - Event Handling - Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Build in Object - User defined object.

UNIT - IV

HTML server controls - Anchor, Tables, Forms, Files. Basic Web server Controls - L.able, Textbox, Button, Image, Links, Check & Radio button, Hyperlink. Data List Web Server Controls - Check box list, Radio button list, Drop down list, List box, Data grid, Repeater.

UNIT - V

Request and Response Objects, Cookies, Working with Data - OLEDB connection class, command class, transaction class, data adaptor class, data set class.

Reference Books:

1. Deitel & Deitel , internet & world wide web How to program, Pearson Education
2. I. Bayross, Web Enable Commercial Application Development Using HTML, DHTML, Javascript, Pen CGI, BPB Publications, 2000
3. J. Jaworski, Mastering Javascript, BPB Publications, 1999
4. T. A. Powell, Complete Reference HTML (Third Edition), TMH, 2002
5. G. Buczek, ASP.NET Developers Guide, TMH, 2002

CORE PRACTICAL - 3

WEB TECHNOLOGY LAB

1. Create a simple page introducing yourself how old you are, what you do, what you like and dislike. Modify the introduction to include a bullet list of what you do and put list the 5 things you like most and dislike as numbered lists. Create another page about your favorite hobby and link it to (and from) your main page. Center something, and put a quote on one of your pages
2. Put an existing image on a web page. Create a table, use a heading and at least one use of row span/col. span. Color a page and some text within the page. Link to another site
3. Create a new file called index. html.
   - ❖ Put the normal HTML document structure tags in the file.
   - ❖ Give it a title.
   - ❖ At the bottom of the page (i.e. the last thing between the body tags) put the following:
     - ♦ A horizontal rule.
     - ♦ A Link to your e-mail Address (With your name between the tag) ; remember to put the link to your E- Mail address within address tags.
     - ♦ A line break.
     - ♦ The date. (I have this same structure at the bottom of this page).
     - ♦ Above this block (which is called the footer), put a title in heading tags.
     - ♦ Add some text describing yourself (you can split this into multiple headings and Paragraphs if you wish).
4. Write a script to create an array of 10 elements and display its contents.
5. Create a document that accepts the user's name in a text field form and displays the sanie the next time when the user visits the site informing him that he has accessed the site for the second time, and so on.

INTERNAL ELECTIVE
(to choose one out of 3)
PAPER - 2
A. INCOME TAX LAW AND PRACTICE - II

Objective:
To enable the students to have a knowledge of law of practice of Income tax.

UNIT - I

Capital gains

What are capital assets? - What are not capital assets? - kinds of capital assets - transfer u/s 2 (47) - cost of acquisition - cost of improvement - computation of short term capital gain - computation of long term capital gain - exemptions from capital gains.

UNIT - II

Income from other sources

Specific incomes chargeable to tax - general incomes chargeable to tax - Interest on securities - Interest exempt from tax u/s 10 (15) - deductions allowed from Income from other sources - computation of income from other sources.

UNIT - III

Clubbing of Incomes and Set off and carry forward of losses

Income transfer without asset transfer - cross transfer -transfer for the benefit of son's wife - capital gain on an asset gifted before marriage - gifted money used for construction of house by spouse - income including losses - clubbing of business income - clubbing of minor's income - computation of total income. Provisions relating to set off of losses- Provisions relating to set off and carry forward of losses - unabsorbed depreciation - order of set off - computation of total income.

UNIT - IV

Agricultural Income and Deductions from gross total income

Meaning of agricultural income - types of agricultural income - income from growing and manufacturing rubber - income from growing and manufacturing coffee - income from growing and manufacturing tea - income of a sugar mill growing its own sugarcane - computation of tax of an assessee having agricultural income. Permissible deductions from gross total income - section 80C, 80CCC, 80CCD, 80D, 80DD, 80DDB, 80E, 80G, 80GG, 80GGA, 80QQB, 80RRB, 80U.

UNIT - V

Assessment of Individuals and Assessment procedures
Sources of income of an individual - computation of total income and tax liability of an individual. Filing of returns - permanent account number (PAN) -Usage of PAN - TDS - types of assessment - self assessment - Best judgement assessment - Income escaping assessment (reassessment) - Advance payment of tax

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text books

1. Gaur & Narang, Income Tax Law & Practice, Kalyani Publishers.
2. Murthy.A,IncomeTaxLaw&Practice,VijayNicoleImprintsPvt.Ltd.Chennai
3. Reddy, T.S. &Hariprasad Reddy, Y, Income Tax Theory, Law & Practice, Margham Publications, Chennai.

Reference books

1. Mehrotra-Income Tax Law & Accounts, Sahithiya Bhavan Publications.
2. Vinod, K.Singhania, Students Guide to Income Tax, Taxman Publications Pvt. Ltd.

INTERNAL ELECTIVE
PAPER - 2

B. BUSINESS ENVIRONMENT

UNIT - I

The concept of Business Environment - Its nature and significance - Brief overview of political - Cultural - Legal - Economic and social environments and their impact on business and strategic decisions.

UNIT - II

Political Environment - Government and Business relationship in India - Provisions of Indian constitution pertaining to business

UNIT - III

Social Environment - Cultural heritage - Social attitudes - impact of foreign culture - castes and communities - Joint family systems - Linguistic and Religious groups - Types of Social Organization

UNIT - IV

Economic Environment - Economic Systems and their impact of Business - Macro Economic Parameters like GDP - Growth Rate - Population - Urbanization - Fiscal deficit - Plan investment - Per capita Income and their impact on business decisions

UNIT - V

Financial Environment - Financial System - Commercial banks - RBI - IDBI - Non-Banking Financial Companies NBFC's

Text Books:

1. Dr. S. Sankaran - Business Environment. Margham Publications, Chennai
2. Aswathappa - Business Environment, Himalaya Pub. House, 2009.

Reference Books:

1. Dasgupta and Sengupta - Government and Business in India.
2. Srinivasan K - Productivity and Social Environment.
3. International Business Environment - Prentice - Hall of India.
3. Dhanabakiyam & M. Kavitha, Business Environment, Vijay Nicole Imprints Pvt. Ltd. Chennai.

INTERNAL ELECTIVE
PAPER - 2
C. SERVICES MARKETING

Objective:

To enable the students to acquire a deep knowledge in services marketing.

UNIT - I

Concept of service - Meaning, definitions - Components and types - Service Vs goods - Service Marketing mix characteristics - Advertising - objectives - Advertising message and media selection - merits - personal selling - process - Advantages

UNIT - II

Physical evidence - Essential and peripheral evidence - Guidelines for physical evidence - Managing demand and supply Capacity constraints - demand patterns - Capacity planning and types - Managing capacity to match demand - Managing demand to match capacity

UNIT - III

Pricing in services - objectives - types of pricing - characteristics and factors affecting pricing decisions - customer relationship marketing - objectives and requisites - benefits

UNIT - IV

Quality of service - five dimensions of quality - Gap analysis and causes for customer gap - key factors leading to Customer Gap - Provider Gaps

UNIT - V

Marketing of Services by Insurance business - Banks - Education - Tourism - Transport.

REFERENCE BOOKS:

1. S.M.Jha, Services Marketing, Himalaya Publications, New Delhi
2. M.K.Rampal & S.L.Gupta, Services Marketing, Galgotta Pub. House
3. Dr.B.Baly, Services Marketing, S. Chand & Co., New Delhi
4. Vasanthi Venugopal & Raghu V.N, Services Marketing, Himalaya Publications, New Delhi.
5. Dr.L. Natarajan, Services Marketing, Margham Publications, Chennai.

INTERNAL ELECTIVE
(To choose any 1 out of 3)

PAPER - 3

A. SOFTWARE ENGINEERING

UNIT - I

Introduction - Evolving Role of Software - Changing Nature of Software - Software Myths; a Generic View of Process: Layered Technology - Process Models: Waterfall Model - Evolutionary Process Models.

UNIT - II

Requirements Engineering: Tasks - Initiating the Requirements Engineering Process - Eliciting Requirements - Building the Analysis Model - Requirements Analysis - Data Modeling Concepts.

UNIT - III

Data Engineering: Design Process and Design Quality - Design Concepts - The Design Model Creating an Architectural Design: Software Architecture - Data Design -Architectural Design - Mapping Data Flow into Software Architecture; Performing User Interface Design: Golden Rules.

UNIT - IV

Testing Strategies: Strategic Approach to Software Testing- Test Strategies for Conventional and Object Oriented Software - Validation Testing - System Testing -Art of Debugging. Testing Tactics: Fundamentals - White Box- Basis Path - Control Structure - Black Box Testing Methods

UNIT - V

Project Management: Management Spectrum - People - Product - Process - Project. Estimation: Project Planning Process - Resources - Software Project Estimation - Project Scheduling - Quality Concepts - Software Quality Assurance - Formal Technical Reviews.

TEXT BOOK:

1. Roger S Pressman, "Software Engineering - A Practitioner's Approach", Sixth Edition, McGraw Hill International Edition, New York: 2005.

REFERENCES:

1. Ian Somerville, "Software Engineering", 7th Edition, Pearson Education, 2006.
2. Mall Rajib," Software Engineering", 2/E, PHI, 2006.

INTERNAL ELECTIVE

PAPER - 3

B. DATA MINING

UNIT - I

Data Mining - Introduction - Meaning- importance of Data mining - various kinds of data - Data Mining Functionalities - Various kinds of Patterns - Pattern Interesting Classification of Data mining Systems - Data mining Task Primitives - Integration of Data Mining System - Major issues in Data Mining.

UNIT - II

Data Processing - Process the Data Descriptive Data Summarization - Measuring Central Tendency Dispersion of Data Graphic Displays of -Basic Descriptive Data Summaries Data Cleaning Data Integration and Transformation data Reduction Data Discrimination - Concept Hierarchy Generation

UNIT - III

Data Warehouse OLAP Technology An overview - Data Warehouse Multidimensional Data Model Data Warehouse Architecture Data Warehouse Implementation from Data Warehouse to Data mining

UNIT - IV

Mining - Frequent Patterns Associations Correlations - Basic Concepts Road Map Efficient Scalable Frequent Item set Mining methods Mining - Various Kinds of Association rules Analysis - Association mining to Correlation Constrain Based Association mining

UNIT - V

Applications Trends - Data mining Applications Data mining - System Products Research Prototype Additional Themes on Data Mining Social impact of Data mining Trends in Data mining

Text Book:

1. **Data Mining** (Concepts and Techniques) Second Ed (Chapter 1,2,3,5,11)

Author: Jiawei Han and Micheline Kamber **Publishers:** Morgan Kaufmann Publishers (An imprint of Elsevier)

Reference Books:

1. Data Mining (Next Generation Challenges and Future Directions) Author: Karguta, Joshi, Sivakumar & Yesha **Publishers:** Printice Hall of India (2007)
2. Data Mining (Practical Machine Learning Tools and Techniques (Second Edition) **Author:** Ian H. Witten &Eibe Frank **Publishers:** Morgan Kaufmann Publishers (An imprint of Elsevier)
3. Data Warehousing, Data mining & OLAP (Edition 2004) **Author:** Alex Benson, Stephen V. Smith **Publishers:** Tata McGraw - Hill

INTERNAL ELECTIVE

PAPER - 3

INTERNET OF THINGS

Objectives:

This course presents the Introduction to IoT, M2M,IoT Architecture, IoT Model And Views, IOT protocols and Real world design constraints enable the students to learn the concepts of IoT.

UNIT - I

INTRODUCTION TO IoT

Objective: To understand the fundamentals of Internet of Things.

Introduction to Internet of Things -Definition and Characteristics of IoT- Physical Design-Logical Design-IoT Enabling Technologies -IoT Levels & Deployment Templates - Domain Specific IoTs - Home - City - Environment - Energy - Retail - Logistics - Agriculture - Industry - health and Lifestyle.

UNIT - II

M2M and IoT ARCHITECTURE

Objective: To understand the M2M and IoT Architecture

IoT and M2M - Difference between IoT and M2M -SDN -IoT System Management with NETCONF-YANG-IoT Platforms Design Methodology - M2M high-level ETSI architecture - IETF architecture for IoT- OGC architecture -Service Oriented Architecture - IoT reference architecture

UNIT - III

IoT MODEL AND VIEWS

Objective: To understand the IoT Model And Views

IoT reference model - Domain model - information model - functional model - communication model - Functional View - Information View - Deployment and operational View - other relevant architectural views - data representation and visualization.

UNIT - IV

IoT PROTOCOLS

Objective: To learn about the basics of IOT protocols.

Protocol Standardization for IoT - Efforts - M2M and WSN Protocols - SCADA and RFID Protocols - Unified Data Standards - Protocols - IEEE 802.15.4 - BACNet Protocol - Modbus-Zigbee Architecture - Network layer - 6LowPAN -CoAP - Security

UNIT - V

REAL-WORLD APPLICATIONS

Objectives: Analyze applications of IoT in real time scenario.

Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT - Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT- Amazon Web Services for IoT.

TEXT BOOKS:

1. "Interconnecting Smart Objects with IP: The Next Internet", Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann, 2010.

2. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015.

3. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014.

REFERENCES:

1. "Internet of Things - A hands-on approach‖", ArshdeepBahga, Vijay Madisetti, Universities Press, 2015

2. "Architecting the Internet of Things‖,"DieterUckelmann, Mark Harrison, Michahelles, Florian (Eds), Springer, 2011.

3. "The Internet of Things in the Cloud: A Middleware Perspective‖", Honbo Zhou, CRC Press, 2012.

4. "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Jan Ho¨ ller, VlasiosTsiatsis, Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand, David Boyle, Elsevier, 2014.

5. "The Internet of Things - Key applications and Protocols", Olivier Hersent, David Boswarthick, Omar Elloumi ,Wiley, 2012.

SKILL BASED SUBJECT

PAPER - 4

INDUSTRIAL RELATIONS

Objective: To enable the students to learn the concepts of Industrial Relations including trade unions, collective bargaining and various labour enactments.

UNIT - I

Industrial Relations (IR)

Concept of Industrial Relations; Nature of Industrial Relations; Objectives of IR; Factors affecting IR in changing Environment, Evolution of IR in India; Role of State; International Dimensions of IR.

UNIT - II

Trade Union

Trade Union: Origin and growth, unions after Independence, unions in the era of liberalization; Factors affecting growth of Trade Unions in India, Major Provisions of Trade Union Act 1926.

UNIT - III

Collective Bargaining and Worker's Participation in Management

Collective Bargaining: Meaning, Nature, Types, Process and Importance of Collective Bargaining Status of Collective Bargaining in India, Functions and role of Trade Unions in Collective bargaining.

Workers' Participation in Management: Consent, practices in India, Works Committees, Joint management councils; Participative Management and co-ownership; Productive Bargaining and Gain Sharing.

UNIT - IV

The Industrial Disputes Act, 1947:

Definitions of Industry, workman, and Industrial Dispute; Authorities under the Act; Procedure, Powers and Duties of Authorities; Strikes and Lock outs; Lay-off and Retrenchment; Provisions relating to Layoff, Retrenchment, and closure.

UNIT - V

The Factories Act, 1948:

Provisions relating to Health, Safety, Welfare facilities, working hours, Employment of young persons, Annual Leave with wages.

Text Books:

1. B. Nandhakumar, *Industrial Relations and Labour Welfare and Labour Laws* - Vijay Nicole Imprints Private Ltd., Chennai.
2. JP Sharma*, Simplified Approach to Labour Laws*, Bharat Law House (P) Ltd.

Reference Books:

1. PK Padhi, *Industrial Relations and Labour Law*, PHI Learning.
2. Arun Monalppa, *Industrial Relations and Labour Law*, McGraw Hill Education.
3. SC Srivastav, *Industrial Relations and Labour Law*, Vikas Publishing House.
4. C.S. Venkata Ratnam, *Industrial Relations*, Oxford University Press.
5. P.L. Malik's *Handbook of Labour and Industrial Law*, Vol 1 and Vol 2, Eastern Book Company.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. BIOCHEMISTRY
UNDER CBCS

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3	III	Core Theory	Paper-1	6	4	Cell biology	25	75	100
4	III	Core Practical	Practical-1	4	0	Titrimetric and Qualitative analysis	0	0	0
5	III	Allied -1	Paper-1	4	3	Chemistry I	25	75	100
6	III	Allied- 1	Practical-1	2	0	Chemistry I & II	0	0	0
7	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
8	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**20**		**150**	**450**	**600**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
10	III	Core Theory	Paper-2	5	4	Biomolecules	25	75	100
11	III	Core Practical	Practical-1	3	2	Titrimetric and Qualitative analysis	25	75	100
12	III	Allied-1	Paper-2	4	3	Chemistry II	25	75	100
13	III	Allied Practical - 1	Practical-1	2	2	Chemistry I & II	25	75	100
14	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
15	IV	Value Education		2	2	Value Education	25	75	100
16	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**

THIRUVALLUVAR UNIVERSITY
B.Sc. BIOCHEMISTRY

SYLLABUS
UNDER CBCS
(With effect from 2020-2021)

SEMESTER I

PAPER - 1

CELL BIOLOGY

At the end of the course, the student will be able to

CO NUMBER	CO Statement
CO1	Explain the structures and functions of basic components of prokaryotic and eukaryotic cells
CO2	Describe the structure, function and composition of cell membrane and communicate the types and mechanism of membrane transport
CO3	Discuss the structure and functions of cellular organelles
CO4	Understand the types of microfilaments and mitochondria
CO5	Describe nucleus and nucleolus ,Illustrate the phases of cell cycle; in particular mitosis and describe the significance of meiosis in genetic diversity Relate the structure and biological role of extra cellular matrix and cell -cell junction with physiological processes

UNIT - I 15 hrs

An overall view of cells - origin and evolution of cells. Cell theory. Classifications of cell - Prokaryotic and Eukaryotic cells. Differences between prokaryotic and eukaryotic cells. Scope of cell biology

UNIT - II 15 hrs

Cell membrane- Evolution, Fluid Mosaic Model of membrane structure. Membrane proteins and their properties. Membrane carbohydrates and their role. Transport mechanism –Uniport, Symport and Antiport. Simple, facilitated diffusion, active and passive transport.

UNIT – III 15 hrs

Endoplasmic reticulum - types, structure and functions. Golgi apparatus- structures and functions. Ribosomes - types, structure and functions. Lysosomes- structure and functions.

UNIT - IV 15 hrs

Cytoskeleton: Types of filaments and their functions. Microfilaments and Microtubules: Chemistry and function (esp. cilia and flagella). Actin and Myosin. Mitochondria: Structure and function

UNIT – V 15 hrs

Nucleus and nucleolus- structure and functions .Chromosome-chromatin structure, the cell cycle - phases of cell cycle. Meiotic and mitotic cell divisions, cell- cell communications, cell recognition, cell adhesion and cell functions.

REFERENCES

1. Rastogi . S.C. Cell Biology. Newage Publishers, (2008).
2. Devasena.T, Cell Biology, Oxford University Press India First edition (2012).
3. Cooper, G.M. and Hausman, R.E. The Cell: A Molecular Approach Sinauer Associates, Inc 6th edition (February 1, 2013)
4. Verma.P.S and Agarwal.V.K. Cell biology, Genetics, Molecular biology, Evolution and Ecology, S.Chand & Co Ltd, 2004

SEMESTER I

CORE PRACTICAL-1
PRACTICAL-1

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO STATEMENT
CO1	Qualitatively analyze the carbohydrates and amino acids and report the type of carbohydrate based on specific tests
CO2	Differentiate the carbohydrates based microscopic examination of the crystal structure.
CO3	Quantify glucose by benedicts method
CO4	Quantify ascorbic acid in lemon by Dichlorophenol indo phenol dye method
CO5	Quantify glycine by Sorenson's formol titration method
CO6	Determine lipid properties of unsaturation and fatty acid content by SAP number and iodine number

I. QUALITATIVE ANALYSIS

A) Qualitative analysis of Carbohydrates

1. Qualitative analysis of Glucose,
2. Qualitative analysis of Fructose,
3. Qualitative analysis of Arabinose/Xylose,
4. Qualitative analysis of Maltose,
5. Qualitative analysis of Sucrose
6. Qualitative analysis of Starch
7. Qualitative analysis of unknown sugar.

B) Qualitative analysis of Amino acids

1. Qualitative analysis of Arginine,
2. Qualitative analysis of Cysteine,
3. Qualitative analysis of Tryptophan
4. Qualitative analysis of Tyrosine
5. Qualitative analysis of unknown amino acids.

II. QUANTITATIVE ANALYSIS:

1. Estimation of ascorbic acid using 2, 6 – dichlorophenol indophenol as link solution, present in unknown solution

2. Estimation of Glycine by Sorenson formal titration.
3. Determination of glucose by Benedict's method.

DEMONSTRATION EXPERIMENTS

1. Determination of SAP number.
2. Determination of Acid number.

TEXT BOOKS/ REFERENCE BOOKS

1. J. Jayaraman, Laboratory Manual in Biochemistry, New Age International Pvt Ltd Publishers, 2011.
2. S. K. Sawhney Randhir Singh, Introductory Practical Biochemistry, Alpha Science International, Ltd 2 edition, 2005.
3. Irwin H.Saegal, Biochemical calculations, Liss, Newyork, 1991

ALLIED - 1
PAPER - 1

CHEMISTRY I

OBJECTIVE:

- Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications wherever necessary are to be taught for I- Semester.

UNIT – I

1.1General Metallurgy - Extraction of Metals - Minerals and Ores- Difference between Minerals and Ores – Minerals of Iron, Aluminum and Copper - Ore Dressing or Concentration of Ores - Types of Ore Dressing- Froth Floatation process, Gravity separation and Magnetic separation.

1.2 Calcination, Smelting, Roasting, Fux, Slag - Definition - Reduction methods - Goldschmidt Aluminothermic process and Carbon Reduction method - Refining of Metals - Electrolytic, Van Arkel and Zone Refining.

1.3 Ores of Titanium and Cobalt - Extraction of Titanium and Cobalt.

UNIT – II

1. Cycloalkanes - Preparation – Wurtz reaction and Dieckmann's condensation - Properties of Cycloalkanes – Substitution and Ring opening reactions.

2.2 Polarisation - Inductive effect, Mesomeric effect and Steric effect (Acid and Base Strength).

2.3Stereoisomerism – Types - Cause of Optical Activity – Enantiomers - Diastereomers - Meso form - Optical Activity of Lactic acid and Tartaric acid - Racemisation and Resolution – Definition and Methods - Geometrical isomerism – Definition and example - Maleic and Fumaric acid – Differences.

UNIT – III

3.1 Chemical Kinetics – Rate of a reaction – Definition of Order and Molecularity – Distinction between Order and Molecularity - Derivation of First order rate equation - Half Life Period of first order reaction.

3.2 Catalysis - Catalyst - Autocatalyst - Enzyme catalyst - Promoters - Catalytic poisons –

Active Centre - Differences between Homogeneous and Heterogeneous Catalysis - Industrial Applications of Catalysts.

3.3 Photochemistry – Grothus-Draper's law – Stark-Einstein's law - Quantum yield – Photosynthesis - Phosphorescence – Fluorescence.

UNIT – IV

4.1 VSEPR Theory – Hybridisation and Shapes of simple molecules BF_3, PCl_5, SF_6 and XeF_6.

4.2 Fuels – Classification of Fuels - Calorific value of Fuels – Water gas, Carbureted Water gas and Producer gas – Composition and Uses - Non-Conventional fuels - Need of Solar Energy - Applications - Biofuels – Oil gas, Natural gas and LPG – Uses.
4.3 Osmosis - Osmotic pressure - Reverse osmosis – Definition - Desalination of Sea water.

UNIT – V

5.1Nuclear Chemistry – Atomic number, Mass number - Isotopes, Isobars and Isotones – Definition and Examples - Definition of Half life period - Nuclear Binding Energy, Mass Defect and N/P ratio - Nuclear Fission and Nuclear Fusion (Elementary idea) - Applications of Radioisotopes in Medicine, Agriculture and Industries – Carbon Dating.

5.2 Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking –
Naphthalene – Preparation – Haworth's method – Properties – Oxidation, Reduction and Uses of Naphthalene - Structure of Naphthalene (Structural elucidation not necessary).

5.3 Conductors, Insulators, Semiconductors, N- and P- Type Semiconductors – Definitions and Examples.

SEMESTER II

CORE THEORY
PAPER – 2

BIOMOLECULES

OBJECTIVE

To understand the importance, structure, properties and functions of various biomolecules.

COURSE OUTCOMES

CO NUMBER	CO STATEMENT
CO1	To gain the knowledge about the classification, structure, properties and functions of carbohydrates.
CO2	Able to understand the classification, structure, properties and importance of amino acids.
CO3	To understand and gain knowledge about the classification of proteins, levels of structural organization of proteins and its properties.
CO4	To gain insights about the types, structure and properties of nucleic acids.
CO5	To acquire knowledge about the classification, structure and properties of different types of lipids.

UNIT I: CHEMISTRY OF CARBOHYDRATES 15 hrs

Introduction -Definition of carbohydrates, classification – monosaccharide, oligosaccharides and polysaccharides; occurrence, structure and functions of monosaccharide (glucose and fructose).General properties with reference to glucose, anomer, epimer, enantiomer and mutarotation. Structure, occurrence, properties and biological importance of disaccharides (sucrose, lactose, maltose) and Polysaccharides-Storage polysaccharides (starch, glycogen), Structural polysaccharides (cellulose, chitin), Heteropolyasaccharides (hyaluronic acid, heparin).

UNIT II: CHEMISTRY OF AMINOACIDS 15 hrs

Amino acids- structure and classification based on structure. Standard and non standard amino acids, Essential and non essential amino acid. Physical properties: isoelectric points and zwitter ion. General reactions of amino acids – Edman's reaction, Sanger's reaction, reaction with Dansyl chloride and Ninhydrin reaction.

UNIT III: CHEMISRTY OF PROTEINS 15 hrs

Definition, classification of proteins based on size, solubility, chemical composition functions , structure of proteins- peptide bond, primary, secondary, tertiary and quaternary structure of proteins, forces that determine folding and conformation and structural organization, Physical properties: salting in and salting out and denaturation.

UNIT IV: CHEMISTRY OF NUCLEIC ACIDS 15 hrs

Nucleic acids – Definition, bases, Nucleotides and Nucleosides, phosphodiester linkage; Nucleic acid types –DNA and RNA; structure- double helical structure of DNA; Properties of DNA – Denaturation , Renaturation, Tm and hyperchromicity, structure of RNA and its major types -tRNA, mRNA and rRNA.

UNIT V: CHEMISTRY OF LIPIDS 15 hrs

Introduction, definition and classification of lipids- simple, compound (phospholipids) and derived lipids (cholesterol).Classification of fatty acids – saturated fatty acids, unsaturated fatty acids. Physical property-emulsification. Chemical properties- saponification number, Rancidity, acid number, Iodine number and Reichert – Meissl number.

REFERENCES

1. Ambika shunmugam, “Fundamendals of Biochemistry(8th Edition)2016, Wolters Kluwer India Pvt Ltd
2. Dr.A.C.Deb, “Fundamentals of Biochemistry” (8th edition), Kolkata, New Central Book Agency
3. Nelson, D. L. & Cox, M. M. Lehninger Principles of Biochemistry. Freeman, 5th edn, 2008.
4. Harper’s Illustrated Biochemistry.30th edition -McGraw Hill
5. U.Sathayanarayana,(2006). Biochemistry. 3rd Edition by Books and Allied (P) Ltd., India.
6. Donald Voet and Judith Voet,”Biochemistry”,2nd edition,John Wiley & Sons,Inc,NY

ALLIED - 1
PAPER - 2

CHEMISTRY II

OBJECTIVE:

- Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins, Medicinal Chemistry, Corrosion and Applications wherever necessary are to be taught for II- semester.

UNIT – I

1.1 Coordination Chemistry - Nomenclature of Coordination Compounds - Ligands, Central Metal Ion and Complex Ion – Definition and Examples – Coordination Number - Werner's Theory of Coordination Compounds - Chelates - Functions and Structure of Haemoglobin and Chlorophyll.

1.2 Industrial Chemistry - Fertilisers and Manures – Biofertilisers - Organic Manures and their importance - Role of NPK in plants - Preparation and Uses of Urea, Ammonium Nitrate, Potassium Nitrite and Super Phosphate of Lime.

1.3 Contents in Match Sticks and Match Box - Industrial making of Safety Matches – Preparation and Uses of Chloroform, DDT, Gammexane and Freons.

UNIT – II

2.1 Carbohydrates - Definition and Examples - Classification – Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate.

2.2 Amino Acids – Definition and Examples - Classification of Amino Acids - Preparation - Gabriel Phthalimide Synthesis – Properties – zwitterion and Isoelectric point - Structure of Glycine.

2.3 Proteins – Definition - Classification of Proteins based on Physical properties and Biologcal functions - Primary and Secondary Structure of Proteins (Elementary Treatment only) – Composition of RNA and DNA and their Biological role - Tanning of Leather - Alum (Aluminum chloride tanning) - Vegetable tanning – Chrome Tanning.

UNIT – III

3.1 Electrochemistry - Electrolytes – Definition and Examples – Classification - Specific and Equivalent Conductance - their determination – Variation of Specific and Equivalent conductance with Dilution – Ostwald's Dilution Law and its Limitations.

3.2 Kohlrausch's Law - Determination of Dissociation Constant of weak Electrolytes using Conductance measurement - Conductometric titrations.

3.3 pH – Definition and pH determination by indicator method - Buffer solutions - Buffer action - Importance of buffers in the living systems.

UNIT – IV

4.1Paints - Components of Paint – Requisites of a Good Paint - Pigments – Classification of Pigments on the basis of Colour – Examples - Dyes – Definition – Chromophores and Auxochromes – Examples - Colour and Dyes - Classification based on Constitution and Application – Examples.

4.2 Vitamins – Definition – Classification – Water Soluble and Fat Soluble – Occurrence - Biological Activities and Deficiency Diseases caused by Vitamin A, B, C, D, E and K - Hormones – Definition and Examples – Biological Functions of Insulin and Adrenaline.

4.3 Chromatography - Principles and Applications of Column and Paper chromatography- R_f value.

UNIT – V

5.1 Drugs - Sulpha Drugs – Preparation and Uses of Sulphapyridine and Sulphadiazine - Mode of Action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicol and Streptomycin - Drug Abuse and Their Implication - Alcohol – LSD.

5.2 Anaesthetics - General and Local Anaesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS.

5.3 Electrochemical Corrosion and its Prevention – Electroplating – Applications.

ALLIED PRACTICAL

CHEMISTRY

VOLUMETRIC ANALYSIS

1. Estimation of HCl – Standard sulphuric acid.
2. Estimation of Borax - Standard Sodium Carbonate.
3. Estimation of NaOH – Standard Oxalic Acid.
4. Estimation of $FeSO_4$ – Standard FAS.
5. Estimation of Oxalic acid – Standard $FeSO_4$.
6. Estimation of FAS – Standard Oxalic Acid.
7. Estimation of Oxalic acid – Standard Oxalic Acid.
8. Estimation of Fe^{2+} using Diphenylamine / N- Phenyl Anthranilic acid as indicator.

ORGANIC ANALYSIS

Systematic Analysis of Organic Compounds containing One Functional Group and Characterisation by Confirmatory Tests.

Reactions of Aromatic Aldehyde, Carbohydrates, Mono and Dicarboxylic acids,
Phenol, Aromatic Primary Amine, Amide and Diamide.

REFERENCE BOOKS

- Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).
- Inorganic Chemistry - B. R.. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications (2013).
- Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
- Text Book of Inorganic Chemistry – R. Gopalan, Universities Press – 2012.
- Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
- Advanced Organic Chemistry - Bahl and Arun Bahl - Sultan Chand and Co. Ltd – 2012.
- Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
- A Text Book of Organic Chemistry K. S. Tewari, N. K. Vishol, S. N. Mehrotra-Vikas Publishing House – 2011.
- Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishal Publishing Company – 2013.
- Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha andU. N. Dash - Sultan Chand & Co – 2006.
- Understanding Chemistry – C. N. R. Rao, Universities Press – 2011.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. BIOCHEMISTRY
UNDER CBCS

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	6	4	Cell biology	25	75	100
	III	Core Practical	Practical-1	4	0	Titrimetric and Qualitative analysis	0	0	0
4.	III	Allied -1	Paper-1	4	3	Chemistry I	25	75	100
	III	Allied- 1	Practical-1	2	0	Chemistry I & II	0	0	0
5.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
6.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**20**		**150**	**450**	**600**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
7.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8.	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
9.	III	Core Theory	Paper-2	5	4	Biomolecules	25	75	100
10.	III	Core Practical	Practical-1	3	2	Titrimetric and Qualitative analysis	25	75	100
11.	III	Allied-1	Paper-2	4	3	Chemistry II	25	75	100
12.	III	Allied Practical - 1	Practical-1	2	2	Chemistry I & II	25	75	100
13.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
14.	IV	Value Education		2	2	Value Education	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**

S.NO	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER III							CIA	Uni. Exam	Total
16.	I	Language	Paper-3	6	4	Tamil/Other Languages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-3	4	4	Analytical Biochemistry	25	75	100
	III	Core Practical	Practical-2	3	0	1. Colorimetry 2. Biochemical Preparation 3. Chromatographic Separation 4. Electrophoretic Technique	0	0	0
19.	III	ALLIED-2	Paper-3	4	3	(To choose 1 out of 2) 1. Microbiology I 2. Zoology I	25	75	100
	III	Allied Practical	Practical-2	3	0		0	0	0
20.	IV	Skill based Subject	Paper-1	2	2	First Aid	25	75	100
21.	IV	Non-major elective	Paper-1	2	2	Food & Nutrition	25	75	100
				30	**19**		**150**	**450**	**600**
SEMESTER IV							CIA	Uni. Exam	Total
22.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
23.	II	English	Paper-4	6	4	English	25	75	100
24.	III	Core Theory	Paper-4	4	4	Plant Biochemistry	25	75	100
25.	III	Core Practical	Practical-2	3	3	1. Colorimetry 2. Biochemical Preparation 3. Chromatographic Separation 4. Electrophoretic Technique	25	75	100
26.	III	ALLIED-2	Paper-4	4	3	(To choose 1 out of 2) 1. Microbiology II 2. Zoology II	25	75	100
27.	III	Allied Practical-2	Practical-2	3	2		25	75	100
28.	IV	**NMSDC : Digital Skills for Employability**	**Paper-2**	**2**	**2**	**Office Fundamentals**	**25**	**75**	**100**
29.	IV	Non-major elective	Paper-2	2	2	Life style diseases and prevention	25	75	100
				30	**24**		**200**	**600**	**800**

S.NO	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER V							CIA	Uni. Exam	Total
30.	III	Core Theory	Paper-5	6	6	Enzymes and Intermediary Metabolism	25	75	100
31.	III	Core Theory	Paper-6	6	6	Molecular Biology	25	75	100
32.	III	Core Theory	Paper-7	6	5	Physiology and Nutrition	25	75	100
	III	Core Practical	Practical-3	3	0	1. Colorimetric Estimations 2. Enzyme Assay	0	0	0
	III	Core Practical	Practical-4	3	0	1. Hematology 2. Microbiology 3. Urine Analysis	0	0	0
33.	III	Internal Elective	Paper-1	3	3	Molecular Endocrinology	25	75	100
34.	IV	Skill based Subject	Paper-3	2	2	Medical Lab technology	25	75	100
				30	**22**		**125**	**375**	**500**
SEMESTER VI							CIA	Uni. Exam	Total
35.	III	Core Theory	Paper-8	5	5	Clinical Biochemistry	25	75	100
36.	III	Core Theory	Paper-9	5	5	Biotechnology	25	75	100
37.	III	Core Practical	Practical-3	3	3	3. Colorimetric Estimations 4. Enzyme Assay	25	75	100
38.	III	Core Practical	Practical-4	3	3	1. Hematology 2. Microbiology 3. Urine Analysis	25	75	100
39.	III	Core Project		5	5	**(Individual / Group Project)**	25	75	100
40.	III	Internal Elective	Paper-2	3	3	Immunology	25	75	100
41.	III	Internal Elective	Paper-3	3	3	Pharmaceutical Biochemistry	25	75	100
42.	IV	Skill based Subject	Paper-4	3	2	Research Methodology	25	75	100
43.	V	Extension Activities		-	1		100	0	100
44.	-	**NMSDC : Employability Readiness**		-	-	**(choose any one)** • **Naandi** • **Unnati** • **Quest** • **Izpay** • **IBM Skills build**	-	-	-
				30	**30**		**300**	**600**	**900**
					140				**4300**

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English & English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	3	10	100	200
	Allied Practical	2	2		100	200
	Electives	3	3	9	100	300
	Core	9	(3-5)	43	100	900
	Core practical	4	(2-3)	11	100	400
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	**43**		**140**		**4300**

THIRUVALLUVAR UNIVERSITY
B.Sc. BIOCHEMISTRY

SYLLABUS
UNDER CBCS
(With effect from 2020-2021)

SEMESTER III

CORE PAPER - 3

ANALYTICAL BIOCHEMISTRY

OBJECTIVE:

To obtain analytical skills and practical knowledge on various techniques involved in biochemistry

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO STATEMENT
CO1	• A practical knowledge on the preparation of solutions • Separate biological sample by centrifugation • Separation of subcellular organelles by differential centrifugation
CO2	• Obtaining analytical skills to separate samples (amino acids) using paper chromatography.
CO3	• Advanced knowledge about the interactions of electromagnetic radiation and matter and their applications in spectroscopy • Assay of biomolecules using UV spectroscopy and spectrofluorimetry
CO4	• Demonstrate the methodology involved in separation of proteins, Nucleic acid by various electrophoretic techniques.
CO5	• Acquire knowledge on atomic structure. • Radiation, types of radioactive decay, • Detection and measurement of radioactivity using GM counter and Scintillation counter. • Biological hazards of radiation and safety measures in handling radio isotopes.

UNIT - I

CENTRIFUGATION **(15 Hrs)**

Definition - pH, pOH. Molarity, Molality and Normality. Examples for preparing solutions (1N, 1 M solutions etc.,). Buffers-Definition**.** Basic principles of centrifugation, RCF, sedimentation

coefficient / Svedberg unit, differential centrifugation, density gradient centrifugation, Analytical ultracentrifuge-Components and its application in separation of macromolecules

UNIT - II

CHROMATOGRAPHY (15 Hrs)

Principles of chromatography, Partition coefficient- Rf value. Principle, operation procedure and applications of Paper chromatography, Thin layer chromatography, Ion exchange, Gel permeation chromatography and affinity chromatography and its applications in separation of macromolecules.

UNIT - III

SPECTROSCOPY (15 Hrs)

Electromagnetic spectrum-Regions. Definitions fot wavelength, wavenumber and frequency, Stoke's shift. Absorption and emission spectra. Beer- Lambert law. Absorbance and transmittance. UV and Visible spectrophotometry, Principle Instrumentation, and applications on coupled enzyme assays. Spectrofluorimetery and Atomic absorption and Flame emission spectroscopy-Principle Instrumentation, and applications

UNIT - IV

ELECTROPHORETIC TECHNIQUES (15 Hrs)

Principles of electrophoresis, electrophoretic mobility. Factors affecting electrophoretic mobility - sample, electric field, supporting medium, composition of buffer. Sodium dodecyl sulphate polyacryl amide gel electrophoresis (SDS- PAGE), methodology and its application. Determination of molecular weight of proteins by SDS PAGE.

UNIT - V

RADIOACTIVITY (15 Hrs)

Atomic structure, radiation, types of radioactive decay, half life, units of radio activity. Detection and measurement of radioactivity - methods based upon ionization (GM counter), methods based upon excitation (Scintillation counter).Autoradiography. Applications of radioisotopes in the elucidation of metabolic pathways. Biological hazards of radiation and safety measures in handling radio isotopes.

TEXT BOOKS/ REFERENCE BOOKS:

1.Chatwal Anand, Instrumental methods of Analysis, Himalaya Publishing house 2014

2.Wilson Walker, Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology, Cambridge University Press. 2018

3.Dr. AvinashUpadhyay, Dr. Kakoli Upadhyay, Dr. NirmalenduNath Biophysical Chemistry Himalaya Publishing house, 2016

ALLIED -2

PAPER - 3

(to choose one out of 2)

MICROBIOLOGY I

Course outcomes

1. To gain knowledge on history of microbiology and various types of microscopes
2. To learn about cell structure and staining methods
3. To understand Microbial Classification and genome organization
4. To gain knowledge on culturing microorganisms and microbial growth
5. To learn about antimicrobials and various groups of microorganisms

UNIT - I

Definition and scope of Microbiology, History and Recent Developments, Spontaneous generation, Biogenesis, Contribution of Louis Pasteur, Anton van Leeuwenhoek, Lazzaro Spallanzani, John Tyndall, Joseph Lister, Robert Koch; Microscopy - Simple, Compound, Light Microscopy, Dark ground, Phase contrast, Fluorescence and Electron Microscopy.

UNIT - II

Anatomy of Prokaryotic and Eukaryotic cells - ultra structure and function of cell wall and cell organelles. Microbial morphology - wet mount, Hanging drop technique; staining methods - Dyes, Simple, Differential and Special staining techniques - Acid fast staining, spore stain, Capsule stain, staining for metachromatic granules.

UNIT - III

Microbial Classification, Five Kingdom concept, Binomial Nomenclature of microbes, species concept, classical approach with examples; Classical techniques of Microbial identification - Morphological, Physiological and Biochemical properties; Bacterial genome and its organization, Plasmids and their significance.

UNIT - IV

Media preparation, Aerobic and Anaerobic culture techniques, pure culture techniques, Preservation of cultures; Measurement of microbial growth, Batch and continuous culture, Growth Determination - Growth curve; Sterilization – physical and chemical methods.

UNIT - V

Antimicrobial chemotheraphy - Antibiotics - source, classification, mode of action - Antimicrobial resistance - Tests for Sensitivity to Antimicrobial agents and its Quality control; General characteristics and classification of Algae - *Chlorella*, Fungi – *Mucor*, Protozoa – *Entamoeba*, Viruses – Rabies virus and Bacteriophages – T4.

Text Book:

- Prescott's Microbiology. 10th Edition, 2016. Willey J., Sherwood L., Woolverton C.J. McGraw Hill Education, New York.

Reference Books:

- Principles of Microbiology. 2nd Edition, 1997. Atlas R.M. William C Brown Publishers, New York.
- Microbiology. 5th Edition, 2006. Pelczar T.R., Chan E.C.S. and Krieg N.R. Tata McGraw-Hill, New Delhi.
- Foundations in Microbiology. 8th Edition, 2001. Talaro K.P. and Chess B. McGraw Hill Companies, New York.
- Microbiology: Principles and Explorations. 8th Edition, 2012. Black J.G. 2012. John Wiley & Sons, Inc., Hoboken, New Jersey.
- Microbiology: An Introduction. 10th Edition, 2010. Tortora G.J., Funk B.R. and Case C.L. Benjamin Cummings, San Francisco.

ALLIED -2

PAPER - 3

ZOOLOGY I

Objective;

To acquire knowledge about different kinds of animals species.

To study the systematic and functional morphology of invertebrates and chordates.

UNIT-I

Type study includes life history.

Protozoa – entamoeba, Porifera- Sycon. Coelenterata – Obelia geniculata. Platyhelminthes - Teania solium.

Unit II

Annilida – earthworm , Arthropoda – Prawn, Mollusca – Freshwater Mussel,Echinodermata – Sea Star.

UNIT-III

Type study includes morphology, digestive system, respiratory system, circulatory system and urinogenital system of Chordate. Chordate – general characters, Prochordata; morphology of Amphioxus. Vertebrates; Pisces –Shark.

UNIT-IV

Amphibia; Frog, Reptiles; calotes.

UNIT-V

Aves; Pigeon, Mammalia; Rabbit.

References;

1.Ayyar, E.K. and T.N. Ananthakrishnan. 1992. Manual of Zoology. Volume I & I, S. Viswanathan (printers and publishers) Pvt. Ltd., Madras, 891 p.

2. Kotpal series, 1998 – 1992. Rastogi publications, Meerut.

3. Jordan E.L. and P.S. Verma. 1993. Invertebrate Zoology 12th edition, S. Chand & Co., Ltd., New Delhi.

4. Jordan, E.L. and P.S. Verma. 1995. Chordate Zoology and Elements of Animal physiology , S. Chand & Co., Ltd., New Delhi.

Outcomes;

1. The students will be able to understand the life – cycle to and adaptations of protozoa, porifera coelenterata and platy helminthes.
2. The student will be able to understand the functional morphology of Annelids, Arthropods , Molluscs and Echinoderms.
3. The student will be able acquire knowledge about the functional morphology of chordata, prochordatas and pisces.
4. The student will be able have a thorough knowledge about Frog and Calotes.
5. The student will be able to understand the functional morphology of Aves and Mammals.

SKILL BASED SUBJECT

PAPER - 1

FIRST AID

OBJECTIVE:

To understand the importance of first aid treatment and to prevent secondary complications.

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO STATEMENT
CO1	Summarize the importance of first aid
CO2	Analyze the symptoms and treatment for various medical emergencies
CO3	Illustrate the causes and effects of poisoning and its treatment
CO4	Identify the causes and treatment for various aches in the body
CO6	Identify the treatment for various wounds

UNIT - I

BASIC PRINCIPLES AND TECHNIQUES OF FIRST AID

Definition, objects and principles of First Aid. Important rules of first aid. Content of first aid kit First Aid Techniques: Dressings, Bandages and Transport techniques.

UNIT - II

MEDICAL EMERGENCIES

Diabetic emergencies - Hyperglycemia, Hypoglycemia - symptoms, signs and treatment. Liver emergency, Kidney emergency, Hemorrhage and its types. Chocking - symptoms, signs and treatment, Asphyxia - causes, symptoms, signs and treatment, Drowning effects - symptoms, signs and treatment, Suffocation by poisonous gases,

UNIT - III

INJURIES AND ANAPHYLACTIC SHOCK

Insect bites, Snake bites, Dog bites - symptoms and treatment. Injuries - Head injuries, burns and scalds, Chemical burns, Electric burns, Radiation burns and cold burns - signs, symptoms and

treatment. Poisoning-Routes of poisoning, Effects poisoning, treatment and measures. Stroke, Heart attack, Coronary obstruction and Cardiac arrest - signs, symptoms and treatment.

UNIT - IV

COMMON AILMENTS

Blood Pressure, Constipation - travel sickness - signs, symptoms and treatment. Head ache, Tooth ache, Ear ache, - causes and treatment, Common Cold, Cough, Diarrhoea and Dysentery - causes, symptoms, signs and treatment.

UNIT - V

WOUNDS AND SAFETY MEASURES IN EMERGENCY

Emergencies in Rural area, Auto safety, Disasters and multiple casualty accidents. Wounds - Types- Open and Closed wounds. Emergency care for general wounds. Wound with foreign body, Special wound, Wounds to the palm of hand, abdominal wounds.

REFERENCES

1. Manual of First aid - L.C.Gupta Abhitab -2004, jaypee brothers, medical publishers (p)ltd, new delhi, India.
2. Sathya Narayanan U, 1999, "Biochemistry",(2nd Edition),Kolkata, Allied publishers.
3. First aid and Safety Hand book by American Red Cross and Kathleen A .Handal .M.D Foreword by Elizabeth Dole, Little brown and company Boston, New York, London.

NON-MAJOR ELECTIVE
PAPER - 1

FOOD AND NUTRITION

OBJECTIVE:

To understand about various biological macro and micro molecules and its function

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO STATEMENT
CO1	Realizing the fact that "Food as medicine", Classify carbohydrates and analyze their sources and functions in the body
CO2	Classify fats and analyze their sources and functions in the body
CO3	Identify and explain proteins in foods and the specific functions in maintaining health.
CO4	Identify the types of vitamins and their biomedical significance of vitamins present in food
CO5	Analyzing the biological importance of major and minor trace elements (Minerals) in the food

UNIT - I

Food -Definition. Balanced diet and its composition. Nutrition and nutrients. Macro and micronutrients. Carbohydrates - Sources, classification, RDA and nutritional significance in the body. Glucose as a chief source of energy. Dietary fibre and its importance

UNIT - II

Lipids, Classification. Sources of dietary lipids. Essential fatty acids and their importance. Saturated and unsaturated fatty acids. Mono unsaturated and Poly unsaturated fatty acids and their importance.

UNIT - III

Proteins as a body building food. Classification of proteins. Major functions of proteins in the body. Rich sources of Protein in diet. RDA for protein. Protein deficiency disorders-Kwashiorkor and marasmus

UNIT - IV

Vitamins- Fat soluble - Vitamin A, D, E and K. - Sources, RDA and functions. Water soluble vitamins- Thiamine, riboflavin, folic acid, cobalamine and pantothenic acid- Sources, RDA and function. Ascorbic acid as a free radical scavenger- Sources and RDA.

UNIT -V

Minerals - Macro and micro minerals. Sources, RDA and biological functions of Iron, Calcium, Iodine, magnesium, Sodium, potassium and chlorine.

REFERENCES

1. R.K. Murray, D.K. Granner, P.A. Mayes, D.W. Rodwell (2006), Harper's Biochemistry, twenty fifth edition, Prentice Hall, New Jersey.
2. D.L.Nelson, and M.M. Cox (2008) Lehninger Principles of Biochemistry, 5th Ed, W.H. Freeman and Company, New York.
3. Sathyanarayanan. U (2002), Essentials of Biochemistry Books and allied (p) Ltd.
4. D. Voet, and G.Voet (2006), Biochemistry, John Wiley and Sons, New York.
5. G.L Zubay (1999) Biochemistry, 4th Ed, WCB, McGraw-Hill, New York.

SEMESTER IV

CORE PAPER - 4

PLANT BIOCHEMISTRY

OBJECTIVE:

To gain knowledge on the plant physiology, photosynthesis and identify the functions of growth hormones, responses of plants to the stress

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO Statement
CO1	Summarize the events in Photosynthesis
CO2	Classify Plant Hormones And Explain Their Functions. Discuss Secondary Metabolites In Plants
CO3	Illustrate Nitrogen Fixation By Symbiosis Biochemistry Of Nitrogen Fixation
CO4	Distinguish Between Types of Stress Tolerance in plants
CO6	Evaluate The Anti Oxidant Defense In Plants

UNIT - I

PLANTS (15 Hrs)

Various plants of a plant and its uses.Photosynthesis - Chlorophyll -Structure and functions. Light reactions, Photosystem I and II, Z scheme. Dark reaction- Calvin cycle, Rubisco-Importance. Proton gradient and ATP synthesis of chloroplast. Regulation of photosynthesis and photorespiration.

UNIT - II

HORMONES (15 Hrs)

Definition**.** Plant hormones, their types and functions. Structure, action, transport, distribution and physiological functions of Auxin, Gibberillin, Cytokinins, Abiscic acid and Ethylene. Plant secondary metabolites/PPhytochemicals-Definition. Types of phytochemicals - Flavonoids, alkaloids, tannins, terpenoids and anthocynanins- their functions

UNIT - III (15 Hrs)

Nitrogen fixation in plants. Nitrogen cycle. Nitrate assimilation, Nitrate reductase and nitrite reductase, incorporation of ammonia into organic compounds, regulation of nitrate assimilation. Nitrogen fixation - nodule formation - regulatory factors involved in modulation - Role of nif genes.

UNIT - IV (15 Hrs)

Stress in plants - Environmental stresses, salinity, water stress. Stress due to heavy metals. Impact of stresson plant growth and metabolism, criteria of stress tolerance. Toxins of plant origin - mycotoxins, phytohemagglutinins, nitriles, protease inhibitors, protein toxins.

UNIT - V (15 Hrs)

Antioxidant mechanism in plants - Reactive oxygen species and sources of ROS generation in plants. Formation of triplet chlorophyll. Oxidative stress. Enzymatic and non-enzymatic antioxidant system. Role of superoxide dismutase, catalase, glutathione peroxidase. Antioxidant vitamins - Role of VitaminC (Ascorbic acid) and vitamin E.

TEXT BOOKS/ REFERENCE BOOKS:

1. Verma, Plant Physiology, Athena Academic Publishers, 2015
2. Lincoln Taiz, Angns Murphy, Fundamentals of Plant Physiology, Oxford University Press, 2018
3. S. K. Verma and MohitVerma, Plant Physiology, Biochemistry and biotech S Chand Publishers , 2018
4. Dr. V. K. Jain Fundamentals of Plant physiology, S Chand Publishers 2016

CORE PRACTICAL-II

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	**Understand good laboratory practices in a biochemistry laboratory**
CO2	Use analytical balance and weigh
CO3	Calculate and prepare normal, molar and percentage solutions
CO4	Learn the working of colorimeter device
CO5	Explain the concept of stock solution and working standard solution
CO6	Estimate phosphorus and protein using colorimetric method
CO7	Exhibit the knowledge of isolation of biomolecules like starch, casein and albumin from biological samples
CO8	Obtain hands on training in basic separation technique like paper chromatography, thin layer chromatography and column chromatography and gain expertise
CO9	Assess the suitability of chromatography technique for solving specific analytical problem and critically apply the knowledge for biomolecule separation
CO10	Demonstrate the principle and working of SDS PAGE and its applications

1. COLORIMETRY

1. Estimation of inorganic phosphorus by Fiske and Subbarow method.
2. Estimation of protein by Biuret method.

2. BIOCHEMICAL PREPARATION

1. Preparation of starch from potatoes.
2. Preparation of Caesin from milk.
3. Preparation of albumin from eggs.

3. CHROMATOGRAPHIC SEPARATION

1. Paper chromatography separation and detection of amino acids and simple sugars (group experiment).
2. Chromatographic separation of chlorophyll, carotenes of flower pigments and protein using column Chromatography (Demo).

4. ELECTROPHORETIC TECHNIQUE

1. Separation of protein by SDS-PAGE (Demo)

TEXT BOOKS/ REFERENCE BOOKS:

1. J. Jayaraman Laboratory Manual in Biochemistry, New Age International Pvt Ltd Publishers, 2011
2. S. Sadasivam A. Manickam , Biochemical Methods, New age publishers, 2009
3. Keith Wilson and John Walker, Principles and techniques of Practical Biochemistry Cambridge University Press. 2010, Seventh edition
4. S. K. Sawhney Randhir Singh, Introductory Practical Biochemistry, Alpha Science International, Ltd, 2 edition, 2005.

ALLIED - 2
PAPER - 4

MICROBIOLOGY – II

Course outcomes

1. To gain knowledge about the importance of microorganisms in soil and agriculture
2. To understand the role of microorganisms in air and water
3. To learn about foodborne microorganisms
4. To gain knowledge on microbial production of industrially important compounds
5. To learn about various microorganisms causing diseases in humans

UNIT - I

Soil Microbiology – Microbes in soil formation, Microorganisms found in soil and their importance; Plant growth promoting bacteria – Nitrogen fixation, Phosphate solubilization, Biofertilizers, Biopesticides; Microrganisms and plant diseases, transmission and control.

UNIT - II

Microorganisms in air, Distribution and Source of Airborne Organisms; Aquatic Microbiology, Sewage Treatment - Physical and Biological methods; Drinking water treatment, Waterborne diseases, role of microorganisms in biogeochemical cycles.

UNIT - III

Food Microbiology - Microbial Spoilage of food, food preservation techniques, Microbes in Milk, microbial product of milk fermentation – Cheese, butter, curd; Pasteurization techniques; Foodborne infections caused by bacteria, fungi and viruses.

UNIT - IV

Microbial Fermentations, Fermentors, Microbial production of Organic acids – Citric acid, Antibiotics – Penicillin, Vitamins – Cyanocobalamin, Amino acid production - glutamic acid, alcohol - Ethanol and beverages - wine; SCP production, Bioremediation, Biodeterioration.

UNIT - V

Morphology, Cultural Characteristics, Pathogenecity, Laboratory diagnosis and prevention of Infections caused by the following organisms *Mycobacterium tuberculosis*, *Vibrio cholerae*, *Salmonella* sp., dermatophytes, *Candida albicans*, *Entamoeba histolytica*, *Plasmodium falciparum*, Rabies virus, Hepatitis B Virus and HIV.

Textbook

- Prescott's Microbiology. 10th Edition, 2016. Willey J., Sherwood L., Woolverton C.J. McGraw Hill Education, New York.

Reference Books

- Modern food microbiology. 7th Edition, 2005. James M. Jay, Martin J. Loessner, David A. Golden. Springer Science & Business.
- Environmental Aspects of Microbiology. 1996. Joseph C. Daniel. Brightsun Publications, Chennai.
- Biotechnology. 2nd Edition, 2000. Crueger W. and A Crueger. Panima Publishing Corporation, New Delhi.
- Text Book of Microbiology. 9Ih Edition, 2013. Ananthanarayanan, R and C.K.J. Panicker. Orient Longman Private Ltd., Chennai.
- Soil Microbiology - Soil microorganisms and Plant growth. 4th Edition, 2017. Subba Rao, N.S. Oxford & IBH publishing Co. Pvt. Ltd.

ALLIED - 2
PAPER - 4
ZOOLOGY II

Objective;

-To study the principles of Cell biology and Genetics.

- To study the principles of Developmental Biology and Physiology.

- To have a complete knowledge about circulatory systems and excretory system.

- To create awareness towards recent changes in the environment and preventive measures.

- To understand the concepts of origin of life.

UNIT-I

Cell Biology – structure of animal cell, Genetic; molecular structure of gene – gene function, sex linked inheritance. Genetic engineering and its application.

UNIT-II

Embryology – cleavage and gastrulation of Amphioxus.

Human Physiology; Digestion, circulation – blood components, structure of heart, heart function.

UNIT-III

Disease of Circulatory system – blood pressure, heart disease – Ischemia, Myocardial infarction, Rheumatic heart disease, stroke.

Excretion – structure of kidney and mechanisms of urine formation.

UNIT-IV

Environmental Biology – Biotic factors and Abiotic factors, food chain and food web. Pollution – Environmental Degradation, (Air, Water and Land) – Green house effect – Bioremediation, - Global warming – acid rain.

UNIT-V

Evolution; Theories of Lamarkism & Darwinism.

Reference;

1. Ekambaranatha Ayyar, and Ananthakrishnan, T.N. 1993. Outlines of Zoology, Vol I & II, Viswanathan and Co, Madras.
2. Sambasiviah, I, Kamalakara Rao, A.P., Augustine Chellappa, S. 1983. Text book of Animal Physiology, S. Chand & Co., New Delhi.
3. Verma and Agarwal. 1983. Text book of animal Ecology, S. Chand & Co., New Delhi.
4. Verma and Agarwal and Tyagi. 1991. Chordate Embryology, S. Chand & Co., New Delhi.
5. Rastogi and Jayaraj. 2000. Taxt book of genetics. Rastogi publications, Meerut.
6. Verma and Agarawal. 2000. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Co., New Delhi.

Outcomes;

1. The student will acquire knowledge about cell structure, gene function and Genetic engineering.
2. The student will be able to understand the cleavage pattern and gastrulation in Amphioxus.
3. The students will have a thorough knowledge about the diseases of circulatory systems and urine formation.
4. The student will be have an awareness about the environment.
5. The student will understand the basic concepts of evolution.

ALLIED PRACTICAL II

ALLIED MICROBIOLOGY PRACTICAL

Course outcomes

1. To gain knowledge about laboratory procedures in Microbiology
2. To use microscopes in the study of microorganisms
3. To learn about media preparation
4. To observe and isolate microorganisms from samples
5. To learn about enumeration of microorganisms

List of Experiments

1. Cleaning of glasswares, sterilization techniques
2. Gram staining
3. Motility (Hanging drop)
4. Lactophenol cotton blue mounting of fungi – *Mucor, Rhizopus, Penicillium, Aspergillus*
5. Observation of wet mount for algae
6. Serial dilution techniques
7. Pour plate and spread plate techniques
8. Preparation of culture media, Slant preparation
9. Streak plate and pour plate techniques
10. Assessment of milk quality by MBRT test
11. Microscopic observation of curd
12. Cross sectioning of Root nodules for *Rhizobium*
13. Assessment of air quality by open plate method

Manuals for Reference

1. Experimental Procedures in Life Sciences. Rajan. S and Selvi Christy. 2015. Anjanaa Book House Publishers, Chennai.
2. Microbiology: A Laboratory Manual. Cappuccino and Sherman. 7th edition, 2004. Benjamin Cummings Publications, US.

ALLIED PRACTICAL

ZOOLOGY

I MAJOR PRACTICAL

DISSECTIONS

Cockroach; Digestive and nervous system

Prawn; nervous system

II MINOR PRACTICAL

MOUNTING

1. Mouth parts of Mosquito and Honey bee
2. Earthworm – Body setae
3. Placoid scales of Shark

III SPOTTERS

Entamoeba, Sycan, Obelia, Taenia solium (entire, scolex) earthworm (entire, Pineal setae) Prawn (entire), Fresh water mussel, Sea star, Amphioxus – Entire, Amphioxus – T.S. through pharynx, Shark, Frog, Calotes, Pigeon, feathers of pigeon and Rabbit.

Sphygnomanometer, Stethoscope, Rain gauge.

References;

1.verma. P.S. 2011. A manual of practical Zoology – INVERTEBRATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

2. Verma. P.S. 2011. A manual of practical Zoology – CHORDATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

SKILL BASED SUBJECT
PAPER - 2

BIOSTATISTICS

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO STATEMENT
CO1	Understand the definition of biostatistics and its scope. Ascertain the methods and importance of data collection and presentation
CO2	Examine the usage of statistical tools like measure of central tendency and measure of dispersion
CO3	Apply hypothesis testing via t, f, z and chi square statistical distribution& Basic Definition of Probability
CO4	deduce the results of correlation and regression
CO5	Deduce ANOVA and make statistical decision

UNIT - I

DATA ANALYSIS (15 hrs)

Nature and scope of statistical methods and their limitations. Collection, classification, tabulation of statistical data. Organization of data - Individual series, discrete series, continuous series / class interval. Diagrammatic and graphical representation of statistical data (bar diagram, line diagram, pictogram, histogram & horizontal and vertical bar diagram).

UNIT - II

MEASURE OF CENTRAL TENDENCY& DISPERSION (15hrs)

Mean, Median, Mode..Measure of Dispersion- Introduction. Range - Introduction & definition. Standard deviation, Variance, Coefficient of Variation.

UNIT - III

PROBABILITY& DISTRIBUTIONS (15hrs)

Probability - Introduction & Definition. Testing of Hypothesis - null hypothesis, alternative hypothesis, standard error. Introduction to Theoretical Distribution, Binomial distribution, Poisson distribution and Normal distribution. Skewness and Kurtosis Chi- Square test- introduction & application, t-test- introduction & application.

UNIT - IV

CORRELATION AND REGRESSION (15 hrs)

Correlation Analysis - introduction, definition, uses. Types of correlation - Positive and negative, linear and nonlinear, simple and multiple, partial and total correlation. Regression Analysis - introduction, definition, application, types of regression.

UNIT - V

ANALYSIS OF VARIANCE (ANOVA) (15 hrs)

Analysis of Variance (ANOVA) - introduction, one way and two way classification.

REFERENCES:

1. Introduction to Biostatistics and Research Methods by P. S. S. Sundar Rao, J. Richard 5th edition PHI learning Pvt Ltd. 2012.
2. Biostatistics: A Foundation for Analysis in the Health Sciences, 10th Edition Wayne W. Daniel, Chad L. Cross Wiley Global Education, 2012.
3. Statistical methods - S.P.Gupta. Sultan chand & sons. 2012.
4. Biostatistical analysis - Jerrold H. Zar 5th edition Prentice Hall of India 2010.
5. Statistical Methods, S.P.Gupta 28th edition Sultan Chand & Sons 2009.
6. Statistical methods - G.W.Snedecor and W.Cocharan- 8th edition. Oxford and IBH, New Delhi.1989.

NON MAJOR ELECTIVE
PAPER - 2

LIFESTYLE DISEASES & PREVENTION

OBJECTIVES:

- Understand the basics of lifestyle diseases.
- Describe the risks of developing a lifestyle disease.
- Choose healthy life style to cope up with modern life.

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO STATEMENT
CO1	Define a Balanced Diet. Understand the importance of vitamins and minerals
CO2	Identify Lifestyle Prone Disorders
CO3	Manage physiological and psychological disorders
CO4	Categorize Communicable And Non-Communicable Disease
CO5	Maintain good health

UNIT - I

Balanced diet- composition and functions. Nutrients and their role. Types of nutrients- Macronutrients- carbohydrates, proteins, fats. Micronutrients, Vitamins and minerals Importance of water. Dietary Fibre and its major role in the body.

UNIT - II

Life style disorders: Lack of Physical activity, Incompatible food, irregular food habits, fast foods. Alcohol intake, cigarette smoking- Consequences. Technology in health deterioration- Computer vision syndrome, mobile vision syndrome.

UNIT - III

Physiological disorders: Food poisoning-Signs and symptoms, Vomiting, diarrhea, head ache, stomach ache, hormonal imbalance, premenstrual syndrome, Renal Calculi and gall stones.

Psychological disorder- Stress, Memory dysfunction. Depression, mood swings, Lack of motivation Suicides-causes. Self-medications.

UNIT - IV

Communicable diseases and Non-communicable diseases - Definition and examples Communicable diseases - AIDS, Tuberculosis, Cholera, typhoid- Causes and treatment. Non-communicable diseases- Type 2 diabetes, Cancer, Coronary Heart diseases, Stroke, Obesity- Definition, causes and treatment.

UNIT - V

Good health- Improved life style, Improved Food habits, Proper deep sleep, Exercise in good health maintenance -Yoga, Swimming, Walking, Outdoor games, Stress management- Meditation.

REFERENCES

1. B. Srilakshmi, Dietetics - Multi Colour Edition, New age inter Pbs 2019
2. B. Srilakshmi, Food Science (Multi Colour Edition) , New age inter Pbs 2017
3. DC SHARMA and DEVANSHI SHARMA Nutritional Biochemistry, CBS Publisher and Distributers, 2017
4. B. Kumar, Meenal Kumar, Guide to prevention of lifestyle diseases b. kumar, Deep and Deep Publications, 2004

SEMESTER V

CORE PAPER - 5

ENZYMES AND INTERMEDIARY METABOLISM

OBJECTIVE:

To understand the role of enzymes in biochemical reactions and its applications and also to promote and understand chemical reactions, central metabolic pathways and kinetics of energy and homeostasis of metabolism

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO STATEMENT
CO1	Acquire Fundamental knowledge in relevant principles of enzyme, mechanism of enzyme kinetics, enzyme catalysis emphasizes on capability of the students to work in a group and gather the information.
CO2	Illustrate the reactions of carbohydrate metabolism. Summarize the steps involved in ATP formation
CO3	Identify the steps involved in oxidation o fatty acids
CO4	Obtain knowledge on the metabolism of amino acids and formation of urea
CO5	Summarize the steps involved in purine and pyrimidine synthesis

UNIT - I
ENZYMES (15 Hrs)

Definition, units, various classifications, nomenclature, specificity, isoenzymes, factors affecting enzyme activity - pH, temperature, enzyme concentration and substrate concentration. Active site, Mechanism - Lock and key mechanism and Induced Fit theory. Michaelis Menten equation, Line weaver Burk plot. Enzyme inhibition - Competitive, Non competitive and Uncompetitive (Concepts with example) inhibition and Irreversible inhibition.

UNIT - II
CARBOHYDRATES METABOLISM (15 Hrs)

Definition - Metabolic pathways (Anabolic and catabolic) and Amphibolic pathways. Glycolysis, Glycogenesis and glycogenolysis, PDH complex, Citric acid cycle, HMP shunt. High energy compounds, Electron transport chain, Oxidative phosphorylation, ATP synthase and Uncouplers.

UNIT - III
LIPID METABOLISM (15 Hrs)

Oxidation of fatty acids - Beta oxidation of palmitic acid, Role of carnitine in beta oxidation. Alpha oxidation and omega oxidation (Only definition). Oxidation of fatty acids with odd number of carbon atoms. Ketogenesis- Formation of ketone bodies. Biosynthesis of saturated fatty acids. Biosynthesis of triacyl glycerol and phospholipids. Biosynthesis of cholesterol with regulation.

UNIT - IV
PROTEIN METABOLISM (15 Hrs)

Amino acid pool, Transamination- Role of transaminases-SGPT and SGOT, PLP as a coenzyme in transamination, Degradation of proteins - Oxidative, Non-oxidative deamination. Role of Glutamate dehydrogenase in aminoacid metabolism. Decarboxylation of amino acids- Formation of serotonin, GABA, Histamine, Epinephrine and nor epinephrine. Urea Cycle, Relationship between urea and TCA cycle. Biosynthesis of creatinine

UNIT - V
NUCLEIC ACID METABOLISM

Purine and Pyrimidine - Sources of nitrogen and carbon atoms in Purine and Pyrimidine. Denovo synthesis of purine and degradation. Pyrimidine nucleotides- biosynthesis and degradation Regulation of purine and pyrimidine biosynthesis.

TEXT BOOKS:

2. J.M. Bery, J.L. Tymoezko and L. Stryer (2008) Biochemistry, 6th Ed, W.H. Freeman and Company, New York.
3. J.L Jain S. (2005), Fundamentals of Biochemistry, Chand Publishing, New Delhi.

REFERENCES:

1. D.L.Nelson, and M.M. Cox (2008) Lehninger Principles of Biochemistry, 5th Ed, W.H. Freeman and Company, New York
2. D. Voet, and G.Voet (2006), Biochemistry, John Wiley and Sons, New York.
3. R.K. Murray, D.K. Granner, P.A. Mayes, D.W. Rodwell (2006), Harper's Biochemistry, twenty fifth edition, Prentice Hall, New Jersey.
4. A.C. Deb (2001), Fundamentals of Biochemistry, New Central Book Agency Pvt., Ltd., Calcutta.
5. S.M. Bhatt (2011), Enzymology and Enzyme Technology. (2011), S. Chand Publishing, New Delhi.
6. U. Sathya Narayanan and U. Chakrapani. (2007), Text book of Biochemistry - 3rdedition, Pvt Ltd.

CORE PAPER - 6

MOLECULAR BIOLOGY

OBJECTIVES

1. To understand the major experimental approaches and mechanisms in cell and molecular biology.
2. To acquire knowledge of gene & to know how genes are expressed
3. To be aware of the regulation of cellular processes, signaling and proliferation in prokaryotic cells.

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO Statement
CO1	Infer the central dogma of molecular biology, Show how DNA acts as vehicle of inheritance through experimental evidences Outline the steps involved in replication and explain the events, enzymology, fidelity and inhibitors of replication in prokaryotes
CO2	Summarize the process of prokaryotic transcription
CO3	Define genetic code and show how it can be deciphered Relate genetic code to translation process and explain protein biosynthesis
CO4	Illustrate the regulation of gene expression in prokaryotes using *lac* and *trp* operon
CO5	Gain knowledge on gene mutation and DNA Repair mechanisms

UNIT - I

REPLICATION (15 Hrs)

DNA as a Genetic material - Experimental evidence -Bacterial Transformation, Transduction and Conjugation. DNA Replication-types, evidence to show DNA replication is semi conservative; Messelson and Stahl experiment.DNA Replication mechanism in Prokaryotes and Inhibitors.

UNIT - II

TRANSCRIPTION (15 Hrs)

Transcription in Prokaryotes: Central Dogma, DNA dependent RNA polymerases, Transcription Mechanism and Inhibition. Post transcriptional modification-mRNA, rRNA and tRNA processing. Reverse transcription and Retro virus.

UNIT - III

TRANSLATION (15 Hrs)

Genetic Code-Definition, deciphering of the genetic code, codon dictionary and salient features, Mechanism of Translation in Prokaryotes-initiation, elongation, translocation, termination and Inhibition. Protein targeting.

UNIT - IV

GENE REGULATION AND AMPLIFICATION (15 Hrs)

Operon model - Lac operon (positive and negative control), Trp Operon (repression and attenuation), recombination and Gene amplification.

UNIT - V

MUTATION AND REPAIR (15 Hrs)

Gene mutation-Base pair substitution, frame shift mutation, missense mutation, nonsense mutation, mutation in termination codons, silent mutation. Molecular mutation- spontaneous and induced mutation. Chromosome mutation - Changes in the number of chromosomes and changes in the structure of chromosomes. DNA Repair-Definition and mechanism.

REFERENCE BOOKS

1. James D Watson, Molecular Biology of the gene 7th edition, Pearson, 2017.
2. David. L. Nelson, Michael. M. Coil Lehninger. Principles of Biochemistry Freeman. W. H. and Company , 2019.
3. Donald Voet, Judith Voet, Charlotte Wiratt. Fundamentals of Biochemistry: life at molecular level. 5th edition John Wiley & Sons 2016
4. Bruce Albert,Molecular Biology of the cell, W.W. Norton and company, 2014.

CORE PAPER - 7

PHYSIOLOGY AND NUTRITION

OBJECTIVE

To learn the structure and functions of the different organs and the importance of nutrients in body

COURSE OUTCOME

At the end of the course students will be able to

CO NUMBER	CO Statement
CO1	Gain knowledge about the various types of RBC and WBC cells, different types of blood groups and basic structure and functions of heart.
CO2	Illustrate the Mechanism of digestion and absorption of macromolecules.
CO3	To acquire the knowledge about the structure and functions of kidney, nephron and mechanism of urine formation.
CO4	Realizing the fact that "Food as medicine", describe the significance of carbohydrates, lipids and proteins and analyze their sources and functions in the body
CO5	Identify the types of vitamins and their biomedical significance of vitamins present in food Analyze the biological importance of major and minor trace elements (Minerals) in the food

UNIT - I

CIRCULATORY SYSTEM (15 Hrs)

Composition of Blood -types of blood cells and function, Blood groups -ABO group and Rh group. Composition of Lymph, Circulatory system, Cardiac system - physiologic anatomy of heart- genesis and spread of cardiac impulses-cardiac cycle, heart sound, cardiac output, ECG.

UNIT - II

DIGESTION (15 Hrs)

Definition, Digestive system of man, Physical and Chemical process of digestion. structure and function of microvillus, Salivary digestion, gastric digestion-mechanism of HCL formation, intestinal digestion-liver, pancreas, intestinal juice, Role of bile salt in Digestion, Digestion and absorption of carbohydrates, proteins, and lipids.

UNIT - III

RESPIRATORY AND EXCRETORY SYSTEM (15 Hrs)

Respiratory system -Types of respiration, Transport of $O_2$and CO_2, Role of Hemoglobin in of O_2 and CO_2 transport. Oxygen Dissociation curve, Bohr Effect, Chloride shift. Oxygen toxicity& therapy, Artificial respiration. Structure and function of kidney and nephron, Mechanism of urine formation

UNIT - IV

MACRONUTRIENTS (15 Hrs)

Food- Definition. Balanced diet and its composition. Nutrition and nutrients. Macro and micronutrients. Carbohydrates - Sources, classification, RDA and nutritional significance in the body. Lipids-Sources, RDA and functions Essential fatty acids and their importance. Poly unsaturated fatty acids and their importance. Proteins as a body building food. Major functions of proteins in the body. Rich sources of Protein in diet. RDA for protein. Protein deficiency disorders-Kwashiorkor and marasmus

UNIT - V

MICRONUTRIENTS (15 Hrs)

Vitamins- Fat soluble - Vitamin A, D, E and K.- Sources, RDA and functions. Water soluble vitamins- Thiamine riboflavin, folic acid and cobalamine - Sources, RDA and function. Minerals - Macro and micro minerals. Sources, RDA and biological functions of Iron, Calcium, Iodine, magnesium, Sodium, potassium and chlorine.

REFERENCES:

1. Textbook of Medical Physiology 10th Ed by Arthur C. Guyton and John E. Hall, Harcourt Asia Pvt. Ltd, 2016.
2. Principles of Anatomy and Physiology 10th Edition by Gerard J. Tortora and Sandra Grabowski. Publisher: John Wiley and Sons.
3. Animal Physiology and biochemistry -RA Agarval, Anil. K,Srivastav, Kaushal Kumar, S .Chand & CO.,
4. Sathyanarayanan. U (2002), Essentials of Biochemistry Books and allied (p) Ltd.
5. Dr. M. Swaminathan,"Food and Nutrition Vol I&II ", Second edition, Bangalore, Bappco Publishers.
6. B. Srilakshmi Dietetics - Multi Colour Edition, New Age International Publishers , 2019
7. B. Srilakshmi Food Science (Multi Colour Edition) New Age International Publishers 2017

INTERNAL ELECTIVE
PAPER - 1

MOLECULAR ENDOCRINOLOGY

OBJECTIVE:

To understand the role of hormones in the body

CO NUMBER	CO STATEMENT
CO1	Understand the structure of hormones and receptors. Classify hormones based on nature, mechanism of action.
CO2	Explain the structure, biological action and regulation of hypothalamic and pituitary hormones.
CO3	Illustrate the structure, biological action and regulation of thyroid and pancreatic hormones.
CO4	Understand about the actions of adrenal hormones
CO5	Compare the structure and metabolic effects of adrenal hormones

UNIT - I (15 Hrs)

Hormones: Definition, Chemical nature and classification. General mechanism of action of Group I and Group II hormones, secondary messengers, G Protein cycle, Signal transduction and Hormonal receptors.

UNIT - II (15 Hrs)

Hypothalamus and hypothalamic releasing factor. Pituitary hormones- Chemistry, Secretion, Functions and Regulation of Anterior Pituitary hormones - GH, Pituitary tropic hormones (LH, FSH and ACTH) and Posterior Pituitary hormones - Vasopressin and Oxytocin.

UNIT - III (15 Hrs)

Thyroid and Parathyroid Hormones-Chemistry, Synthesis, Secretion, Functions and Regulations and disorders. Pancreatic Hormones - Chemistry, Secretion, Functions and Regulations of Pancreatic hormones (Insulin and Glucagon)

UNIT - IV (15 Hrs)

Adrenal gland hormones - Chemistry, Secretion, Functions Regulations and disorders of Adrenal Cortex hormones (glucocorticoids and mineralocorticoids) and Adrenal Medullary hormones (Epinephrine and Nor-Epinephrine).

UNIT - V (15 Hrs)

An introduction to Male and Female Reproductive system. Functions of Gonadal hormones - Testosterone, Estrogen and Progesterone. Ovarian cycle and its regulation.

TEXT BOOKS:

1. R.K. Murray, D.K. Granner, P.A. Mayes, D.W. Rodwell (2006), Harper's Biochemistry, twenty fifth edition, Prentice Hall, New Jersey.
2. Guyton (1996) Human Physiology and Mechanisms of Disease. Saunders Publications; 6th edition.

REFERENCES:

1. Wiiliams Textbook of Endocrinology. (2011), Shilomo Melmed., Elsevier, New Delhi.
2. N.Chatterjee and Rana Shinde (2012) Textbook of Medical Biochemistry - eighth edition, Jaypee publication, New Delhi.
3. D.L.Nelson, and M.M. Cox (2008) Lehninger Principles of Biochemistry, 5th Ed, W.H. Freeman and Company, New York
4. D. Voet, and G.Voet (2006), Biochemistry, John Wiley and Sons, New York.
5. G.L Zubay (1999) Biochemistry, 4th Ed, WCB, McGraw-Hill, New York.

SKILLED BASED SUBJECT
PAPER - 3

MEDICAL LABORATORY TECHNOLOGY

OBJECTIVE:

To obtain [practical skills to analyze biological samples

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO STATEMENT
CO1	• Follow good laboratory practices • Prepare reagents for experiments
CO2	• Examine urine and stool sample for normal and abnormal constituents
CO3	• Estimate Hemoglobin and other hematological parameters
CO4	• Perform blood grouping
CO5	• Acquire knowledge on culturing microorganisms.

UNIT - I

LABORATORY CARE AND INSTRUMENTATION (15 Hrs)

Good laboratory practices, Code of conduct for laboratory personnel - safety measures in the laboratory-chemical and reagents, labeling, storage and usage. First aid in laboratory accidents - precautions and first aid equipment. Reporting laboratory tests and keeping records-documentation. General approach to quality control, quality control of quantitative data.

UNIT - II

URINE ANALYSIS AND STOOL EXAMINATION (15 Hrs)

Composition, collection, preservation, gross examination, interfering factors, chemical examination. Significance of sugar, protein, ketone bodies, bile pigments, blood, uric acid in urine. Specimen collection- inspection of faeces- odour, pH, Interfering substance. Test for occult blood, faecal fat.

UNIT - III

CLINICAL HEMATOLOGY **(15 Hrs)**

Anticoagulant, preservation, Estimation of Hb, PCV, WBC, RBC, Platelets, ESR. Clotting time, bleeding time - normal value, clinical interpretation.

UNIT - IV

BODY FLUIDS AND BLOOD BANKING **(15 Hrs)**

Cerebrospinal fluid and amniotic fluid, semen analysis, sputum examination - Interpretation. Blood grouping- ABO system, Rh typing, Blood transfusion, cross matching, blood transfusion and its complications.

UNIT - V

MEDICAL MICROBIOLOGY **(15 Hrs)**

Culturing of organisms from various specimens. Culture media and antibiotic sensitivity test (pus, urine, Stool, sputum, throat swab, gram staining, Zielh -Neilson staining (TB, Lapra bacilli). Safety procedure in microbiological techniques.

REFERENCES:

1. Medical Laboratory Technology - Kanai L. Mukherjee, 10th reprint, Tata McGraw Hill Publication and Co. Ltd., Vol, I, II, III. 2002.
2. Medical Laboratory Science- J. Ochei & A. Kolhatkar, Tata McGraw Hill Publication and Co. Ltd., 2002.
3. Practical Clinical Biochemistry - Harold Varley, 5th edition, William Heinemann Medical Books Ltd., London. 1980.
4. Medical lab technology - Ramnik Sood, Jaypee Brothers, Medical Publishers (P) Ltd, New Delhi.
5. Clinical Chemistry- M.N. Chatterjee & R. Chawla, 2nd edition, Jaypee Brothers Medical Publishers (P) Ltd., 2010.

SEMESTER VI

CORE PAPER - 8

CLINICAL BIOCHEMISTRY

OBJECTIVES:

This course would make the students to understand the significance of diagnostic biochemistry.

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO Statement
CO1	• Understand the blood glucose regulation. • Describe the pathophysiology and molecular basis of Diabetes mellitus. • Acquire knowledge on the clinical features on Glycosuria, Ketosis, Fructosuria & Galactosemia.
CO2	• Analyze the genetic diseases like phenyl ketonuria, cystinuria, albinism, hypo and hyperuricemias, obesity and fatty liver
CO3	• Explain the physiopathological and biochemical markers of the liver function tests.
CO4	• Assess the diagnostic performance of renal function tests.
CO5	• Examine the gastric contents. Practical knowledge on FTM analysis • Categorize the use of enzymes and Isozymes in assessment of liver damage, bone disorders and myocardial infarction.

UNIT - I (15 Hrs)

Blood glucose homeostatsis, renal threshold value, regulation of blood glucose - hormonal action. WHO criteria Definitions for hypo & hyperglycemia,. Diabetes Mellitus and its metabolic complications. Oral GTT in normal and diabetic condition, renal glycosuria, Fructosuria & Galactosemia.

UNIT - II (15 Hrs)

Disease related to amino acid metabolism- Clinical manifestation of Phenylketonuria, Cystinuria, Albinism, Fanconi syndrome, Tyrosinemia and alkaptonuria. Types of Lipoproteins - Dyslipoproteinemias, atherosclerosis, obesity & Fatty liver.

UNIT - III (15 Hrs)

Liver function tests: Metabolism of bilirubin - Jaundice, types, causes and differential diagnosis. Liver function test -Icteric index, Vandenberg test, plasma protein changes, Prothrombin Time. Liver disorders - Acute and Chronic Hepatitis, Cirrhosis.

UNIT - IV (15 Hrs)

Renal function tests: Clearance test - urea, creatinine, inulin, PAH test, concentration and dilution test. Renal disorders - glomerulonephritis, Diabetes Insipidus, Nephrotic syndrome, renal failure and UTI.

UNIT - V (15 Hrs)

Gastric function test- collection of gastric contents, examination of gastric residue, FTM stimulation test, tubeless gastric analysis. Gastric disorders.Enzyme patterns in acute pancreatitis, Myocardial infarction and bone disorder.

REFERENCES:

1. N.Chatterjee and Rana Shinde (2012) Textbook of Medical Biochemistry - eighth edition, Jaypee publication, New Delhi.
2. T.M. Devlin (2002), Textbook of Biochemistry with Clinical correlations, 5th edition, John Wiley & Sons Inc, Publications.
3. P.D. Mayne, Clinical chemistry in Diagnosis and Treatment, ELBS / Arnold, New Delhi.
4. W.J. Marshall and S.K. Bangert, Clinical Chemistry [1995]
5. K.V. Krishnadas, Textbooks of Medicine [1996], Jaypee publication, New Delhi.
6. Harrison's principles of internal medicine - Vol-I &II., (2015), 19 edition. McGraw Hill Education Publishers.
7. Fundamentals of Biochemistry - 10 th Edition - A C DEB, New Central Agency (p) Ltd, Kolkata.

CORE PAPER - 9

BIOTECHNOLOGY

OBJECTIVE:

To acquire knowledge on the recombinant DNA, vectors and applications of rDNAin biotechnology

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO Statement
CO1	To discuss the basic requirements and tools employed in genetic engineering process
CO2	Demonstrate the basic and recent techniques applied in the field of Recombinant DNA technology
CO3	Apply the basic rDNA technique to produce transgenic animal, discuss gene transfer methods, their application in pharmaceutical industry, cloning and its importance
CO4	To Design plants based on rDNA techniques
CO5	To Describe the methods employed for DNA amplification, gene therapy and antisense RNA therapy. To Discuss the basic requirements and tools employed in genetic engineering process

UNIT - I (15 Hrs)

Biotechnology -Definition, Recombinant technology- Restriction endonuclease- Type I, Type II. DNA ligase- DNA joining enzyme, alkaline phosphatase, DNA modifying enzymes. Linkers, adapters, homopolymers, enzymes used in genetic engineering. Applications of Recombinant DNA. Vectors-Plasmids- pBR322, cosmids, Yeast artificial chromosome

UNIT - II (15 Hrs)

Preparation of r-DNA, insertion of r-DNA into vector, methods of transfer, selection of recombinants and screening- genetic methods, immuno chemical methods, South- Western screening, Nucleic acid hybridization methods, radio-active and non-radioactive labelling of probes.

UNIT - III (15 Hrs)

Animal biotechnology: Animal cell culture, tissue culture - gene transfer methods in animals - transfection, microinjection, electroporation, gene gun, use of polycation, transgenic mice - knock out and knock in technology. Embryo transfer and invitro fertilization - applications.

UNIT - IV (15 Hrs)

Plant biotechnology: Plant tissue culture -role of Auxins, Cytokinins, Giberellic acid. Somaclonal variantions -microprojectiles, transgenic plant technology -for pest resistance, herbicide tolerance, delay of fruit ripening and use of plants to produce commercially important proteins -growth promoting bacteria in plants -antisense RNA technology.gene transfer.

UNIT - V (15 Hrs)

Basic techniques: Maxam and Gilbert method of DNA sequencing. Chemical synthesis of oligonucleotides. Isolation, purification and sequencing of DNA -hybridization methods - southern, northern and western blotting. Amplification of DNA -PCR,- quantitative and qualitative. PCR - types and applications.

TEXT BOOKS / REFERENCE BOOKS

1. U.Sathyanarayana, U Chakrapani, Biotechnology, 12thedition, 2018
2. Brown T.A.Gene cloning and DNA analysis, Wiley Blackwell publishers, 2016.
3. Old and primrose. Principles of gene manipulation. Business service publishers,2003.
4. RC. Dubey, A Textbook of Biotechnology, S. Chand publishers, 2014.

INTERNAL ELECTIVE
PAPER - 2

IMMUNOLOGY

OBJECTIVE:

To study the mechanism of action of Ag-Ab interaction and immunological techniques

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO Statement
CO1	A wide knowledge on the immunity, cells and organs of immune system
CO2	Illustrate the structure and classification of antibodies
CO3	Enlightenment of antigen and antibody interaction during infection
CO4	Exposure to mechanisms involved during allergic reactions.
CO5	Acquire knowledge on the principles, methodology involved in immunological techniques.

UNIT - I (15 Hrs)

History of Immunology - Edward Jenner and Louis Pastuer. Immunity - Innate & Acquired immunity. Immune Response - Antibody & Cell Mediated response. Primary and secondary lymphoid organs. Structure of T, B and NK cell, Structure and functions of Neutrophils, Eosinophils and Basophils, Macrophages - Phagocytosis and inflammation.

UNIT - II (15 Hrs)

Antigen - Properties, Specificity, Cross reactivity, Immunogenicity, antigen determinants, Haptens, Adjuvants, Self antigen (MHC). Antibodies - Properties and Structure of classes and subclasses of Immunoglobulin, Monoclonal Antibody production.

UNIT - III (15 Hrs)

Antigen - Antibody interaction - Precipitation and Agglutination - Definition and mechanism of formation. Complement pathways, Cytokines and their functions.

UNIT - IV (15 Hrs)

Immunity to infection: Hypersensitivity - type I, II, III and IV and their clinical manifestations.Transplantation - types, Mechanism of Allograft rejection, Graft Vs Host reaction, mechanism and prevention of graft rejection,(skin),Immuno suppressive drugs. Basic concepts of plastic surgery.

UNIT - V (15 Hrs)

Precipitation in gel**.** Ouchterlony procedure, Radial immunodiffusion, Immuno electrophoresis, Electroimmmunodiffusion. Principle and applications of RIA and, ELISA **.**Immunization - Passive and Active, Vaccines - Recombinant vaccines, DNA vaccines, Benefits and adverse effects of vaccination.

REFERENCES

1. Annadurai. B (2008), A textbook of Immunology and Immunotechnology, 1st Edition. S.Chand & Co, Ltd,New York.

2. J. Kuby, R.A.Goldsby, T.J. Kindt and B.A. Osborne, B.A. (2007), Immunology, 4th edition, W.H.Freeman and Company, New York, USA.

3. J. Kuby (2002), Immunology, 5th edition, W.H.Freeman and Company, New York.

4. Ian R. Tizard (2000), Immunology: An Introduction., 4th edition, W.B.Saunders Co.,Philadelphia.

5. Murphy Kenneth (2008), Janeway's Immunobiology, Garland Science Publishers, New York..

6. Peter J.Delves, Ivan Maurice Roitt,, Seamu J. Martin and Deninis Burton (2006), Roitt's Essential Immunology, 11th edition, Blackwell Scientific Publications, London.

7. I. Roitt, J. Brostoff and DMale (2002), Essential Immunology, 8th edition, English Language Book Society, London..

8. Rajasekaran Pandian (2007), Immunology and Immunotechnology, Panima Publishers, Chennai.

INTERNAL ELECTIVE
PAPER - 3

PHARMACEUTICAL BIOCHEMISTRY

OBJECTIVE:

To identify the mechanism and action of drugs used for various diseases

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO STATEMENT
CO1	Define a drug and identify the chemistry of drug molecules. Illustrate the mechanism of drug absorption, distribution and metabolism
CO2	Explain the routes of drug administration. Appraise on the novel drug delivery systems compared to the conventional routes.
CO3	Justify the use of synthetic drugs for different disease systems.
CO4	Highlight the uses of Plants in traditional medicine
CO5	Highlight the importance of organic phytochemicals in pharmaceuticals

UNIT - I (15 Hrs)

Drug -Definition- Structural feature- prodrug concept. Mechanism of Absorption -first -pass effect. Distribution and metabolism of drug. Mechanism of Phase I and Phase II reactions, Action of cytochrome p450. Drug receptor- localization, type and subtypes, models and their drug - receptor interaction, agonist & antagonist. Examples

UNIT - II (15 Hrs)

Definition for IC 50 and LD50 of a drug - Drug tolerance and intolerance, Idio syneracy (pharmacogenesis), drug allergy- allergic responses to sulphadrugs. Drug abuse. Novel drug delivery systems- role of liposomes and nanoparticles in drug delivery - non conventional routes of administration.

UNIT - III (15 Hrs)

GI tract disorders. Drugs for GI tract disorders. Mechanism of action of drugs used in therapy of GI tract disorder - Ulcer, Irritable bowel syndrome and constipation. Statins as a drug for hyperlipidemia. Antibiotics - sulfonamides,, cotrimoxazole and penicillin. Role of insulin in the

treatment of diabetes mellitus. Oral hypoglycemic drugs - sulphonyl ureas (Gliclazide,glimipride, glibenclamide biguanides (Metformin).

UNIT - IV (15 Hrs)

Plants and bioactive compounds used in traditional medicine Ayurveda , Siddha and Unani - tulsi, turmeric, neem, ashwagandha, amla, coriander, ginger, Aloe barbadensis. Nila vembu kashayam preparation.

UNIT - V

Bioactive components of plant origin: flavonoids, alkaloids, terpenoids, glycosides, saponins, Medicinal plants for the treatment of Diabetes mellitus and Cancer. Chemotherapy - Cytotoxic drug. Biological analysis of active compounds using HPLC, GC- MS(Basic principles only).

TEXT BOOKS/ REFERENCE BOOKS:

1. R.S. Satoskar, S.D. Bhandhakar,Pharmacology and pharmacotheraphy Elsevier, 2017.
2. Bertram. G. Katzung, Basic and clinical Pharmacology, Tata Mc Qrahill publishers, 2015
3. David G. smith, Oxford textbook of clinical pharmacology and drug therapy, Oxford press, 2008, 3rd edition.
4. Ajay Kumar Meena , Parveen Bansal, Sanjiv Kumar Plants-herbal wealth as a potential source of ayurvedic drugs, Asian Journal of Traditional Medicines, 2009

SKILL BASED SUBJECT

PAPER - 4

RESEARCH METHODOLOGY

OBJECTIVE:

To learn the fundamentals of research, research design, principles of scientific research, data collection and analysis of data.

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO Statement
CO1	Gain wide knowledge on the fundamentals of research
CO2	Identify the research problem and research design
CO3	Enlighten Importance of Hypothesis, Characteristics of a Good Hypothesis
CO4	Exposure to write thesis
CO5	Acquire knowledge on journals and paper writing
	Acquire a knowledge on finding scientific articles using PubMed

UNIT - I (15 Hrs)

Definition of research - Objectives of research, general characteristics of research, qualities of researcher, criteria for good research, Types of Research, approaches and significance of Research. Problems encountered in research, Motivation in Research.

UNIT - II (15 Hrs)

Scientific thinking, identification of research problem, defining the problem, evaluation of a Problem. Research design- contents and types of research design, factors affecting research design.

UNIT - III (15 Hrs)

Meaning of Hypothesis, Definitions of Hypothesis, Importance of Hypothesis, Characteristics of a Good Hypothesis, Variables in a Hypothesis, formulating a Hypothesis, Testing the Hypothesis

UNIT - IV (15 Hrs)

Thesis- Components of a thesis -format for writing thesis (Abstract, introduction, review of literature, materials and methods and discussion), reference styles. Useful search engines. E-resources (e-books/e-journals).

UNIT - V (15 Hrs)

Journals: Standard of research journals - International and national journals, Scopus indexed journals-explanation. Impact factor - citation index and H index-Definition.Preparation of research manuscript - report writing - format of journals - proof reading - sources of information; journals, reviews, books, and monographs-bibliography. Plagiarism.Search engines - google, pubmed - national informatics center network services. Online data base library.

REFERENCES:

1. Research methodology, Methods and techniques. C.R.Kothari & Gurav Garg. New age publishers, New Delhi.4th edition.2019.
2. Research methodology. P.Saravanavel - Kitlab mahal, 6th edition. 2018.
3. Research methodology: The beginners' manual. 1st edition. Graham Myers. 2017.
4. Research Methodology: Methods and Techniques. Kothari, C.R.New Age International Publishers, New Delhi.2004.
5. Bioinformatics: sequence and genome analysis, by David Mount, second edition.Cold spring harbor lab press. 2004.
6. Bioinformatics: Sequence and Genome Analysis David W Mount, CBS Publishers, Ian Korf, Mark Yandell& Joseph Bedell. 2003.
7. Introduction to Bioinformatics by T.K Atwood and D.J Parry, Smith Publisher: Pearson Education Pvt Ltd. 2002.
8. Robert A. Day. How To Write & Publish a Scientific Paper. Oryx Press; 5 edition.1998.

CORE PRACTICAL-III

ENZYMOLOGY AND BIOMOLECULES

Course Outcomes: At the end of the Course, the Student will be able to:

CO NUMBER	CO Statement
CO1	Demonstrate the collection of blood sample List the conditions essential for collection of urine and other clinical samples
CO2	Show the effect of pH,temperature and substrate concentration on the activity of salivary amylase Assay the activity of salivary amylase
CO3	Estimate creatinine by Jaffe's method, urea by DAM-TSC method, DNA by diphenylamine method and RNA by orcinol method
CO4	Identify and enumerate the total count of erythrocytes and leukocytes Differentiate leukocytes and calculate their total count
CO5	Define and determine the erythrocyte sedimentation rate, packed cell volume and mean corpuscular volume and relate their clinical implications Utilize sphygmomanometer to determine the blood pressure

I. COLORIMETRIC ESTIMATION

a. Estimation of creatinine by Jaffe's method (in serum & urine)

b. Estimation of urea by diacetyl monoxime method (in serum & urine)

c. Estimation of glucose by O- Toludine method

d. Estimation of Protein by Lowry's method

II.CLINICALLY IMPORTANT ENZYMES:

a. Assay of Serum alkaline phosphatase

b. Determination of optimum pH of salivary amylase.

c. Determination of optimum temperature of salivary amylase.

d. Effect of substrate concentration on the activity of salivary amylase.

e. Assay of activity of salivary amylase.

REFERENCE BOOKS/TEXT BOOKS

1. J. Jayaraman Laboratory Manual in Biochemistry, New Age International Pvt Ltd Publishers, 2011
2. S. K. Sawhney Randhir Singh, Introductory Practical Biochemistry, Alpha Science International, Ltd 2 edition, 2005.
3. Alan H Gowenlock Varley's Practical Clinical Biochemistry, CBS Publishers and distributors, India Sixth Edition, 1988.

CORE PRACTICAL - IV

HEMATOLOGY, MICROBIOLOGY AND URINALYSIS

At the end of course students will be able to

CO NUMBER	**CO Statement**
CO1	Demonstrate the collection of blood sample
	List the conditions essential for collection of urine and other clinical samples
CO2	Hands on training to sterilization and gram staining
CO4	Identify and enumerate the total count of erythrocytes and leukocytes
	Differentiate leukocytes and calculate their total count
CO5	Define and determine the erythrocyte sedimentation rate, packed cell volume and mean corpuscular volume and relate their clinical implications
	Utilize sphygmomanometer to determine the blood pressure
CO5	Qualitatively analyze the normal and abnormal constituents of urine sample

1. HAEMATOLOGY

Hematology - Haemoglobin by Sahli's method, RBC count, PCV, ESR, Total and differential WBC count, Platelet count, Blood grouping, ABO system, Rh System, clotting time, bleeding time.

2. MICROBIOLOGY

Sterilization and disinfection, culture, gram staining, media preparation, antibiotic sensitivity testing

3. URINE ANALYSIS

1. Collection of urine samples
2. Qualitative analysis of urine for normal and pathological conditions.

DEMO EXPERIMENTS.

- Detection of Heart sounds using Stethoscope
- Measurement of Blood pressure using Sphygmomanometer.

REFERENCE BOOKS/TEXT BOOKS

1. J. Jayaraman Laboratory Manual in Biochemistry, New Age International Pvt Ltd Publishers, 2011
2. S. K. Sawhney Randhir Singh, Introductory Practical Biochemistry, Alpha Science International, Ltd 2 edition, 2005.
3. Alan H Gowenlock Varley's Practical Clinical Biochemistry, CBS Publishers and distributors, India Sixth Edition, 1988.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. CHEMISTRY DEGREE COURSE

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3	III	Core Theory	Paper-1	6	4	General Chemistry - I	25	75	100
4	III	Core Practical	Practical-1	3	0	Volumetric Analysis	0	0	0
5	III	Allied -1	Paper-1	4	3	(Choose any 1 out of 5) 1. Physics I 2. Botany I 3. Zoology I 4. Biochemistry I 5. Mathematics I*	25	75	100
6	III	Allied- 1	Practical-1	3	0		0	0	0
7	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
8	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**20**		**150**	**450**	**600**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
10	III	Core Theory	Paper-2	5	4	General Chemistry - II	25	75	100
11	III	Core Practical	Practical-1	3	2	Volumetric Analysis	25	75	100
12	III	Allied-1	Paper-2	4	3	(Choose any 1 out of 5) 1. Physics II 2. Botany II 3. Zoology II 4. Biochemistry II 5. Mathematics II*	25	75	100
13	III	Allied Practical - 1	Practical-1	2	2		25	75	100
14	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
15	IV	Value Education		2	2		25	75	100
16	IV	Soft Skill		2	1		25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**

* **Allied Mathematics**:

	Ins. Hrs/Week	Credit	CIA	University	Total Marks
Paper-1	6	3	25	75	100
Paper-2	6	5	25	75	100

THIRUVALLUVAR UNIVERSITY

B.Sc., CHEMISTRY
SYLLABUS
UNDER CBCS
(With effect from 2020- 2021)

SEMESTER I
PAPER – 1
GENERAL CHEMISTRY – I

Objective:

Basic concepts regarding Atomic Structure, Periodic Properties, Bonding Concepts, Ionic Bond, VSEPR and MO Theories, Nomenclature of Organic Compounds, Hybridisation, Reaction Intermediates, States of Matter, Principle of Volumetric Analysis, Related Problems and Applications wherever necessary are to be taught for I- Semester.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Recollect the Chemistry of Quantum Numbers.

2) Review and apply periodicity of properties.

3) Discuss various types of bonding through VB & MO theories.

4) Name simple Aliphatic and Aromatic Compounds.

5) Illustrate and apply electron displacement effects and reaction mechanisms.

6) Elaborate the basic concepts of solid, liquid and gaseous states.

7) Apply the principles of Volumetric Analysis.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Recollect the Chemistry of Quantum Numbers.

2) Review and apply periodicity of properties.

3) Discuss various types of bonding through VB & MO theories.

4) Name simple Aliphatic and Aromatic Compounds.

5) Illustrate and apply electron displacement effects and reaction mechanisms.

6) Elaborate the basic concepts of solid, liquid and gaseous states.

7) Apply the principles of Volumetric Analysis.

UNIT-I ATOMIC STRUCTURE

1.1 Quantum numbers n, l, m and s – Pauli's exclusion principle – Energy distribution and orbitals - Hund's rule of maximum multiplicity - Aufbau's principle – Electronic Configuration of elements - Stability of Half-filled and completely filled orbitals. Shapes of s, p, d and f orbitals.

1.2 Classification of elements – General characteristics of s, p, d and f- Block elements – Periodicity of properties- Definition and Periodicity of the following properties – Atomic radii and Ionic radii - Factors affecting the Atomic radii and Ionic radii.

1.3 Ionisation potential, Electron affinity and Electronegativity - Factors affecting the Ionisation potential, Electron affinity and Electronegativity – Pauling scale – Mulliken electronegativity scale – Applications of Electronegativity regarding the Bonding nature. Trends in periodic table and applications in predicting and explaining the chemical behavior.

UNIT- II CHEMICAL BONDING

2.1 Ionic bond - Conditions for the formation of ionic bond - General properties – Energetics of formation of NaCl from Na^+ and Cl^- - Hydration energy, Lattice energy and their applications – Born-Haber cycle - Polarisation of ions- Fajan's rule - Transition from ionic to covalent character.

2.2 Covalent bond - Conditions for the formation of covalent bond - General properties - Polarity of bonds - Orbital overlap - Bond lengths and Bond energies - Hybridisation - Sigma and Pi bonds - VSEPR theory - Geometries of $BeCl_2$, BF_3, NH_3, CH_4, SF_4, ICl_2^-, H_2O, PCl_5, ClF_3, XeF_6, SF_6 and IF_7 molecules - Partial ionic character of covalent bond - Percentage of ionic character from dipole moment and electronegativity difference.

2.3 Molecular Orbital theory – Bonding and Anti-bonding orbitals - Relative order of

Energies of molecular orbitals - MO diagram of H_2, He_2, O_2, O^{2+}, O^{2-}, N_2, F_2, HF and CO - Bond Order - Stability and Magnetic properties of the molecules - Comparison of VB and MO theories. Hydrogen bonding-types, examples and effect on properties.

UNIT- III BASIC CONCEPTS OF ORGANIC CHEMISTRY

3.1 Classification of Organic Compounds – Nomenclature of Organic Compounds –

Functional Groups - Homologous Series - IUPAC Recommendations for Naming Simple Aliphatic and Alicyclic Compounds.

3.2 Basic concepts of bonding in organic chemistry - Hybridisation – Definition – Geometry of Molecules - Methane, Ethane, Ethylene, Acetylene and Benzene - Electron displacement effects - Inductive - Inductomeric - Electromeric – Mesomeric Effect - Resonance - Hyperconjugation and Steric Effects.

3.3 Cleavage of bonds - Homolytic and Heterolytic fission of carbon-carbon bond – Methods to determine the Reaction Mechanism - Reaction intermediates - Structure and Stability of Carbocations, Carbanions and Free radicals.

UNIT-IV STATES OF MATTER

4.1 Gaseous state - Kinetic gas equation - Postulates and Derivation - Gas laws from the kinetic gas equation - Kinds of velocities - Mean, RMS, Most Probable Velocities - Calculation of molecular velocities - Maxwell's distribution of Molecular Velocities (No derivation) - Effect of Temperature on velocity distribution - Equipartition of energy - Heat capacity on molecular basis - Virial equation of state - Boyle temperature - Coefficient of Compressibility and Thermal expansion.

4.2 Liquid state - Density – Diffusion - Viscosity – Evaporation - Surface tension Determination using Stalagmometer - Effect of temperature on surface tension - Parachor - Definition and Applications only - Coefficient of Viscosity- determination using Oswald's Viscometer- Effect of Temperature and Pressure - Liquid crystals - Classification and Applications.

4.3 Solid State - Crystal lattices - Symmetry elements in crystals - Unit cell- Seven crystal systems - Space lattice - Bravais lattices - Laws of Crystallography-law of constancy of inter facial angles and Rational Indices- Miller indices, X-ray diffraction by crystals.

UNIT-V PRINCIPLES OF VOLUMETRIC ANALYSIS

5.1 Definitions of Molarity, Molality, Normality and Mole Fraction – Their Calculations - Definition and Examples for Primary and Secondary standards - Calculation of Equivalent Weight of Acid, Base, Oxidising Agent, Reducing Agent and Salts.

5.2 Principles of Volumetric Analysis - Theories of Acid- Base, Redox, precipitation titrations, Complexometric Iodometric and Iodimetric titrations.

5.3 Theories of indicators- Choice of indicators - Acid-base indicators - Redox, Metal ion and Adsorption indicators.

ALLIED 1

(to choose one out of 5)
PAPER-1

1. PHYSICS I

Course Objectives

1. To understand the basics of gravitation and to study the properties of matter.
2. To learn the law of thermoelectric circuits and thermoelectric diagrams.
3. To teach the growth and decay of a transient current and magnetometer.
4. To explain production of ultrasonics and reverberation time.
5. To know the basics of laser and fibre optics principles and applications.

UNIT-1: Properties of Matter

Gravitation: Acceleration due to gravity -Determination of 'g' by Simple pendulum - Drawbacks of simple pendulum –Determination of time period of compound pendulum - 'g' by compound pendulum -Centre of Oscillation and Centre of Suspension are interchangeable-Determination of 'g' by Bar/compound pendulum.

Elasticity: Bending of beams -Expression for bending moment - Cantilever Depression at the loaded end of a cantilever Expression forYoung's modulus -non–uniform bending-Pin and microscope method.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period - Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid -Viscous force - Co-efficient of viscosity of a liquid – Poiseuille's formula -Experimental method using Burette- Effect of temperature and pressure on viscosity-applications.

Surface Tension: Surface tension of a liquid-Surface Tension and interfacial surface tension by the method of drops-applications.

UNIT-2: Thermo Electricity

Seeback, Peltier and Thomson effects - laws of thermoelectric circuits -Peltier coefficient - Thomson coefficient -application of thermodynamics to a thermocouple and expressions for Peltier and Thomson coefficients -thermo electric power and thermo electric diagrams.

UNIT-3: Transient Current and Magnetism

Growth and decay of current in a circuit containing resistance and inductance- Growth and decay of charge in circuit containing resistance and capacitor - growth and decay of charge in a LCR circuit – condition for the discharge to be oscillatory – frequency of oscillation.

Magnetism -Magnetic moment and pole strength of a magnet – Deflection magnetometer – Tan C

Position- Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer and the vibration magnetometer .

UNIT -4: Acoustics

Sound: Transverse vibration of strings -Velocity and frequency of vibrations of a stretched string - laws -Sonometer -A.C. Frequency - Steel wire- Brass wire.

Introduction to Ultrasonics – Piezo electric effect–production by Piezo electric method – properties –applications- Acoustics of buildings – reverberation time – derivation of Sabine's formula – determination of absorption coefficient-Acoustic aspects of halls and auditoria.

UNIT-5:Lasers and Fibre Optics

Laser: Introduction - Principles of laser -Einstein's explanation for stimulatedemission – Differences between stimulated and spontaneous emission - Population inversion –Properties of laser -Types of lasers - He- Ne Laser - Semiconductor Laser-Applications of laser.

Fibre optics: Basic principle of an optical fibre -Total internal reflection -Basic structure of an optical fibre -Numerical aperture –Coherent bundle – Attenuation and dispersion - classification of optical fibres-step index and graded index fibers – single mode and multi mode fibers-Fibre optic communication system block diagram.-applications.

Text Books

Unit 1 and Unit 4

1. R. Murugesan and KiruthigaSivaprasath, Properties of Matter and Acoustics, S. Chand & Co. New Delhi, Kindle edition.

Unit 2 and Unit 3

1. R. Murugesan, Electricity & Magnetism, S. Chand & Co. New Delhi, 2019.

Unit 5

1. N Subrahmanyam, BrijLal and M.N Avadhanulu, A Text Book of Optics, S. Chand &Co. New Delhi, Revised Edition as per UGC model syllabus.

Reference Books

1. BrijLal and N Subrahmanyam,Electricity and Magnetism, S Chand & Company Pvt Ltd, New Delhi, 2000.
2. D.C. Tayal, Electricity and Magnetism, Himalaya Publishing House,Bombay, 2014.
3. BrijLal and N.Subrahmanyam, A Text Book of Sound,Vikas Publications, New Delhi (2 Edition)

4. C.L.Arora, Physics for Degree Students B.Sc First Year, S. Chand Publishing, 2013.
5. K.Thyagarajan and Ajay Ghatak, Introduction to Fibre optics-, Cambridge University.
6. Ajay Ghatak and K.Thyagarajan, Fiber optics and Lasers-The two revolutions, Macmillan, 2006.
7. K.Thyagarajan and Ajay Ghatak, Lasers; Fundamentals and applications, Springer.
8. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2016.

E-MATERIALS

1. https://courses.lumenlearning.com/physics/chapter/16-4-the-simple-pendulum/
2. https://www.youtube.com/watch?v=aw0_seEt4v0
3. https://en.wikipedia.org/wiki/Thermoelectric_effect
4. https://www.youtube.com/watch?v=S0I37M2sx_0
5. https://physicscatalyst.com/elecmagnetism/growth-and-delay-charge-R-C-circuit.php
6. https://www.youtube.com/watch?v=PLQQPXot6vE
7. https://www.youtube.com/watch?v=d0_Eff4MXwM
8. https://www.techglads.com/cse/sem1/production-of-ultrasonics-by-piezoelectric-methods/
9. https://thefactfactor.com/facts/pure_science/physics/optical-fibre/5159/
10. https://www.youtube.com/watch?v=auk1OS0SVWc (Tamil video)

Course Objectives

1. After studied unit-1, the student will be able to find the acceleration due to gravity at a place using simple pendulum and compound pendulum. Also can know the properties of matter like elasticity, viscosity and surface tension.
2. After studied unit-2, the student will be able to learn thermo emf using Seebeck and Peltier effects and hence understand thermoelectric circuits.
3. After studied unit-3, the student will be able to explain growth and decay of a transient current in a circuit containing resistance-inductance, resistance-capacitance and LCR in series. Also will be able to determine the horizontal components of earth's magnetic induction at a place using deflection magnetometer in Tan C position.
4. After studied unit-4, the student will be able to derive the expression for the velocity of a sound in a stretched string and hence they can determine the frequency of A.C mains.
5. After studied unit-5, the student will be able to understanding the principle of laser and can demonstrate the working of He-Ne laser and applications of laser. Also, the student will be able to learn the fibre optics, structure and application in communication.

ALLIED 1

PAPER-1

2. BOTANY - I

UNIT-I: Cell Biology
Prokaryotic and Eukaryotic cell (plant cell)
Cell organells - Chloroplast, Mitochondrion and Nucleus.
Cell division – Mitosis.

UNIT-II: Anatomy
Tissues - Meristematic and permanent tissues. Primary and Normal Secondary thickening of Dicot stem.

UNIT-III: Bacteria and Viruses
Bacteria - General characters - shape - flagellation - Structure of E. Coil - reproduction - (Vegetative
and asexual), Economic importance. Structure of Tobaco Mosaic Virus, Bacteriophage.

UNIT-IV: Structure and Life History of
a) Chlorella and Gracilaria
b) Albugo, Penicilium and Agaricus

UNIT-V: Structure and Life History of
a) Funaria
b) Lycopodium
c) Cycas
Economic importance of Chlorella, Penicillium and Agaricus.

ALLIED 1

PAPER-1

3. ZOOLOGY I

Objective;

To acquire knowledge about different kinds of animals species.

To study the systematic and functional morphology of invertebrates and chordates.

UNIT-I

Type study includes life history.

Protozoa – entamoeba, Porifera- Sycon. Coelenterata – Obelia geniculata. Platyhelminthes - Teania solium.

Unit II

Annilida – earthworm , Arthropoda – Prawn, Mollusca – Freshwater Mussel,Echinodermata –Sea Star.

UNIT-III

Type study includes morphology, digestive system, respiratory system, circulatory system and urinogenital system of Chordate. Chordate – general characters, Prochordata; morphology of Amphioxus. Vertebrates; Pisces –Shark.

UNIT-IV

Amphibia; Frog, Reptiles; calotes.

UNIT-V

Aves; Pigeon, Mammalia; Rabbit.

References;

1.Ayyar, E.K. and T.N. Ananthakrishnan. 1992. Manual of Zoology. Volume I & I, S. Viswanathan (printers and publishers) Pvt. Ltd., Madras, 891 p.

2. Kotpal series, 1998 – 1992. Rastogi publications, Meerut.

3. Jordan E.L. and P.S. Verma. 1993. Invertebrate Zoology 12th edition, S. Chand & Co., Ltd., New Delhi.

4. Jordan, E.L. and P.S. Verma. 1995. Chordate Zoology and Elements of Animal physiology , S. Chand & Co., Ltd., New Delhi.

Outcomes;

1. The students will be able to understand the life – cycle to and adaptations of protozoa, porifera coelenterata and platy helminthes.
2. The student will be able to understand the functional morphology of Annelids, Arthropods , Molluscs and Echinoderms.
3. The student will be able acquire knowledge about the functional morphology of chordata, prochordatas and pisces.
4. The student will be able have a thorough knowledge about Frog and Calotes.
5. The student will be able to understand the functional morphology of Aves and Mammals.

ALLIED - 1

PAPER – 1

4. BIOCHEMISTRY I

OBJECTIVE:

To acquire knowledge on the structure and functions of biomolecules

At the end of the course, the students will be able to

CO1	Explain the structure, biological importance of carbohydrates, from monosaccharides to polysaccharides
CO2	Identify the structure and classification of amino acids,
CO3	Classify proteins and explain their properties
CO4	Define and classify lipids with examples, explain the properties of fats and describe the structure and biological functions of phospholipids, glycolipids and sterols
CO5	Illustrate the structure of nucleotides, distinguish DNA and RNA and describe the structure of DNA, types of RNA and their biological functions

UNIT-I: Carbohydrates

Definition and Classification of carbohydrate. Monosaccharides–Glucose, Fructose and Arabinose, Linear and ring forms (Haworth formula)for glucose and fructose. Anomer, epimer and enatiomers-Definition with examples. Disaccharides –Definition- Sucrose, maltose and Lactose occurrence, structure and functions. Polysaccharides –Homopolysaccharides -Starch -Structure and functions. Heteropolysacharides-Aminosugars and sugar acids.

UNIT-II: Amino acids

Definition and classification of amino acids. Reaction of amino acids with ninhydrin, Color reactions of amino acids (Xanthoproteic test, Morners test, Millons test, Sakaguchi test, Lead acetate test and Pauly's test), Amphoteric nature, isoelectric pH and Zwitter ion.

UNIT-III: Proteins

Proteins-Definition. Peptide bond formation. Classification of proteins based on solubility, shape and size. Denaturation. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT-IV: Lipids

Definition, classification and functions of lipids. Occurrence, chemistry and biologicalfunctions of simple lipids, compound lipids (e.g. phospholipids) and derived lipids:steroids (e.g. cholesterol). Physical property-emulsification. Chemical property-saponification. Functions of bile acids and bile salts.

UNIT- V: Nucleic acids

Nucleic acid- Composition of nucleic acid. Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNAand its biological functions. Chargaff's rule. RNA-Structure, types and functions of RNA: tRNA, mRNAand rRNA. Differences between DNA and RNA

REFERENCES

3. J. L. Jain, Nitin Jain, Sunjai Jai., Fundamentals of Biochemistry 7th editionS. Chand @ Co.Ltd .,2016
4. U. Satyanarayanan BiochemistryElseiver 2017
5. David.L.Nelson, Michael. M.Cox Lehninger principles of Biochemistry 7theditionFreeman. W.H. and Company2017
6. Victor Rodwell Harper's Illustrated Biochemistry McGrew. Hill 2018

ALLIED 1

PAPER-1

MATHEMATICS – I

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ.

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates-Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.
3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

SEMESTER II

PAPER – 2

GENERAL CHEMISTRY - II

OBJECTIVES:

- Basic knowledge on s- and p- Block Elements, Group Study, Hydrocarbons, Cycloalkanes, Dienes, Quantum Chemistry, Thermochemistry, First Law of Thermodynamics, Derivation of Equations, Related Problems, Reaction Mechanism and Applications wherever necessary are to be taught for II- Semester.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Compare the basic properties of elements and their Compounds of s & p – block elements.
2) Explain the reaction mechanisms of alkanes, alkenes and alkynes and predict the products.
3) Classify dienes and analyze the stability of alkanes, alkenes and cycloalkanes.
4) Recollect the basic concepts of Quantum Theory and Thermodynamics.
5) Calculate the thermodynamic parameters using thermo chemical equations and data.

UNIT-I s- and p- Block Elements

1.1 Alkali metals - Li, Na, K, Rb and Cs - Occurrence - Comparative study of Elements with respect to Oxides, Halides, Hydroxides and Carbonates - Exceptional property of Lithium - Diagonal Relationship of Li with Mg.

1.2 Alkaline earth metals - Be, Mg, Ca, Sr and Ba - Occurrence - Comparative study of the elements with respect to Oxides, Hydroxides, Halides, Sulphates and Carbonates - Exceptional property of Beryllium - Diagonal relationship of Be with Al - Comparison of Alkaline Earth Metals with Alkali Metals - Magnesium acting as bridge element between II A and II B groups - Magnesium resembles Zinc.

1.3 p- Block elements - Boron family - Group discussion - Anomalous behaviour of Boron - Diagonal Relationship between Boron and Silicon - Electron deficiency and Electron acceptor behaviour of Boron trihalides - Bonding in Diborane (Hydrogen-bridge structure) - Preparation, Properties, structure and Uses of Borazine, $NaBH_4$, $LiAlH_4$ and boron nitride.

UNIT-II HYDROCARBONS

2.1 Alkanes - Methods of preparation of alkanes - Wurtz method, Kolbe's method and Reduction of alkyl halides - Physical and Chemical Properties of alkanes - Mechanism of Free Radical Substitution in alkanes – Halogenation and Reactivity.

2.2 Alkenes - Properties of alkenes – Electrophilic and Free radical addition - Addition reactions of Alkenes with mechanism - Addition of Hydrogen, Halogens,

Hydrogen Halide (Markownikoff's rule) - Hydrogen bromide (Peroxide effect) - Sulphuric Acid, Water, BH_3, Ozonolysis, Hydroxylation with $KMnO_4$ - Allylic substitution by NBS.

2.3 Alkynes - Acidity of alkynes - Addition of hydrogen - Hydroboration - Hydrohalogenation - Addition of hypohalous acid, Hydration - Addition of water with $HgSO_4$ catalyst - Oxidation with $KMnO_4$ – Ozonolysis - Formation of Acetylides.

UNIT-III DIENES AND CYCLOALKANES

3.1 Dienes – Classification - Conjugated, Isolated and Cumulative Dienes - Stability of

Dienes - 1, 2- and 1, 4- Addition reactions of H_2 and HX with mechanisms – Synthesis of dienes – 1, 3 - Butadiene, Isoprene and Chloroprene - Diels-Alder reaction.

3.2 Cycloalkanes - Preparation using Wurtz's reaction, Dieckmann's ring closure and Reduction of aromatic hydrocarbons - Substitution and Ring opening reactions.

3.3 Stability of Alkanes, Alkenes and Cycloalkanes - Bayer's strain theory - Theory of Strainless rings.

UNIT-IV QUANTUM CHEMISTRY AND THERMOCHEMISTRY

4.1 Planck's Quantum theory of radiation - Photoelectric Effect - Compton Effect - Wave mechanical concept of the atom - de Broglie's relationship – Davisson and Germer experiment - Wave nature of electron - Heisenberg's Uncertainty Principle.

4.2 Schrodinger wave equation (Without derivation) - Significance of wave functions ψ and ψ^2 - Shapes of s, p and d- orbitals.

4.3 Thermodynamics - Definition and Explanation of terms - System, Boundary, Surroundings - Homogeneous and Heterogeneous systems – Open, Closed and Isolated systems -Intensive and Extensive properties - State of a system - Independent state variables - Dependent state variables - Thermodynamic functions - State and Path functions.

UNIT-V THERMODYNAMICS

5.1 Thermodynamic processes - Types of processes - Cyclic - Reversible – Irreversible - Isothermal – Adiabatic Process - Exact and Inexact Differentials - Concept of Heat and Work - Zeroth Law of Thermodynamics.

5.2 First law of Thermodynamics - Statement and Equation – C_p and C_v Relationship - Calculation of w, q, ΔE and ΔH for the Expansion of Ideal Gases under Reversible, Isothermal and Adiabatic Conditions.

5.3 Thermochemistry - Heat of a reaction - Exothermic and Endothermic reactions - Calculation of ΔH from ΔE and vice versa - Thermochemical equations - Bond dissociation energy - Calculation from thermochemical data - Variation of Heat of a reaction with temperature - Kirchoff's Equation and Its significance.

CORE PRACTICAL

Paper – 1

VOLUMETRIC ANALYSIS

Acidimetry

1. Estimation of Borax - Standard Sodium Carbonate

2. Estimation of Sodium Hydroxide - Standard Sodium Carbonate

3. Estimation of HCl – Standard Oxalic Acid.

Iodometry

4. Estimation of Copper - Standard Copper Sulphate

5. Estimation of Potassium Dichromate - Standard Potassium Dichromate

Complexometry

6. Estimation of Magnesium using EDTA.

7. Estimation of Zinc using EDTA

Dichrometry

8. Estimation of Ferrous Iron using Diphenyl amine / N- pPhenylanthranillic acid as indicator.

Precipitation titration

9. Estimation of Chloride in neutral medium (Demonstration experiment).

Permanganometry

10. Estimation of Ferrous Sulphate – Standard FAS.

11. Estimation of Oxalic Acid – Standard Oxalic Acid.

- Students must write Short Procedure for the given estimation in Ten Minutes during the examination and submit the Paper for Evaluation.

ALLIED 1
PAPER-2

1. PHYSICS II

Course Objectives

1. To study the concept of special theory of relativity.
2. To expose the structure of atom with different models.
3. To know the definition of binding energy and to study about nuclear models
4. To learn the different number system in digital electronics and logic gates
5. To give an introduction about nanomaterial.

UNIT-1: Special Theory of Relativity

Frames of reference-inertial frames and non-inertial frames -Galilean transformations - Michelson-Morley experiment-interpretation of results - postulates of special theory of relativity Lorentz transformation equations -length contraction - time dilation - transformation of velocities -variation of mass with velocity -Mass-energy equation.

UNIT-2: Atomic Physics

Bohr atom model – Critical Potentials - Experimental determination of critical potentials - Franck and Hertz's experiment -Sommerfield's Relativistic atom model The vector atom model – spatial quantization–spinning of an electron –quantum numbers associated with the vector atom model – coupling schemes –LS and jj coupling – the Pauli's exclusion principle – Stern and Gerlach experiment

UNIT-3: Nuclear Physics

Binding energy-Binding energy per nucleon-Packing fraction-Nuclear models – liquid drop model – semi empirical mass formula – merits and demerits -shell model -evidences for shell model – nuclear radiation detectors –ionization chamber – G.M Counter-Wilson cloud chamber-Particle accelerators-Cyclotron-Betatron.

Unit-4: Digital Electronics

Number systems -Decimal, Binary, Octal and Hexadecimal system – Conversion from one number system to another- Binary Arithmetic -Addition –Subtraction- 1's and 2's complement -Binary codes- BCD code – Excess 3 code, Gray code.

NAND, NOR and EXOR – functions and truth tables. NAND & NOR as universal gates-Half adder and Full adder - Half subtractor and Full subtractor using NAND gate only.

UNIT-5: Nanomaterial

Introduction-Nanomaterial- Properties of nanomaterial (size dependent) -synthesis of

nanomaterial- sol gel- hydrothermal method-Scanning Electron Microscope (SEM)- Principle and Instrumentation-Fullerenes- Carbon nanotubes- Fabrication and structure of carbon nanotubes - Properties of carbon nanotubes (Mechanical and Electrical) - Applications ofCNT's.

Text Books

Unit 1 to Unit 3

1. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2016

Unit 4

1. V.Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007

Unit 5

1. V. Raghavan, *Material Science and Engineering* ,Printice Hall India.,2004.

Reference Book

1. Allied Physics – R. Murugesan S. Chand & Co. New Delhi, 2005.
2. A Text book of Digital electronics – R.S.Sedha, S.Chand&Co, 2013
3. Malvino and Leech, Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi, 2000.
4. Dr. M.N. Avadhanulu, *Material science*, S.Chand& Company, New Delhi, 2014.
5. M.Arumugam, *Material science*, Anuradhapuplishers, 1990.
6. V. Rajendran, *Material Science*, Tata McGraw Hill Ltd, New Delhi,2001.
7. D.C.Tayal, Nuclear Physics, Himalaya Publishing House, 2009

E-MATERIALS

1. https://en.wikipedia.org/wiki/Galilean_transformation
2. https://www.youtube.com/watch?v=NH3_lIkSB9s
3. https://www.youtube.com/watch?v=EEWuUst2GK4
4. https://en.wikipedia.org/wiki/Vector_model_of_the_atom
5. https://www.tutorialspoint.com/what-is-a-geiger-muller-counter
6. https://www.youtube.com/watch?v=jxY6RC52Cf0
7. https://www.tutorialspoint.com/digital_circuits/digital_circuits_number_systems.htm
8. https://www.youtube.com/watch?v=4ae9sJBBkvw
9. https://en.wikipedia.org/wiki/Nanomaterials
10. https://www.youtube.com/watch?v=mPxoJz6treE (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to study the frames of reference, Galilean transformation equations and special theory of relativity.

2. After studied unit-2, the student will be able to describe the different atomic models and Stern and Gerlach Experiment.
3. After studied unit-3, the student will be able to explain binding energy, liquid drop model, G.M counter and particle accelerators.
4. After studied unit-4, the student will be able to know the conversion of number systems from one to other and also will be able to design universal gates using NAND and NOR gates.
5. After studied unit-5, the student will be able to understanding the basics of nanomaterial, synthesis and its applications.

ALLIED PRACTICAL- PHYSICS

List of Experiments (Any 12 Experiments only)

1. Determination of 'g' using Compound pendulum.
2. Young's modulus-Non-Uniform bending-Pin & microscope
3. Rigidity Modulus – Torsional oscillation method (without masses).
4. Rigidity Modulus – Static Torsion method using Scale and Telescope.
5. Surface tension and Interfacial Surface tension by Drop Weight method.
6. Sonometer – Frequency of a Tuning fork.
7. Sonometer –Determination of A.C. frequency- using steel and brass wire
8. Air Wedge – Determination of thickness of a thin wire
9. Newton's Rings – Radius of Curvature of a convex lens.
10. Spectrometer – Refractive index of a liquid – Hollow prism.
11. Spectrometer grating – Minimum Deviation- Wavelength of Mercury lines.
12. Potentiometer – Calibration of Low range voltmeter.
13. Deflection magnetometer and Vibration magnetometer-Tan C Position-Determination of
    m and B_H.
14. Figure of merit- Table galvanometer.
15. Construction of AND, OR gates using diodes and NOT gate using a transistor.
16. NAND/NOR as universal gate.
17. Half adder and Full adder using NAND gate.
18. Half subtractor and Full subtractor using NAND gate.
19. Lasers: Study of laser beam parameters.
20. Measurement of Numerical aperture (NA) of a telecommunication graded index optic fiber.
21. Fiber attenuation of a given optical fiber.

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai,2018.
2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Dr. S. Somasundaram, Practical Physics, Apsarapublications,Tiruchirapalli, 2012.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

ALLIED 1
PAPER-2

2. BOTANY II

UNIT-I: Taxonomy

General outline of Bentham and Hooker's system of classification. Study of the range of characters and economic importance of the following families: Annonaceae, cucurbitaceae, Apocynaceae, Euphorbiaceae and Liliaceae.

UNIT-II: Embryology

Structure of mature anther. Structure of mature ovule and its types. Fertilization.

UNIT-III: Plant Physiology & Plant Tissue Culture

Physiological role of micro and macro elements their deficiency symptoms Photosynthesis - lightreaction - Calvin cycle Respiration - Glycolysis - Kreb's cycle - electron transport system. Growth hormones – Auxins. Tissue culture and its principles.

UNIT-IV: Ecology

Ecosystem - fresh water ecosystem. Environmental pollution. Major pollutants - types of pollution - Air pollution, water pollution, soil pollution - control measures.

UNIT-V: Genetics & Evolution

Mendelism - Monohybrid and dihybrid crosses. Theories of evolution - Lamarckism, Darwinism.

ALLIED PRACTICAL
BOTANY – I & II

Description of plants in technical terms belonging to the families mentioned in the theory part.
To study the internal structure of Anatomy material, Pteridophytes and Gymnosperms.
Identification and Description of Micro Preparation materials mentioned in the theory part.
Description of experimental setup of plant physiology.

BOOKS SUGGESTED

Ashok Bendre, A.K. and Pandey P.C. (1975) Introductory Botany. Rastogi Publication Meerut.

Ganguly, A.K. and Kumar. N.C. (1971) General Botany Vol. I & Vol. II, Emkay Publication, Delhi.

Rev. Fr. Ignacimuthu, S.J. (1975) Basic Biotechnology – Tata Mcraw till publication co., New Delhi.

Rao, K.N. Krishnamoorthy, K.V. and Rao. G. (1975) Ancillary Botany. S. Viswanathan Private. Ltd., Chennai.

ALLIED 1
PAPER-2
3. ZOOLOGY II

Objective;

-To study the principles of Cell biology and Genetics.

- To study the principles of Developmental Biology and Physiology.

- To have a complete knowledge about circulatory systems and excretory system.

- To create awareness towards recent changes in the environment and preventive measures.

- To understand the concepts of origin of life.

UNIT-I

Cell Biology – structure of animal cell, Genetic; molecular structure of gene – gene function, sex linked inheritance. Genetic engineering and its application.

UNIT-II

Embryology – cleavage and gastrulation of Amphioxus.

Human Physiology; Digestion, circulation – blood components, structure of heart, heart function.

UNIT-III

Disease of Circulatory system – blood pressure, heart disease – Ischemia, Myocardial infarction, Rheumatic heart disease, stroke.

Excretion – structure of kidney and mechanisms of urine formation.

UNIT-IV

Environmental Biology – Biotic factors and Abiotic factors, food chain and food web. Pollution – Environmental Degradation, (Air, Water and Land) – Green house effect – Bioremediation, - Global warming – acid rain.

UNIT-V

Evolution; Theories of Lamarkism & Darwinism.

Reference;

1. Ekambaranatha Ayyar, and Ananthakrishnan, T.N. 1993. Outlines of Zoology, Vol I & II, Viswanathan and Co, Madras.
2. Sambasiviah, I, Kamalakara Rao, A.P., Augustine Chellappa, S. 1983. Text book of Animal Physiology, S. Chand & Co., New Delhi.

3. Verma and Agarwal. 1983. Text book of animal Ecology, S. Chand & Co., New Delhi.
4. Verma and Agarwal and Tyagi. 1991. Chordate Embryology, S. Chand & Co., New Delhi.
5. Rastogi and Jayaraj. 2000. Taxt book of genetics. Rastogi publications, Meerut.
6. Verma and Agarawal. 2000. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Co., New Delhi.

Outcomes;

1. The student will acquire knowledge about cell structure, gene function and Genetic engineering.
2. The student will be able to understand the cleavage pattern and gastrulation in Amphioxus.
3. The students will have a thorough knowledge about the diseases of circulatory systems and urine formation.
4. The student will be have an awareness about the environment.
5. The student will understand the basic concepts of evolution.

ALLIED PRACTICAL

ZOOLOGY

I MAJOR PRACTICAL

DISSECTIONS

Cockroach; Digestive and nervous system

Prawn; nervous system

II MINOR PRACTICAL

MOUNTING

1. Mouth parts of Mosquito and Honey bee
2. Earthworm – Body setae
3. Placoid scales of Shark

III SPOTTERS

Entamoeba, Sycan, Obelia, Taenia solium (entire, scolex) earthworm (entire, Pineal setae) Prawn (entire), Fresh water mussel, Sea star, Amphioxus – Entire, Amphioxus – T.S. through pharynx, Shark, Frog, Calotes, Pigeon, feathers of pigeon and Rabbit.

Sphygnomanometer, Stethoscope, Rain gauge.

References;

1.verma. P.S. 2011. A manual of practical Zoology – INVERTEBRATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

2. Verma. P.S. 2011. A manual of practical Zoology – CHORDATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

ALLIED 1
PAPER-2

4. BIOCHEMISTRY II

OBJECTIVE:

To acquire a wide knowledge on metabolism, disorders of metabolism and biological functions of vitamins and minerals

At the end of the course, the students will be able to

CO1 Illustrate the reactions of various metabolic pathways

CO2 Acquire knowledge on the various metabolic disorders

CO3 Classify enzymes and explain their functions

CO4 Define and classify vitamins with examples, explain the sources, RDA and functions of fat soluble and water soluble vitamins

CO5 Illustrate the sources, RDA and functions of minerals

UNIT-I: Metabolism

Metabolism-Catabolism and anabolism-Definition. Reactions of glucose oxidation-Glycolysis, TCA cycle and its energetics, HMP shunt and its significance. Amino acid-transamination and Deamination,reaction, Urea cycle- Formation of urea.

UNIT-II: Metabolic Disorders

Diabetes mellitus- definition. Types and symptoms. Glycogen storage diseases-Types, Renal Glycosuria-Definition and causes. In born errors of amino acid metabolism- Phenylketonuria, Alkaptonuria (Black urine syndrome) and albinism

UNIT-III: Enzymes

Enzymes-Definition, IUB system of classification with one example. Mechanism of enzyme action- Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Coenzymes- Vitamins as coenzymes (Tabulation of Coenzymes with functions in metabolism)

UNIT-IV: Vitamins

Vitamins- fat soluble (Vitamin A, D, E and K) and water soluble vitamins (Vitamin B1, B2, B3 and B12),Vitamin C - sources, RDA, biological function and deficiency of Vitamins of the above mentioned vitamins

UNIT V-Minerals

Minerals- sources, RDA, biological functions and deficiency of Calcium, Iron, Phosporus, Sodium and potassium. Examples of minerals as cofactors in metabolism.

REFERENCES

1. J. L. Jain, Nitin Jain, Sunjai Jai., Fundamentals of Biochemistry 7th edition S. Chand @ Co.Ltd .,2016
2. U. Satyanarayanan BiochemistryElseiver 2017
3. David.L.Nelson, Michael. M.CoxLehninger principles of Biochemistry 7th editionFreeman. W.H. and Company2017
4. Victor RodwellHarper's Illustrated BiochemistryMcGrew. Hill 2018

ALLIED PRACTICAL

PRACTICAL I

BIOCHEMISTRY I & II

CO NUMBER	CO Statement
CO1	Quantify glucose in unknown solution by benedicts method
CO2	Quantify ascorbic acid in lemon by Dichlorophenol indo phenol dye method
CO3	Quantify glycine by Sorenson's formal titration method
CO4	Qualitatively analyze the carbohydrates and amino acids and report the type of carbohydrate based on specific tests
CO5	Differentiate the carbohydrates based microscopic examination of the crystal structure.

Volumetric Estimation

1. Estimation of Glucose by Benedict's method.
2. Estimation of Ascorbic acid by 2, 6 dichlorophenol indophenols dye method.
3. Estimation of Glycine by Sorenson's formal titration.

A) Qualitative analysis of Carbohydrates

1. Qualitative analysis of Glucose,
2. Qualitative analysis of Fructose,
3. Qualitative analysis of Sucrose
4. Qualitative analysis of Maltose,
5. Qualitative analysis of Starch

B) Qualitative analysis of Amino acids

1. Qualitative analysis of Arginine,
2. Qualitative analysis of Cysteine,
3. Qualitative analysis of Tryptophan
4. Qualitative analysis of Tyrosine
5. Qualitative analysis of Histidine

REFERENCES

1. J. Jayaraman,Laboratory Manual in Biochemistry New Age International Pvt Ltd Publishers

2011

2. S. K. SawhneyRandhir Singh Introductory Practical Biochemistry Alpha Science International, Ltd,2 edition, 2005.
3. Irwin H.Saegal Biochemical calculations Liss, Newyork 1991

5. MATHEMATICS - II

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume - Fourier series for functions in (0,2□) and □□□□□□□□

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Guass, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. CHEMISTRY DEGREE COURSE

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	6	4	General Chemistry - I	25	75	100
	III	Core Practical	Practical-1	3	0	Volumetric Analysis	0	0	0
4.	III	Allied -1	Paper-1	4	3	(Choose any 1 out of 5) 1. Physics I 2. Botany I 3. Zoology I 4. Biochemistry I 5. Mathematics I*	25	75	100
	III	Allied- 1	Practical-1	3	0		0	0	0
5.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
6.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**20**		**150**	**450**	**600**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
7.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8.	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
9.	III	Core Theory	Paper-2	5	4	General Chemistry - II	25	75	100
10.	III	Core Practical	Practical-1	3	2	Volumetric Analysis	25	75	100
11.	III	Allied-1	Paper-2	4	3	(Choose any 1 out of 5) 1. Physics II 2. Botany II 3. Zoology II 4. Biochemistry II 5. Mathematics II*	25	75	100
12.	III	Allied Practical - 1	Practical-1	2	2		25	75	100
13.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
14.	IV	Value Education		2	2		25	75	100
15.	IV	Soft Skill		2	1		25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
16.	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-3	4	4	General Chemistry - III	25	75	100
	III	Core Practical	Practical-2	3	0	Inorganic Qualitative Analysis & Preparations	0	0	0
19.	III	ALLIED-2	Paper-3	4	3	**Any one from** 1. Physics -I 2. Botany -I 3. Zoology -I 4. Biochemistry - I 5. Mathematics - I*	25	75	100
	III	Allied Practical	Practical-2	3	0	Allied practical-II	0	0	0
20.	IV	Skill Based Subject	Paper-1	2	2	Water Treatment and Analysis	25	75	100
21.	IV	Non-Major Elective	Paper-1	2	2	Medicinal Chemistry	25	75	100
				30	19		**150**	**450**	**600**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
22.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
23.	II	English	Paper-4	6	4	English	25	75	100
24.	III	Core Theory	Paper-4	4	4	General Chemistry - IV	25	75	100
25.	III	Core Practical	Practical-2	3	3	Inorganic Qualitative Analysis & Preparations	25	75	100
26.	III	Allied-2	Paper-4	4	3	**Any one from** 1. Physics -II 2. Botany -II 3. Zoology -II 4. Biochemistry - II 5. Mathematics - II*	25	75	100
27.	III	Allied Practical	Practical-2	3	2	Allied practical-II	25	75	100
28.	**IV**	**NMSDC : Digital Skills for Employability**	**Paper-2**	**2**	**2**	**Office Fundamentals**	**25**	**75**	**100**
29.	IV	Non-Major Elective	Paper-2	2	2	Chemistry in Every Day Life	25	75	100
				30	**24**		**200**	**600**	**800**

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
30.	III	Core Theory	Paper-5	6	5	Inorganic Chemistry - I	25	75	100
	III	Core Practical	Practical-3	3	0	Gravimetric Estimation	0	0	0
31.	III	Core Theory	Paper-6	6	5	Organic Chemistry - I	25	75	100
	III	Core Practical	Practical-4	3	0	Organic qualitative Analysis and Preparations	0	0	0
32.	III	Core Theory	Paper-7	6	4	Physical Chemistry - I	25	75	100
33.	III	Internal Elective	Paper-1	3	3	**Any one from** A. Analytical chemistry - I B. Basis of computer programming in C and its applications in Chemistry c. Organic Synthesis	25	75	100
34.	IV	Skill Based Subject	Paper-3	3	2	Applied Chemistry	25	75	100
				30	**19**		**150**	**450**	**600**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
35.	III	Core Theory	Paper-8	6	4	Inorganic Chemistry - II	25	75	100
36.	III	Core Theory	Paper-9	6	4	Organic Chemistry - II	25	75	100
37.	III	Core Theory	Paper-10	6	4	Physical Chemistry - II	25	75	100
38.		Compulsory Project		0	5		25	75	100
39.	III	Core Practical-3	Practical-3	0	2	Gravimetric Estimation	25	75	100
40.	III	Core Practical-4	Practical-4	0	2	Organic qualitative Analysis and Preparations	25	75	100
41.	III	Core Practical-5	Practical-5	3	3	Physical Chemistry Experiments	25	75	100
42.	III	Internal Elective	Paper-2	3	3	**Any one from** A. Analytical Chemistry-II B. Textile Chemistry C. Nano Chemistry	25	75	100
43.	III	Internal Elective	Paper-3	3	3	**Any one from** A. Pharmaceutical Chemistry B. Polymer Chemistry C. Green Chemistry	25	75	100
						Agriculture and Leather			

44.	III	Skill based Subject	Paper-4	3	2	Chemistry	25	75	100
45.	IV	Extension Activities		0	1		100	0	100
46.	-	**NMSDC : Employability Readiness**				**(choose any one)** • **Naandi** • **Unnati** • **Quest** • **Izpay** • **IBM Skills build**	-	-	-
		TOTAL		**30**	**33**		**350**	**750**	1100

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English & English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Allied Practical	2	2		100	200
	Electives	3	3	9	100	300
	Core	10	(3-5)	42	100	1000
	Core practical	5	(2-3)	12	100	500
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	**43**		**140**		**4500**

* **Allied Mathematics**:

	Ins. Hrs/Week	Credit	CIA	University	Total Marks
Paper-1	7	3	25	75	100
Paper-2	7	5	25	75	100

THIRUVALLUVAR UNIVERSITY
B.Sc., CHEMISTRY SYLLABUS UNDER CBCS
(With effect from 2020- 2021)

SEMESTER - III
CORE PAPER - 3
GENERAL CHEMISTRY - III

OBJECTIVE:

Basic concepts regarding the Principles of Inorganic Analysis and Applications of Qualitative Analysis, Types of Solvents, p- Block Elements, Group Study, Aromaticity, Electrophilic and Nucleophilic Substitution Reactions, Elimination Reactions, Reaction Mechanism, Second Law of Thermodynamics, Derivation of Equations, Related Problems and Applications wherever necessary are to be taught for III semester.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Explain the basic principles of Inorganic Qualitative Analysis.
2) Compare the properties of Carbon, Nitrogen and Oxygen elements and their compounds.
3) Apply Huckel's rule and predict the Aromaticity of compounds.
4) Discuss the mechanism of substitution and elimination reactions of Aliphatic and Aromatic compounds.
5) Explain the Thermodynamic second law and predict the spontaneity of a process.

UNIT - I

Semimicro Techniques - Principles of Acid-Base Equilibria - Common ion effect - Solubility Product and its Applications in Qualitative Analysis - Principles of Inorganic Analysis - Reactions involved in the Separation and Identification of Cations and Anions in Qualitative analysis - Spot test reagents - Aluminon, Cupferon, DMG, Thiourea, Magneson, Alizarin and Nessler's reagent - Types of solvents - Protic and Aprotic solvents - Amphiprotic / Amphoteric solvents - Aqueous and Non-aqueous solvents- Reactions in non-aqueous solvents with reference to - Liquid Ammonia and liquid SO_2. Acids and bases-Arrhenius, Bronsted-Lowry, Lewis and Lux-Flood concept .

UNIT - II

Carbon family - Group study - Comparative study of Elements with respect to Valency, Oxides, Halides, Hydrides and Oxyacids - Catenation - Comparison of Properties of Carbon and Silicon - Silicates - Classification and Structure - Silicones- Preparation, Properties and Uses - Nitrogen family - Group study - Comparative study of N, P, As, Sb and Bi with respect to Oxides, Oxyacids, Halides and Hydrides - Hydrazine and Hydroxylamine - Hydrazoic acid - Preparaton and uses of $NaBiO_3$ - Oxygen family - Group study - Comparative study of O, S, Se and Te with respect to Catenation, Oxides, Halides, Hydrides and Oxyacids - Anomalous Behaviour of Oxygen - Oxyacids of Sulphur (Structure only) - Peracids of Sulphur - Preparation, Properties and Structure - Differences Between Permonosulphuric Acid and Perdisulphuric Acid.

UNIT - III

Aromaticity - Modern Theory of Aromaticity - Huckel's (4n +2) Rule and Its Simple Applications to Benzenoid and Non- benzenoid Compounds - Electrophilic substitution reactions in Aromatic Compounds - Mechanisms of Nitration, Halogenations, Sulphonation, Friedel-Crafts Acylation and Alkylation - Directive influence - Orientation - Ortho/Para ratio - Nuclear and Side chain Halogenation.

UNIT - IV

Aliphatic Nucleophilic Substitutions - Mechanisms of S_N1, S_N2 and S_Ni Reactions - Effect of Structure of Substrate, Solvent, Nucleophile and Leaving Group - Elimination reactions - Mechanism of E1 and E2 reactions - Hoffmann and Saytzeff'’s rules - Cis and Trans Eliminations - Aromatic Nucleophilic Substitutions - Unimolecular Nucleophilic Substitution, Bimolecular Nucleophilic Substitution and their Mechanism.

UNIT - V

Second Law of Thermodynamics - Need for the II Law of Thermodynamics - Spontaneous Process - Criteria of Spontaneity - Different Forms of Statements of the Second Law - Cyclic Process - Definition - Heat Engines - Carnot's cycle - Efficiency - Carnot's theorem (Statement only) - Concept of Entropy - Definition and Mathematical Statement - Randomness and Entropy - Standard Entropy -Derivation of Entropy from Carnot Cycle - Entropy change of an Ideal Gas during Isothermal Process - Entropy changes in Cyclic, Reversible and Irreversible Processes - Entropy Changes in Physical Transformations - Calculation of Entropy Changes with Changes in T, V and P - Entropy of Mixing of Ideal Gases - Physical Significance of Entropy.

ALLIED - 2

PAPER – 3

(to choose one out of 5)

1. PHYSICS - I

Course Objectives

1. To understand the basics of gravitation and to study the properties of matter.
2. To learn the law of thermoelectric circuits and thermoelectric diagrams.
3. To teach the growth and decay of a transient current and magnetometer.
4. To explain production of ultrasonics and reverberation time.
5. To know the basics of laser and fibre optics principles and applications.

UNIT-1: Properties of Matter

Gravitation: Acceleration due to gravity -Determination of 'g' by Simple pendulum - Drawbacks of simple pendulum –Determination of time period of compound pendulum - 'g' by compound pendulum -Centre of Oscillation and Centre of Suspension are interchangeable-Determination of 'g' by Bar/compound pendulum.

Elasticity: Bending of beams -Expression for bending moment - Cantilever Depression at the loaded end of a cantilever Expression forYoung's modulus -non–uniform bending-Pin and microscope method.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period - Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid -Viscous force - Co-efficient of viscosity of a liquid – Poiseuille's formula -Experimental method using Burette- Effect of temperature and pressure on viscosity-applications.

Surface Tension: Surface tension of a liquid-Surface Tension and interfacial surface tension by the method of drops-applications.

UNIT-2: Thermo Electricity

Seeback, Peltier and Thomson effects - laws of thermoelectric circuits -Peltier coefficient - Thomson coefficient -application of thermodynamics to a thermocouple and expressions for Peltier and Thomson coefficients -thermo electric power and thermo electric diagrams.

UNIT-3: Transient Current and Magnetism

Growth and decay of current in a circuit containing resistance and inductance- Growth and decay of charge in circuit containing resistance and capacitor - growth and decay of charge in a LCR circuit – condition for the discharge to be oscillatory – frequency of oscillation.

Magnetism -Magnetic moment and pole strength of a magnet – Deflection magnetometer – Tan C Position- Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer and the vibration magnetometer .

UNIT -4: Acoustics

Sound: Transverse vibration of strings -Velocity and frequency of vibrations of a stretched string - laws -Sonometer -A.C. Frequency - Steel wire- Brass wire.

Introduction to Ultrasonics – Piezo electric effect–production by Piezo electric method – properties – applications- Acoustics of buildings – reverberation time – derivation of Sabine's formula – determination of absorption coefficient-Acoustic aspects of halls and auditoria.

UNIT-5:Lasers and Fibre Optics

Laser: Introduction - Principles of laser -Einstein's explanation for stimulatedemission – Differences between stimulated and spontaneous emission - Population inversion –Properties of laser -Types of lasers - He- Ne Laser - Semiconductor Laser-Applications of laser.

Fibre optics: Basic principle of an optical fibre -Total internal reflection -Basic structure of an optical fibre -Numerical aperture –Coherent bundle – Attenuation and dispersion - classification of optical fibres-step index and graded index fibers – single mode and multi mode fibers-Fibre optic communication system block diagram.-applications.

Text Books

Unit 1 and Unit 4

1. R. Murugesan and KiruthigaSivaprasath, Properties of Matter and Acoustics, S. Chand & Co. New Delhi, Kindle edition.

Unit 2 and Unit 3

1. R. Murugesan, Electricity & Magnetism, S. Chand & Co. New Delhi, 2019.

Unit 5

1. N Subrahmanyam, BrijLal and M.N Avadhanulu, A Text Book of Optics, S. Chand &Co. New Delhi, Revised Edition as per UGC model syllabus.

Reference Books

1. BrijLal and N Subrahmanyam,Electricity and Magnetism, S Chand & Company Pvt Ltd, New Delhi, 2000.
2. D.C. Tayal, Electricity and Magnetism, Himalaya Publishing House,Bombay, 2014.
3. BrijLal and N.Subrahmanyam, A Text Book of Sound,Vikas Publications, New Delhi (2 Edition)
4. C.L.Arora, Physics for Degree Students B.Sc First Year, S. Chand Publishing, 2013.
5. K.Thyagarajan and Ajay Ghatak, Introduction to Fibre optics-, Cambridge University.
6. Ajay Ghatak and K.Thyagarajan, Fiber optics and Lasers-The two revolutions, Macmillan, 2006.
7. K.Thyagarajan and Ajay Ghatak, Lasers; Fundamentals and applications, Springer.
8. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, S.Chand&Co, New

Delhi, 2016.

E-MATERIALS

1. https://courses.lumenlearning.com/physics/chapter/16-4-the-simple-pendulum/
2. https://www.youtube.com/watch?v=aw0_seEt4v0
3. https://en.wikipedia.org/wiki/Thermoelectric_effect
4. https://www.youtube.com/watch?v=S0I37M2sx_0
5. https://physicscatalyst.com/elecmagnetism/growth-and-delay-charge-R-C-circuit.php
6. https://www.youtube.com/watch?v=PLQQPXot6vE
7. https://www.youtube.com/watch?v=d0_Eff4MXwM
8. https://www.techglads.com/cse/sem1/production-of-ultrasonics-by-piezoelectric-methods/
9. https://thefactfactor.com/facts/pure_science/physics/optical-fibre/5159/
10. https://www.youtube.com/watch?v=auk1OS0SVWc (Tamil video)

Course Objectives

1. After studied unit-1, the student will be able to find the acceleration due to gravity at a place using simple pendulum and compound pendulum. Also can know the properties of matter like elasticity, viscosity and surface tension.
2. After studied unit-2, the student will be able to learn thermo emf using Seebeck and Peltier effects and hence understand thermoelectric circuits.
3. After studied unit-3, the student will be able to explain growth and decay of a transient current in a circuit containing resistance-inductance, resistance-capacitance and LCR in series. Also will be able to determine the horizontal components of earth's magnetic induction at a place using deflection magnetometer in Tan C position.
4. After studied unit-4, the student will be able to derive the expression for the velocity of a sound in a stretched string and hence they can determine the frequency of A.C mains.
5. After studied unit-5, the student will be able to understanding the principle of laser and can demonstrate the working of He-Ne laser and applications of laser. Also, the student will be able to learn the fibre optics, structure and application in communication.

ALLIED - 2

PAPER – 3

2. BOTANY – I

Course Objectives :

1. To knowledge of cell and cell organelles
2. To know classification and structure of tissues
3. To understand characters and reproduction of bacteria and viruses
4. To acquire knowledge of algae and fungi
5. To study the structure and life cycle of some bryophytes, pteridophytes and gymnosperms.

UNIT-I: Cell Biology

Prokaryotic and Eukaryotic cell (plant cell)
Cell organells - Chloroplast, Mitochondrion and Nucleus.
Cell division – Mitosis.

UNIT-II: Anatomy

Tissues - Meristematic and permanent tissues. Primary and Normal Secondary thickening of Dicot stem.

UNIT-III: Bacteria and Viruses

Bacteria - General characters - shape - flagellation - Structure of E. Coil - reproduction - (Vegetative
and asexual), Economic importance. Structure of Tobaco Mosaic Virus, Bacteriophage.

UNIT-IV: Structure and Life History of

a) Chlorella and Gracilaria
b) Albugo, Penicilium and Agaricus

UNIT-V: Structure and Life History of

a) Funaria
b) Lycopodium
c) Cycas
Economic importance of Chlorella, Penicillium and Agaricus.

Course Out Comes :

1. To knowledge of cell and cell organelles
2. To know classification and structure of tissues
3. To understand characters and reproduction of bacteria and viruses
4. To acquire knowledge of algae and fungi
5. To study the structure and life cycle of some bryophytes, pteridophytes and gymnosperms.

ALLIED - 2

PAPER - 3

3. ZOOLOGY I

Objective:

To acquire knownledge about different kinds of animal species.

To study the systematic and fuctional morphology of invertebrates and chordates.

UNIT - I:
Type study includes life history.

Protozoa - Entamoeba, **Porifera** - Sycon. **Coelenterata** - Obelia geniculata. **Platyhelminthes** - Teania solium.

UNIT - II

Annelida - Earthworm, **Arthropoda** - Prawn, **Mollusca** - Fresh water mussel, **Echinodermata** - Sea star.

UNIT - III:
Type study includes Morphology, digestive system, respiratory system, circulatory system and urinogenital system of Chordate - **Chordata** - General charters, **Prochordata:** Morphology of Amphioxus - **Vertebrates: Pisces** - Shark.

UNIT - IV

Amphibia: Frog, **Reptiles:** Calotes

UNIT - V

Aves: Pigeon, **Mammalia:** Rabbit.

REFERENCES:

1. Ayyar, E.K. and T.N. Ananthakrishnan. 1992. Manual of Zoology. Vol I & II, S. Viswanathan (printers and publishers) Pvt. Ltd., Madras, 891 p.
2. Kotpal series, 1998 - 1992. Rastogi Publications, Meerut.
3. Jordan E.L. and P.S. Verma. 1993. Invertebrate Zoology 12th edition, S. Chand & Co., Ltd., New Delhi.
4. Jordan, E.L., and P.S. Verma. 1995. Chordate Zoology and Elements of Animal Physiology, S. Chand & Co., Ltd., New Delhi.

ALLIED - 2

PAPER - 3

4. BIOCHEMISTRY I

OBJECTIVE:

To acquire knowledge on the structure and functions of biomolecules

At the end of the course, the students will be able to

CO1	Explain the structure, biological importance of carbohydrates, from monosaccharides to polysaccharides
CO2	Identify the structure and classification of amino acids,
CO3	Classify proteins and explain their properties
CO4	Define and classify lipids with examples, explain the properties of fats and describe the structure and biological functions of phospholipids, glycolipids and sterols
CO5	Illustrate the structure of nucleotides, distinguish DNA and RNA and describe the structure of DNA, types of RNA and their biological functions

UNIT-I: Carbohydrates

Definition and Classification of carbohydrate. Monosaccharides–Glucose, Fructose and Arabinose, Linear and ring forms (Haworth formula)for glucose and fructose. Anomer, epimer and enatiomers-Definition with examples. Disaccharides –Definition- Sucrose, maltose and Lactose occurrence, structure and functions. Polysaccharides –Homopolysaccharides -Starch -Structure and functions. Heteropolysacharides-Aminosugars and sugar acids.

UNIT-II: Amino acids

Definition and classification of amino acids. Reaction of amino acids with ninhydrin, Color reactions of amino acids (Xanthoproteic test, Morners test, Millons test, Sakaguchi test, Lead acetate test and Pauly's test), Amphoteric nature, isoelectric pH and Zwitter ion.

UNIT-III: Proteins

Proteins-Definition. Peptide bond formation. Classification of proteins based on solubility, shape and size. Denaturation. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT-IV: Lipids

Definition, classification and functions of lipids. Occurrence, chemistry and biologicalfunctions of simple lipids, compound lipids (e.g. phospholipids) and derived lipids:steroids (e.g. cholesterol). Physical property-emulsification. Chemical property-saponification. Functions of bile acids and bile salts.

UNIT- V: Nucleic acids

Nucleic acid- Composition of nucleic acid. Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNAand its biological functions. Chargaff's rule. RNA-Structure, types and functions of RNA: tRNA, mRNAand rRNA. Differences between DNA and RNA

REFERENCES

1. J. L. Jain, Nitin Jain, Sunjai Jai., Fundamentals of Biochemistry 7th editionS. Chand @ Co.Ltd .,2016
2. U. Satyanarayanan BiochemistryElseiver 2017
3. David.L.Nelson, Michael. M.Cox Lehninger principles of Biochemistry 7theditionFreeman. W.H. and Company2017
4. Victor Rodwell Harper's Illustrated Biochemistry McGrew. Hill 2018

ALLIED - 2

PAPER - 3

5. MATHEMATICS - I*

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT - I

ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT - II

THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT - III

MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors - Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT - IV

TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ.

UNIT - V

DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates- Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics*. Vol. I&II. Vikas Publications, New Delhi.
3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company

Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

SKILL BASED SUBJECT

PAPER - 1

WATER TREATMENT AND ANALYSIS

Objective:

To impart knowledge about the various methods of Water Analysis and Treatment of Water.

UNIT - I

Introduction - Characteristics of water - Alkalinity - Hardness - Unit of hardness - Total solids - Oxidation - Transparency - Silica content - Purification of Water for drinking purpose - Potability of water - Clarification - Coagulation - Contact and Electrochemical Coagulation - Sterilisation and Disinfection of water - Precipitation - Aeration - Ozonisation - Chlorination.

UNIT - II

Water Softening Methods - Clark's process - Lime soda process - Modified lime soda process - Permutit or Zeolite process - Ion exchange process - Demineralisation of water - Determination of Hardness of water - Titration method - Complexometric method using EDTA - Expressing Hardness - Equivalents of Calcium Carbonate - Problems to determine Temporary and Permanent Hardness.

UNIT – III

Hard water and Industries - Industrial water treatment - Boiler feed water method of Softening - Prevention of plumbo solvency - Scales in boilers - Consequences - Internal conditioning methods - Desalination of Brackish water - Elecrodiaysis - Reverse osmosis - Removal of Fe, Mn and Silicic acid - Effluent Treatment of Water from Paper Industry, Petrochemicals, Fertilizer industry and Power station.

UNIT - IV

Water analysis - Sampling of Water for analysis - Chemical Substances affecting Potability - Colour, Turbidity, Odour, Taste, Temperature, pH and Electrical Conductivity - Analysis of Solids present in water - Suspended Solids - Dissolved Solids - Total Acidity - Alkalinity - Free CO_2 - Free Chlorine - Ca, Mg, Fe, Mn, Ag and Zn - Water in Industry - Pollution of Water by Fertilisers, Detergents, Pesticides and Industrial wastes.

UNIT - V

Analysis of Chemical Substances Affecting Health - NH_3, Nitrate, Nitrite, Cyanide, Sulphate, Sulphide, Chloride and Fluoride - Measurement of Toxic Chemical Substances - Analysis of Chemical Substances indicative of Pollution - Dissolved oxygen - Biochemical Oxygen Demand (BOD) - Chemical Oxygen Demand (COD) - Bacteriological Examination of Water - Total Count Test - E. coli test - E. coli index - Most Probable Number method - Biological Examination of Water - Physical Examination of Water - Radioactivity of Water - Methods of removing Radioactivity from Water.

Outcome:

The Students will be able to

1) Classify water based on the presence of dissolved salts in it.
2) Explain the various methods to make the water potable.
3) Discuss the softening methods of hardwater and determine hardness of water.
4) Understand electrodialysis and RO methods to desalinate Brackish water.
5) Analyse the presence of Chemical substances in water indicative of pollution by measuring BOD and COD.
6) Illustratrate the methods used for biological examination of water.

Reference Books

1. Industrial Chemistry (Including Chemical - Engineering) - B. K. Sharma - Goel Publishing House, Meerut (1987).
2. Pollution Control in Process Industries - S. P. Mahajan - Tata McGraw Hill Publishing Company Ltd., New Delhi (1991).
3. Water Pollution and Management - C. K. Varashney - Wiley Eastern Ltd., Chennai -20 (1991).

NON-MAJOR ELECTIVE
PAPER - 1
MEDICINAL CHEMISTRY

Objectives:

To learn the basic idea of Drugs and Names of Common Drugs, Blood, Blood Pressure, Diabetes, AIDS, Vitamins, Indian Medicinal Plants and First Aid.

UNIT - I

Clinical Health and Biochemical Analysis - Definition of Health - WHO standard - Sterilisation of Surgical Instruments - Biochemical Analysis of Urine and Serum - Blood - Composition of Blood - Blood grouping and Rh factor.

UNIT - II

Common Drugs - Antibiotics, Antipyretics and Analgesics - Examples, Uses and Side effects - Anti-inflammatory agents, Sedatives, Antiseptics and Antihistamines - Examples, Uses and Side effects - Tranquilizers, Hypnotics and Antidepressant drugs - Definition, Examples, Uses and Side effects.

UNIT - III

Vital Ailments and Treatment - Blood pressure - Hypertension and Hypotension - Diabetes, Cancer, AIDS - Causes, Symptoms and Treatment - Vitamins - Classification of Vitamins - Sources and Deficiency diseases caused by Vitamins.

UNIT - IV

Indian Medicinal Plants - Palak, Vallarai, Kizhanelli and Thumbai - Chemical Constituents and Medicinal Uses - Hibiscus, Adadodai, Thoothuvalai - Chemical Constituents and Medicinal Uses - Nochi, Thulasi, Aloe Vera - Chemical Constituents and Medicinal Uses.

UNIT - V

First Aid and Safety - Treatment of Shock, Haemorrage, Cuts and Wounds - Burns - Classification - First Aid - Asbestos, Silica, Lead Paints, Cement, Welding fumes and Gases - Hazard alert and Precautions for Safety.

Reference Books

1. Applied Chemistry, Jayashree Ghosh - S. Chand and Company Ltd., 2006

2. Biochemistry, S. C. Rastogi - Tata McGraw Hill Publishing Co., 1993.

3. Medicinal Plants of India, Rasheeduz Zafar - CBS Publishers and Distributors, 2000.

4. Hawk's Physiological Chemistry, B. L. Oser - Tata-McGraw Hill Publishing Co. Ltd.

5. Practical Pharmaceutical Chemistry, A. H. Beckett and J. B. Stenlake - Vol. I - CBS Publishers and Distributors, 2000.

Outcome:

The Students will be able to

1) Understand the composition of blood and biochemical analysis of Urine and Serum

2) Gain knowledge about uses and side effects of Antibiotics, Antipyreties, Analgesics and

tranquilizers.

3) Explain the causes, symptoms and treatment of Blood pressure, Diabetes, Cancer and AIDS.
4) Classify and understand the sources and diseases caused by deficiency of Vitamins.
5) Analyse the therepheutic importances of Indian Medicinal plants
6) Describe the first Aid and Safety treatment of Shock, Haemorrage, Cuts and wounds and Burns.

SEMESTER - IV
CORE PAPER - 4
GENERAL CHEMISTRY - IV

OBJECTIVE:

Noble gases, Carboxylic Acids, Amines, Alcohols, Phenols, Naphthols, Important Name Reactions, Mechanism, Thermodynamics, Derivation of Equations, Partial Molar Properties, Chemical Potential, Related Problems and Applications are to be taught for IV semester.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Classify water based on the presence of dissolved salts in it.

2) Explain the various methods to make the water potable.

3) Determine the hardness of water and discuss the softening methods of hard water.

4) Discuss electro dialysis and RO methods to desalinate brackish water.

5) Analyze the presence of chemical substances in water indicative of pollution by measuring BOD and COD.

6) Illustrate the methods used for biological examination of water.

UNIT - I

Noble gases - Electronic Configurations - Position of Noble Gases in the Periodic Table - Chemical inertness of Noble gases – Reason - Compounds of Xenon - Hybridization and Geometry of XeF_2, XeF_4, XeF_6 $XeOF_2$, XeO_3 and $XeOF_4$ (Preparation, Properties - Not necessary) - Clathrates - Definition and Applications - Uses of Noble gases.

UNIT - II

Monocarboxylic acids - Acetic acid and Benzoic acid - Preparation by Grignard method - Conversion of Acids to their derivatives - Amide, Ester, Anhydride and Acid Chloride - Strength of Carboxylic Acids - Effect of Substituents on the Strength of Acids - Dicarboxylic acids - Oxalic acid, Malonic acid, Succinic acid, Glutaric acid and Adipic acid - Preparation - Properties - Action of Heat on Dicarboxylic acids - Amines - Ethylamine and Aniline - Preparation - Basicity of Amines - Effect of Substituents on Basicity - Reactivity of Amines - Distinction between Primary, Secondary and Tertiary Amines.

UNIT - III

Alcohols - Preparation by Grignard method - Oxidation of alcohols - Difference between Primary, Secondary and Tertiary alcohols - Preparation and Properties of Allyl alcohol - Phenols - Acidic character of phenols - Kolbe's reaction, Reimer-Tiemann reaction, Gattermann , Lederer-Manasse, Houben-Hoesh, Friedel-Crafts, Schotten-Baumann and Liebermann's Nitroso Reaction - Preparation, Properties and Uses of Alpha- and Beta- Naphthols.

UNIT - IV

Free energy and Work function - Gibbs free energy - Helmholtz free energy -Relationship between Gibbs free energy and Helmholtz free energy -Their variations with Temperature, Pressure and Volume - Free energy change as criteria for Equilibrium and Spontaneity. Difference between Free Energy and standard Free Energy - Maxwell's Relations - Thermodynamic Equation of State - Gibbs-Helmholtz equation - Derivation and Applications - Clausius-Clapeyron equation - Derivation and Applications.

UNIT - V

Third Law of Thermodynamics - Entropy at Absolute Zero - Nernst Heat Theorem - Statement of III law of thermodynamics - Planck's formulation of III law of thermodynamic - Evaluation of Absolute Entropy from Heat Capacity Measurements - Exceptions to III law - Applications of III law - Partial molar properties - Chemical Potential - Definition - Effect of Temperature and Pressure on Chemical Potential - Gibbs-Duhem equation.Fugacity-Variation with Temperature and Pressure.

CORE PRACTICAL

PAPER - 2

INORGANIC QUALITATIVE ANALYSIS AND PREPARATION

Analysis of mixture containing two cations and two anions (One will be an interfering anion). Semi micro methods using the conventional scheme are to be adopted.

Cations to be studied

Lead, Copper, Bismuth, Cadmium, Iron, Aluminium, Zinc, Manganese, Cobalt, Nickel, Barium, Calcium, Strontium, Magnesium and Ammonium.

Anions to be studied

Carbonate, Sulphide, Sulphate, Nitrate, Chloride, Bromide, Fluoride, Borate, Oxalate and Phosphate.

Preparation of Inorganic compounds

- Tetraamminecopper(II) Sulphate
- Tris(thiourea)copper(I) Chloride
- Potassium trioxalatoferrate(II)
- Ferrous Ammonium Sulphate
- Microcosmic Salt
- Manganese(II) Sulphate

References

- Vogel's Text Book of Quantitative Chemical Analysis, 5th Edition, ELBS/ Longman, England, 1989.
- Inorganic Semimicro Qualitative Analysis, V. V. Ramanujam.

ALLIED - 2

Paper - 4

(to choose one out of 5)

1. PHYSICS II

Course Objectives

1. To study the concept of special theory of relativity.
2. To expose the structure of atom with different models.
3. To know the definition of binding energy and to study about nuclear models
4. To learn the different number system in digital electronics and logic gates
5. To give an introduction about nanomaterial.

UNIT-1: Special Theory of Relativity

Frames of reference-inertial frames and non-inertial frames -Galilean transformations -Michelson-Morley experiment-interpretation of results - postulates of special theory of relativity Lorentz transformation equations -length contraction - time dilation - transformation of velocities -variation of mass with velocity -Mass-energy equation.

UNIT-2: Atomic Physics

Bohr atom model – Critical Potentials - Experimental determination of critical potentials - Franck and Hertz's experiment -Sommerfield's Relativistic atom model The vector atom model – spatial quantization–spinning of an electron –quantum numbers associated with the vector atom model – coupling schemes –LS and jj coupling – the Pauli's exclusion principle – Stern and Gerlach experiment

UNIT-3: Nuclear Physics

Binding energy-Binding energy per nucleon-Packing fraction-Nuclear models – liquid drop model – semi empirical mass formula – merits and demerits -shell model -evidences for shell model – nuclear radiation detectors –ionization chamber – G.M Counter-Wilson cloud chamber-Particle accelerators-Cyclotron-Betatron.

Unit-4: Digital Electronics

Number systems -Decimal, Binary, Octal and Hexadecimal system – Conversion from one number system to another- Binary Arithmetic -Addition –Subtraction- 1's and 2's complement -Binary codes- BCD code – Excess 3 code, Gray code.

NAND, NOR and EXOR – functions and truth tables. NAND & NOR as universal gates-Half adder and Full adder - Half subtractor and Full subtractor using NAND gate only.

UNIT-5: Nanomaterial

Introduction-Nanomaterial- Properties of nanomaterial (size dependent) -synthesis of nanomaterial-sol gel- hydrothermal method-Scanning Electron Microscope (SEM)- Principle and Instrumentation-

Fullerenes- Carbon nanotubes- Fabrication and structure of carbon nanotubes - Properties of carbon nanotubes (Mechanical and Electrical) - Applications ofCNT's.

Text Books

Unit 1 to Unit 3

1. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2016

Unit 4

1. V.Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007

Unit 5

1. V. Raghavan, *Material Science and Engineering* ,Printice Hall India.,2004.

Reference Book

1. Allied Physics – R. Murugesan S. Chand & Co. New Delhi, 2005.
2. A Text book of Digital electronics – R.S.Sedha, S.Chand&Co, 2013
3. Malvino and Leech, Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi, 2000.
4. Dr. M.N. Avadhanulu, *Material science*, S.Chand& Company, New Delhi, 2014.
5. M.Arumugam, *Material science*, Anuradhapuplishers, 1990.
6. V. Rajendran, *Material Science*, Tata McGraw Hill Ltd, New Delhi,2001.
7. D.C.Tayal, Nuclear Physics, Himalaya Publishing House, 2009

E-MATERIALS

1. https://en.wikipedia.org/wiki/Galilean_transformation
2. https://www.youtube.com/watch?v=NH3_lIkSB9s
3. https://www.youtube.com/watch?v=EEWuUst2GK4
4. https://en.wikipedia.org/wiki/Vector_model_of_the_atom
5. https://www.tutorialspoint.com/what-is-a-geiger-muller-counter
6. https://www.youtube.com/watch?v=jxY6RC52Cf0
7. https://www.tutorialspoint.com/digital_circuits/digital_circuits_number_systems.htm
8. https://www.youtube.com/watch?v=4ae9sJBBkvw
9. https://en.wikipedia.org/wiki/Nanomaterials
10. https://www.youtube.com/watch?v=mPxoJz6treE (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to study the frames of reference, Galilean transformation equations and special theory of relativity.
2. After studied unit-2, the student will be able to describe the different atomic models and Stern and Gerlach Experiment.
3. After studied unit-3, the student will be able to explain binding energy, liquid drop model, G.M counter and particle accelerators.
4. After studied unit-4, the student will be able to know the conversion of number systems from one to other and also will be able to design universal gates using NAND and NOR gates.
5. After studied unit-5, the student will be able to understanding the basics of nanomaterial, synthesis and its applications.

ALLIED - 2

Paper - 4

2. BOTANY – II

Course Objectives :

1. To familiarize range of characters and economic importance of some families.
2. To know structure of mature anther and types of ovules
3. To understand physiology mechanisms of plant.
4. To acquire knowledge of ecosystem and environmental pollution
5. To study the Mendel's test of monohybrid and dihybrid, evolutionary theories.

UNIT-I: Taxonomy

General outline of Bentham and Hooker's system of classification. Study of the range of characters and economic importance of the following families: Annonaceae, cucurbitaceae, Apocynaceae, Euphorbiaceae and Liliaceae.

UNIT-II: Embryology

Structure of mature anther. Structure of mature ovule and its types. Fertilization.

UNIT-III: Plant Physiology & Plant Tissue Culture

Physiological role of micro and macro elements their deficiency symptoms Photosynthesis - lightreaction - Calvin cycle Respiration - Glycolysis - Kreb's cycle - electron transport system. Growth hormones – Auxins. Tissue culture and its principles.

UNIT-IV: Ecology

Ecosystem - fresh water ecosystem. Environmental pollution. Major pollutants - types of pollution - Air pollution, water pollution, soil pollution - control measures.

UNIT-V: Genetics & Evolution

Mendelism - Monohybrid and dihybrid crosses. Theories of evolution - Lamarckism, Darwinism.

Course Out Comes

1. To familiarize range of characters and economic importance of some families.
2. To know structure of mature anther and types of ovules
3. To understand physiology mechanisms of plant.
4. To acquire knowledge of ecosystem and environmental pollution
5. To study the Mendel's test of monohybrid and dihybrid, evolutionary theories.

Books Suggested:

1. Sharma, O.P (2011). Algae, Tata McGraw Hill Education Private limited, New Delhi.
2. Sharma, PD (2003).The Fungi. Rastogi Publications, Meerut
3. H.C.Dube (2007)A Text Book of fungi, bacteria and viruses, Student Edition, NewDelhi.
4. Pandey, B.P. (2001). College Botany Vol. I:Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S. Chand & Company Ltd., New Delhi.
5. Vashishta , P.C , Sinha and Anilkumar (2010). Pteridophytes, S.Chand &company Ltd, New Delhi.
6. Johri , RM, Lata S , Tyagi K (2005), A text book of Gymnosperms , Dominate Pub and Distributer, New Delhi.
7. Verma.P.S and Agarwal, V.K. 2007. Cytology. S. Chand & Co. Chennai.
Lawrence, GHM. (1995). The Taxonomy of vascular Plants (Vol I-IV) ,Central Book, Dept., Allahabad.
8. Gupta, P.K, 2000. Gentics. Rasatogi publications, Meerut.
9. Gupta, N.K and Gupta, S. 2005. Plant Physiology. Oxford &IBH Publishing Co. Ltd., New Delhi.
10. Shukla, R.S. &P.S. Chandel (1991) : Plant Ecology & Soil Science S.Chand & Co., New Delhi.
11. Pandey, B.P. 2007 Botany for Degree Students. S. Chand & Co. New Delhi

ALLIED - 2

Paper - 4

3. ZOOLOGY II

Objective:

To study the principles of cell biology, genetics, developmental biology, physiology, ecology and evolution.

UNIT - I

Cell Biology - structure of animal cell, **Genetics:** molecular structure of gene - gene function, sex linked inheritance. Genetic Engineering and its application.

UNIT - II

Embryology - cleavage and gastrulation of Amphioxus - **Human Physiology:** Digestion, Circulation - blood components, structure of heart, heart function.

UNIT - III

Diseases of Circulatory system - blood pressure, heart disease - Ischemia, Myocardial Infarction, Rheumatic heart disease, stroke - **Excretion** - structure of kidney and mechanism of urine formation.

UNIT - IV

Environmental Biology - Biotic factors and Abiotic factors, food chain and food web. Pollution - Environmental degradation, (Air, Water and Land) - Green house effect - Bioremediation, Biodegradation - Global warming - acid rain.

UNIT - V

Evolution: Theories of Lamarkism & Darwinism.

REFERENCES:

1. Ekambaranatha Ayyar, and Ananthakrishnan, T.N. 1993. Outlines of Zoology, Vol I & II, Viswanathan and Co, Madras.
2. Sambasiviah, I, Kamalakara Rao, A.P., Augustine Chellappa, S. 1983. Text book of Animal Physiology, S. Chand & Co., New Delhi.
3. Verma and Agarwal. 1983. Text book of animal Ecology, S. Chand & Co., New Delhi.
4. Verma and Agarwal and Tyagi. 1991. Chordate Embryology, S. Chand & Co., New Delhi.
5. Rastogi and Jayaraj. 2000. Text book of Genetics. Rastogi publications, Meerut.
6. Verma and Agarwal. 2000. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Co., New Delhi.

Paper - 4

4. BIOCHEMISTRY II

OBJECTIVE:

To acquire a wide knowledge on metabolism, disorders of metabolism and biological functions of vitamins and minerals

At the end of the course, the students will be able to

CO1	Illustrate the reactions of various metabolic pathways
CO2	Acquire knowledge on the various metabolic disorders
CO3	Classify enzymes and explain their functions
CO4	Define and classify vitamins with examples, explain the sources, RDA and functions of fat soluble and water soluble vitamins
CO5	Illustrate the sources, RDA and functions of minerals

UNIT-I: Metabolism

Metabolism-Catabolism and anabolism-Definition. Reactions of glucose oxidation- Glycolysis, TCA cycle and its energetics, HMP shunt and its significance. Amino acid- transamination and Deamination,reaction, Urea cycle- Formation of urea.

UNIT-II: Metabolic Disorders

Diabetes mellitus- definition. Types and symptoms. Glycogen storage diseases-Types, Renal Glycosuria-Definition and causes. In born errors of amino acid metabolism- Phenylketonuria, Alkaptonuria (Black urine syndrome) and albinism

UNIT-III: Enzymes

Enzymes-Definition, IUB system of classification with one example. Mechanism of enzyme action-Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Coenzymes- Vitamins as coenzymes (Tabulation of Coenzymes with functions in metabolism)

UNIT-IV: Vitamins

Vitamins- fat soluble (Vitamin A, D, E and K) and water soluble vitamins (Vitamin B1, B2, B3 and B12),Vitamin C - sources, RDA, biological function and deficiency of Vitamins of the above mentioned vitamins

UNIT V-Minerals

Minerals- sources, RDA, biological functions and deficiency of Calcium, Iron, Phosporus, Sodium and potassium. Examples of minerals as cofactors in metabolism.

REFERENCES

1. J. L. Jain, Nitin Jain, Sunjai Jai., Fundamentals of Biochemistry 7th edition S. Chand @ Co.Ltd .,2016
2. U. Satyanarayanan BiochemistryElseiver 2017
3. David.L.Nelson, Michael. M.CoxLehninger principles of Biochemistry 7th editionFreeman. W.H. and Company2017
4. Victor RodwellHarper's Illustrated BiochemistryMcGrew. Hill 2018

ALLIED - 2

Paper - 4

5. MATHEMATICS - II*

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT - I

APPLICATION OF INTEGRATION

Evaluation of double, triple integrals - Simple applications to area, volume -Fourier series for functions in (0,2□) and □□□□□□□□

UNIT - II

PARTIAL DIFFERENTIAL EQUATIONS

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT - III

LAPLACE TRANSFORMS

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT - IV

VECTOR ANALYSIS

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT - V

VECTOR ANALYSIS (CONTINUED)

Line and surface integrals - Guass, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

ALLIED PRACTICAL - 2

ALLIED PRACTICAL- PHYSICS

List of Experiments (Any 12 Experiments only)

1. Determination of 'g' using Compound pendulum.
2. Young's modulus-Non-Uniform bending-Pin & microscope
3. Rigidity Modulus – Torsional oscillation method (without masses).
4. Rigidity Modulus – Static Torsion method using Scale and Telescope.
5. Surface tension and Interfacial Surface tension by Drop Weight method.
6. Sonometer – Frequency of a Tuning fork.
7. Sonometer –Determination of A.C. frequency- using steel and brass wire
8. Air Wedge – Determination of thickness of a thin wire
9. Newton's Rings – Radius of Curvature of a convex lens.
10. Spectrometer – Refractive index of a liquid – Hollow prism.
11. Spectrometer grating – Minimum Deviation- Wavelength of Mercury lines.
12. Potentiometer – Calibration of Low range voltmeter.
13. Deflection magnetometer and Vibration magnetometer-Tan C Position-Determination of m and B_H.
14. Figure of merit- Table galvanometer.
15. Construction of AND, OR gates using diodes and NOT gate using a transistor.
16. NAND/NOR as universal gate.
17. Half adder and Full adder using NAND gate.
18. Half subtractor and Full subtractor using NAND gate.
19. Lasers: Study of laser beam parameters.
20. Measurement of Numerical aperture (NA) of a telecommunication graded index optic fiber.
21. Fiber attenuation of a given optical fiber.

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai,2018.
2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Dr. S. Somasundaram, Practical Physics, Apsarapublications,Tiruchirapalli, 2012.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

ALLIED PRACTICAL
2. BOTANY – I & II

Description of plants in technical terms belonging to the families mentioned in the theory part.
To study the internal structure of Anatomy material, Pteridophytes and Gymnosperms.
Identification and Description of Micro Preparation materials mentioned in the theory part.
Description of experimental setup of plant physiology.

BOOKS SUGGESTED

Ashok Bendre, A.K. and Pandey P.C. (1975) Introductory Botany. Rastogi Publication Meerut.
Ganguly, A.K. and Kumar. N.C. (1971) General Botany Vol. I & Vol. II, Emkay Publication, Delhi.
Rev. Fr. Ignacimuthu, S.J. (1975) Basic Biotechnology – Tata Mcraw till publication co., New Delhi.
Rao, K.N. Krishnamoorthy, K.V. and Rao. G. (1975) Ancillary Botany. S. Viswanathan Private. Ltd., Chennai.

ALLIED PRACTICAL
3. ZOOLOGY

I - MAJOR PRACTICAL

DISSECTIONS

Cockroach: Digestive and nervous system

Prawn: Nervous system

II - MINOR PRACTICAL

MOUNTING

1. Mouth parts of **Mosquito** and **Honey bee**

2. **Earthworm** - Body setae

3. Placoid scales of **shark**

III - SPOTTERS

Entamoeba, Sycon, Obelia, Taenia solium (entire, scolex) earthworm (entire, Pineal setae) Prawn (entire), Fresh water mussel, Sea star, Amphioxus - Entire, Amphioxus - T.S. through pharynx, Shark, Frog, Calotes, Pigeon, feathers of pigeon and Rabbit.

Sphygnomanometer, Stethoscope, Rain gauge.

REFERENCES:

1. Verma. P.S. 2011. A manual of practical Zoology - INVERTEBRATES. Chand & Co., Ltd., Ram Nagar, New Delhi.
2. Verma. P.S. 2011. A manual of practical Zoology - CHORDATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

ALLIED PRACTICAL

4. BIOCHEMISTRY I & II

PRACTICAL I

CO NUMBER	CO Statement
CO1	Quantify glucose in unknown solution by benedicts method
CO2	Quantify ascorbic acid in lemon by Dichlorophenol indo phenol dye method
CO3	Quantify glycine by Sorenson's formal titration method
CO4	Qualitatively analyze the carbohydrates and amino acids and report the type of carbohydrate based on specific tests
CO5	Differentiate the carbohydrates based microscopic examination of the crystal structure.

Volumetric Estimation

1. Estimation of Glucose by Benedict's method.
2. Estimation of Ascorbic acid by 2, 6 dichlorophenol indophenols dye method.
3. Estimation of Glycine by Sorenson's formal titration.

A) Qualitative analysis of Carbohydrates

1. Qualitative analysis of Glucose,
2. Qualitative analysis of Fructose,
3. Qualitative analysis of Sucrose
4. Qualitative analysis of Maltose,
5. Qualitative analysis of Starch

B) Qualitative analysis of Amino acids

1. Qualitative analysis of Arginine,
2. Qualitative analysis of Cysteine,
3. Qualitative analysis of Tryptophan
4. Qualitative analysis of Tyrosine
5. Qualitative analysis of Histidine

REFERENCES

1. J. Jayaraman,Laboratory Manual in Biochemistry New Age International Pvt Ltd Publishers 2011
2. S. K. SawhneyRandhir Singh Introductory Practical Biochemistry Alpha Science International, Ltd,2 edition, 2005.
3. Irwin H.Saegal Biochemical calculations Liss, Newyork 1991

SKILL BASED SUBJECT

PAPER - 2

FOOD CHEMISTRY

Objective:

- To impart knowledge about Different Foods, Their Nutritive Values and Food

Preservation.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Describe the structures and nutritive values of cereals, Pulses and sugar and their medicinal values.
2) Illustrate the composition and nutritive values of Vegetables, Fruits, Milk, Egg and soya beans.
3) Define and classify Beverages and functions of appetizers.
4) Explain the methods of preservation of foods.
5) Discuss about Food Additives and their functions.

UNIT - I

Cereals - Definition - Classification - Processing - Structure of Cereals - Composition and Nutritive value - Pulses - Definition - Classification - Processing - Structure of Pulses - Composition and Nutritive Value - Toxic Constituents in Pulses - Medicinal value of Cereals and Pulses - Sugar - Structure and Properties - Nutritive value - Sugar composition in different food items - Sugar related products - Classification and Nutritive value - Artificial sweeteners - Examples - Saccharin and Cyclamate - Advantages and Disadvantages.

UNIT - II

Vegetables and Fruits - Classification - Composition and Nutritive values - Fungi and Algae as food - Enzymatic Browning and Non- enzymatic Browning - Nutritive value of some common foods - Milk, Egg and Soyabeans.

UNIT-III

Beverages - Definition - Examples - Classification - Fruit Beverages - Milk Based Beverages - Malted Beverages - Examples - Alcoholic and Non-Alcoholic Beverages - Examples - Appetizers - Definition - Classification - Examples - Water - Functions and Deficiency.

UNIT-IV

Food Preservatives - Definition - Classification - Food Spoilage - Definition – Prevention - Methods of Preservation - Classification - Low and High temperature - Preservatives – Examples - Dehydration - Osmotic pressure - Food irradiation.

UNIT-V

Food Additives - Definition - Artificial sweeteners - Saccharin and Cyclamate - Classification - Their functions - Chemical substances - Packaging of Foods - Classification - Materials used for Packaging - Food Colours - Restricted use - Spurious Colours - Taste Enhancers - MSG - Vinegar.

Reference Books

- Food Science - B. Srilakshmi, III Edition, New Age International Publishers, 2005.
- Food Chemistry - Lilian Hoagland Meyer, CBS Publishers & Distributors, 2004.

- Food Science, Nutrition and Health - Brian A. Fox, Allan G. Cameron, Edward Arnold, London.
- Fundamentals of Foods and Nutrition - Mudambi R. Sumathi, and Rajagopal, M. V., - Wiley Eastern Ltd., Madras.
- Handbook of Food and Nutrition - M. Swaminathan - Bangalore Printing and Publishing Co. Ltd., Bangalore.

NON - MAJOR ELECTIVE

PAPER - 2

CHEMISTRY IN EVERY DAY LIFE

Objectives:

- To know the basics of Chemistry in our life
- To know about the Food Colours, Plastics, Drugs etc.,

Course Outcomes:

Upon completion of this course, the students will be able to

1) Explain the preparations of cosmetics, soaps and detergents and the Hazards of Cosmetics used in everyday life.
2) Identify Adulterants in various food items.
3) Define and classify Vitamins and understand their physiological importance.
4) Describe Food preservative methods.

5) Define Antipyretics, Analgesics, Anesthetics and Sedatives.

6) Discuss the preparation and applications of plastics, Resins, Rubbers.

7) Classify fertilizers and describe their uses and Hazards.

8) Explain advantages and disadvantages of natural and artificial sweetening agents.

UNIT - I

General Survey of Chemicals used in everyday life - Cosmetics - Talcum Powder, Tooth pastes, Shampoos, Nail Polish and Perfumes - General formulation - Preparation - Hazards of Cosmetic use - Soaps and Detergents - Types - Preparation and Uses.

UNIT - II

Food and Nutrition - Carbohydrates, Proteins, Fats and Minerals - Examples - Vitamins Definitions - Classification - Sources and their Physiological importance - Balanced diet. Adulterants in Milk, Ghee, Oil, Coffee Powder, Tea, Asafoetida, Chilli Powder, Pulses and Turmeric Powder - Identification.

UNIT - III

Food colours used in food - Soft drinks and its Health hazards - Food Preservatives - Definition - Examples - Methods of preservation - Low and High temperature - Dehydration - Osmotic pressure - Food irradiation.

UNIT - IV

Plastics, Polythene, PVC, Bakelite, Polyesters, Resins and their Applications - Natural Rubber - Synthetic rubbers - Vulcanisation - Preparation and its Applications - Antipyretics, Analgesics, Anaesthetics, Sedatives - Definition - Examples and Uses.

UNIT - V

Gobar gas - Production - Feasibility and Importance of Biogas with special reference to Rural India - Fertilizers - Definition - Classification - Urea, NPK and Super phosphates - Need - Uses and Hazards - Sweetening agents - Sucrose and Glucose - Artificial Sweetening agents - Saccharin - Cyclamate - Advantages and Disadvantages.

Reference Books

1. Chemical Process Industries - Norris Shreve Joseph A. Brine .Jr.
2. Perfumes, Cosmetics and Soaps - W. A. Poucher (Vol 3).
3. Environmental Chemistry - A. K. DE.
4. Industrial Chemistry, B. K. Sharma- Goel publishing house Meerut.
5. Food Science - B. Srilakshmi - III Edition - New Age International Publishers, 2005.
6. Food Chemistry, Lillian Hoagland Meyer - CBS publishers & distributors, 2004.
7. Fundamental Concepts of Applied Chemistry - Jayashree Ghosh, S. Chand & Co Ltd., New Delhi - 2010.
8. Applied chemistry - K. Bagavathi Sundari - MJP Publishers (2006).

SEMESTER - V
CORE PAPER - 5
INORGANIC CHEMISTRY - I

Objectives:

- To study about the Halogens and Related compounds.
- To give students a firm grounding in Co-ordination chemistry and Solid state Chemistry.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Compare the properties of Halogens and their Compounds.
2) Recollect the basic concepts and nomenclature of Co-ordination Compounds.
3) Explain the theories of Co-ordination Compounds.
4) Compare VBT with MOT and apply Complexes in qualitative and quantitative analyses.
5) Calculate the CFSE Values of Octahedral and Tetrahedral Complexes.
6) Analyze the bonding and structure of metallic carbonyls.
7) Draw the structures of ionic crystals and explain the defects in solids.

UNIT - I

Halogens - Group discussion - Comparative study of F, Cl, Br, I and At - Reactivities, hydracids, and oxides- Oxyacids of Halogens (Structure only) - Classification of Halides - Comparison of Fluorine with Oxygen-Fluorides of oxygen-Exceptional properties of Fluorine

- Interhalogen compounds - Preparation, Properties and Geometry of AX, AX_3, AX_5 and AX_7 type of Compounds - Pseudohalogens and pseudohalides - Cyanogen and Thiocyanogen - Comparison of Pseudohalogens and Halogens - Basic Properties of Iodine - Evidences.

UNIT - II

Coordination compounds **-** Definition of terms used - Classification of Ligands - Chelation and Effect of Chelation - Applications of Complexes - Coordination Number and Stereochemistry of Complexes - IUPAC Nomenclature of Complexes - Isomerism in Complexes - Ionisation isomerism, Hydrate Isomerism, Linkage Iomerism, Ligand Isomerism, Coordination Isomerism, Coordination position Isomerism and Polymerisation Isomerism - Geometrical and Optical Isomerism in 4- and 6- Coordinated Complexes.

UNIT - III

Werner's theory of Coordination Compounds-Sidgwick's Theory - EAN rule - Theory of Bonding - Valence Bond Theory - Postulates of VBT - Hybridisation, Geometry and Magnetic properties - Failure of VBT - Crystal field theory - Spectrochemical series - Splitting of d - orbitals in Octahedral, Tetrahedral and Square Planar Complexes - Factors affecting crystal field splitting energy-Crystal Field Stabilisation Energy - Calculation of CFSE In Octahedral and Tetrahedral Complexes - Low Spin and High Spin Complexes - Explanation of Magnetic Properties, Colour and Geometry Using CFT.

UNIT - IV

Comparison of VBT and CFT - Applications of Coordination Compounds in Qualitative and Quantitative Analysis - Estimation of Nickel using DMG and Aluminium using Oxine - Detection of Potassium ion, S^{2-}ion, Fe^{2+}ion and Fe^{3+}ion - Separation of Copper and Cadmium ions in the second group-Separation of Pb^{2+} and Ag^{+} ions in the first group - Bonding, Hybridization and Structure of Carbonyls of Ni, Cr, Fe, Co, Mn, W and V.

UNIT - V

The nature of the Solid State - Amorphous and Crystalline - Differences - Close Packing in Crystals - Examples for Cubic, BCC and FCC Lattices - Bragg's law - Application of XRD to Crystal studies - Structure of NaCl, CsCl, CaF_2 and ZnS - Metallic bond-Free electron, Valence bond and Band theory of Solids, Metals, Semiconductors and Insulators - Defects in solids - Scottky Defect and Frenkel Defect - Metal Excess and Metal Deficiency Defects - Conductors in Ionic Solids - Electrical and Magnetic properties.

CORE PAPER - 6
ORGANIC CHEMISTRY - I

Objectives:

- To effectively impart knowledge about Carbohydrates, Stereochemistry, Conformational Analysis, Nitroalkanes and Heterocyclic chemistry.
- To make the students more inquisitive in learning the Mechanistic details in Organic Chemistry through the teaching of the named reactions.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Elucidate the structures of saccharides.
2) Assign the stereo configuration of Organic Compounds.
3) Compare the Conformation and Configuration of cyclohexanes and substituted cyclohexanes.
4) Explain the preparation, properties and uses of Nitro alkanes.
5) Apply different reagents in studying various Organic reactions.
6) Explain the mechanism of Organic named reactions.
7) Explain the synthesis and properties of five and six membered heterocyclic compounds and condensed heterocyclic compounds.
8) Compare the basicity of heterocyclic Compounds.

UNIT - I

Carbohydrates **-** Classification - Aldoses and Ketoses, Reducing and Non-reducing Sugars - Reactions of Glucose and Fructose - Osazone formation, Mutarotation and their Mechanism - Structural elucidation of Glucose and Fructose - Pyranose and Furanose forms - Haworth's method - Determination of Ring Size- Haworth Projection Formula - Configuration of Glucose and Fructose - Epimerization - Chain lengthening and chain shortening of Aldoses - Inter conversion of Aldoses and Ketoses - Uses of Glucose - Disaccharides and Polysaccharides - Reactions and Structural elucidation of Sucrose and Maltose - Properties, Structure and Uses of Starch and Cellulose.

UNIT - II

Stereoisomerism - Definition - Classification into Optical and Geometrical isomerism. Conditions for Optical Activity - Asymmetric centre - Chirality - Achiral molecules - Meaning of (+) and (-) and D- and L- notations - Elements of symmetry - Projection formulae - Fischer, Flying Wedge, Sawhorse and Newmann projection formulae - Notation

of optical isomers - Cahn - Ingold - Prelog rules - R, S notation of Optical isomers with one Asymmetric carbon atoms - Erythro and Threo representations - Optical activities in Compounds not containing Asymmetric Carbon Atoms - Biphenyl, Allenes and Spiranes - Racemisation - Methods of Racemisation (By substitution and Tautomerism) - Resolution - Methods of Resolution (Mechanical, Biochemical and Conversion To Diastereomers) - Asymmetric Synthesis (Partial and Absolute Synthesis) - Walden inversion - Geometrical isomerism - Cis - Trans, Syn - Anti and E-Z Notations - Geometrical Isomerism In Maleic and Fumaric Acids and Unsymmetrical Ketoximes - Methods of Distinguishing Geometrical Isomers using Melting Points, Dipole Moment, Dehydration, Cyclisation, Heat of Hydrogenation and Combustion.

UNIT - III

Conformational analysis - Introduction of terms - Conformations, Configuration, Dihedral Angle, Torsional Strain - Differences between Conformational isomers and Configurational isomers - Conformational analysis of Ethane and n-Butane including energy diagrams - Conformations of Cyclohexane (Chair, Boat and Twist-Boat forms) - Axial and Equatorial bonds - Ring flipping showing Axial and Equatorial bonds Interconversions - Conformations of Methyl Cyclohexane, Dimethyl Cyclohexane and their stability - 1,2 and 1,3 - Interactions.

UNIT - IV

Nitroalkanes - Preparation - Properties - Structure - Nitro-Acinitro Tautomerism - Uses of Nitroalkanes - Differences between Primary, Secondary and Tertiary Nitroalkanes. Diazomethane,Diazoaceticester,alkylazides-Preparation and synthetic uses - Reagents and their Applications in Organic Chemistry - Anhydrous $AlCl_3$, P_2O_5, H_2/ Pd- $BaSO_4$, Zn/ Hg-HCl and Ag_2O - Mechanism of Aldol, Perkin and Benzoin condensations - Knoevenagel, Claisen, Wittig, Cannizzaro, Reformatsky and Michael addition reactions.

UNIT - V

Heterocyclic compounds - Huckel's rule - Aromaticity of Heterocyclic compounds - Preparation, Properties, Structure and Uses of Furan, Pyrrole and Thiophene - Preparation and properties of Pyridine and Piperidine - Comparative study of Basicity of Pyrrole, Pyridine and Piperidine with Amines - Nucleophilic and Electrophilic substitution reactions of Pyridine - Condensed Five and Six Membered Heterocyclic Compounds - Preparation of Indole, Quinoline and Isoquinoline - Fischer-Indole synthesis, Skraup Quinoline synthesis and Bischler-Napieralski synthesis - Electrophilic substitution reactions.

CORE PAPER- 7

PHYSICAL CHEMISTRY - I

Objectives:

- To impart knowledge about the Solutions, Phase Rule and its Applications, Colligative properties, Chemical Equilibrium, Phase Rule and its Applications, Electrochemistry and its Applications.

Course Outcomes:

Upon completion of this course, the students will be able to

- Explain the Thermodynamics of ideal and Non-ideal solutions, Nernst distribution law and its applications.
- Draw and explain phase diagrams of one Component and two Component systems having congruent and incongruent melting points.
- Derive law of Chemical equilibrium and Van't Hoff isotherm.
- Determine molar mass from the colligative properties.
- Explain variation of conductivity with dilution, measurement of conductivity and concept of Transport Number and its determination.
- Explain Debye-Huckel Theory of strong electrolytes.
- Apply conductivity measurements and explain conductometric titrations.
- Explain buffer action and derive Henderson equation and pH of aqueous salt solutions.

UNIT - I

SOLUTIONS

Solutions of liquids in liquids -Ideal Solution and Raoult's law - Vapour pressure of ideal solutions. Vapour Pressure-Composition and Temperature-Composition Curves of Ideal and Non-ideal Solutions. Thermodynamics of Solutions. Gibbs-Duhem-Margules equation - Vapour pressure of Non-ideal solutions - Fractional distillation of Binary liquid solutions - Lever rule- Azeotropic mixtures - Partially miscible liquids. CST and effect of impurity on CST. Phenol - Water, Triethylamine - Water and Nicotine - Water systems - Immiscible Liquids- Steam Distillation. Nernst distribution law - Definition - Thermodynamic derivation - Applications.

UNIT - II

PHASE RULE

Definition of the terms - Phase, Components and Degrees of freedom - Derivation of Gibbs phase rule - Applications of phase rule - One component system - Water and Sulphur system - Thermal Analysis and Cooling Curves- Reduced phase rule - Two components system - Simple eutectic system - Lead-silver system. Compound formation with congruent and incongruent melting points.Zn-Mg,Na-k,$FeCl_3$-H_2O,KI-H_2O systems. Freezing Mixtures.

UNIT - III

COLLIGATIVE PROPERTIES AND CHEMICAL EQUILIBRIUM

Colligative properties - Lowering of vapour pressure - Osmosis and osmotic pressure - Thermodynamic Derivation of Elevation of boiling point and Depression of freezing point - Determination of molar mass - Van't Hoff factor - Chemical Equilibrium - Law of Chemical Equilibrium - Thermodynamic derivation of Law of Chemical Equilibrium. Relationship between Kp,Kc and Kx for reactions involving Ideal Gases - Van't Hoff Reaction Isotherm - Temperature Dependence of Equilibrium Constant - Van't Hoff Isochore - Le Chatelier's Principle and Its Applications.

UNIT - IV

ELECTROCHEMISTRY - I

Metallic and Electrolytic Conductors-Faraday's Laws-Electro plating Specific conductance and Equivalent conductance - Measurement of equivalent conductance - Variation of Equivalent Conductance and Specific Conductance with Dilution Kohlrausch Law and its applications - Ostwald's Dilution Law and its Limitations - Debye-Huckel's theory of Strong Electrolytes - Onsagar equation (No derivation) -Verification and Limitations Wien effect, Falkenhagen effect. Ionic Strength - Migration of ions - Ionic Mobility - Ionic Conductance - Transport Number and its determination - Hittorff's method and Moving Boundary method.Effect of Temperature and Concentration on Conductance.

UNIT - V

ELECTROCHEMISTRY - II

Applications of Conductometric Measurements - Determination of Degree of Dissociation of Weak Electrolytes, Ionic Product of water - Solubility Product of sparingly soluble salt - Conductometric Titrations - Concept of pH - Buffer solutions, Buffer action - Henderson equation - Applications of Buffer Solutions - Hydrolysis of Salts - Expressions for Hydrolysis Constant, Degree of Hydrolysis and pH of aqueous salt solutions.

INTERNAL ELECTIVE

PAPER - 1

(to choose one out of 3)

A. ANALYTICAL CHEMISTRY - 1

Objective:

- To impart knowledge about Data Analysis, Purification of organic compounds, Different Spectroscopic Techniques and their Application.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Analyze Data and explain the methods of purification of solids.
2) Purify solid and liquid Organic Compounds.
3) Explain the concept of Gravimetric Analysis.
4) Describe the principles, Instrumentation and applications of UV, Visible, Microwave, IR and Raman Spectroscopy.
5) Determine the structure of Organic Compounds using various spectral techniques.

UNIT - I

Data analysis - Types of errors - Correction of determinate errors - Idea of Significant Figures and their Importance with examples - Precision and Accuracy - Methods of expressing Accuracy - Error analysis - Minimising errors - Methods of expressing Precision - Average deviation - Standard Deviation and Confidence Limit - Purification of Solid Organic Compounds - Solvent extraction - Recrystalisation - Use of immiscible solvents - Soxhlet extraction - Crystallisation - Use of miscible solvents - Fractional Crystallisation and Sublimation.

UNIT - II

Purification of liquids - Experimental Techniques of Distillation - Fractional Distillation - Vacuum Distillation - Steam Distillation - Tests of Purity - Gravimetric Analysis - Characteristics of Precipitating Agents - Condition of Precipitation - Types of Precipitants - Purity of Precipitate - Co-precipitation and Post precipitation - Precipitation from Homogeneous Solution - Digestion and Washing of precipitate - Ignition of precipitate - Uses of Sequestering Agents - Definition of spectrum - Electromagnetic radiation - Quantization of different forms of energies in molecules (Translational, Rotational, Vibrational and Electronic) - Born- Oppenheimer approximation - Condition of energy of absorption of various types of spectra.

UNIT - III

Microwave Spectroscopy - Theory of Microwave Spectroscopy - Selection Rule Calculation of Moment of Inertia and Bond Lengths of Diatomic molecules - Effect of Isotopic Substitution - UV - Visible Spectroscopy - Absorption laws - Calculations involving Beer-Lambert's law - Instrumentation - Photocalorimeter and Spectrophotometer - Block diagrams with description of components - Theory of Electronic Spectroscopy - Types of Electronic Transitions - Chromophore and Auxochromes - Absorption bands and Intensity - Factors influencing Position and Intensity of Absorption Bands - Frank- Condon Principle - Applications.

UNIT - IV

IR Spectroscopy - Principle - Theory of IR spectra - Vibrational Degrees of Freedom -Modes of Vibration of Diatomic Molecules -Triatomic linear (CO_2) and Non-linear Molecules (H_2O) - Stretching and Bending vibrations - Symmetric and Asymmetric Stretching vibrations - Selection rules - Expression for Vibrational Frequency (Derivation not needed) - Calculation of Force constant - Factors influencing Vibrational Frequencies - IR Spectrophotometer - Instrumentation - Source, Monochromator, Cell, Detectors, Recorders and Sampling Techniques - Applications of IR Spectroscopy - Identification of Functional Groups - Interpretation of the spectra of Alcohols, Aldehydes, Ketones and Esters (Aliphatic and Aromatic) - Hydrogen bonding.

UNIT - V

Raman Spectroscopy - Rayleigh and Raman scattering - Selection rule - Raman shift - Stokes and Anti-stokes lines - Differences between Raman and IR Spectroscopy - Raman Spectrophotometer - Instrumentation - Block diagram - Components and their Functions - Advantages of using Laser in Raman Spectroscopy - Applications - Structural elucidation in the study of Inorganic and Organic Compounds - Rotational-Raman spectra of Non - Centrosymmetric molecules - Mutual exclusion principle (CO_2 and N_2O) - Applications - Structural diagnosis.

Reference Books

- Elements of Analytical Chemistry - R. Gopalan, P. S. Subramanian, K. Rengarajan - S. Chand and sons (1997).
- Fundamentals of Analytical Chemistry - D. A. Skoog and D. M. West, Holt Reinhard and Winstor Publications - IV Edition (1982).
- Principles of Instrumental Methods of Analysis - D. A. Skoog and Saunders, College Publications, III Edition (1985).
- Analytical Chemistry - S. M. Khopkar - New age Insternational Publishers.
- Instrumental Methods of Chemical Analysis - Chatwal - Anand, Himalaya Publishing House (2000).
- Analytical Chemistry - R. Gopalan, Sultan Chand.
- Analytical Chemistry - S. Usharani, Macmillan.
- Instrumental Methods of Analysis - 7^{th} Edition - H. H. Willard, L. L. Merit. J. Dean and F. A. Settle -Wadsworth Publishing Company Limited, Belmont, California, USA, 1988.

- Physico- Chemical Techniques of Analysis - P. B. Janarthanan - Vol. I & II - Asian Publishing.
- Instrumental Methods of Chemical Analysis - B. K. Sharma - Goel Publications.
- Applications of Absorption Spectroscopy of Organic Compounds - Prentice Hall, John R. Dyer.
- Spectroscopic Identification of Organic Compounds - R. M. Silverstein, G. C. Bassler and T. C. Morill - John Wiley and Sons.

INTERNAL ELECTIVE

PAPER - 1

B. BASICS OF COMPUTER PROGRAMMING IN C AND ITS APPLICATIONS IN CHEMISTRY

Objective:

- To introduce the basics of computers.
- To learn C language and its applications in solving problems in Chemistry.

UNIT - I

Basic Computer Organisation, Processor and Memory - Main Memory, Secondary Storage Devices and Storage Hierarchy - Software - Relationship between Hardware and Software - Types of Software - Planning the Computer Program - Algorithm and Flowcharts - Basics of Operating Systems.

UNIT - II

Computer Languages - Machine Language, Assembly Language, Assembler, Compiler, Interpreter and Programming Languages - C language - Introduction - C Compiler - Operating Systems and Preprocessor Directives - Variables, Constants, Operators, Input and Output Functions.

UNIT - III

Control Structures - Conditional, Looping, Goto, Break, Switch and Continue Statements, Functions, Arrays And Pointers.

UNIT - IV

Applications in Chemistry - Calculation of the Radius of the first Bohr orbit for an Electron. Calculation of Half-life Time for an integral order reaction - Calculation of Molarity, Molality and Normality of a solution - Calculation of Pressure of Ideal Gases and Van der Waal's gases - Calculation of Electronegativity of an Element using Pauling's relation.

UNIT - V

Applications in Chemistry - Calculation of Empirical Formulae of Hydrocarbons - Calculation of Reduced Mass of a few Diatomic Molecules - Determination of the Wave Numbers of Spectral lines of Hydrogen atom - Calculation of Work of Expansion in Adiabatic Process - Calculation of pH, Solubility Product and Bond Energy using Born-Lande equation - Calculation of Standard Deviation and Correlation Coefficient.

Reference Books

- Computers in Chemistry, K. V. Raman, 8th Edition, Tata McGraw Hill Publishers, 2005.
- Programming with C, Venugopal and Prasad, 11th Edition, 1971. .
- Programming in C, E. Balaguruswamy, 2nd Edition, 1989.

INTERNAL ELECTIVE

PAPER - 1

C. ORGANIC SYNTHESIS

Objectives

- To know the Basics of Retrosynthesis.
- To impart knowledge about the Ring Synthesis.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Analyze the importance of Organic synthesis.
2) Explain various disconnection approaches in Organic synthesis.
3) Explain the role of protecting groups in Organic synthesis.
4) Apply Ring synthesis in the synthesis of Camphor, Longifolene, Cortisone and Reserpine.

UNIT - I

DISCONNECTION APPROACH

An introduction to Synthons and Synthetic Equivalent - Disconnection Approach - Functional Group Interconversions - The importance of the Order of Events in Organic Synthesis - One group C-X and Two group C-X disconnections - Chemoselectivity - Reversal of Polarity.

UNIT - II

PROTECTING GROUPS

Principle of Protection of Alcoholic group and Amino group - Principle of Protection of Carbonyl group and Carboxyl group - Activation of Functional Groups.

UNIT - III

ONE GROUP C-C DISCONNECTIONS

Alcohols and Carbonyl Compounds - Regioselectivity and Alkene Synthesis - Uses of Acetylenes and Aliphatic Nitro Compounds in Organic Synthesis.

UNIT - IV

TWO GROUP C-C DISCONNECTIONS

Diels-Alder Reaction - 1, 3 - Difunctionalised Compounds - α, β- Unsaturated Carbonyl Compounds - Control in Carbonyl Condensations - 1,5-Difunctionalised Compounds - Michael Addition and Robinson Annulation reactions.

UNIT - V

RING SYNTHESIS

Saturated Heterocyclic Compounds - Synthesis of 3-, 4- and 6- Membered Rings Aromatic Heterocycles in Organic Synthesis - Application of the above in the Synthesis of Camphor, Longifoline, Cortisone and Reserpine.

Reference Books

- Some Modern Methods of Organic Synthesis, W. Carruthers, Cambridge University Press, UK.
- Advanced Organic Chemistry, F. A. Carey and R. J. Sundberg, Part- B, Plenium Press.
- Modern Synthetic Reactions. H. O. House and W. A. Benjamin,

SKILL BASED SUBJECT

PAPER - 3

APPLIED CHEMISTRY

Objective:

- To impart Knowledge about Petrochemicals, Paper Technology, Sugar Industry, Explosives, Photography and Diary Chemistry,

Course Outcomes:

Upon completion of this course, the students will be able to

1) Explain the refining process of petroleum and differentiate between Thermal and Catalytic Cracking.
2) Explain the various processes involved in paper technology.
3) Recover glucose from molasses and estimate sugar.
4) Prepare alcohol from molasses.
5) Explain the Proximate and Ultimate analysis of Coal.
6) Describe Chemical changes occurring in Milk during processing.
7) Define the principle involved in photography.
8) Explain the need for making milk powder and principle involved in drying process.

UNIT - I

Petroleum - Origin - Composition of Petroleum - Inorganic, Engler and Modern theories - Classification - Refining (Simple Refinery) - Cracking - Thermal and Catalytic - Knocking - Octane Rating - Antiknock Compounds - Cetane Rating - Synthetic Petrol - LPG - Gobar Gas - Production - Feasibility and Importance of Biogas with special reference to Rural India - Petrochemicals - Elementary study - Definition - Chemicals from Natural Gas, Petroleum, Light naphtha and Kerosene - Origin - Composition - Synthetic Gasoline.

UNIT - II

Paper technology - Introduction - Manufacture of pulp - Various raw materials used for the preparation of pulp - Preparation of Sulphite pulp, Soda pulp and Rag pulp - Various processes - Beating, Refining, Filling, Sizing and Colouring - Manufacture of Paper - Calendering - Uses.

UNIT - III

Sugar industry - Sugar industries in India - Sugarcane and sugar beet - Manufacture of cane sugar - Extraction of juice - Concentration - Separation of crystals - Recovery of Glucose from Molasses - Defection - Sulphitation - Carbonation - Testing and Estimation of Sugar - Double Sulphitation Process - Preparation of Bagasse - Use of Bagasse for Manufacture of Paper and Electricity - Preparation of Alcohol from Molasses - Preparation of Absolute Alcohol - Manufacture of Wine, Beer, Methylated Spirit and Power Alcohol.

UNIT - IV

Explosives - Primary, Low and High Explosives - Single compound explosives - Binary

explosives - Plastic explosives - Dynamites - Blasting explosives - Preparation and Uses of Lead Azide, Nitroglycerine, Nitrocellulose, TNT, Cordite, Picric Acid and Gun Powder - Introduction to Rocket Propellants - Photography - Chemical Principle - Preparation of Sensitive Emulsion - Exposure - Developing - Fixing and Printing - Colour photography - Xerographic copying - Coal - Classification by rank - Proximate and Ultimate analysis - Low and High Temperature Carbonisation - Otto-Hoffmann's by-product - Distillation of Coal Tar.

UNIT - V

Milk - Definition - Physico-Chemical properties of milk - Constituents of milk and Their Physico-chemical Properties - Chemical change taking place in Milk due to Processing Parameters - Boiling, Pasteurisation, Sterilisation and Homogenisation - Definition and Composition of Creams, Butter, Ghee and Ice Creams - Milk Powder -Definition, Need for making powder - Principles involved in Drying process - Spray drying and Drum drying.

Reference Books

1. Fundamental Concepts of Applied Chemistry - Jayashree Ghosh - 1st Edition, S. Chand & Co. Ltd, New Delhi, 2006.
2. Milk and Milk Products - Clarence Henry Eckles, Willes Barnes Combs, Harold Macy - 4th Edition, Tata McGraw Hill Publishing Company Ltd, Reprint 2002.
3. Industrial Chemistry - B. K. Sharma - 13th Edition, Goel Publishing House, 2008.

SEMESTER - VI
CORE PAPER - 8
INORGANIC CHEMISTRY - II

Objectives:

To impart knowledge about Nuclear chemistry, Radioactivity, Metallurgy, Chemistry of f-Block Elements, Organometallic Compounds and Bio-inorganic Chemistry.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Explain the stability of nuclides in terms of N/P ratio, mass defect, binding energy and packing fraction.
2) Describe natural and artificial radioactivity and compare high energy nuclear reactions.
3) Describe the various processes involved in Metallurgy.
4) Compare the properties of d-block elements.
5) Compare the properties of lanthanides and actinides.
6) Classify Organometallic Compounds and discuss the biological importance of Fe, Cu and Zn.

UNIT - I

NUCLEAR CHEMISTRY

Introduction - Composition of Nucleus - Fundamental Particles of Nucleus - Nuclear Forces operating between the Nucleons - N/P ratio - Nuclear Stability - The whole number rule and Packing fraction - Isotopes, Isobars, Isotones, mirror nuclei and Nuclear isomers - Detection and Separation of isotopes - Nuclear Binding Energy - Mass defect - Simple calculations involving Mass Defect and Binding Energy per Nucleon - Magic Numbers - Liquid drop model - Shell model.

UNIT - II

RADIOACTIVITY

Natural Radioactivity - Properties of Alpha, Beta and Gamma rays - Detection and measurement of Radioactivity - Radioactive series including Neptunium series - Soddy's Group Displacement Law - Rate of disintegration and Half - Life period - Derivation - Average life period - Artificial Radioactivity - Induced Radioactivity -Q-value of nuclear reactions- Uses of Radioisotopes-Hazards of radiations - Nuclear fission - Nuclear energy - Nuclear reactors, Breeder reactors - Nuclear fusion -Thermonuclear reactions - Energy source of the Sun and Stars -Atom bomb and Hydrogen bomb- Comparison of Nuclear Fission and Nuclear Fusion.

UNIT - III

METALLURGY

General metallurgy and Metallurgical processes - Methods of Concentration - Gravity separation, Froth floatation process, Magnetic separation, Roasting - Reduction methods - Smelting, Calcination, Goldschmidt Aluminothermic process, Reduction by active metals, Electrolytic reduction - Purification methods - Liquation, Zone refining, Van Arkel method, Carbonyl process and Electrolytic refining - Characteristic properties of d-block elements- Comparative study of Ti, V, Cr, Mn and Fe group elements with special reference to Occurrence, Oxidation States, Magnetic Properties, complexes, coordination number and

Colour - Occurrence and Extraction of Ti, Mo, W and Co - Preparation and Uses of Ammonium Molybdate and $V_2 O_5$.

UNIT - IV

INNER TRANSITION ELEMENTS

General Characteristics of f- Block elements - Position of Lanthanides in the periodic table - Separation of Lanthanides (Ion exchange method) - Comparative study of Lanthanides and Actinides - Occurrence, Oxidation states, Magnetic properties, Colour and Spectra and complex formation - Lanthanide Contraction - Causes and Consequences - Comparison between Lanthanides and Actinides - Positon of Actinides in the periodic table - Extraction of Thorium and Uranium

UNIT - V

ORGANOMETALLIC COMPOUNDS AND BIOINORGANIC CHEMISTRY

Organometallic Compounds - Definition - Nomenclature - Classification - Organo-Lithium and Organo-Boron Compounds - Preparation, Properties, Structure and Uses. - Biological Functions of Iron, Copper and Zinc - Biologically Important Compounds - Myoglobin, Cytochrome, Haemoglobin and Ferritin - Binary Metallic Compounds - Hydrides, Borides, Carbides and Nitrides - Classification - Preparation, Properties, Structure and Uses.

CORE PRACTICAL

PAPER - 3

GRAVIMETRIC ESTIMATION

1. Estimation of Sulphate as Barium Sulphate.
2. Estimation of Barium as Barium Sulphate.
3. Estimation of Barium as Barium Chromate.
4. Estimation of Lead as Lead Chromate.
5. Estimation of Calcium as Calcium Oxalate Monohydrate.

References

- Qualitative Inorganic Analysis, A.I. Vogel - 7th Edition, Prentice Hall.
- Quantitative Chemical Analysis, A.I. Vogel - 6th Edition, Prentice Hall.

CORE PAPER - 9

ORGANIC CHEMISTRY - II

Objectives:

- To kindle interest in students in learning Bio-organic chemistry through the introduction of topics such as Proteins, Nucleic acids, Terpenes, Alkaloids etc.
- To generate Keen Interest and Thinking in Understanding the Mechanisms of Molecular Rearrangements and Synthetic Applications of Acetoacetic Ester, Benzene Diazonium Chloride, Grignard Reagents and Diazomethane.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Explain the mechanisms of inter and intra molecular rearrangements.
2) Classify amino acids and explain their preparation and properties and synthesis of Peptides.
3) Differentiate between DNA and RNA.
4) Explain primary and secondary structures of proteins.
5) Elucidate the structures of Antibiotics, Alkaloids and Terpenoids.

UNIT - I

MOLECULAR REARRANGEMENTS

Rearrangements - Classification - Anionotrpic, Cationotropic and Free Radical Rearrangements - Intermolecular and Intramolecular Rearrangements - Examples - Cross over experiment - Differences between Intermolecular and Intramolecular rearrangements - Mechanisms, Evidences, Migratory Aptitude, Intermolecular or Intramolecular nature of the following rearrangements - Pinacol-Pinacolone, Benzil-Benzilic acid and Beckmann rearrangement - Mechanism of Hoffmann, Curtius, Baeyer-Villiger, Claisen (Sigmatropic), Fries rearrangement, Cope and Oxy-Cope rearrangements.

UNIT - II

AMINO ACIDS AND POLYPEPTIDES

Amino acids - Classification - Essential and Non- Essential amino acids - Acidic, Basic and Neutral Amino Acids - Alpha, Beta and Gamma- Amino acids - Preparation of alpha amino acids - Gabriel's Phthalimide synthesis, Strecker synthesis and Erlenmeyer Azlactone synthesis - Glycine, Alanine and Tryptophan - General properties of Amino acids - Reactions of Amino acids due to Amino group and Carboxyl group - Zwitterions - Isoelectric point - Peptides - Synthesis - Bergmann Method - Structural Determination of Polypeptides - End Group Analysis - N-Terminal and C-Terminal Amino Acids Determination.

UNIT - III

PROTEINS AND NUCLEIC ACIDS

Proteins - Definition - Classification based on Physical Properties, Chemical Properties and Physiological Functions - Primary and Secondary Structure of Proteins - Helical and Beta Sheet Structures (Elementary Treatment Only) - Denaturation of Proteins - Nucleic acids - Nucleoproteins - Definition - Types of Nucleic Acids - RNA and DNA - Nucleoside, Nucleotide, Degradation of Nucleotide Chain - Components of RNA and DNA - Differences between DNA and RNA - Structures of Ribose and 2- Deoxyribose - Double Helical Structure of DNA - Biological functions of Nucleic Acids - Elementary ideas on Replication and Protein Synthesis.

UNIT - IV

CHEMISTRY OF NATURAL PRODUCTS

Antibiotics - Definition - Structural elucidation of Penicillin and Chloramphenicol - Uses of Penicillin and Chloramphenicol - Alkaloids - Classification - Isolation of alkaloids - General methods of Determination of structure of Alkaloids - Synthesis and Structural Elucidation of Piperine, Coniine and Nicotine - Terpenoids - Definition - Classification - Isoprene rule - Synthesis and Structural elucidation of Citral, Menthol and Alpha- pinene.

UNIT - V

ORGANOSULPHUR COMPOUNDS AND AROMATIC SULPHANIC ACIDS.

Thioalcohols-Structure-Nomenclature-methods of preparation-Physical and Chemical properties - Thioethers-Stucture-Nomenclature-Physical and Chemical properties - dimethyl sulphoxide - uses.Mustard gas-Preparation-Properties and uses - Aromatic sulphanic acid - stucture-Nomenclature-benzene sulphanic acid,benzene sulphanyl chloride, benzene disulphanic acids,Toluene sulphanic acids,Chloramine-T,Saccharin and sulphanilic acid-Chemical properties and uses.

CORE PRACTICAL

PAPER - 4

ORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS

Analysis of organic compounds containing one functional group and characterisation with a derivative.

Reactions of the following Functional Groups:

Aldehyde, Ketone, Carboxylic Acid (Mono and Di), Ester, Carbohydrate (Reducing

and Non-Reducing), Phenol, Aromatic Primary Amine, Amide, Nitro Compounds, Diamide and Anilide.

Organic Preparations

Acylation

1. Acetylation of Salicylic acid or Aniline.
2. Benzoylation of Aniline or Phenol.

Nitration

3. Preparation of m- Dinitrobenzene
4. Preparation of p- Nitroacetanilide

Halogenation

5. Preparation of p- Bromoacetanilide
6. Preparation of 2,4,6-Tribromophenol

Diazotisation /Coupling

7. Preparation of Methyl Orange

Oxidation

8. Preparation of Benzoic Acid from Toluene or Benzaldehyde.

Hydrolysis

9. Hydrolysis of Ethyl Benzoate (Or) Methyl Salicylate (Or) Benzamide.

Reference Books

- Vogel's Text Book of Chemical Analysis
- Practical Chemistry - A. O. Thomas - Scientific Book Center, Cannanore.
- Practical Chemistry - 3 Volumes - S. Sundaram and others.
- Text Book of Practical Organic Chemistry - A. I. Vogel, A. R. Tatchell, B. S. Furnis, A. J. Hannaford and P.W. G. Smith - 5th Edition - 1996.
- Comprehensive Practical Organic Chemistry - Preparation and Quantitative Analysis -

V. K. Ahluwalia, Renu Agarwal - Universities Press - 2013.

CORE **PAPER - 10**

PHYSICAL CHEMISTRY - II

Objectives:

- To impart Knowledge about Electrochemistry, Surface Chemistry, Photochemistry, Chemical Kinetics and Theories of reaction rates.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Derive Nernst equation and explain Cell reactions.
2) Explain Concentration Cells and polarization.
3) Derive rate constant expressions for zero, first, second and third order reactions and determine the order of a raection.
4) Compare Collision theory and ARRT.
5) Explain Lindemann's theory of unimolecular reactions.
6) Explain Langmuir Theory of Adsorption.
7) Derive Michaelis-Menten equation for enzyme catalyzed reactions.
8) State laws of photochemistry and explain the kinetics of photo chemical reactions.
9) Explain various Photo physical processes and Photosensitized reactions.

UNIT - I

ELECTROCHEMISTRY - III

Galvanic cells - Daniel cell - Reversible and Irreversible Cells - EMF of a Cell and its Measurement - Standard Weston Cadmium Cell - Evaluation of Thermodynamic Quantities- ΔG, ΔH and ΔS from emf data - Derivation of Nernst equation for Electrode Potential and Cell emf -Types of reversible electrodes - Electrode reactions - Electrode potentials - Reference electrodes - Standard Hydrogen Electrode - Standard Electrode Potential - Sign conventions - Electrochemical Series and its Applications.

UNIT - II

ELECTROCHEMISTRY - IV

Liquid Junction Potential - Concentration cells With Transference and Without Transference - Applications of Concentration cells - Valency of ions, Solubility and Solubility Product - Activity Coefficient of electrolytes - Determination of pH using Hydrogen, Quinhydrone and Glass electrodes - Potentiometric titrations - Polarisation - Overvoltage - Decomposition potential - Storage Cells- Lead Storage Battery- Mechanism of Charging and Discharging- Fuel Cells (H_2-O_2 Cell).

UNIT - III

CHEMICAL KINETICS

Definitions of the terms - Order and Molecularity - Rate of the reaction - Derivations of expressions for Zero, First, Second(for equal and unequal concentrations of reactants) and Third order rate equations - Study of kinetics - Methods of Determination of Order of a reaction - Effect of Temperature on reaction rate - Arrhenius equation - Theories of reaction rates - Bimolecular Collision Theory - Lindmann's theory of Unimolecular Reactions - ARRT - Thermodynamic treatment of ARRT - Eyring equation - Comparison of Collision Theory and ARRT.

UNIT - IV

SURFACE CHEMISTRY

Adsorption - Characteristics of adsorption - Physisorption and Chemisorption - Differences between Physical and Chemical Adsorption - Applications of Adsorption - Adsorption of Gases by Solids - Different Types of Isotherms - Freundlich adsorption isotherm - Langmuir theory of adsorption - Derivation.BET Theory(no derivation) - Catalysis - Definition - General Characteristics of Catalytic Reactions - Acid-Base catalysis - Enzyme catalysis - Michaelis-Menton Equation - Effect of Temperature and pH on Enzyme Catalysis.Enzyme Inhibition - Homogeneous catalysis - Function of a catalyst in terms of Gibb's free energy of activation - Heterogeneous catalysis - Kinetics of Unicellular Surface Reactions.

UNIT - V

PHOTOCHEMISTRY

Difference between Thermal and Photo chemical reactions - Laws of photochemistry - Grothus-Draper law, Stark-Einstein's law - Primary and Secondary processes - Quantu yield and its determination - Qualitative description of Fluorescence, Phosphorescence-Jabalonski diagram - Photosensitized Reactions. Luminescence, Chemiluminescence and Bioluminescence - Kinetics of Photochemical Reactions - H_2-Cl_2 and H_2-Br_2 reactions - Photodimerisation of Anthracene.

REFERENCE BOOKS

INORGANIC CHEMISTRY

1. Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).
2. Principles of Inorganic Chemistry - B. R. Puri, L. R. Sharma and K. C. Kallia - Milestone Publications (2013).
3. Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
4. Inorganic Chemistry: Principles of Structure and Reactivity - J. E. Huheey, E. A. Keiter, R. I. Keiter and O. K. Medhi - 2006.
5. Concise Inorganic Chemistry - J. D. Lee - III edition - Von Nostrand.
6. Industrial Chemistry - B. K. Sharma - Goel Publications (1983).
7. Industrial Chemistry R. K. Das - Kalyani Publications, New Delhi (1982).
8. Coordination Chemistry - S. F. A. Kettle - ELBS (1973).
9. Coordination Chemistry - K. Burger - Butterworthy (1973).
10. Vogel's Handbook of Quantitative Inorganic Analysis - Longman.
11. Text Book of Qualitative Inorganic Analysis - A. I. Vogel - III edition (1976).
12. Source Book on Atomic Energy - S. Glasstone- East-West Press Pvt. Ltd. (1967).

13. Nuclear and Radiochemistry - John Wiley and Sons (1964).
14. Nuclear Chemistry - H. J. Arnikar - Wiley Eastern Co., - II edition (1987).
15. Advanced Inorganic Chemistry - Cotton and Wilkinson - V Edition - Wiley and Sons (1988)
16. Text Book of Inorganic Chemistry - R. Gopalan - Universities Press - 2012.
17. Modern Inorganic Chemistry - R. D. Madan - S. Chand Publications, Reprint, 2014.

ORGANIC CHEMISTRY

1. Organic Chemistry - R. T. Morrison and Boyd - Pearson - 2010.
2. Organic Chemistry - I. L. Finar - Volume I and II - Pearson Education.
3. Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
4. Advanced Organic Chemistry - Bahl and Arun Bahl - S. Chand and Co. Ltd. - 2012.
5. Stereochemistry, Conformations and Mechanisms - Kalsi - 2nd Edition, Wiley Eastern Ltd., Chennai - 1993.
6. Organic Chemistry of Natural Products - Volume I and II - O. P. Agarwal - Goel Publishing House
7. A Guide Book to Mechanisms in Organic Chemistry - Peter Sykes - Pearson Education - 2006.
8. Stereochemistry of Organic Compounds - D. Nasipuri - New Age International Publishers..
9. Chemistry of Natural Products - Gurdeep Chatwal- Himalaya Publishing House.
10. Reactions and Reagents - O. P. Agarwal- Goel Publishing House.
11. Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
12. A Text Book of Organic Chemistry, K. S. Tewari, N. K. Vishnoi, S. N. Mehrotra - Vikas Publishing House - 2011.
13. Modern Organic Chemistry- M. K. Jain and S. C. Sharma- Vishnoi Publications, 2014.
14. Reaction, Mechanism and Structure - Jerry March - John Wiley and Sons, NY -1992.
15. Organic Chemistry - Bruice - Pearson Education.
16. Text Book of Organic Chemistry - C. N. Pillai - Universities Press - 2009.
17. Organic Reaction Mechanisms - Parmar and Chawla - S. Chand & Co.
18. Organic Chemistry - I. L. Finar - 6th Edition, Pearson Education, 2008.
19. A Guide Book to Mechanisms in Organic Chemistry - Peter Sykes - Pearson Education, 2006
20. Stereochemistry of Carbon Compounds- E. I. Eliel - Tata Mcgrow Hill Education - 2000.
21. Organic Chemistry - T. W. Graham Solomon, C. B. Fryhle - S. A. Dnyder - John Wiley & Sons - 2014.
22. Advanced Organic Reaction Mechanism (Problems and Solutions) - N. Tewari - Books and Allied (P) Ltd - 2005.
23. Advanced Organic Stereochemistry (Problems and Solutions) - N Tewari - Books and Allied (P) Ltd - 2010.

PHYSICAL CHEMISTRY

1. Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishnal

Publishing Co., - 2013.

2. Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha and U. N Dash - Sultan Chand & Co., - 2006.
3. Physical Chemistry - Negi and Anand - Eastern Wiley Pvt.Ltd..
4. Physical Chemistry - Kundu and Jain - S. Chand & Co.
5. Physical Chemistry - K. L. Kapoor - Macmillan - 4 volumes.
6. Elements of Physical Chemistry - Glasstone and Lewis - Macmillan.
7. Text book of Physical Chemistry - S. Glasstone - Macmillan (India) Ltd.
8. Fundamentals of Physical Chemistry - Maron and Landor - Colier - Macmillan.
9. Physical Chemistry - G. W. Castellan - Narosa publishing house - 2004.
10. Physical Chemistry - Walter J. Moore - Orient Longman - 1972.
11. Numerical Problems on Physical Chemistry, Gashal - Books and Allied (P) Ltd.,
12. Universal General Chemistry, C.N.R. Rao, Macmillan.
13. Group Theory and its Chemical Applications - P. K. Bhattacharya - Himalaya Publishing House.
14. Text book of Physical Chemistry - M. V. Sangaranarayanan, V. Mahadevan, Universities Press - 2011.
15. General and Physical Chemistry - Dr. A. Arunabhasan, Books of Allied (P) Ltd., - Ghosal - 2009.

CORE PRACTICAL

PAPER - 5

PHYSICAL CHEMISTRY EXPERIMENTS

1. Kinetics

Determination of the Order of the following reactions

a) Acid catalysed Hydrolysis of an Ester (Methyl or Ethyl acetate)

b) Saponification of an Ester (Methyl or Ethyl Acetate)

c) Iodination of Acetone.

2. Molecular weight of a solute - Rast's method using Naphthalene or Diphenyl as Solvents.

3. Heterogeneous equilibria

a) *Phenol-Water system - CST

b) Effect of impurity - 2 % NaCl or Succinic acid solutions on Phenol -Water system - Determination of the Concentration of the given solution

4. **Determination of the Transition Temperature** of the given salt hydrate. $Na_2S_2O_3.5H_2O$, $CH_3COONa.3H_2O$, $SrCl_2.6H_2O$, $MnCl_2.4H_2O$

5. **Electrochemistry**

Conductivity

a) Determination of Cell Constant and Equivalent Conductivities ofthe solutions of two different concentrations.
b) Conductometric titration of a Strong Acid against a Strong Base.

6. Potentiometric titration of a Strong Acid against a Strong Base.

7. Colorimetry- Determination of unknown concentration using Photoelectric colorimeter.

8. Determination of pKa of acetic acid using pH Meter.

***Need not be given in examination.**

Students must write Short Procedure / Formula with explanation in Ten Minutes for evaluation during the university practical examination.

INTERNAL ELECTIVE

PAPER - 2

(to choose one out of 3)

A. ANALYTICAL CHEMISTRY - II

Objective:

- To impart knowledge about Different Chromatographic and Spectroscopic Techniques.

UNIT - I

Chromatography - Principles and Techniques of Column, Paper and Thin Layer Chromatography - Column Chromatography - Preparation of Column - Adsorption - Adsorbents - Elution - Recovery of Substances - TLC - Choice of Adsorbent and Solvents - Preparation of Chromatogram and Applications - R_f value - Paper Chromatography - Solvents used - Factors affecting R_f value - Separation of Amino Acid Mixtures - Radial Paper Chromatography - Applications - ion exchange chromatography - Principle - Experimental Techniques - Types of Resins - Reqirement of a Good Resin - Action of Ion Exchange Resins - Experimental Techniques and Applications - Separation of Zinc-Magnesium, Cobalt - Nickel and Cadmium - Zinc ions.

UNIT - II

High Pressure Liquid Chromatography and Gas Chromatography - Principle and Applications - Gas Chromatography - Mass Spectrophotometer (GC-MS) - Liquid Chromatography - Mass Spectrophotometer (LC-MS) - Principle and Applications - Polarography - Principle - DME - Advantages and Disadvantages - Ilkovic equation and its significance (No Derivation) - Polarography as an Analytical tool in Quantitative and Qualitative Analysis - Amperometric Titrations.

UNIT - III

NMR Spectroscopy - Principle of Nuclear Magnetic Resonance - Basic Instrumentation - Number of Signals - Chemical Shift - Shielding and Deshielding - Factors influencing Chemical Shift - Spin-Spin Coulpling and Coupling constants - TMS as NMR standard - Splitting of Signals - NMR Spectra of simple Organic Molecules - Applications in Structural Elucidation.

UNIT - IV

Mass Spectroscopy - Basic principles of Mass Spectrum - Instrumentation - Molecular ion peak- Base peak - Metastable peak - Isotopic peak and their Uses - Fragmentation - Factors affecting Cleavage Patterns - Nitrogen rule - Ring rule - McLafferty rearrangement -

Determination of Molecular Formulae with examples - Mass spectrum of simple organic compounds - Identification - Alcohols, Aldehydes and Aromatic hydrocarbons.

UNIT - V

ESR Spectroscopy - Condition - Selection Rule for Transition - Theory of ESR Spectra - Basic Instrumentation - ESR Spectrometer - Components and their Functions - Hyperfine splitting - ESR Spectra of simple radicals - CH_3, CD_3, Naphthalene radical ions only - Applications in structural elucidation - Thermoanalytical methods - Principle involved in Thermogravimetric analysis (TGA) and Differential Thermal Analysis (DTA) - Instrumentation- Discussion of Various Components with Block Diagram - Characteristics of TGA ($CaC_2O_4.H_2O$, $CuSO_4.5H_2O$) and DTA curves - Factors Affecting TGA and DTA Curves - Thermometric Titrations - Principle and Applications.

Outcome:

The Students will be able to

1) Explain the principles and techniques of column, paper and thin layer chromatography,ion-exchange, high - pressure liquid and gas chromatography
2) Elucidate the structure of organic compounds using NMR,Mass and ESR spectroscopy .
3) Discuss the principle and applications of TGA, DTA and thermometric titrations.
4) Explain the principle of polarography and amperometric titrations .

Reference Books

1. Analytical Chemistry - S. M. Khopkar - New Age International Publishers - 1998.
2. Analytical Chemistry - R. Gopalan - Sultan Chand & Sons - 2002.
3. Chemical Analysis: An Instrumental Approach - A. K. Srivastava and P. C. Jain.
4. Spectroscopic Identification of Organic Compounds - R. M. Silverstein, G. C. Basseler & T. C. Morill.
5. Organic Spectroscopy - W. Kemp.
6. Spectroscopic Methods in Organic Chemistry - D. Williams & I. Fleming.
7. Fundamentals of Moleculars Spectroscopy - 4th Edition, C. N. Banwell and E. M. McCash - Tata McGrow Hill Publishers, New Delhi - 2006.
8. Applications of Absorption Spectroscopy of Organic Compounds - John R. Dyer.
9. Introduction to Molecular Spectroscopy - Barrow.
10. Spectroscopy of Orgnic Compounds - P. S. Kalsi.
11. Instrumental Methods of Chemical Analysis - B. K. Sharma - Goel Publications - 2000.
12. Fundamentals of Analytical Chemistry: An introduction - D. A. Skoog, D. M. West - Thomson - 2004.
13. Analytical Chemistry: Theory and Practice - U. N. Dash.
14. Vibrational Spectroscopy - D. N. Sathyanarayanan - New Age International Publishers - 2000.
15. Fundamentals of Spectroscopy - Y. R. Sharma - S. Chand - 2008.
16. Fundamentals of Molecular Spectroscopy - 4th Edition - C. N. Banwell and E. M. McCash - Tata McGrow Hill, New Delhi - 2006.
17. Elementary Organic Spectroscopy - Principles and Chemical Applications - Y. R. Sharma, S. Chand & Company Private Limited, V Revised Edition - 2013.

INTERNAL ELECTIVE

PAPER - 2

B. TEXTILE CHEMISTRY

Objective:

- To impart knowledge about the Production, Properties and Applications of Natural and Synthetic Fibres, Colour and Constitution, Classification of Dyes and Concept of Dyeing in Textile Industry.

UNIT - I

General Classification of Fibres - Chemical structure - Production - Properties - Count, Denier, Tex, Staple Length, Spinning Properties, Strength, Elasticity and Creep - Applications of the following Natural Cellulose Fibres (Cotton and Jute) - Natural Protein Fibres (Wool and Silk) - General characteristics.

UNIT - II

Chemical Structure, Production and properties of the following Synthetic Fibres - Man- made Cellulose Fibres (Rayon and Modified cellulose fibres) - Polyamide Fibres (Different types of Nylons) - Preparation - Nylon degradation - Polyester Fibres - Preparation - Degradation - Polyacrylonitrile fibre - Preparation and Properties - Viscose fibre - Preparation and Properties - Identification tests for Cellulose, Cotton, Wool, Silk, Rayon, Acrylic, Viscose, Polyamide and Polyester Fibres.

UNIT - III

Impurities in Raw Cotton and Grey Cloth, Wool and Silk - General principles of the Removal, Scouring - Purpose, Alkali Scouring and Acid Scouring - Bleaching (Methods - Hypochlorite, Peroxide and Bleaching Powder) - Desizing (Hydrolytic and Enzymatic), Kier Boiling and Chemicking - Dyeing of Polyester and Blends - Functions of Dispersing agents - Fibre swelling - Carrier dyeing - High temperature dyeing - Selection of dyestuff.

UNIT - IV

Colour and Constitution - A general treatment - Chromophores - Auxochromes - Bathochromes and Hypsochromes - Classification of dyes - Acidic, Basic, Direct, Mordant, Azoic, Ingrain, Vat and Reactive Dyes - Classification as per Chemical constitution - Azo dyes - Triphenyl Methane Dyes, Phthalein Dyes, Indigo and Anthraquinone Dyes - Structure, Preparation and Uses - Methyl Orange, Phenolphthalein and Malachite Green.

UNIT - V

Dyeing - Dyeing of Wool and Silk - Fastness properties of dyed materials - Dyeing of Nylon, Terylene and other Synthetic Fibres - Finishing - Finishes given to Fabrics - Mechanical finishes on Cotton, Wool and Silk - Method used in process of Mercerizing - Anticrease and Antishrink finishes - Water Proofing.

Outcome:

The Students will be able to

1) Understand the chemical structure of fibres.
2) Identify natural and synthetic fibres through identification tests.
3) Explain Scouring and Bleaching methods used in textile industries .
4) Classify dye and explain the concept of dyeing in textile industries.
5) Explain the methods used in the process of mercerizing in textile industries.

References

- Chemical Technology of Fibrous Materials - F. Sadov, M. Horchagin and A. Matetshy, Mir Publishers.
- The Identification of Textile Fibres - Bruno Nuntak.
- Introduction to Textile Science - 3rd edition, Maryory L. Joseph.
- Textile Chemistry - Vol. II, R. H. Peters, Elsevier, Amsterdam.
- Dyeing and Chemical Technology of Textile Fibres - 5th Edition, E. R. Trotman, Charles Griffin &Co Ltd.
- Chemistry of dyes & Principles of Dyeing - V. A. Shenai, Sevak Publications.
- Scouring and Bleaching, E. R. Trotman, Charles Griffin & Co Ltd.
- Text Book of Applied Chemistry - K. Kapur.
- A Students Text Book of Textile Science - A. J. Hall.

INTERNAL ELECTIVE

PAPER - 2

C. NANO CHEMISTRY

Objectives:

- To introduce the Basics of Nanotechnology.
- To learn the Instrumental Techniques used in Characterisation of Nanomaterials.

UNIT - I

BASICS OF NANOCHEMISTRY

Introduction - Definition - Length scales - Importance of Nanoscale and its Technology - Self Assembly of Materials - Self Assembly of Molecules - Porous solids, Nanowires, Nanomachines and Quantum Dots.

UNIT - II

NANOPARTICLES

Introduction - Types of Nanoparticles - Preparation, Properties and Uses of Gold, Silicon, Silver, Zinc Oxide, Iron Oxide, Alumina and Titania Nanoparticles.

UNIT – III
SYNTHETIC TECHNIQUES

Techniques to Synthesise Nanoparticles - Top down and Bottom up Approaches - Common Growth Methods - Characterisation of Nanoparticles - Applications and Toxic effects of Nanomaterials.

UNIT - IV
NANOMATERIALS

Preparation, Properties and Applications of Carbon Nanotubes, Nanorods, Nanofibres and Nanoclays.

UNIT - V

INSTRUMENTAL TECHNIQUES

Electron Microscopes - Scanning Electron Microscopes (SEM) - Transmission Electron Microscopes (TEM) - Scanning Probe Microscopy - Atomic Force Microscopy (AFM) - Scanning Tunneling Electron Microscope (STEM) - Basic Principles only.

Books for Study

- Nanotechnology, S. Shanmugam, MJP Publishers, Chennai (2010).
- A Handbook on Nanochemistry, Patrick Salomon, Dominant Publishers and Distributers, New Delhi.
- Nanobiotechnology, S. Balaji, MJP Publishers, Chennai (2010).

Outcome:

The Students will be able to

1) Understand the basics of Nanotechnology .
2) Explain the preparation ,properties and uses of Nano particles.
3) Discuss the techniques used to synthesise Nano particles.
4) Understand the role of Electron microscopes- SEM ,TEM,SPM,AFN, and STEN in Nano technology.

Books for Reference

- The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).
- Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).
- Nanochemistry, G. B. Segreev, Elsevier, Science, New York, (2006).
- Nano: The Essentials, T. Pradeep, Tata Mc-Graw Hil Publishers, New Delhi (2007).
- Text Book of Nanoscience and NanoTechnology, P. Shankar Baldev Raj, B. B. Rath and James Murday - 2014.

INTERNAL ELECTIVE

PAPER - 3
(to choose one out of 3)

A. PHARMACEUTICAL CHEMISTRY

Objective:

- To effectively impart knowledge about Various Diseases and Their Treatment, Importance of Indian Medicinal Plants and Different Types of Drugs. Preparation, Synthesis and Structural Determination are not required for the Compounds mentioned.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Define the terms involved in pharmaceutical chemistry.
2) Explain the causes, symptoms and treatment of common diseases.
3) Explain the composition of blood.
4) Explain the role of antibacterial, antiseptics, vitamins, analgesics and anesthetics.
5) Apply the therapeutic importance of Indian medicinal plants.
6) Classify hormones and explain their functions.

UNIT - I

Definition of the following terms - Drug, Pharmacophore, Pharmacology, Pharmacopoeia, Bacteria, Virus, Chemotherapy and Vaccine - Causes, Symptoms and Treatment for Jaundice, Cholera, Malaria and Filaria - First Aid for Accidents - Antidotes for Poisoning - Organic Pharmaceutical Aids - Their Role as Preservatives, Antioxidants, Colouring, Flavouring and Sweetening agents - Examples.

UNIT - II

Causes, Detection and Control of Anaemia and Diabetes - Diagnostic tests for Sugar, Salt and Cholesterol in Serum and Urine - Blood - Composition of Blood and Blood Plasma - RBC - Structure and Functions - Functions of Haemoglobin - WBC - Structure and Functions - Rh Factor - Blood Coagulation - Identification and Estimation of Cholesterol in Blood - Blood Pressure - Hypertension and Hypotension - Normal, High and Low to Control - Indian Medicinal Plants and Their Uses - Tulasi, Neem, Kizhanelli, Mango, Semparuthi, Adadodai and Thoothuvelai.

UNIT - III

Antibacterials - Sulpha drugs - Sulphanilamide Derivatives - Mode of action of Sulpha drugs - Examples - Prontosil, Sulphathiazole and Sulphafurazole - Uses - Antibiotics - Definition - Gram positive and Gram negative bacteria - Uses of Ampicillin, Streptomycin and Tetracyclines - Antiseptics and Disinfectants - Definition and Distinction - Phenolic compounds, Chloro compounds and Cationic surfactants -

Vitamins - Definition - Classification of Vitamins - Sources and Uses - Deficiency Diseases caused by Vitamins.

UNIT - IV

Analgesics - Definition - Classification - Narcotic and Non- narcotic - Antipyretic analgesics - Mechanism of action - Morphine and its derivatives - Pethedine and Methadone - Salicylic acid derivatives - Antipyretics and Antiinflammatory Agents - Definition and Actions - Aspirin, Paracetamol, Ibuprofen - Disadvantages and Uses - Anaesthetics - Definition - Classification - Local and General - Volatile - Uses of volatile liquids as Inhalation Anaesthetics - Chloroform - Gaseous Anaesthetics - Nitrous Oxide, Ether and Cyclopropane - Uses and Disadvantages - Intravenous Anaesthetic Agents - Thiopental sodium, Methohexitol and Propanidid - Drugs affecting CNS - Definition, Distinction and Examples for Tranquilizers, Sedatives (Phenobarbital, Diazepam) - Hypnotics, Psychedelic Drugs - LSD, Hashish- Their effects.

UNIT - V

Antineoplastic Drugs - Causes and Types of Cancer - Treatment of Cancer - Antineoplastic Agents - Antimetabolites - AIDS - AZT, DDC - Hormones - Definition - Classification - Physiological Functions of Insulin, Adrenaline, Thyroxin and Oxytacin - Sex hormones - Androsterone, Testosterone, Progesterone and Estrogen - Biological functions - Disorders of Hyposecretion and Hypersecretion of Hormones.

Reference Books

1. A Text Book of Pharmaceutical Chemistry - Jayashree Ghosh - S. Chand Company Ltd, 2015.
2. Pharmaceutical Chemistry - S. Lakshmi - Sultan Chand, 2011.
3. Pharmacology and Pharmatherapeutics - R. S. Satoskar - Popular Prakashan - Vol.I and Vol. II.
4. Medicinal Chemistry - Asuthosh Kar - New Age International Publishers, 2007.
5. A Text Book of Synthetic Drugs - O. D. Tyagi - Ammol Publications.
6. Introduction to Biological Chemistry - J. Awapara, Prentice Hall.
7. A Text Book of Biochemistry - Ambika.S.
8. Biochemistry - A. L. Leninger, II Edition, Kalyani Publishers, Ludhiana, 1998.
9. Essentials of Biological Chemistry - James Fanley - East West Press.
10. Medicinal Chemistry - Gurdeep Chatwal - Himalaya Publishers House, 2012.
11. Medicinal Chemistry - Ahluwalia - Ane Books, 2008.
12. A Text Book of Pharmaceutical Chemistry - Viva Books Private Ltd., New Delhi, 2009.
13. Medicinal Plants of India - Rasheeduz Zafar - CBS Publishers and Distributors, 2000.

INTERNAL ELECTIVE

PAPER - 3

B. POLYMER CHEMISTRY

Objective:

- To impart Knowledge about the Types of Polymers, Polymerization Techniques, Commercial Polymers and their Applications.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Classify polymers and explain the various types of polymerization techniques.
2) Explain various methods of determining molecular weights of polymers.
3) Describe the chemistry of plastics and resins.
4) Explain the preparation of commercial, natural and synthetic polymers.
5) Enumerate the importance of Biopolymers, Conducting polymers and Acrylic polymers.

UNIT - I

Introduction to Polymers - Monomers, Oligomers, Polymers and their Characteristics - Classification of Polymers - Addition and Condensation Polymers - Natural and synthetic - Linear, Branched, Cross-Linked and Network - Plastics - Elastomers - Fibres - Homopolymers and Copolymers - Bonding in Polymers - Primary and Secondary bond forces in Polymers - Cohesive energy and Decomposition of Polymers - Chain Growth Polymerisation - Cationic, Anionic and Free radical polymerisation - Stereoregular polymers - Ziegler Natta polymers - Step Growth Polymers.

UNIT - II

Polymerization Techniques - Bulk, Solution, Suspension and Emulsion Polymerisation - Melt Polycondensation - Polymer Processing - Calendering - Die Casting and Rotational Casting - Molecular weight of polymers - Number average - Weight average - Sedimentation and Viscosity - Average molecular weight - Molecular weight and Degree of Polymerisation - Methods of determination of Molecular Weight - Gel permeation chromatography – Ultracentrifugation - Reactions - Hydrolysis - Hydrogenation -Addition - Substitution -Cross linking - Vulcanisation - Cyclisation.

UNIT - III

Plastics and Resins - Definitions - Thermoplastic and Thermosetting Resins - Constituents of Plastic Fibres - Dyes, Pigments, Plasticisers, Lubricants and Catalysts - Important Thermoplastic Resins - Acrylics, Polyvinyl and Cellulose Derivatives - Important Thermosetting Resins - Phenolic resins - Epoxy resins - Adhesives - Shellac resins - Vegetable glues and Animal glues.

UNIT - IV

Chemistry of Commercial Polymers - General methods of Preparation and Uses of the following - Teflon, Polyethylene, PTFE, Polystyrene, Polycarbonates and PVC - Textile fibres - Definition and Polymer requirement for fibres - Polyamides - Nylon 66 -Nylon 6 - Polyesters - Terylene - Cellulose acetate - Viscose rayon - Natural and Synthetic Rubber - Constitution of Natural rubber - Natural Rubber - Isoprene - Synthetic Rubber - Butyl, Buna, Buna- S, SBR, Thiocol, Neoprene, Polyurethane and Silicone Rubber - Ebonite.

UNIT - V

Advances in Polymers - Biopolymers, Biomaterials, Polymers in Medical Field, High temperature and Fire Resistant Polymers - Applications of Silicones - Conducting Polymers - Elementary idea - Examples - Polysulphur Nitriles, Polyparaphenylene, Polypyrrole, Polythiophene, Polyaniline and Polyacetylene - Acrylic polymers - Polmers of Acrylic Acid, Methacrylic Acid and Polyacrylates.

Reference Books

1. Text Book of Polymer Science, F. W. Bill Meyer, Jr. John, Wiley & Sons - 1984.
2. Polymer Science - V, R. Gowarikar, N. V. Viswanathan, Jayader Sreedhar - Wiley Eastern Ltd., New Delhi - 2005
3. Polymer Chemistry, B. K. Sharma - Goel Publishing House, Meerut - 1989.
5. Polymer Chemistry - M. G. Arora, M. S. Vadar - Anmol Publications (p) Ltd., New Delhi -1998.
6. Polymer Chemistry - An introduction - M. P. Stevens, Oxford - 2002.

INTERNAL ELECTIVE

PAPER - 3
C. GREEN CHEMISTRY

Objective:

- To impart knowledge about Green Solvents, Green Techniques, Green Catalysts and Green Reactions.

Course Outcomes:

Upon completion of this course, the students will be able to

1) Summarize the importance of green chemistry.
2) Select green solvents for various synthetic processes.
3) Describe the various techniques to prepare nanoparticles.
4) Explain the importance of green catalysis.
5) Explain the rearrangement and aromatic substitution reactions with the help of green chemistry.

UNIT - I

GREEN CHEMISTRY - INTRODUCTION

Need for Green Chemistry - Principles of Green Chemistry - Atom economy - Definition with example (Ibuprofen synthesis) - Green oxidants - Hydrogen peroxide - Green synthesis - Evaluation of the type of the reaction - Rearrangements (100 % Atom economic) - Addition reaction (100 % Atom economic) - Organic reactions by Sonication method - Apparatus required - Examples of Sonochemical Reactions (Heck, Hundsdiecker and Wittig reactions).

UNIT - II

GREEN SOLVENTS

Selection of Solvents - Aqueous Phase Reactions - Diels-Alder reaction in water - Catalysis in water (Aerobic Oxidation of Alcohols catalysed by Pd (II) / Bathophenanthroline) - Reactions in ionic liquids - Simple preparation - Types - Properties and Applications - Ionic liquids in Organic Reactions (Heck reaction, Suzuki reactions, Epoxidation), Industrial (Battery) and Analytical Chemistry (Matrices for MALDI-TOF MS, Gas Chromatography Stationary Phases) - Advantages and Disadvantages - Solid Supported Synthesis - Supercritical CO_2 - Preparation, Properties and Applications (Decaffeination, Dry cleaning) - Environmental impact.

UNIT - III

GREEN TECHNIQUES

Microwave and Ultrasound Assisted Green Synthesis - Apparatus required - Examples of MAOS (Synthesis of Fused Anthroquinones, Leukart reductive Amination of Ketones) - Advantages and Disadvantages of MAOS - Aldol condensation - Cannizzaro condensation - Diel's-Alder reaction - Strecker's synthesis - Photochemical reactions using

Sunlight - Photoreduction of Benzophenone to Benzopinacol using Sunlight - Photochemical alternative to Friedel- Crafts reaction - Nanoparticles - Introduction - Types of Nanoparticles - Techniques to prepare Nanoparticles - Top down and Bottom up approaches - Common growth methods.

UNIT - IV

GREEN CATALYSIS

Green Catalysis - Heterogeneous catalysis - Uses of Zeolites, Silica, Alumina, Clay supported catalysis - Biocatalysis - Enzymes and Microbes - Phase Transfer Catalysis (PTC) - Principles, Catalysts and Lipophility of ions - Two phase systems - Solid-Liquid, Liquid-Liquid, Gas-Liquid - Triphase systems - Inverted PTC - Applications in Synthesis - Micellar Catalysis, Surfactants and Synthesis in water - Principles, Materials and Synthetic Applications.

UNIT- V

GREEN REACTIONS

Acetylation of Primary Amine, Base catalysed Aldol condensation (Synthesis of Dibenzalpropanone), Halogen addition to C = C bond (Bromination of Trans- Stilbene), [4+2] Cycloaddition reaction (Diels-Alder reaction between Furan and Maleic acid) - Rearrangement reaction (Benzil- Benzilic acid rearrangement), Coenzyme catalyzed Benzoin condensation (Thiamine hydrochloride catalysed synthesis of Benzoin), Pechmann condensation for Coumarin synthesis (Clay catalysed Solid State Synthesis of 7- Hydroxy- 4-methylcoumarin) - Electrophilic Aromatic Substitution Reactions (Nitration of phenol, Bromination of Acetanilide) - Green oxidation reactions (Synthesis of adipic acid, Preparation of Manganese (III) acetylacetonate) - Zeolite catalyzed Friedel-Crafts acylation.

Books for Study

- Green Chemistry: Environmental Friendly Alternatives, Rs. Sanghi and M. M. Srinivatava, Narosa Publishing House, New Delhi.
- Green Chemistry, V. Ahluwalia, Narosa, New Delhi (2011).
- Nanotechnology, S. Shanmugam, MJP Publishers, Chennai. (2010).
- A Handbook on Nanochemistry, Patrick Salomon, Dominant Publishers and Distributers, New Delhi.
- Nanobiotechnology, S. Balaji, MJP Publishers, Chennai (2010).
- Nano: The Essentials, T. Pradeep, Tata Mc-Graw Hill, New Delhi (2007).

Books for Reference

- Methods and Reagents for Green Chemistry, P. Tundo, A. Perosa and F. Zechini, John Wiley & Sons Inc., New Jercy, (2007).
- The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).
- Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).
- Nanochemistry, G. B. Segreev, Elsevier, Science, New York, (2006)

SKILL BASED SUBJECT

PAPER - 4

AGRICULTURE AND LEATHER CHEMISTRY

OBJECTIVE:

- To learn about Soil fertility and Productivity, Soil Chemistry, Insecticides, Leather Industry and Treatment of Tannery Effluents.

UNIT - I

SOIL CHEMISTRY

Soil - Introduction - Classification - Properties of Soil - Physical properties - Components - Structure and Texture - Soil-Water, Soil-Air and Soil-Temperature - Chemical properties - Soil Minerals, Soil Colloids, Soil Reaction and Buffering - Analysis of Soil - Soil pH - Determination of Soil pH - Effect of pH on Plants - Buffering of soil - Soil acidity, Soil salinity and Soil alkalinity - Soil Fertility - Carbon and Nitrogen cycle - Acid, Alkaline and Saline soils - Their Formation - Reclamation - Liming agents.

UNIT - II

FERTILISERS AND MANURES

Fertilisers - Definition - Classification - Requirements of a Good fertiliser - Nitrogen fertiliser - Urea - Preparation and Uses - Potash fertiliser - KCl, K_2SO_4 and KNO_2 - Preparation and Uses - Phosphorus fertiliser - Phosphatic slag, Superphophate of lime and Triple Superphosphate - Preparation and Uses- NPK fertiliser - Advantages- Role of Micronutrients - Manures - Compost - Composting - Methods of Composting - Farmyard Manure, Vermicompost, Composted Coconut Coir Pith, Press mud and Poultry manure – Applications - Types of pollutions caused by Fertilisers - Ill effects of Fertilisers and their Control.

UNIT - III

INSECTICIDES AND FUNGICIDES

Insecticides - Definition - Classification of Insecticides - Stomach poisons - Contact poisons and Fumigants - Insecticides - Organic Insecticides - DDT - Gammexane - Malathion - Parathion - Fungicides - Inorganic Fungicides - Sulphur compounds - Copper compounds - Mercuric compounds - Organic Fungicides - Dithiocarbamates - Dithane M - Bordeaux mixture - Herbicides - Rodenticides - Pesticides in India - Adverse Environmental Effects of Pesticides.

UNIT - IV

LEATHER CHEMISTRY

Introduction - Constituents of Animal Skin - Preparing Skins and Hides - Leather processing - Process before Tannage - Flaying, Curing, Drying, Pickling, Cleaning and Soaking - Liming and Degreasing - Manufacture of Leather - Leather Tanning methods - Vegetable Tanning - Chemistry of Chrome Tanning and Mineral Tanning - Deliming - Dyeing of Leather and Fat Liquoring - Leather Finishing - Oil Tanning - By products.

UNIT - V

TANNERY EFFLUENTS

Tannery effluents - Pollution and its control - Water pollution and Air pollution - Waste Management - Treatment of Tannery Effluents - Primary, Secondary and Tertiary treatment - Pollution Prevention - Effect of Tannery Effluents on Agriculture - Organic Amendments - Reclamation of Tannery Effluents Affected Soil.

Outcome:
The Students will be able to

1) Explain the structure Texture and Chemical properties of soil
2) Define and classify fertilizers and illustrate the requirements of a good fertilizer.
3) Control the pollution caused by fertilizers.
4) Define and classify insecticides.
5) Discuss leather tanning methods.
6) Control pollution caused by tannery effluents.

Reference Books

- Industrial Chemistry by B. K. Sharma - Goel Publishing House, Meerut.
- Applied Chemistry by K. Bagavathi Sundari, MJP Publishers, 2006.
- Fundamental Concept of Applied Chemistry by Jayashree Ghosh, S. Chand & Company Ltd.,
- The Nature and Properties of Soils - IX Edition - Nyle. C. Bready - S. Chand.
- Soils and Soil Fertility - Louis M. Thompson - and Frederick. R. Troch - Tata Mc Graw Hill Publishing Co.
- Text Book of Soil Science - T. D. Biswas and S. K. Mukerjee - II Edition.
- Soil Science - A. Sankara.
- Fundamentals of Leather Science - Wood roffe Publications of CLRI - Chennai.
- Nature and Properties of Soils - Harry, O. Buckman.

Outcome: The Students will be able to

Explain the structure Texture and Chemical properties.

7) Define and classify fertilizers and illustrate the requirements of a good fertilizers.
8) Control the pollution caused by fertilizers.
9) Define and classify insecticides.
10) Discuss leather tanning methods.
11) Control pollution caused by tanning effluents.

SCHEME OF VALUATION FOR PRACTICAL EXAMINATIONS

PRACTICAL - I

VOLUMETRIC ANALYSIS

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 marks

Record: 15 Marks

Procedure: 10 Marks

Error upto 2 % : 50

2.1 - 3 % : 40

3.1 - 4 % : 30

4.1 - 5 % : 20

>5 % : 10

For incomplete or wrong calculation deduct 20 % of total marks scored.

For no calculation deduct 40 % of total marks scored.

For each arithmetic error deduct 1 mark.

CORE PRACTICAL - II

INORGANIC QUALITATIVE ANALYSIS AND PREPARATION

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 marks

Record: 15 Marks

Preparation: 20 (Quantity- 15 Marks; Quality- 5 marks)

Analysis: 40 Marks.

Each radical with procedure: 10 Marks

(Spotting for each radical - 5 Marks; Fixing the group - 5 Marks)

PRACTICAL - III

GRAVIMETRIC ANALYSIS

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 marks

Record: 15 Marks

Procedure: 10 Marks

Error upto 2 % : 50

2.1 - 3 % : 40

3.1 - 4 % : 30

4.1 - 5 % : 20

>5 % : 10

a. Among the duplicate results, the value more favorable to the candidate must be taken.

b. When no duplicate result is given deduct 5 marks.

c. If the two results differ by more than 2 % deduct 5 marks.

d. For each independent arithmetical error deduct 1 mark.

e. For incomplete or wrong calculation deduct 20 %.

f. For no calculation deduct 40 %.

g. If the experiment is not completed due to an accident, award 5 marks.

PRACTICAL - IV

ORGANIC ANALYSIS

Internal assessment: 25 Marks

External assessment: 75 marks

Total: 100 marks

Record: 15 Marks

Preparation: 15 (quantity: 10 & quality: 5)

Analysis: 45

Preliminary reaction: 4

Aliphatic/ Aromatic: 4

Saturated/ Unsaturated: 4

Tests for elements: 9

Functional groups: 10

Confirmatory tests: 10

Derivative/Coloured reaction: 4

PHYSICAL CHEMISTRY PRACTICALS

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 Marks

Record: 15 Marks

Experiment: 45 Marks

Manipulation, Tabulation and Calculation: 15 Marks

1) **Kinetics**

Graph	: 10 Marks
Below a factor of 10	: 35
By a factor of 10	: 25
More than a factor of 10	: 15

2) <u>Molecular weight</u>

Error upto 10 %: 45

20 %: 35

30 %: 25

> 30 %: 15

3) <u>Effect of electrolyte on CST</u>

Graph: 10

Error upto 10 %: 35

20 %: 25

30 %: 15

> 30: 10

4) <u>Transition temperature</u>

Graph: 10

Error upto 2^{o}C difference: 35

7^{o}C difference: 25

> 7^{o}C difference: 15

5) <u>Conductance</u>

<u>Equivalent conductance: 25 marks</u>		**<u>Cell constant : 20 marks</u>**	
Error upto 10 %	: 25	Error upto 10 %	: 20
Upto 15 %	: 15	Upto 15 %	: 15
>15 %	: 10	>15 %	: 10

6) <u>Conductometric titration</u>

Graph: 10

Upto 2 % : 35

2.1 to 3 % : 30

3.1 to 4 % : 25

4.1 to 5 % : 20

> 5% : 15

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF COMPUTER SCIENCE

CBCS PATTERN

(With effect from 2020-2021)

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3	III	Core Theory	Paper-1	6	4	Programming in C	25	75	100
4	III	Core Practical	Practical-1	3	2	Programming in C Lab	25	75	100
5	III	Allied -1	Paper-1	7	3	**(to choose any one)** 1. Mathematics I 2. Mathematical Foundations I	25	75	100
6	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
7	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**22**		**175**	**525**	**700**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
7	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
9	III	Core Theory	Paper-2	5	4	C++ & Data Structure	25	75	100
10	III	Core Practical	Practical-2	2	2	C++ and Data Structures Lab	25	75	100
11	III	Allied-1	Paper-2	7	5	**to choose any one)** 1. Mathematics II 2. Mathematical Foundations II	25	75	100
12	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
13	IV	Value Education		2	2	Value Education	25	75	100
14	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		**36**	**25**		**200**	**600**	**800**

THIRUVALLUVAR UNIVERSITY

BACHELOR OF COMPUTER SCIENCE

SYLLABUS
UNDER CBCS
(With effect from 2020-2021)

SEMESTER I

CORE THEORY PAPER -1

PROGRAMMING IN C

OBJECTIVES:

- ✓ To understand simple algorithms,
- ✓ To understand language constructs
- ✓ To understand and develop programming skills in C.
- ✓ To understand the basic concepts of decision making and looping statements.
- ✓ To understand the concepts of arrays , structures, union, pointers and files.

UNIT – I

Overview of C: History – Importance – Sample Programs – Basic Structure – Programming Style – Executing – Unix System – MS-DOS System - **Constants, Variables, and Data Types:** Character Set – C Token – Keyword and Identifiers – Constants – Variables – Data Types – Declaration of Storage Class – Assigning Values to Variables – Defining Symbolic Constants – Declaration – Overflow and Underflow of Data - **Operators and Expressions:** Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Special Operators – Arithmetic Expressions, Evaluation of Expressions – Precedence of Arithmetic Operators – Some Computational Problems – Type Conversions in Expressions – Operator Precedence and Associativity – Mathematical Functions .

UNIT – II

Managing Input and Output Operations: Reading, Writing a Character – Formatted Input, Output - **Decision Making and Branching:** Decision Making with If statement – Simple If Statement – The If…Else Statement – Nesting of If…Else Statements – The Else If Ladder – The Switch Statement- The ?: Operator – The Goto Statement - **Decision Making and Looping:** The while Statement – The do Statement – The for Statement – Jumps in Loops – Concise Test Expressions.

UNIT – III

Arrays: One-Dimensional Arrays - Declaration, Initialization of One-Dimensional Arrays – Two-Dimensional Arrays - Initializing Two-Dimensional Arrays – Multi-Dimensional Arrays – Dynamic Arrays - **Character Arrays and Strings:** Declaring and Initializing String

Variables – Reading Strings from Terminal – Writing Strings to Screen – Arithmetic Operations on Characters – Putting String Together – Comparison of Two Strings –String-Handling Functions – Table of Strings – Other Features of Strings - **User Defined Functions**: Need for User-Defined Functions – A Multi-Function Program – Elements of User-Defined Functions – Definition of Functions – Return Values and Their Types – Function Calls – Function Declaration – Category of Functions – No Arguments and No Return Values – Arguments but no return values – Arguments with Return Values – No Arguments but Returns a value – Functions that Return Multiple Values – Nesting of Functions – Recursion – Passing Arrays, Strings to Functions – The Scope, Visibility and Lifetime of Variables – Multi file Programs.

UNIT – IV

Structure and Unions: Defining a Structure – Declaring Structure Variables – Accessing Structure Members – Structure Initialization and Copying and Comparing Structure Variable – Operations on Individual Members – Arrays of Structures – Arrays within Structures – Structures within Structures – Structures and Functions – Unions – Size of Structures – Bit Fields **Pointers:** Understanding Pointers – Accessing the Address of Variable – Declaring, Initialization of Pointer Variables – Accessing a Variable through its pointer – Chain of Pointers – Pointer Expression – Pointer Increments and Scale Factor – Pointers and Arrays – Pointers and Character Strings – Array of Pointers – Pointers as Function Arguments – Functions Returning Pointers – Pointers to Functions – Pointers and Structures – Troubles with Pointers **File Management in C**: Defining and Opening a File – Closing a File – Input/Output Operations on File – Error Handling During I/O Operations – Random Access to Files – Command Line Arguments.

UNIT – V

Fundamental Algorithms: Exchanging the values of Two Variables- Counting- Summation of a Set of Numbers-Factorial Computation -Sine Function Computation –Generation of the Fibonacci Sequence-Reversing the Digits of an Integer- Base Conversion – Character to Number Conversion - **Factoring Methods:** Finding the square Root of a Number –The Smallest Divisor of an Integer-The Greatest Common Divisor of the two integers-Generating Prime Numbers- Computing the Prime Factors of an integer –Generation of Pseudo-random Numbers-Raising a Number to a Large Power-Computing the nth Fibonacci Number (Chapters: 2 & 3)

TEXT BOOK:

1. Programming in ANSI C, E. Balagurusamy, Tata McGrawhill Education, 6th Edition, 2013. (Unit I to IV)
2. How to Solve it by Computer, R.G.Dromey, PHI International (Unit V)

REFERENCE BOOKS:

1. The C Programming Language (ANSI C), Kernighan, B.W. and Ritchie, D.M., PHI.
2. C by Discovery , Foster & Foster , Penram International Publishers, Mumbai.

E - REFERENCES

1. NPTEL, Introduction to C Programming, Prof.SatyadevNandakumar ,IIT, Computer Science and Engineering Kanpur.
2. NPTEL, Introduction to Problem Solving & Programming, by Prof. Deepak Gupta Department of Computer Science and Engineering IIT Kanpur.

Course Outcomes:

- The Student will be able to understand the concepts of Constants, Variables, and Data Types, Operators and Expressions
- The Student will be able to understand the concepts of Managing Input and Output Operations, Decision Making and Branching, Decision Making and Looping.
- The Student will be able to understand the concepts of Arrays, Character Arrays and Strings, User Defined Functions.
- The Student will be able to understand the concepts of Structure and Unions, Pointers, File Management in C.
- The Student will be able to understand the concepts of Fundamental Algorithms, Factoring Methods.

CORE PRACTICAL-1

Programming in C - Lab

Objectives:

1. To understand concepts of for/while loop and switch.
2. To understand language Functions and recursions.
3. To understand and develop String Manipulations.
4. To understand the basic concepts of searching and sorting.
5. To understand the concepts of structures.

Control Statements:
1. Print n Fibonacci numbers – (using for)

2. Print n Prime numbers – (using while)

3. Simple arithmetic on two numbers – (using switch/case)

Functions:
4. Swap two values using call by value / call by reference.

Recursion:
5. To compute NcR and NpR

6. To Compute GCD and LCM

String Manipulation.
7. Operations on string such as length, concatenation, reverse, counting, and copy of a string to another.

Matrices:
8. Matrix Addition, Subtraction, Multiplication, Transpose of n x m matrices.

9. Inverse of a square matrix.

Searching:
10. Binary Search.

Sorting:
11. Bubble Sort

12. Insertion Sort

Structures:
13. Students Mark statement

Pointers:
14. Arithmetic operations on pointers.

Files
15. Creating/ Reading/ Writing a text/binary file.

REFERENCE BOOK:

1. Programming in ANSI C, E. Balagurusamy, Tata McGrawhill Education, 6th Edition, 2013.

Outcomes:

- Enhance the analyzing and problem solving skills and use the same for writing programs in C.
- Write diversified solutions, draw flowcharts and develop a well-documented and indented program according to coding standards.
- Learn to debug a given program and execute the C program.
- To have enough practice the use of conditional and looping statements.
- To implement arrays, functions and pointers.

ALLIED
PAPER -1
1. MATHEMATICS – I

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ.

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates-Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.
3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

ALLIED 1

PAPER - I

2. MATHEMATICAL FOUNDATIONS - I

Objectives

To know about Logical operators, validity of arguments, set theory and set operations, relations and functions, Binary operations, Binary algebra, Permutations & Combinations, Differentiation, Straight lines, pair of straight lines, Circles, Parabola, Ellipse, Hyperbola.

UNIT-I: SYMBOLIC LOGIC

Proposition, Logical operators, conjunction, disjunction, negation, conditional and bi-conditional operators, converse, Inverse, Contra Positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

UNIT-II: SET THEORY

Sets, set operations, venndiagram, Properties of sets, number of elements in a set, Cartesian product, relations & functions,

Relations : Equivalence relation. Equivalence class, Partially and Totally Ordered sets,

Functions: Types of Functions, Composition of Functions.

UNIT-III: BINARY OPERATIONS

Types of Binary Operations: Commutative, Associative, Distributive and identity, Boolean algebra: simple properties. Permutations and Combinations.

UNIT-IV: DIFFERENTIATION

Simple problems using standard limits,

$$\lim_{x \to a} \frac{x^n - a^n}{x - a}, \lim_{x \to 0} \frac{\sin x}{x}, \lim_{x \to 0} \frac{\tan x}{x}, \lim_{n \to \infty} \frac{e^x - 1}{n}, \lim_{n \to 0} (1+n)^{1/n}, \lim_{n \to 0} (1+1/n)^n$$

Differentiation, successive differentiation, Leibnitz theorem, partial differentiation, Applications of differentiation, Tangent and normal, angle between two curves.

UNIT-V: TWO DIMENSIONAL ANALYTICAL GEOMETRY

Straight Lines - Pair Straight Lines

Text Book.

P.R. Vittal, Mathematical Foundations – Maragham Publication,

Chennai.

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V.Sundaram& Others, Dircrete Mathematical Foundation - A.P.Publication, sirkali.
3. P.Duraipandian& Others, Analytical Geometry 2 Dimension - Emerald publication 1992 Reprint.
4. Manicavachagompillay&Natarajan. Analytical Geometry part I - Two Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

SEMESTER II

CORE THEORY PAPER -2

C++ & DATA STRUCTURES

Objectives:

1. To understand the concepts of object-oriented programming and master OOP using C++.
2. To understand the concepts of Inheritance, polymorphism and templates.
3. To understand the concepts of different view of data, stack and queues.
4. To understand the concepts of Programming with Recursion, Binary Search Tree and graphs.
5. To understand the concepts of Sorting and Searching Algorithms.

UNIT-I :

Principles of Object Oriented Programming – Beginning with C++ – Token , Expressions and Control Structures- Functions in C++ – Classes and Objects – Constructors and Destructors.

UNIT-II :

Operator Overloading and Type Conversions – Inheritance : Extending Classes – Pointers, Virtual Functions and Polymorphism - Managing Console I/O Operations. Working with Files - Templates – Exception Handling – Manipulating Strings.

UNIT-III:

Data Design & implementations: Different views of data – Abstraction and Built-in Types – Arrays ADTs Stacks and Queue (Linear and Linked) , Stack (Array and Pointer)- Applications- Infix to Postfix Conversions – Queue(Array and Pointer) – List(Array and Pointer) – Applications: (Polynomial Addition) - Doubly Linked Lists.

UNIT – IV:

Programming with Recursion : Recursion – Verifying and Writing Recursive Functions **– Binary Search Tree :** Implementation – Tree Traversal **– Graphs:** Implementations – BFS – DFS – Dijkstras Shortest Path Algorithm.*(Chapter 7:Section 7.1,7.4 7.5, Chapter 8:Section 8.1,8.4, Chapter 9:Section 9.3)*

UNIT-V:

Sorting and Searching Algorithms: Sorting – Searching – Hashing *(Chapter 10: Section 10.1,10.2,10.3)*

TEXT BOOK:

1. Object Oriented Programming with C++, E Balagurusamy , Tata McGraw Hill, 6th Edition, 2014.
(Units I, II)

2. C++ Plus Data Structure, Nell Dale, Jones & Bartlett Publishers , 4th Edition, 2010. (Units III, VI & V)

REFERENCES:

1. C++ The Complete Reference, Herbert Schildt, Tata McGraw Hill, 4th Edition, 2003.
2. OOP In ANSI C and Turbo C, Ashok N.Kamthene, Pearson Education, 6th Edition, 2008.
3. Data Structures and Algorithms, Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, Addison Wesley Longman Inc., 2nd Edition, 1999.

Course Outcomes:

- The Student will be able to understand the concepts of object oriented programming Apply structure and inline functions.
- The Student will be able to understand the concepts of the types of inheritances and Applying various levels of Inheritance for real time problems Apply the OOPs concepts class and object. Understand Explain the file concept and exception handlings in C++
- The Student will be able to understand the concepts of Stacks and Queue using array and pointers.
- The Student will be able to understand the concepts of Recursion, Binary Search Tree and graphs.
- The Student will be able to understand the concepts of Sorting and Searching Algorithms.

CORE PRACTICAL-2

C++ & DATA STRUCTURES LAB

Objectives:

1. To develop C++ programming skills in design
2. To understand the basic concepts of different abstract types and structure of data.
3. To understand the concepts of Function Overloading
4. To understand the concepts of Stack, Queue, List, Doubly Linked List - using Pointers-using Arrays.
5. To understand the concepts of Searching and Sorting Algorithms.

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LIST OF LAB EXERCISES

1. Constructors & Destructors, Copy Constructor.
2. Friend Function & Friend Class.
3. Inheritance.
4. Polymorphism & Function Overloading.
5. Virtual Functions.
6. Overload Unary & Binary Operators Both as Member Function & Non Member Function.
7. Class Templates & Function Templates.
8. Exception Handling Mechanism.
9. Standard Template Library concept.
10. File Stream classes.
11. Array implementation of Stack, Queue : Infix to postfix
12. Implementation of Stack, Queue, List, Doubly Linked List - using Pointers- Polynomial Addition
13. Implementation of Binary Search Tree, Traversal
14. Implementation of Searching and Sorting Algorithms.
15. Graph Implementation of shortest path (Djikstras)

REFERENCE :

1. Object Oriented Programming with C++, E Balagurusamy , Tata McGraw Hill, 6th Edition, 2014.
2. C++ Plus Data Structure, Nell Dale, Jones & Bartlett Publishers , 4th Edition, 2010.

Course Outcomes:

- Understand the Creating and Deleting the Objects with the Concepts of Constructors and Destructors.
- Demonstrate the Polymorphism Concepts and Operator Overloading.
- Understand basic Data Structures such as Arrays, Linked Lists, Stacks, Queues, Doubly Linked List and Infix to Postfix Conversion.
- Apply Algorithm for solving problems like Sorting and Searching.
- Apply Algorithms and use Graphs and Trees as tools to visualize and simplify Problems

ALLIED 1

PAPER -2

1. MATHEMATICS II

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume - Fourier series for functions in (0,2□) and □□□□□□□□

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Guass, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

ALLIED 1

PAPER -2

2. MATHEMATICAL FOUNDATIONS II

Objectives

To know about Matrix Operations, Symmetric, Skew-Symmetric, Hermitian, Skew-Hermitian, Orthogonal, Unitary Matrices. Rank of a Matrix Solutions of linear equations Consistency and Inconsistency, Characteristic roots and Characteristics Vectors, Cayley - Hamilton Theorem, Integration of rational functions, Integration by parts, Reduction formulae, Area and volume using integration, Planes, Straight lines, Spheres, Curves, Cylinders.

UNIT-I: MATRICES

Multiplication of matrices, Singular and Non-Singular matrices, Adjoint of a Matrix, Inverse of a matrix Symmetric and Skew-Symmetric, Hermitian and Skew-Hermition, Orthogonal and unitary matrices, Rank of a matrix, Solution of Simultaneous Linear equations by

(i) Cramer's rule.

(ii) Matrix Inversion Method.

UNIT-II: MATRICES

Test for Consistency and Inconsistency of linear equations, (Rank Method), characteristic roots and characteristic vectors, Cayley - Hamilton theorem, matrix of linear transformations: reflection about the x, y axes and the line y=x, rotation about the origin through an angle, expansion or compression, shears, translation.

UNIT-III

Integration Simple problems, integration of rational function involving algebraic expressions of the form

$$\frac{1}{\sqrt{ax^2+bx+c}}, \frac{1}{\sqrt{ax^2+bx+c}}, \frac{px+q}{\sqrt{ax^2+bx+c}}, \frac{px+q}{\sqrt{ax^2+bx+c}}, \sqrt{px+q}$$

integrations using simple substitutions integrations involving trigonometric functions of the form

$$\frac{1}{a+b\cos x}, \frac{1}{a^2\sin^2 x+b^2\cos^2 x}$$

Integration by parts.

UNIT-IV

Properties of definite integrals. Reduction formulae for

$\int x^n e^{ax} dx$, $\int \sin^n x dx$, $\int \cos^n x dx$, $\int x^m (1-x)^n dx$, applications of integration for (i) Area under plane caurves, (ii) Volume of solid of revolution.

UNIT-V: ANALYTICAL GEOMETRY OF THREE DIMENSION

Planes, straight lines.

Text Book.

P.R.Vittal, Mathematical Foundations - Margham Publication,

Chennai.

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V.Sundaram& Others, Dircrete Mathematical Foundation - A.P.Publication, sirkali.
3. P.Duraipandian& Others, Analytical Geometry 3 Dimension – Emerald publication 1992 Reprint.
4. Manicavachagompillay&Natarajan. Analytical Geometry part II - three Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

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THIRUVALLUVARUNIVERSITY

B.Sc. COMPUTER SCIENCE

CBCS PATTERN

(With effect from 2020-2021)

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	6	4	Programming in C	25	75	100
4.	III	Core Practical	Practical-1	3	2	Programming in C Lab	25	75	100
5.	III	Allied -1	Paper-1	7	3	**(to choose any one)** 1. Mathematics I 2. Mathematical Foundations I	25	75	100
6.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
7.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**22**		**175**	**525**	**700**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
8.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9.	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
10.	III	Core Theory	Paper-2	5	4	C++ & Data Structure	25	75	100
11.	III	Core Practical	Practical-2	2	2	C++ and Data Structures Lab	25	75	100
12.	III	Allied-1	Paper-2	7	5	**(to choose any one)** 1. Mathematics II 2. Mathematical Foundations II	25	75	100
13.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
14.	IV	Value Education		2	2	Value Education	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		**36**	**25**		**200**	**600**	**800**

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
16.	I	Language	Paper-3	6	4	Tamil/ OtherLanguages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-3	3	3	Programming in JAVA	25	75	100
19.	III	Core Practical	Practical-3	3	3	Programming in JAVA Lab	25	75	100
20.	III	Allied II	Paper-3	4	3	**(Choose any one)** 1. Physics I 2. Statistical Methods and Their Applications I	25	75	100
	III	Allied II	Practical	3	0	Physics/Statistics Practical	0	0	0
21.	IV	Skill Based Subject	Paper-1	3	2	Digital Logic Design and Computer Organization	25	75	100
22.	IV	Non-Major Elective	Paper-1	2	2	Introduction to Information Technology	25	75	100
		Sem. Total		**30**	**21**		**175**	**525**	**700**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
23.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
24.	II	English	Paper-4	6	4	English	25	75	100
25.	III	Core Theory	Paper-4	4	3	Relational Database Management Systems	25	75	100
26.	III	Core Practical	Practical-4	3	3	RDBMS Lab	25	75	100
27.	III	Allied II	Paper-4	4	3	**(to choose any one)** 1. Physics II 2. Statistical Methods and their Applications II	25	75	100
28.	III	Allied II	Practical	3	2	Physics/Statistics Practical	25	75	100
29.	**IV**	**NMSDC : Digital Skills for Employability**	**Paper-2**	**2**	**2**	**Office Fundamentals**	**25**	**75**	**100**
30.	IV	Non-Major Elective	Paper-2	2	2	Internet Technology	25	75	100
		Sem. Total		**30**	**23**		**200**	**600**	**800**

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
31.	III	Core Theory	Paper-5	6	4	Mobile Application Development	25	75	100
32.	III	Core Theory	Paper-6	6	4	Operating System	25	75	100
33.	III	Core Theory	Paper–7	4	3	Design and Analysis of Algorithms	25	75	100
34.	III	Core Practical	Practical-5	4	3	Mobile Applications Development-Lab	25	75	100
35.	III	Core Practical	Practical-6	4	3	Operating System-Lab	25	75	100
36.	III	Internal Elective	Paper-1	3	3	**(to choose any one)** 1. Data Mining 2. Information Security 3. Software Testing	25	75	100
37.	IV	Skill Based Subject	Paper-3	3	2	Software Engineering	25	75	100
				30	**22**		**175**	**525**	**700**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
38.	III	Core Theory	Paper-8	5	4	Open Source Software	25	75	100
39.	III	Core Theory	Paper-9	4	4	Python Programming	25	75	100
40.	III	Core Practical	Practical-7	4	3	Python Programming Lab	25	75	100
41.	III	Core Practical	Practical-8	4	2	Open Source Programming Lab	25	75	100
42.	III	Project		5	5	Project Work (Group/Individual Project)	25	75	100
43.	III	Internal Elective	Paper - 2	3	3	**(to choose any one)** 1. Big Data Analytics 2. Cryptography 3. Digital Image Processing	25	75	100
44.	III	Internal Elective	Paper - 3	3	3	**(to choose any one)** 1. Artificial Intelligence 2. System Software 3. Cloud Computing	25	75	100
45.	III	**NMSDC : Emerging Technology for Employability II**	**Paper - 4**	**2**	**2**	**(Choose any one)** • **PBL Android App Development** • **Machine Learning**	**25**	**75**	**100**
46.	V	Extension Activities		0	1		100	0	100
		Sem. Total		**30**	**27**		**300**	**600**	**900**
					140				**4600**

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English & English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Allied Practical	1			100	100
	Electives	3	3	9	100	300
	Core	9	(3-5)	34	100	900
	Core practical	8	(2-3)	21	100	800
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	**46**		**140**		**4600**

THIRUVALLUVARUNIVERSITY

B.Sc. COMPUTER SCIENCE

CBCS PATTERN

(With effect from 2020-2021)

SEMESTER III

CORE PAPER - 3

PROGRAMMING IN JAVA

COURSE OBJECTIVES:

- Knowing about a General-purpose and Purely object-oriented programming language including data types, control statements, and classes
- Secured, well-suited for internet programming using applets and GUI-based

UNIT I

Declarations and Access Control: Identifiers and Keywords: Oracle‘s Java Code Conventions. Define Classes: Import Statements and the Java API - Static Import Statements. Use Interfaces: Declaring an Interface- Declaring Interface Constants. Declare Class Members: Access Modifiers - Non access Member Modifiers - Constructor Declarations - Variable Declarations. Declare and Use enums: Declaring enums. Object Orientation: Encapsulation - Inheritance and Polymorphism- Polymorphism - Overriding / Overloading: Overridden Methods -Overloaded Methods.

UNIT II

Object Orientation: Casting - Implementing an Interface - Legal Return Types: Return Type Declarations - Returning a Value. Constructors and Instantiation: Overloaded Constructors - Initialization Blocks. Statics: Static Variables and Methods. Assignments: Stack and Heap - Literals, Assignments, and Variables: Literal Values for All Primitive Types. Scope - Variable Initialization - Passing Variables into Methods: Passing Object Reference Variables - Passing Primitive Variables. Garbage Collection. Operators: Java Operators - Assignment Operators - Relational Operators - instanceof Comparison - Arithmetic Operators - Conditional Operator - Logical Operators.

UNIT III

Working with Strings, Arrays, and Array Lists: Using String and StringBuilder: The String Class - The StringBuilder Class - Important Methods in the StringBuilder Class. Using Arrays: Declaring an Array -Constructing an Array - Initializing an Array. Using ArrayList:ArrayList Methods in Action - Important Methods in the ArrayList Class. Flow Control and Exceptions: Using if and switch Statements -Creating Loops Constructs - Handling Exceptions - Catching an Exception Using try and catch - Using finally. String Processing, Data Formatting Resource Bundles: String, StringBuilder, and StringBuffer -Dates, Numbers, Currencies, and Locales.

UNIT IV

I/O and NIO: File Navigation and I/O: Creating Files Using the File Class - Using FileWriter and FileReader. File and Directory Attributes -DirectoryStream - Serialization. Generics and Collections: toString(), hashCode(), and equals(): The toString() Method - Generic Types -Generic Methods - Generic Declarations. Inner Classes: Method – Local. Inner Classes - Static Nested Classes - Threads: Defining, Instantiating, and Starting Threads - Thread States and Transitions - Synchronizing Code, Thread Problems - Thread Interaction. Concurrency: Concurrency with the java.util.concurrent Package - Apply Atomic Variables and Locks - Use java.util.concurrent Collections - Use Executors and ThreadPools.

UNIT V

Applets: Applet fundamentals - Applet class - Applet life cycle - Steps for developing an applet program - Passing values through parameters - Graphics in an applet - Event-handling. GUI Applications - Part 1: Graphical user interface - Creating windows - Dialog boxes - Layout managers - AWT component classes - Swing component classes. GUI Applications - Part 2: Event handling - Other AWT components - AWT graphics classes - Other swing controls.

TEXT BOOK(S):

1. Kathy Sierra, Bert Bates — OCA/OCP Java SE 7 Programmer I & II Study Guide, Oracle Press. (Unit I,II,III,IV).

2. Sagayaraj, Denis, Karthik and Gajalakshmi, 2018, Java Programming - For Core and Advanced Learners, University Press (India) Private Limited, Hyderabad.(Unit V).

REFERENCE BOOKS:

1. Hebert Schild, 2002, The Complete Reference Java2, [Fifth Edition]. Tata McGraw-Hill, New Delhi.

2. John Hubbard, R.2004. Programming with Java. [Second Edition]. Tata McGraw-Hill,New Delhi.

3. Debasish Jana. 2005. Java and Object-Oriented Programming Paradigm, [Second Printing]. Prentice-Hall of India, New Delhi.

4. Sagayaraj, Denis, Karthik and Gajalakshmi 2018, Java Programming for core and advanced Learners, University Press India Pvt. Ltd., Hyderabad.

Course Outcomes:

- Students are able to know about a General-purpose and Purely object-oriented programming language including data types, control statements, and classes
- Students are able to Secured, well-suited for internet programming using applets and GUI-based

CORE PRACTICAL - Practical-3

PROGRAMMING IN JAVA LAB

List of Practical's

1. Implementation of Classes and Objects

2. Implementation of Inheritance and Polymorphism

3. Implementation of Interface and Package concepts

4. Implementation of Flow, Border ,Grid Layouts

5. Implementation of Tic-Tac Toe Application Using Applets

6. Implementation of Frames, Menus, Dialog

7. Implementation of Swing concepts

8. Implementation of Exception Handling

9. Implementation of Multi Threading

10. Implementation of I/O Streams

11. Implementation of Java Networking concepts

12. Implementation of Java Servlets (Connecting Database)

13. Implementation of RMI

14. Implementation of Java Beans

ALLIED - 2

PAPER -1

PHYSICS I

Course Objectives

1. To understand the basics of gravitation and to study the properties of matter.
2. To learn the law of thermoelectric circuits and thermoelectric diagrams.
3. To teach the growth and decay of a transient current and magnetometer.
4. To explain production of ultrasonics and reverberation time.
5. To know the basics of laser and fibre optics principles and applications.

UNIT-1: Properties of Matter

Gravitation: Acceleration due to gravity -Determination of 'g' by Simple pendulum - Drawbacks of simple pendulum –Determination of time period of compound pendulum - 'g' by compound pendulum -Centre of Oscillation and Centre of Suspension are interchangeable-Determination of 'g' by Bar/compound pendulum.

Elasticity: Bending of beams -Expression for bending moment - Cantilever Depression at the loaded end of a cantilever Expression forYoung's modulus -non–uniform bending-Pin and microscope method.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period - Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid -Viscous force - Co-efficient of viscosity of a liquid – Poiseuille's formula -Experimental method using Burette- Effect of temperature and pressure on viscosity-applications.

Surface Tension: Surface tension of a liquid-Surface Tension and interfacial surface tension by the method of drops-applications.

UNIT-2: Thermo Electricity

Seeback, Peltier and Thomson effects - laws of thermoelectric circuits -Peltier coefficient - Thomson coefficient -application of thermodynamics to a thermocouple and expressions for Peltier and Thomson coefficients -thermo electric power and thermo electric diagrams.

UNIT-3: Transient Current and Magnetism

Growth and decay of current in a circuit containing resistance and inductance- Growth and decay of charge in circuit containing resistance and capacitor - growth and decay of charge in a LCR circuit – condition for the discharge to be oscillatory – frequency of oscillation.

Magnetism -Magnetic moment and pole strength of a magnet – Deflection magnetometer – Tan C Position- Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer and the vibration magnetometer .

UNIT -4: Acoustics

Sound: Transverse vibration of strings -Velocity and frequency of vibrations of a stretched string -

laws -Sonometer -A.C. Frequency - Steel wire- Brass wire.

Introduction to Ultrasonics – Piezo electric effect–production by Piezo electric method – properties –applications- Acoustics of buildings – reverberation time – derivation of Sabine's formula – determination of absorption coefficient-Acoustic aspects of halls and auditoria.

UNIT-5:Lasers and Fibre Optics

Laser: Introduction - Principles of laser -Einstein's explanation for stimulatedemission – Differences between stimulated and spontaneous emission - Population inversion –Properties of laser -Types of lasers - He- Ne Laser - Semiconductor Laser-Applications of laser.

Fibre optics: Basic principle of an optical fibre -Total internal reflection -Basic structure of an optical fibre -Numerical aperture –Coherent bundle – Attenuation and dispersion - classification of optical fibres-step index and graded index fibers – single mode and multi mode fibers-Fibre optic communication system block diagram.-applications.

Text Books

Unit 1 and Unit 4

1. R. Murugesan and KiruthigaSivaprasath, Properties of Matter and Acoustics, S. Chand & Co. New Delhi, Kindle edition.

Unit 2 and Unit 3

1. R. Murugesan, Electricity & Magnetism, S. Chand & Co. New Delhi, 2019.

Unit 5

1. N Subrahmanyam, BrijLal and M.N Avadhanulu, A Text Book of Optics, S. Chand &Co. New Delhi, Revised Edition as per UGC model syllabus.

Reference Books

1. BrijLal and N Subrahmanyam,Electricity and Magnetism, S Chand & Company Pvt Ltd, New Delhi, 2000.
2. D.C. Tayal, Electricity and Magnetism, Himalaya Publishing House,Bombay, 2014.
3. BrijLal and N.Subrahmanyam, A Text Book of Sound,Vikas Publications, New Delhi (2 Edition)
4. C.L.Arora, Physics for Degree Students B.Sc First Year, S. Chand Publishing, 2013.
5. K.Thyagarajan and Ajay Ghatak, Introduction to Fibre optics-, Cambridge University.
6. Ajay Ghatak and K.Thyagarajan, Fiber optics and Lasers-The two revolutions, Macmillan, 2006.
7. K.Thyagarajan and Ajay Ghatak, Lasers; Fundamentals and applications, Springer.
8. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2016.

E-MATERIALS

1. https://courses.lumenlearning.com/physics/chapter/16-4-the-simple-pendulum/
2. https://www.youtube.com/watch?v=aw0_seEt4v0

3. https://en.wikipedia.org/wiki/Thermoelectric_effect
4. https://www.youtube.com/watch?v=S0I37M2sx_0
5. https://physicscatalyst.com/elecmagnetism/growth-and-delay-charge-R-C-circuit.php
6. https://www.youtube.com/watch?v=PLQQPXot6vE
7. https://www.youtube.com/watch?v=d0_Eff4MXwM
8. https://www.techglads.com/cse/sem1/production-of-ultrasonics-by-piezoelectric-methods/
9. https://thefactfactor.com/facts/pure_science/physics/optical-fibre/5159/
10. https://www.youtube.com/watch?v=auk1OS0SVWc (Tamil video)

Course Objectives

1. After studied unit-1, the student will be able to find the acceleration due to gravity at a place using simple pendulum and compound pendulum. Also can know the properties of matter like elasticity, viscosity and surface tension.
2. After studied unit-2, the student will be able to learn thermo emf using Seebeck and Peltier effects and hence understand thermoelectric circuits.
3. After studied unit-3, the student will be able to explain growth and decay of a transient current in a circuit containing resistance-inductance, resistance-capacitance and LCR in series. Also will be able to determine the horizontal components of earth's magnetic induction at a place using deflection magnetometer in Tan C position.
4. After studied unit-4, the student will be able to derive the expression for the velocity of a sound in a stretched string and hence they can determine the frequency of A.C mains.
5. After studied unit-5, the student will be able to understanding the principle of laser and can demonstrate the working of He-Ne laser and applications of laser. Also, the student will be able to learn the fibre optics, structure and application in communication.

ALLIED - 2

PAPER -1

STATISTICAL METHODS AND THEIR APPLICATIONS I

Objective

To understand and computing statistical Methods by which to develop the programmingSkills.

UNIT-I

Introduction - scope and limitations of statistical methods - classification of data -Tabulation of data - Diagrammatic and Graphical representation of data - Graphical determination of Quartiles ,Deciles and Percentiles.

UNIT-II

Measures of location : Arithmetic mean, median, mode, geometric mean and Harmonicmean and their properties.

UNIT-III

Measures of dispersion : Range, Quartile deviation, mean deviation, Standard deviation,combined Standard deviation, and their relative measures.

UNIT-IV

Measures of Skewness Karl Pearson's, Bowley's, and kelly's and co-efficient ofSkewness and kurtosis based on moments.

UNIT-V

Correlation - Karl Pearson - Spearman's Rank correlation - concurrent deviation methods.
Regression Analysis: Simple Regression Equations.

Note : The proportion between theory and problems shall be 20:80

Books for Reference:

1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII
3. Elements of Statistics - Mode . E.B. - Prentice Hall
4. Statistical Methods - Dr. S.P. Gupta - Sultan Chand & Sons

SKILL BASED SUBJECT

PAPER-1

Digital Logic Design and Computer Organization

Objectives:

This course aims to provide the students with a detailed knowledge on digital logic, internals of the System logic circuits and to know the working principles of the computers.

UNIT-I BINARY NUMBER SYSTEM

Objective : To understand the basics of Number System

Number system and its conversions-. Digital Computers and Digital Systems - Binary Number System – Binary Addition – Binary Subtraction- Binary Multiplication and Division-Number Base Conversion: decimal, binary, octal, hexadecimal. The Basic Gates - Boolean Algebra - Universal Gates - Boolean Laws and Theorem.

UNIT-IISIMPLIFICATION

Objective: To understand the concept of Simplification of Boolean expressions using K-map and arithmetic circuits.

Sum of products - Product of Sums - K-map simplifications - Don't care conditions-QuineMcclausky tabulation method. Combinational Arithmetic Circuits: Adders-Subtractors-full adder-subtractor-BCD Adder.

UNIT-III COMBINATIONAL LOGIC CIRCUITS

Objective: To understand the concept of Combinational Logic Circuits

Multiplexers-De-Multiplexers- Decoders : -Encoders- Decoders-Sequential Logic Circuit: Flip-Flops -RS Flip flop- JK Flip flop- D Flip flop-T Flip flop and Master Slave. Counters-Synchronous and Asynchronous –Shift Registers and its types.

UNIT- IV BASIC STRUCTURE OF COMPUTERS

Objective: To understand the concept of **Basic Structure of Computers**

Basic Operational Concepts, Bus Structures - Central Processing Unit: General Register and stack Organization-Instruction Formats Addressing Modes-Data Transfer and manipulation.

UNIT V- INPUT OUTPUT AND MEMORY ORGANIZATION

Objective: To understand the basic concepts of Input Output and Memory Organization

Peripheral Devices- I/O Interface - Asynchronous Data Transfer- -Priority Interrupt – Direct Memory Access – I/O Processor.Memory Organization– Main Memory- Auxiliary Memory – Associative Cache and Virtual Memory.

TEXT BOOKS:

1. M. Morris Mano -Digital Logic and Computer Design- PHI.
2. M. Morris Mano, Computer System Architecture, Pearson Education.

REFERENCE BOOKS:

1 Thomas C. Bartee Digital Computer Fundamentals- McGraw HillPub.
2 Malvino& Leach- Digital Principles and Applications –McGraw HillPub.
3. S. Ramalatha - Digital Computer Fundamentals, MeenakshiAgency.
4. V. Carl Hamacher, Zvonko G. Vranesic, Safwat G. Zaky, Computer Organization, McGraw Hill HigherEducation.
5. John P. Hayes, Computer System Architecture, McGraw Hill HigherEducation

NON-MAJOR ELECTIVE

PAPER-1

Introduction to Information Technology

OBJECTIVES:

The subject aims to build the concepts regarding:

- Major components of Computer System and its working principles.
- Role of an Operating System and basic terminologies of networks.
- How the Information Technology aids for the Current Scenario.
- To understand the Computer Software.
- To understand internet applications

UNIT-I

Introduction: Characteristics of Computers-Technological Evolution of Computers-The Computer Generations-Categories of Computer. **Data and Information:** Introduction-Types of Data-A Simple Model of a Computer-Data Processing Using a Computer-Desktop Computer. **Acquisition of Number and Textual Data:** Introduction- Input Units-Internal Representation of Numeric Data-Representation of Characters in Computers–Error-Detecting Codes.

UNIT-II

Data Storage: Introduction-Memory Cell-Physical Devices Used as Memory Cells-Random Access Memory-Read Only Memory- Secondary Memory- Floppy Disk Drive- Compact Disk Read Only Memory (CDROM)-Archival Memory. **Central Processing Unit:** The Structure of a Central Processing Unit-Specification of a CPU-Interconnection of CPU with Memory and I/O Units.

UNIT-III

Computer Networks: Introduction-Local Area Network (LAN)- Applications of LAN-Wide Area Network (WAN)–The Future of Internet Technology. **Output Devices:** Introduction- Video Display Devices-Flat Panel Displays–Printers.

UNIT-IV

Computer Software: Introduction-Operating System-Programming Languages–A Classification of Programming Languages. **Data Organization:** Introduction-Organizing a Database-Structure of a Database- Database Management System-Example of Database Design.

UNIT-V

Some Internet Applications: Introduction- E-mail- Information Browsing Service- The World Wide Web- Information Retrieval from the World WideWeb-Other Facilities Provided by Browsers - Audio on the Internet.**Societal Impactsof Information Technology:** CareersinInformation Technology.

TEXTBOOKS:

1. *Rajaraman,V.*2008.**IntroductiontoInformationTechnology.**[SixthPrinting]. PrenticeHall of India Pvt. Limited, New Delhi.(UNIT I toV)

2. *Nagpal,D.P.*2010.**ComputerFundamentals**.[FirstEdition,Revised].S.Chand &CompanyLtd, New Delhi. (**UNIT I(Introduction: Characteristics of Computers to Categories of Computer**))

REFERENCE BOOKS:

1. *ITL EducationsSolution Limited.* 2009. **Introduction toComputer Science**. [Fourth Impression].Pearson Education, New Delhi.
2. *Alexis Leon and Mathews Leon.* 1999. **Fundamentals of Information Technology.**[FirstEdition]. Leon TECHWorld, New Delhi.

COURSE OUT COMES :

- Students understand Major components of Computer System and its working principles.
- Students learn and understand the Role of an Operating System and basic terminologies of networks.
- Students understand how the Information Technology aids for the Current Scenario.
- Students understand the Computer Software.
- Students understand internet applications

SEMESTER IV

CORE PAPER-4

RELATIONAL DATABASE MANAGEMENT SYSTEMS

Objective:

- ✓ The students are able to understand database concepts and database management system software and have a high-level understanding of major DBMS components and their function.
- ✓ The students are able to understand the E R model and relational model.
- ✓ The students are able to be able to write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.
- ✓ The students are able to Understand Functional Dependency and Functional Decomposition.
- ✓ The students are able to understand the architecture of database management system and also understand the various different architecture such as server system architecture, parallel sytems and distributed database systems.

UNIT- I : DATABASE ARCHITECTURE AND ER DIAGRAM 12 Hours

Database system applications - Purpose of database systems - View of data- Database languages - Database architecture - Database users and administrators - History of database systems-Entity relationship modeling: entity types, entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, sub classes; super classes, inheritance, specialization and generalization

UNIT- II: RELATIONAL DATA MODEL 12 Hours

Relational model concepts, Relational constraints, Relational Languages : Relational Algebra, The Tuple Relational Calculus - The Domain Relational Calculus - SQL: Basic Structure-Set Operations- Aggregate Functions-Null Value-Nested Sub Queries-Views Complex QueriesModification Of Database-Joined Relations-DDL-Embedded SQL-Dynamic SQL-Other SQL Functions- -Integrity and Security.

UNIT - III: DATA NORMALIZATION 12 Hours

Pitfalls in relational database design – Decomposition – Functional dependencies – Normalization – First normal form – Second normal form – Third normal form – Boyce-codd normal form – Fourth normal form – Fifth normal form.

UNIT- IV: STORAGE AND FILE ORGANIZATION 12 Hours

Disks - RAID -Tertiary storage - Storage Access -File Organization – organization of files - Data Dictionary storage

UNIT- V: QUERY PROCESSING AND TRANSACTION MANAGEMENT 12 Hours

Query Processing - Transaction Concept - Concurrency Control - Locks based protocol Deadlock Handling -Recovery Systems.

TEXT BOOK:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, McGraw Hill, 2010. 2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition,2002

REFERENCES

1. Bipin Desai, An Introduction to database systems, Galgotia Publications, 2010. 2. RamezElamassri, Shankant B-Navathe, Fundamentals of Database Systems, Pearson, 7th Edition, 2015

E - REFERENCES

1. NPTEL, Introduction to database desigh, Dr P Sreenivasa Kumar Professor CS&E, Department, IIT, Madras
2. 2. NPTEL, Indexing and Searching TechniquesinDatabasesDr. ArnabBhattacharya,IIT Kanpur

Course Outcomes:

- Describe the database architecture and its applications Sketch the ER diagram for real world applications Uses various ER diagram for a similar concepts from various sources.
- Discuss about the relational algebra and calculus Construct various queries in SQL and PL/SQL Compiles various queries in SQL, Relational Calculus and Algebra.
- Describe the various normalization forms Apply the normalization concepts for a table of data Practices a table and implement the normalization concepts.
- Explain the storage and accessing of data.
- Illustrate the query processing in database management. Define the concurrency control and deadlock concept

CORE PRACTICAL - 4

RELATIONAL DATABASE MANAGEMENT SYSTEMS LABS

Objectives:

- ✓ To understand the concepts of DDL/DML/DCL/TCL commands.
- ✓ To understand the concepts of Join queries.
- ✓ To understand the concepts of exception handling.
- ✓ To understand the concepts of cursors.
- ✓ To understand the concepts of packages.

LAB EXERCISES:

1. Execute a single line query and group functions.
2. Execute DDL Commands.
3. Execute DML Commands
4. Execute DCL and TCL Commands.
5. Implement the Nested Queries.
6. Implement Join operations in SQL
7. Create views for a particular table
8. Implement Locks for a particular table.
9. Write PL/SQL procedure for an application using exception handling.
10. Write PL/SQL procedure for an application using cursors.
11. Write a PL/SQL procedure for an application using functions
12. Write a PL/SQL procedure for an application using package

REFERENCE BOOK:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, McGraw Hill, 2010. 2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition,2002

Course Outcomes:

- Design and Implement a database schema for a given problem domain.
- Populate and Query a database using SQL DDL/DML Commands.
- Build well formed in String Date/Aggregate Functions.
- Design and Implement a database query using Joins, Sub-Queries and Set Operations.
- Program in SQL including Objects (Functions, Procedures, Triggers)

ALLIED -2
PAPER - 2

Course Objectives

1. To study the concept of special theory of relativity.
2. To expose the structure of atom with different models.
3. To know the definition of binding energy and to study about nuclear models
4. To learn the different number system in digital electronics and logic gates
5. To give an introduction about nanomaterial.

UNIT-1: Special Theory of Relativity

Frames of reference-inertial frames and non-inertial frames -Galilean transformations -Michelson-Morley experiment-interpretation of results - postulates of special theory of relativity Lorentz transformation equations -length contraction - time dilation - transformation of velocities -variation of mass with velocity -Mass-energy equation.

UNIT-2: Atomic Physics

Bohr atom model – Critical Potentials - Experimental determination of critical potentials - Franck and Hertz's experiment -Sommerfield's Relativistic atom model The vector atom model – spatial quantization–spinning of an electron –quantum numbers associated with the vector atom model – coupling schemes –LS and jj coupling – the Pauli's exclusion principle – Stern and Gerlach experiment

UNIT-3: Nuclear Physics

Binding energy-Binding energy per nucleon-Packing fraction-Nuclear models – liquid drop model – semi empirical mass formula – merits and demerits -shell model -evidences for shell model – nuclear radiation detectors –ionization chamber – G.M Counter-Wilson cloud chamber-Particle accelerators-Cyclotron-Betatron.

Unit-4: Digital Electronics

Number systems -Decimal, Binary, Octal and Hexadecimal system – Conversion from one number system to another- Binary Arithmetic -Addition –Subtraction- 1's and 2's complement -Binary codes- BCD code – Excess 3 code, Gray code.

NAND, NOR and EXOR – functions and truth tables. NAND & NOR as universal gates-Half adder and Full adder - Half subtractor and Full subtractor using NAND gate only.

UNIT-5: Nanomaterial

Introduction-Nanomaterial- Properties of nanomaterial (size dependent) -synthesis of nanomaterial-sol gel- hydrothermal method-Scanning Electron Microscope (SEM)- Principle and Instrumentation-Fullerenes- Carbon nanotubes- Fabrication and structure of carbon nanotubes - Properties of carbon nanotubes (Mechanical and Electrical) - Applications ofCNT's.

Text Books
Unit 1 to Unit 3

1. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2016

Unit 4

1. V.Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007

Unit 5

1. V. Raghavan, *Material Science and Engineering* ,Printice Hall India.,2004.

Reference Book

1. Allied Physics – R. Murugesan S. Chand & Co. New Delhi, 2005.
2. A Text book of Digital electronics – R.S.Sedha, S.Chand&Co, 2013
3. Malvino and Leech, Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi, 2000.
4. Dr. M.N. Avadhanulu, *Material science*, S.Chand& Company, New Delhi, 2014.
5. M.Arumugam, *Material science*, Anuradhapuplishers, 1990.
6. V. Rajendran, *Material Science*, Tata McGraw Hill Ltd, New Delhi,2001.
7. D.C.Tayal, Nuclear Physics, Himalaya Publishing House, 2009

E-MATERIALS

1. https://en.wikipedia.org/wiki/Galilean_transformation
2. https://www.youtube.com/watch?v=NH3_1IkSB9s
3. https://www.youtube.com/watch?v=EEWuUst2GK4
4. https://en.wikipedia.org/wiki/Vector_model_of_the_atom
5. https://www.tutorialspoint.com/what-is-a-geiger-muller-counter
6. https://www.youtube.com/watch?v=jxY6RC52Cf0
7. https://www.tutorialspoint.com/digital_circuits/digital_circuits_number_systems.htm
8. https://www.youtube.com/watch?v=4ae9sJBBkvw
9. https://en.wikipedia.org/wiki/Nanomaterials
10. https://www.youtube.com/watch?v=mPxoJz6treE (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to study the frames of reference, Galilean transformation equations and special theory of relativity.
2. After studied unit-2, the student will be able to describe the different atomic models and Stern and Gerlach Experiment.
3. After studied unit-3, the student will be able to explain binding energy, liquid drop model, G.M counter and particle accelerators.
4. After studied unit-4, the student will be able to know the conversion of number systems from one to other and also will be able to design universal gates using NAND and NOR gates.
5. After studied unit-5, the student will be able to understanding the basics of nanomaterial, synthesis and its applications.

ALLIED PRACTICAL- PHYSICS

List of Experiments (Any 12 Experiments only)

1. Determination of 'g' using Compound pendulum.
2. Young's modulus-Non-Uniform bending-Pin & microscope
3. Rigidity Modulus – Torsional oscillation method (without masses).
4. Rigidity Modulus – Static Torsion method using Scale and Telescope.
5. Surface tension and Interfacial Surface tension by Drop Weight method.
6. Sonometer – Frequency of a Tuning fork.
7. Sonometer –Determination of A.C. frequency- using steel and brass wire
8. Air Wedge – Determination of thickness of a thin wire
9. Newton's Rings – Radius of Curvature of a convex lens.
10. Spectrometer – Refractive index of a liquid – Hollow prism.
11. Spectrometer grating – Minimum Deviation- Wavelength of Mercury lines.
12. Potentiometer – Calibration of Low range voltmeter.
13. Deflection magnetometer and Vibration magnetometer-Tan C Position-Determination of m and B_H.
14. Figure of merit- Table galvanometer.
15. Construction of AND, OR gates using diodes and NOT gate using a transistor.
16. NAND/NOR as universal gate.
17. Half adder and Full adder using NAND gate.
18. Half subtractor and Full subtractor using NAND gate.
19. Lasers: Study of laser beam parameters.
20. Measurement of Numerical aperture (NA) of a telecommunication graded index optic fiber.
21. Fiber attenuation of a given optical fiber.

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai,2018.

2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Dr. S. Somasundaram, Practical Physics, Apsarapublications,Tiruchirapalli, 2012.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

ALLIED -2
PAPER - 2

STATISTICAL METHODS AND THEIR APPLICATIONS XXIIII

Objective

To understand and computing statistical Methods by which to develop the programming Skills.

UNIT-I

Curve fitting by the methods of least squares -
$Y = a x + b$, $Y = a x^2 + b x + c$, $Y = a x^b$, $Y = a e^{bx}$ and $Y = ab^x$

UNIT-II

Sample Space - events - probability - Addition and Multiplication Theorem - conditional probability -Baye's Theorem. Mathematical expectation Addition and Multiplication theorem, Chebychev's Inequality.

UNIT-III

Standard distributions - Binomial, Poisson, Normal distribution and fitting of these distributions.

UNIT-IV

Test of Significance- small sample and large sample test based on mean, S.D. correlation and proportion - confidence interval.

UNIT-V

Analysis of variance - One and Two way classifications - Basic principle of design of Experiments - Randomisation, Replication and Local control - C.R.D., R.B.D. and L.S.D.

Books for Reference:

1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Fundamental of Applied Statistics - S.C. Gupta & V.K. Kapoor – Sultan Chand
3. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII
4. Elements of Statistics - Mode . E.B. – Prentice Hall

ALLIED PRACTICAL

STATISTICAL METHODS AND THEIR APPLICATIONS - Practical

1. Formation of uni-variate and bi-variate frequency distribution
2. Diagrams and Graphs
3. Measures of Location
4. Measures of Dispersion
5. Skewness and Kurtosis
6. Correlation and Regression
7. Curve Fitting : $y = ax+b$, $y=ax^2+bx+c$, $y=ax^b$, $y=ae^{bx}$
8. Fitting of distributions - Binomial, Poisson, Normal
9. Test of significance small sample and large sample tests
10. Analysis of Variance: one way classification, Two way classification and Design of Experiments - C.R.D, R.B.D & L.S.D

BOOKS FOR REFERENCE:

1. Statistical Methods by S.P. Gupta, Sultan chand & Sons
2. Fundamental of Applied Statistics - S.C. Gupta & V.K. Kapoor

Note:

Use of Scientific Calculator shall be permitted for Practical Examination. Statistical Table may be provided to the students at the Examination Hall.

SKILL BASED SUBJECT
PAPER-2
WIRELESS DATA COMMUNICATION

Objectives:

- ✓ This course introduces the concepts and theories of networking
- ✓ To applies them to various situations, classifying networks, analyzing performance and implementing new technologies.
- ✓ To implement the various new wireless technologies.
- ✓ To implement the various TCP/IP protocols.
- ✓ To implement the various security threads.

UNIT-1 BASIC CONCEPTS OF OSI LAYERS 9 Hours

Data Communication – Networks – Protocol and Standards – Line Configuration – Topology – Transmission Modes – Categories of Networks – Internetworks- OSI Models – Functions of OSI Layers.

UNIT-II SIGNALS AND TRANSMISSION MEDIA 9 Hours

Analog and digital – Periodic and Non Periodic signals – Analog Signals – Time And Frequency Domain - Composite Signals- Digital signals – Guided Media – UnGuided Media – Transmission Impairment – Performance.

UNIT-III ERROR DETECTION, CORRECTION AND DATA LINK CONTROL 9 Hours

Type of errors –Detection-Vertical Redundancy Check (VRC) -Longitudinal Redundancy Check (LRC) Cyclic Redundancy Check (CRC) – check sum – Error Corrections – Flow Control – Error Control.)**SWITCHING & NETWORK DEVICES:** Circuit Switching-Packet Switching-Message Switching Repeaters-Bridges-Routers-Gateways-other Devices - Routing Algorithms-Distance Vectors Routing- Link State Routing.

UNIT- IV: WIRELESS NETWORKS 9 Hours

Wireless LAN: Advantages and Disadvantages-Infrared Vs Radio Transmission – Infrastructure Networks- Ad hoc Networks – Bluetooth- Wireless ATM: Working GroupServices- Reference Model – Functions – Radio Access Layer – Handover-Handover reference model- Requirements and Types.

UNIT-V TCP/IP PROTOCOL SUITE: PART I, PROTOCOLS & NETWORK SECURITY 9 Hours

Overview Of TCP/IP – Network Layer – Addressing – Subnetting – Other Protocols In The Network Layer – Transport Layer – Client/Server Model – BootStrap Protocol and DHCP - Domain Name System (DNS) – Tel Net –File Transmission Protocol (FTP)

– Simple Mail Transfer Protocol (SMTP) – SNMP Protocol – Hyper Text Transmission Protocol (HTTP) – World Wide Web (WWW) –Four Aspects of Security – Privacy – Digital Signature – PGP – Access Authorization.

Text Book:

1. Data Communication and Networking 2nd Edition Behrouz A. Forouzan, McGraw Hill Education 2014.
2. Stojmenovic and Cacute, Handbook of Wireless Networks and Mobile Computing, Wiley, 2002, ISBN 0471419028.

Reference Books:

1. Data and Communication Network, William Stalling PHI 2014.

2. Computer Networks, Andrew S. Tanenbaum , David J. Wetherall, 5th Edition,Prentice Hall. 2010

E REFERENCES

1. http://nptel.ac.in/video.php?subjectId=117102062

Course Outcomes:

- To understand the concepts of basic OSI layers.
- To understand the concepts of signals and transmission media.
- To understand the basic concepts of error detection and DLC
- To understand the Characterize of wireless transmission technologies
- To understand the concepts of Security.

NON-MAJOR ELECTIVE

PAPER-2

INTERNET TECHNOLOGY

OBJECTIVS

The subject aims to build the concepts regarding:

- Fundamentals of Internet, Connectivity and its Resource Requirements.
- To understand the Internet Technology and its applications
- To Understand WWW and Web Browsers.
- Mailing system and applications of Internet.
- To Understand relay chat

UNIT-I

Introduction to internet: What is Internet? Evolution and History of Internet- Growth of Internet-Owners of Internet- Internet Services- How does the Internet Works?-Anatomy of Internet-Internet Addressing-Internet vs Intranet-Impact of Internet- Governance of Internet.

UNIT-II

Internet Technology and Protocol: ISO-OSI Reference Model-**Internet Connectivity:** Getting Connected- Different Types of Connections- Levels of Internet Connectivity- Internet Service Provider. **Internet Tools and Multimedia:** Current Trends on Internet-Multimedia and Animation.

UNIT-III

WWW and Web Browser: WWW-Evolution of Web-Basic Elements of WWW-Web Browsers- Search Engines- Search Criteria. **Web Publishing:** Web Publishing- Web Page Design.

UNIT-IV

Email: E-Mail Basics- E-Mail System-E-Mail Protocol-E-Mail Addresses-Structure of an E-Mail Message-E-Mail Clients&Servers-MailingList-E-MailSecurity.

UNIT-V

Usenet and Internet Relay Chat: What is Usenet?-Newsgroup Hierarchies-What is a Newsreader?- How do you Read Newsgroups?- Who Administers Usenet?- Common News reading Tasks- How to Read Articles from Network News?- Relationship between Netnews and E-Mail-What is IRC?-Channels-Nicknames- Microsoft NetMeeting. **Internet and Web Security**: Overview of Internet Security-
Aspects and Need of Security-E-Mail Threats and Secure E-mail-Web Security and Privacy Concepts-Firewall.

TEXTBOOK:

1. *ISRD Group*. 2012. **Internet Technology andWebDesign.** [Fourth reprint]. Tata McGraw-HillEducationPrivateLimited., New Delhi.

REFERENCE BOOKS:

1. *Deitel,H.M Dietel,P.J.andGoldbergA.B*.2008.**Internet&Worldwide Web- How toProgram.**[Third Edition].PHL,New Delhi.
2. *Comdex.*2000.**Teachyourselfcomputersandtheinternetvisually**.[First Edition]. IDGBookIndia (p)Ltd.
3. *Ramachandran,T.M.Nambissan*.2003.**AnOverviewofinternetandweb development**. [FirstEdition].T M-Dhruv Publications.

COURSE OUT COMES :

- Students understand the Fundamentals of Internet, Connectivity and its Resource Requirements.
- Students understand the Internet Technology and its applications
- Students Understand the basis of WWW and Web Browsers.
- Students learn how to Mailing system and applications of Internet.
- Students Understand relay chat that is how to read e- contents.

SEMESTER V

CORE PAPER - 5

MOBILE APPLICATIONS DEVELOPMENT

Objectives:

This course aims to provide the students with a detailed knowledge on Mobile Application Development and Deployment about Android programming from basics to building mobile applications for digital world.

UNIT I: INTRODUCTION TO ANDROID PLATFORM

Objective: To understand the basics of smart phones and android platforms**.**

Introduction to Mobile Application Development – Various platforms – Smart phones – Android platform: features – Architecture – Versions – ART (Android Runtime) – ADB (Android Debug Bridge) – Development environment/IDE: Android studio and its working environment – Emulator setup – Application framework basics – XML representation and Android manifest file – Creating a simple application.

UNIT II: ANDROID UI DESIGN

Objective: To understand the basic concepts of user interface related to app development.

GUI for Android: activities lifecycle – Android v7 support library – Intent: Intent object – Intent filters – Adding categories – Linking activities – User Interface design components – Basic Views – Picker Views – List View – Specialized Fragment – Gallery and Image View – Image Switcher – Grid View, Options Menu – Context Menu – Clock View –Web view – Recycler View.

UNIT III: DATA PERSISTENCE

Objective: To understand the important of data persistence in mobile environment.

Different Data Persistence schemes: Shared preferences – File Handling – Managing data using SQLite database – Content providers: user content provider – Android in build content providers.

UNIT IV: ANDROID SERVICES & NETWORK ENVIRONMENT

Objective: To understand the various services and network facilities provided by android platform.

Services: Introduction to services – Local service – Remote service – Binding the service –Communication between service and activity – Intent Service – Multi–Threading: Handlers – AsyncTask– Android network programming: HttpUrlConnection– Connecting to REST–based – SOAP based Web services – Broad cast receivers: LocalBroadcastManager– Dynamic broadcast receiver – System Broadcast – Telephony Manager: Sending SMS and making calls.

UNIT V: ADVANCED APPLICATIONS

Objective: To understand the various apps deployed and developed on by mobile platform.

Location based services: Google maps V2 services using Google API – Animations and Graphics: Property Animation – View Animations –Drawable Animations – Media and Camera API: Working with video and audio inputs – camera API – Sensor programming: Motion sensors – Position sensors – Environmental sensors – Publishing Android Apps: Guide lines – policies and process of uploading Apps to Google play.

TEXT BOOKS:

1. "Head First: Android Development", Dawn Griffiths, David Griffiths, OReilly, 1st Edition, 2015.
2. Barry Burd, "Android Application Development – All–in–one for Dummies", 2nd Edition, Wiley India, 2016.

REFERENCES:

1. "Professional Android™ Sensor Programming", Greg Milette,Adam Stroud, John Wiley and Sons, Inc 2012.
2. "Android 6 for Programmers, App Driven approach", Paul Deital, Harvey Deital, Alexander Wald, Prentice Hall, 2015.

CORE PAPER - 6

OPERATING SYSTEM

Objectives:

Enable the student to get sufficient knowledge on concepts, functions and various system resources of operating systems.

UNIT I: OPERATING SYSTEM BASICS

Objective: To understand the structure and functions of operating systems.

Basic Concepts of Operating System – Services of Operating System – Operating System Types – Computer System Operation – I/O Structure – Storage Structure – Memory Hierarchy – System Components – System Calls – System Programs – System Design and Implementation – Introduction to Process – Process State – Process Control Block – Process Scheduling – Operations on Process – Interprocess Communication – Communication in Client/Server Systems – Threads.

UNIT II: CPU SCHEDULING ALGORITHM AND PREVENTION

Objective: To understand the principles of scheduler, scheduler algorithms and Deadlock.

Introduction –Types of CPU Scheduler – Scheduling Criteria – Scheduling Algorithms – Semaphores – Classic Problems of Synchronization – Basic Concept of Deadlocks – Deadlock Characterization – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery of Deadlock.

UNIT III: STORAGE MANAGEMENT

Objective: To learn various memory management schemes.

Memory Management – Basics Concept of Memory – Address Binding – Logical and Physical Address Space – Memory Partitioning – Memory Allocation – Paging – Segmentation – Segmentation and Paging – Protection – Fragmentation – Compaction – Demand Paging – Page Replacement Algorithm – Classification of Page Replacement Algorithm .

UNIT IV: I/O SYSTEMS

Objective: To study I/O management, File system and Mass Storage Structure .

File System Storage – File Concept– File Access Methods – Directory Structure – File Sharing – File Protection – File System Implementation – File System Structure –

Allocation Methods – Free Space Management – Mass Storage Structure – Disk structure – Disk Scheduling and Management – RAID Levels.

UNIT V: CASE STUDIES

Objective: To learn the basics of UNIX, LINUX systems and perform administrative tasks on LINUX servers.

UNIX System – A Case Study – LINUX System – Case Study – Design Principles – Process Management – Scheduling – Memory Management – File Systems – Security .

TEXT BOOKS:

1. "Operating System Concepts" –Abraham Silberschatz Peter B. Galvin, G. Gagne, Sixth Edition, Addison Wesley Publishing Co., 2003.
2. "Operating System" – William Stalling, Fourth Edition, Pearson Education,2003.

REFERENCES:

1. "Operating systems – Internals and Design Principles", W. Stallings, 6th Edition, Pearson.
2. "Modern Operating Systems", Andrew S.Tanenbaum, Second Edition, Addison WesleyPublishing Co., 2001.
3. "Fundamentals of Operating System", Prof. R. Sriddhar, Dynaram Publication, Bangalore Company.

CORE PAPER - 7

DESIGN AND ANALYSIS OF ALGORITHMS

Objectives:

The objective of the course is to teach techniques for effective problem solving in computing. The use of different paradigms of problem solving will be used to illustrate clever and efficient ways to solve a given problem. In each case emphasis will be placed on rigorously proving correctness of the algorithm.

UNIT –I: ALGORITHM AND ANALYSIS

Objective: Understanding various algorithm design techniques.
Elementary Data Structures: Stack – Queues – Trees – Priority Queue – Graphs – What is an Algorithm? – Algorithm Specification – Performance Analysis: Space Complexity – Time Complexity – Asymptotic Notation – Randomized Algorithms.

UNIT – II: DIVIDE AND CONQUER

Objective: This technique is the basis of efficient algorithms for all kinds of problems**.**

General Method – Binary Search – Recurrence Equation for Divide and Conquer – Finding the Maximum and Minimum—– Merge Sort – Quick Sort – Performance Measurement – Randomized Sorting Algorithm – Selection Sort – A Worst Case Optimal Algorithm – Implementation of Select2 – Stassen's Matrix Multiplications.

UNIT – III: THE GREEDY METHOD

Objective: This is a simple approach which tries to find the best solution at every step.

The General Method – Container Loading – Knapsack Problem – Tree Vertex Splitting – Job Sequencing with Deadlines – Minimum Cost Spanning Trees – Prim's Algorithm – Kruskal's Algorithm – An optimal Randomized Algorithm – Optimal Storage on Tapes – Optimal Merge Pattern – Single Source Shortest Paths.

UNIT – IV: DYNAMIC POGRAMMING, TRAVERSAL & SEARCHING

Objective: Providing a general insight into the dynamic programming approach.

The General Method – Multistage Graphs – All Pair Shortest Path – Optimal Binary Search Trees – String Editing – 0/1 Knapsack – Reliability Design – The Traveling Salesperson Problem. Techniques for Binary Trees – Techniques for Graphs – BFS – DFS.

UNIT – V: BACKTRACKING & BRANCH AND BOUND

Objective: Algorithm design paradigm for discrete and combinatorial optimization problems.

The General Method – The 8– Queens Problem – Sum of Subsets– Graph Coloring – Hamiltonian Cycles – Branch and Bound: General Method – LC Branch and Bound – FIFO Branch and Bound.

TEXT BOOKS:

1. "Fundamentals of Computer Algorithms", Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Galgotia Publications, Second Edition 2015.
2. "Introduction to Algorithms", Coremen T.H., Leiserson C.E. and Rivest R.L., PHI Publications, Third Edition, 1998.

REFERENCES:

1. "Introduction to the Design and Analysis of Algorithms", AnanyLevitin, Pearson Education, 2nd Edition.
2. "Introduction to Algorithms" Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, Prentice Hall of India, New Delhi, Second Edition, 2007.
3. "Computer Algorithms – Introduction to Design & Analysis" Sara Baase and Allen Van Gelder, Pearson Education New Delhi, Third Edition, 2000.

CORE PRACTICAL - 5

MOBILE APPLICATIONS DEVELOPMENT LAB

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Intent and Activity.
3. Develop an application that uses Layout Managers and event listeners.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of RSS Feed.
6. Implement an application that implements Multi-threading.
7. Develop an application that create alarm clock.
8. Develop an application Using Widgets.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Develop an application that makes use of database.

CORE PRACTICAL - 6

OPERATING SYSTEM LAB

1. Basics of UNIX commands.
2. Shell Programming.
3. Implement the following CPU scheduling algorithms

   a) Round Robin b) SJF c) FCFS d) Priority
4. Implement all file allocation strategies

   a) Sequential b) Indexed c) Linked
5. Implement Semaphores
6. Implement all File Organization Techniques

   a) Single level directory b) Two level c) Hierarchical d) DAG
7. Implement Bankers Algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement e all page replacement algorithms

   a) FIFO b) LRU c) LFU
10. Implement Shared memory and IPC
11. Implement Paging Technique of memory management.
12. Implement Threading & Synchronization Applications.

INTERNAL ELECTIVE
PAPER-1
(to choose one out of 3)
A. DATA MINING

Objectives:

To enable the students to understand the importance of Data Mining and its techniques with recent trends and tools.

UNIT I: DATA MINING BASICS

Objective: To understand about the basics of Data Mining and Data

What is Data Mining– Kinds of Data – Kinds of patterns – Technologies used for Data Mining– Major Issues in Data Mining– Data –Data Objects and Attribute types– Data Visualization– Measuring Data Similarity and Dissimilarity–Data Preprocessing– overview– Data Cleaning– Data Integration– Data Reduction– Data Transformation and Data Discretization.

UNIT II: DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING

Objective: To understand about the methods of Data Warehousing

Data Warehouse– Basic concepts–Data Warehouse Modeling: Data Cube and OLAP– Data Warehouse Design and Usage– Data Warehouse Implementation– Data Generalization by Attribute–Oriented Induction– Data Cube Technology– Data Cube Computation Methods– Exploring Cube Technology–Multidimensional Data Analysis in cube space.

UNIT III: PATTERNS AND CLASSIFICATION

Objective: To understand about the techniques of Data Mining

Patterns– Basic concepts– Pattern Evaluation Methods–Pattern Mining: Pattern Mining in Multilevel– Multidimensional space–Constraint–Based Frequent Pattern Mining– Mining High Dimensional Data and Colossal patterns– Mining compressed or Approximate patterns– Pattern Exploration and Application. Classification– Decision tree Induction– Bayes Classification methods– Rule based Classification– Model Evaluation and selection– Techniques to Improve Classification Accuracy– Other Classification methods.

UNIT IV: CLUSTERING AND OUTLIER DETECTION

Objective: To understand about the importance of Cluster and outlier detection

Cluster Analysis– Partitioning Methods–Hierarchical Methods–Density–Based Methods– Grid–Based Methods – Evaluation of Clustering.– Clustering High – Dimensional Data–Clustering Graph and Network Data – Clustering with Constraints–Web Mining– Spatial Mining. Outlier Detection – Outliers and Outliers Analysis–Outlier Detection Methods–Outlier Approaches–Statistical–Proximity–Based– Clustering–Based– Classification Based – High–Dimensional Data.

UNIT V: RECENT TRENDS IN DATA MINING AND TOOLS

Objective: To improve the student's knowledge with recent trends and tools

Other Methodologies of Data Mining –Data Mining Applications–Data Mining Trends– Recent Data Mining Tools–Rapid miner–Orange–Weka–Knime–Sisense–Ssdt (SQL Server Data Tools)–Oracle–Rattle–Data melt–Apache Mahout.

TEXT BOOKS:

1. "Data Warehousing Fundamentals", PaulrajPonnaiah, Wiley Publishers, 2001.

2. "Data Mining: Concepts and Techniques", Jiawei Han, MichelineKamber, Morgan Kaufman Publishers, 2006.

3. "Introduction to Data mining with case studies", G.K. Gupta, PHI Private limited, New Delhi, 2008. 2nd Edition, PHI, 2011

REFERENCES:

1. "Advances in Knowledge Discover and Data Mining", Usama M. Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth RamasamyUthurusamy, the M.I.T. Press, 2007.
2. "The Data Warehouse Toolkit", Ralph Kimball, Margy Ross, John Wiley and Sons Inc., 2002
3. "Building Data Mining Applications for CRM", Alex Berson, Stephen Smith, Kurt Thearling, Tata McGraw Hill, 2000.
4. "Data Mining: Introductory and Advanced Topics", Margaret Dunham, Prentice Hall, 2002.
5. "Discovering Knowledge in Data: An Introduction to Data Mining", Daniel T. Larose John Wiley & Sons, Hoboken, New Jersey, 2004

INTERNAL ELECTIVE
PAPER-1
B. INFORMATION SECURITY

Objectives:

To enable the student to understand various methodologies available for securing information.

UNIT I: INFORMATION SECURITY BASICS

Objective: To understand the basic concepts of Information Security

Introduction – History – What is Information Security?– Critical Characteristics of Information– NSTISSC Security Model– Components of an Information System– Securing the Components– Balancing Security and Access– The SDLC– The Security SDLC.

UNIT II SECURITY INVESTIGATION

Objective: To understand the legal, ethical and professional issues in Information Security

Security– Business Needs– Threats– Attacks– Legal– Ethical and Professional Issues– Relevant U.S. Laws – International Laws and Legal Bodies – Ethics and Information Security – Codes of Ethics and Professional Organizations

UNIT III SECURITY ANALYSIS

Objective: To know about risk management

Risk Management – Introduction – An Overview of Risk Management – Risk Identification – Risk Assessment – Risk Control Strategies – Selecting a Risk Control Strategy – Quantitative versus Qualitative Risk Control Practices – Risk Management Discussion Points

UNIT IV SECURITY MODELS

Objective: To understand the technological aspects of Information Security

LOGICAL DESIGN– Blueprint for Security– Information Security Policy – Standards and Practices– ISO 17799/BS 7799– NIST Models– VISA International Security Model– Design of Security Architecture– Planning for Continuity – Security Physical Design –Firewalls –Security Technology– IDS–IPS–Honey Pots– Honey Nets–Padded cell Systems Scanning and Analysis Tools–Access Control Devices.

UNIT V: CRYPTOGRAPHY AND ETHICAL HACKING

Objective: To understand the concepts of Cryptography and Hacking methods

Cipher methods– Cryptographic Algorithms and Tools–Attacks on Cryptosystems– Hacking– Effects of Hacking– Hacker – Types of Hacker– Ethical Hacker–Hacktivism– Networking & Computer Attacks – Malicious Software (Malware) – Protection Against Malware– Intruder Attacks on Networks and Computers – Wireless Hacking– Windows Hacking– Linux Hacking Session.

TEXT BOOKS:

1. "Principles of Information Security", Michael E Whitman and Herbert J Mattord, 5th Edition, Vikas Publishing House, New Delhi, 2003.
2. "Fundamentals of Information Systems Security", David Kim,MichaelG.Solomon, 3rd Edition ,Jones & Bartlett Learning, October 2016.
3. "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", Patrick Engebretson, 2nd Edition, Syngress Basics Series – Elsevier, 2011.
4. "Hands-On Ethical Hacking and Network Defense", Michael T. Simpson, Kent Backman, James E. Corley, Second Edition, CENGAGE Learning, 2010.

REFERENCES:

1. "Handbook of Information Security Management", Micki Krause, Harold F. Tipton, sixth Edition, CRC Press LLC, 2004.
2. "Hacking Exposed", Stuart McClure, Joel Scrambray, George Kurtz, Tata McGraw–Hill, 2003.
3. "Computer Security Art and Science", Matt Bishop, 2ndEdition , Pearson/PHI, 2002.

INTERNAL ELECTIVE
PAPER-1
C. SOFTWARE TESTING

Objectives:

To study the concepts of software engineering with the aim of acquiring skills to develop Software applications, following all standardized procedures and techniques.

UNIT I: INTRODUCTION TO SOFTWARE TESTING

Objective: To understand the concept of software testing, and software quality

Fundamentals of software testing – need for software testing– Psychology of testing – various approaches – characteristics of testing – principles of testing – testing strategies – verification and validation – Defect and Prevention strategies.

UNIT II: SOFTWARE DEVELOPMENT MODEL AND TESTING

Objective: To learn to inspect and detect errors by going through each and every code segment

Water fall model– V–model– Spiral model– Agile model – Life cycle of testing– Static Testing – dynamic testing – White box testing – Block box testing – Regression testing – Integration Testing – System and Performance Testing – Usability Testing

UNIT III: FUNCTIONAL AND STRUCTURAL TESTING

Objective: To gain knowledge of various functional and structural testing techniques

Boundary Value Analysis – Equivalence Class Testing – Decision Table – Based Testing – Cause Effect Graphing Technique – Path testing –Cyclomatic Complexity – Graph Metrics – Data Flow Testing – Slice based testing

UNIT IV: TEST MANAGEMENT AND TOOLS

Objective: To understand basic concept of Software Management tools and object oriented testing

Test planning – cost–benefit analysis of testing – monitoring and control–Test reporting –Test control – Specialized testing – Object Oriented Testing – Automated Tools for Testing – Tool Selection and Implementation – Challenges in test

automation – GUI Testing

UNIT V: SOFTWARE QUALITY AND SOFTWARE QUALITY ASSURANCE

Objective: To understand basic concept of Software quality and software quality assurance

Introduction to software quality and software quality assurance – basic principles about the software quality and software quality assurance – Planning for SQA – various models for software product quality and process quality – SCM – RAD – System Documentation

TEXT BOOKS:

1. "Software Testing– A Craftsman's Approach" – Paul C. Jorgensen – Second Edition – CRC Press 2008
2. "Software Testing", – Ron Patton, Second Edition –Sams Publishing, Pearson Education, 2007.
3. "Software Testing– A Craftsman's Approach" – Paul C. Jorgensen, Second Edition – CRC Press, 2008

REFERENCES:

1. "Software Testing and Analysis: Process, Principles and Techniques" – Mauro Pezze, Michal Young – Wiley India , 2008
2. "Software Engineering" – K.K. Aggarwal&Yogesh Singh – New Age International Publishers – New Delhi, 2003.
3. "Software Testing – Principles and Practices" –SrinivasanDesikan and Gopalaswamy Ramesh, Pearson Education, 2006.

SKILL BASED SUBJECT

PAPER-3

SOFTWARE ENGINEERING

Objectives:

This course is intended to provide the students with an overall view over Software Engineering discipline and with insight into the processes of software development.

UNIT–I: INTRODUCTION TO EVOLVING SOFTWARE

Objective: Introduces the concepts and methods required for the construction of large software intensive systems.

Evolving Role of Software – Nature of Software – Software Engineering – The Software Process– Software Engineering Practices – Software Myths – A Generic View of Process Model – Process Assessment and Improvement – Process Models : Waterfall Model – Incremental Process Models – Evolutionary Process Models – Concurrent Models.

UNIT–II: REQUIREMENTS ENGINEERING

Objective: Gets the idea of choosing the Requirements in Software Engineering.

Requirements Engineering: Establishing the Groundwork – Initiating the Requirements Engineering Process – Eliciting Requirements – Collaborative Requirements Gathering – Quality Function Deployment – Usage Scenarios – Elicitation work Products – Building the Requirements Model – Elements of Requirements Model – Analysis Pattern – Requirements Analysis – Data Modeling Concepts.

UNIT–III: DATA ENGINEERING

Objective: Gives an understanding the concept of Data Engineering.

Data Engineering: Design Process and Design Quality – Design Concepts – The Design Model– Creating an Architectural Design – Software Architecture – Data Design – Architectural style – Architectural Design – Architectural Mapping Using Data Flow – Performing User Interface Design – Golden Rules.

UNIT–IV: TESTING STRATEGIES

Objective: To impart knowledge on Testing and Debugging.

Testing Strategies: Strategic Approach to Software Testing – Strategic Issues – Test

Strategies for Conventional and Object Oriented Software – Validation Testing – System Testing – Art of Debugging. Software Testing Fundamentals – White Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing – Model Based Testing.

UNIT–V: PROJECT MANAGEMENT

Objective: To enable the students to learn the basic of Project Management & Scheduling.

Project Management: Management Spectrum – People – Product – Process – Project – Critical Practices – Estimation: Project Planning Process – Software Scope and Feasibility – Resources – Software Project Estimation – Project Scheduling – Quality Concepts – Software Quality Assurance – Elements of Software Quality Assurance – Formal Technical Reviews.

TEXT BOOKS:

1. ”Software Engineering – A Practitioner’s Approach”, Roger S Pressman, McGraw Hill International Edition, New York: 2005, Seventh Edition

2. ” Software Engineering”, Mall Rajib, PHI Learning, 2009, 3 Third Edition.

REFERENCES:

1. “Software Engineering”, Ian Somerville, Pearson Education, 2006, 7th Edition.

2. “Software Engineering Concepts” Richard Fairley, Tata McGraw–Hill Education, 2011.

3. “Software Engineering: Theory and Practice “, Pfleeger and Lawrence, Pearson Education, 2001, Second Edition.

SEMESTER VI

CORE PAPER - 8

OPEN SOURCE SOFTWARE

Objectives:

To study the concepts of open source techniques that can be effectively applied in practice about HTML5, JavaScript, PHP, and PERL.

UNIT I: INTRODUCTION TO HTML, CSS

Objective: To understand the concept of HTML, HTML5 and CSS.

Need of Open Source –Advantages of Open source –Application of Open Source – HTML – HTML tags –Dynamic Web content– HTTP Request and Response Procedure–Introduction to HTML5– HTML5 Canvas – HTML5 Audio and Video– Introduction to CSS – CSS Rules –Style Types – CSS Selectors– CSS Colors.

UNIT II: LINUX

Objective: To learn to inspect and detect errors by going through each and every code segment.

Introduction: Linux Essential Commands – Kernel Mode and user mode –File system Concept – Standard Files – The Linux Security Model – Vi Editor – Partitions Creation – Shell Introduction – String Processing – Investigation and Managing Processes – Network Clients – Installing Application.

UNIT III:JAVA SCRIPT AND MYSQL

Objective: To understand basic concept of Java Script and MySQL.

Java script :Advantages of JavaScript –JavaScript Syntax–Data type– Variable– Array – Operators and Expressions– Loops – functions – Dialog box– MySQL – The show Databases and Table – The USE command –Create Database and Tables – Describe Table – Select, Insert, Update, and Delete statement.

UNIT IV: PHP

Objective: To understand basic concept of PHP

PHP Introduction – General Syntactic Characteristics – PHP Scripting – Commenting your code – Primitives, Operations and Expressions – PHP

Variables – Operations and Expressions Control Statement – Array – Functions – Basic Form Processing – File and Folder Access – Cooking – Sessions – Database Access with PHO.

UNIT V: PERL

Objective: To understand basic concept of PERL

PERL : Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines, Packages, and Modules– Working with Files – Data Manipulation.

TEXT BOOKS:

1. "The Complete Reference Linux", Peterson, Tata McGraw HILL–2010

2. "Perl: The Complete Reference", Martin C. Brown, Tata McGraw Hill Publishing Company Limited, Indian Reprint 2009.
3. "MYSQL: The Complete Reference", VikramVaswani, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009
4. "PHP: The Complete Reference", Steven Holzner, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009.
5. "Complete Reference HTML", T. A. Powell, 3rd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2002.
6. "Mastering Java script" – J. Jaworski, BPB Publications, 1999

REFERENCES:

1. "Fundamentals of Open Source Software", by M.N. Rao, PHI publishers.
2. "MySQL Bible", Steve Suchring, John Wiley, 2002
3. "The Linux Kernel Book", Remy Card, Eric Dumas and Frank Mevel, Wiley Publications, 2003
4. Ivan Byross, HTML, DHTML, Javascript, Perl, BPB Publication

CORE PAPER - 9

PYTHON PROGRAMMING

UNIT I:

Identifiers – Keywords - Statements and Expressions – Variables – Operators – Arithmetic operators – Assignment operators – Comparison operators – Logical operators – Bitwise operators - Precedence and Associativity – Data types - Number – Booleans – Strings - Indentation – Comments – Single line comment – Multiline comments - Reading Input – Print Output – Type Conversions – int function – float function – str() function – chr() function – complex() function – ord() function – hex() function – oct() function - type() function and Is operator – Dynamic and Strongly typed language.

UNIT II:

Control Flow Statements – If statement – If else statement – If elif else statement – nested if statement - while loop – for loop – continue and break statements – catching exceptions using try and except statement – syntax errors – exceptions – exception handling – Strings – str() function - Basic string operations – String comparison – Built in functions using strings – Accessing characters in string – String slicing – String joining – split() method – string traversing.

UNIT III:

Functions – Built in functions – function definition and calling - return statement – void function – scope and lifetime of variables – args and kwargs – command line arguments - Tuples – creation – basic tuple operations – tuple() function – indexing – slicing – built-in functions used on tuples – tuple methods – packing – unpacking – traversing of tuples – populating tuples – zip() function - Sets – Traversing of sets – set methods – frozenset.

UNIT IV:

Lists: Using List- List Assignment and Equivalence – List Bounds- Slicing - Lists and Functions- Prime Generation with a List.List Processing: Sorting-Flexible Sorting-Search- List Permutations- Randomly Permuting a List- Reversing a List.

UNIT V:

Objects: Using Objects- String Objects- List Objects. Custom Types: Geometric Points- Methods- Custom Type Examples- Class Inheritance. Handling Exceptions: Motivation- Exception Examples- Using Exceptions - Custom Exceptions.

TEXT BOOKS:

1. Gowrishankar S, Veena A, "Introduction to Python programming", 1st Edition, CRC Press/Taylor & Francis, 2008. (Units 1-3)
2. Learn to Program with Python, 3th Edition, Richard L. Halterman, Southern Adventist University. (Units 4-5)

REFERENCE BOOKS:

1. Core Python Programming, 2thEdition, Wesley J. Chun, Prentice Hall.
2. Jake VanderPlas,"Python Data Science Handbook:Essential Tools for working with Data",1st edition, O'Reilly Media, 2016.

CORE PRACTICAL - 7

PYTHON PROGRAMMING LAB

Write a Python program to find the area and perimeter of a circle.

1. Write a Python program to generate Fibonacci series.
2. Write a Python program to compute the GCD of two numbers.
3. Write a Python program to generate first n prime numbers.
4. Write a Python program to find the sum of squares of n natural numbers.
5. Write a Python program to find the sum of the elements in an array.
6. Write a Python program to find the largest element in the array.
7. Write a Python program to check if the given string is a palindrome or not.
8. Write a Python program to store strings in a list and print them.
9. Write a Python program to find the length of a list, reverse it, copy it and then clear it.

CORE PRACTICAL - 8

OPEN SOURCE SOFTWARE LAB

1. Create a web page with Frames and Tables.
2. Create a web page incorporating CSS (Cascading Style Sheets).
3. Write a shell program to find the factorial of an integer positive number.
4. Write a shell program to find the details of a user session.
5. Create a simple calculator in JavaScript.
6. Write a JavaScript program to scroll your name in the scrollbar.
7. Develop a program and check message passing mechanism between pages.
8. Application for Email Registration and Login using PHP and MySQL.
9. Program to Create a File and write the Data into it using PHP.
10. Program to perform the String Operation using Perl.

INTERNAL ELECTIVE

PAPER -2

(to choose one out of 3)

A. BIG DATA ANALYTICS

Objectives:

- To explore the fundamental concepts of big data analytics.
- To learn to analyze the big data using intelligent techniques and mining data stream.
- To understand the applications using Map Reduce Concepts.

UNIT–I: INTRODUCTION TO BIG DATA

Objective: To explore the fundamental concepts of big data analytics.

Introduction to big data: Introduction to Big Data Platform – Challenges of Conventional Systems – Intelligent data analysis – Nature of Data –.Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data – Volume, Velocity, Variety – Other Characteristics of Data – Need for Big Data– Analytic Processes and Tools – Analysis vs. Reporting.

UNIT–II: MINING DATA STREAMS

Objective:To learn to use various techniques for mining data stream.

Mining data streams: Introduction To Streams Concepts – Stream Data Model and Architecture – Stream Computing – Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) Applications – Case Studies – Real Time Sentiment Analysis– Stock Market Predictions.

UNIT III: BIG DATA FROM DIFFERENT PERSPECTIVES

Objective: To learn the Big data Business Perspective

Big data from business Perspective: Introduction of big data–Characteristics of big data–Data in the warehouse and data in Hadoop– Importance of Big data– Big data Use cases– Patterns for Big data deployment. Big data from Technology Perspective– Application Development in Hadoop–Getting your data in Hadoop.

UNIT –IV:HADOOP AND MAP REDUCE

Objective: To understand the applications using Map Reduce Concepts.

Hadoop: The Hadoop Distributed File System – Components of HadoopAnalysing the Data with Hadoop– Scaling Out–Hadoop Streaming– Design of HDFS–Java interfaces to HDFS Basics– Developing a Map Reduce Application–How Map Reduce Works–Anatomy of a Map Reduce Job run–Failures–Job Scheduling–Shuffle and Sort – Task execution – Map Reduce Types and Formats– Map Reduce Features– Hadoop environment.

UNIT – V: FRAMEWORKS

Objective:To introduce programming tools HIVE in Hadoop echo system.

Frameworks: Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive – fundamentals of HBase and ZooKeeper– IBM InfoSphereBigInsights and Streams.

TEXT BOOKS:

1. “Intelligent Data Analysis”, Michael Berthold, David J. Hand, Springer, 2007.
2. “Hadoop: The Definitive Guide “, Tom White Third Edition, Oreilly Media, 2012.

REFERENCES:

1. “Big Data and Analytics" SeemaAcharya, SubhasiniChellappan, Wiley 2015.
2. “Mining of Massive Datasets”,AnandRajaraman and Jeffrey David Ullman,CUP,2012.
3. “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data” .Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,McGrawHill Publishing, 2012.
4. “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, Bill Franks, John Wiley& sons, 2012.
5. “Making Sense of Data”, Glenn J. Myatt, John Wiley & Sons, 2007.

INTERNAL ELECTIVE

PAPER -2

B. CRYPTOGRAPHY

Objectives:

- Understand various Security practices and System security standards
- Understand different cryptographic operations
- Understand the various Authentication schemes to simulate different applications.

UNIT–I: COMPUTER AND NETWORK SECURITY

Objective: Understand OSI security architecture and classical encryption techniques**.**

Computer Security Concepts – OSI security architecture –Security trends – Security attacks – Security Services – Security Mechanisms – Fundamental Security Design Principles – Attack Surfaces and Attack Trees – Model for Network Security – Network Standards.

UNIT–II:SYMMETRIC CRYPTOGRAPHY

Objective: Understand the different cryptographic operations of symmetric cryptographic algorithm**s.**

Symmetric Cipher – Classical Encryption Technique – Symmetric Cipher Model – Substitution Techniques, Transposition Technique – Steganography – Block Cipher and the Data Encryption Standard – The Data Encryption Standard – Differential and Linear Cryptanalysis – Block Cipher Principles. Advanced Encryption Standard – AES Structure – AES Transformation Function.

UNIT–III: PUBLIC KEY CRYPTOGRAPHY

Objective: Understand the different cryptographic operations of Public key cryptographic algorithms.

Public Key Cryptography and RSA Principles– RSA Algorithm, Key Management and other Public Key Cryptosystems Key Management, Diffie–Hellman Key Exchange, Elliptic Curve Arithmetic – Elliptic Curve Cryptography – Psedorandom Number Generation**.**

UNIT –IV:HASH FUNCTIONS AND DIGITAL SIGNATURES

Objective: To make use of application protocols to design and manage a secure system.

Cryptographic Hash Functions – Application of Hash Functions – Two Simple Hash Functions – Secure Hash Algorithm(SHA) –Message Authentication Codes – Authentication requirement – Authentication function – MAC – HMAC – CMAC – Digital signature and authentication protocols – Digital Signature Standards –Digital Signatures Schemes– Digital Certificate – Key Management and Distribution.

UNIT – V: SECURITY APPLICATIONS

Objective: To learn the configuration and manage E–mail and WLAN Security.

Intrusion Detection System – Password Management – Introduction to Firewall – Firewall Generations– Web Security – Wireless network Security – Electronic Mail Security– Internet Mail Architecture–S/MIME – Pretty Good Privacy (PGP).

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TEXT BOOKS:

1. "Cryptography and Network security Principles and Practices",William Stallings,Pearson/PHI,Seventh Edition, 2017.
2. "CRYPTOGRAPHY & NETWORK SECURITY" – Principles and Practices, William Stallings, Pearson Education, Third Edition.

REFERENCES:

1. "Modern Cryptography Theory and Practice", Wenbo Mao, Pearson Education, 2004.
2. "Cryptography and Network Security ",BehourzForouzan, DebdeepMukhopadyay,Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2010.
3. "Quantum Cryptography and Secret–Key Distillation", Gilles van Assche, CambridgeUniversity Press, 2010.

INTERNAL ELECTIVE

PAPER -2

C. DIGITAL IMAGE PROCESSING

Objectives:

This course enables the student knowledge about various image processing concepts like enhancement, restoration, segmentation, compression and recognition.

UNIT I: FUNDAMENTALS

Objective: To know the basics of Digital image and techniques.

Introduction – Origin – Steps in Digital Image Processing – Components – Applications of DIP – Elements of Visual Perception – Light and Electro Magnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization – Images in Matlab– Pixels – Color models – Digital Image Processing in Multimedia.

UNIT II: IMAGE ENHANCEMENT

Objective: To understand various Image enhancement ideas.

Spatial Domain – Gray level transformations – Histogram Quantization – Histogram matching and processing – Basics of Spatial Filtering – Smoothing and Sharpening Spatial Filtering – Introduction to Fourier Series – Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal – Butterworth and Gaussian filters.

UNIT III: IMAGE RESTORATION AND SEGMENTATION

Objective: To understand Image restoration techniques.

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation– Active Contour Models – Snakes – Fuzzy Connectivity – Morphological processing– erosion and dilation.

UNIT IV: WAVELETS AND IMAGE COMPRESSION

Objective: To understand degrees of image resolution and compression methods.

Wavelets – Subband coding – Multi resolution expansions – Compression: Fundamentals – Image Compression models – Error Free Compression – Predictive Compression Methods – Vector Quantization – Variable Length Coding – Bit–Plane

Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.

UNIT V: IMAGE REPRESENTATION AND RECOGNITION

Objective: To understand concepts of image representation and recognition.

Knowledge Representation – Statistical Pattern Recognition – Neural Nets – Fuzzy Systems – Chain Code – Polygonal approximation, signature, boundary segments – Shape number – Fourier Descriptor moments– Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching.

TEXT BOOKS

1. "Digital Image Processing," Rafael C. Gonzalez, Richard E.Woods, Prentice Hall, Third Edition, 2008.
2. "Digital Image Processing and Computer Vision," Sonka, Hlavac, Boyle, Cengage Learning, 2009
3. “Fundamentals of Digital Image Processing”, Anil Jain K, PHI Learning Pvt. Ltd., 2011.

REFERENCES:

1. “Digital Image Processing”, S. Sridhar, Oxford University Press; Second edition, 2016.
2. “Digital Image Processing”, Gonzalez & woods, Pearson Education India, 2016.

INTERNAL ELECTIVE
PAPER -3
(to choose one out of 3)
A. ARTIFICIAL INTELLIGENCE

Objectives:

To induce the innovative ideas of students, related to Robotics, Artificial Intelligence and Machine Learning. This course enables the student's level to compete in the world of information and technology era.

UNIT I: INTRODUCTION TO ARTIFICIAL INTELLIGENCE:

Objective: To know the basics of Artificial Intelligence.

History of AI – Artificial Narrow Intelligence (ANI) – Artificial General Intelligence (AGI) – Artificial Super Intelligence (ASI) – Characteristics – Types of AI – Domains – Programming Languages of AI – Applications of AI – Future of AI.

UNIT II: AI – PROBLEM SOLVING METHODS:

Objective: To Understand the Methods and algorithms in AI.

Problem solving Methods – Search Strategies: Uninformed – Informed – Heuristics – Generate and test – hill climbing – Best first search – problem reduction – Local Search Algorithms and Optimization – Game Playing mini–max procedure – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games

UNIT III: AI – KNOWLEDGE REPRESENTATION:

Objective: To learn to represent knowledge in solving AI problems.

Procedural Versus declarative knowledge – logic programming – Forward Versus backward reasoning – Matching – Control knowledge – Ontological Engineering– Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories –Reasoning with Default Information.

UNIT IV: STATISTICAL REASONING AND AGENTS:

Objective: To Understand Statistical logics and know about Software agents.

Probability and Bayes Theorem – Certainty factors – Probabilistic Graphical Models – Bayesian Networks – Markov Networks – Fuzzy Logic. Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi–agent systems.

UNIT V: MACHINE LEARNING AND APPLICATIONS

Objective: To learn how Machine learning is related to AI.

Types of Machine Learning – Neural Networks – Deep Learning – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

TEXT BOOKS:

1. “Artificial Intelligence”, Elaine Rich, Kevin Knight, Tata McGraw Hill, II Edition.
2. "Artificial Intelligence: A Modern Approach," Stuart Russell, Peter Norvig, Third Edition, Prentice Hall of India, New Delhi, 2010.
3. “Prolog: Programming for Artificial Intelligence”, I. Bratko, Addison – Wesley Educational Publishers Inc., Fourth edition 2011.

REFERENCES:

1. “Machine Learning for Beginners 2019”, Matt Henderson, This Is Charlotte, 2019
2. “Introduction to Artificial Intelligence and Expert Systems”, Dan W. Patterson, Pearson, 2015

INTERNAL ELECTIVE
PAPER -3
B. SYSTEM SOFTWARE

Objectives:

To have an understanding the basic design of assemblers, loaders, linkers, macro processor.

UNIT I: INTRODUCTION TO SYSTEM SOFTWARE

Objective: To understand the basic concepts of system software

System software vs. Application software – Different types of system software – SIC& SIC/XE Architecture – traditional (CISC) machines – RISC machines.

UNIT II: ASSEMBLERS

Objective: Ability to trace the path of a source code to object code and to executable file

Basic assembler functions– Machine dependent and independent assembler features– Assembler design options–One pass assemblers–Multi pass assemblers– MASM assembler.

UNIT III: LOADERS AND LINKERS

Objective: To design and implementation of loaders and linkers

Basic loader functions–Simple bootstrap loaders – Machine dependent and independent loader features–Linkage editors– Dynamic linking.

UNIT IV: MACRO PROCESSOR

Objective: To understand the concepts of macro processor

Basic macro processor functions–Machine dependent and independent macro processor features–Macro processor design options.

UNIT V: COMPILERS

Objective: Ability to analyze the functions of compilers

Basic compiler functions–Machine dependent compiler features–Machine independent compiler features–Compiler design options the YACC compiler– Compiler.

TEXT BOOKS:

1. "System Software–An introduction to system programming", Leland L. Beck & D. Manjula, Pearson Education, 3rd edition, 2007.

2. "Compilers – Principles, techniques and tools", A.V. Aho, Ravi Sethi, J.D. Ullman, 2nd Edition, Pearson Education, 2011.

REFERENCES:

1. "Systems Programming and Operating Systems", D.M. Dhamdhere, Second Revised Edition, Tata McGraw Hill, 2000.

2. "Systems Programming", John J. Donovan, Tata McGraw Hill Edition, 2000.

3. "Systems Programming", Srimanta Pal, Oxford University Press, 2011.

INTERNAL ELECTIVE
PAPER -3
C. CLOUD COMPUTING

Objectives:

To enable the students to learn the basic functions, principles and concepts of cloud computing Systems.

UNIT I: UNDERSTANDING CLOUD COMPUTING

Objective: To understand the concepts in Cloud Computing.

Computing Paradigms – Cloud Computing Fundamentals – History of Cloud Computing – Cloud Computing Architecture & Management – Cloud Computing Deployment Models – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Cloud Services.

UNIT II: DEVELOPING CLOUD SERVICES

Objective: To understand the concepts of Cloud Computing Services.

Cloud Service Models – SOA & Cloud – Multicore Technology – Memory and Storage Technologies – Networking Technologies – Web 2.0 – 3.0 – Software Process Models for Cloud – Agile SDLC for Cloud Computing – Pervasive Computing – Application Environment – Virtualization.

UNIT III: PROGRAMMING MODELS FOR CLOUD COMPUTING

Objective: To enable the Students to learn Programming Models in Cloud Computing and its Environments.

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – CGL– Map Reduce – Programming models for Aneka – Hadoop Library from Apache – Mapping Applications – Programming Support – Google App Engine, Amazon AWS – Cloud Software Environments –Eucalyptus, Open Nebula, Open Stack, CloudSim – SAP Labs – EMC – Sales force – VMware.

UNIT IV: SOFTWARE DEVELOPMENT IN CLOUD

Objective: The student should be made to learn the basics of Software Development in Cloud.

Different Perspectives on SaaS Development – New Challenges in Cloud – Cloud

Aware Software Development Using Paas Technology – Networking for Cloud Computing – Networking Issues in Data Centers – Transport Layer Issues in DCNs – TCP Enhancements for DCNs – Open Source Support for Cloud – Open Source Tools for Iaas Open Source Tools for Iaas – Open Source Tools for Paas – Open Source Tools for Research.

UNIT V: SECURITY IN CLOUD COMPUTING

Objective: At the end of the course, the student should be able to learn Security Aspects of Cloud Computing.

Security Aspects – Platform Related Security – Audit and Compliance – Cloud Security Challenges and Risks – Software–as–a–Service Security– Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security – Identity Management and Access Control – Autonomic Security – Advance Concepts in Cloud Computing.

TEXT BOOKS:

1. "Essentials of Cloud Computing "– K.CHANDRASEKARAN – CRC Press Taylor and Francis Group an Informal Business – 2015.

2. Cloud Computing – A Practical Approach for Learning and Implementation, A.Srinivasan and J.Suresh, Pearson India Publications, 2014

REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.

3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.

4. Kumar Saurabh, "Cloud Computing – insights into New–Era Infrastructure", Wiley India, 2011.

5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly.

SKILL BASED SUBJECT

PAPER-4

INTERNET OF THINGS

Objectives:

This course presents the Introduction to IoT, M2M,IoT Architecture, IoT Model And Views, IOT protocols and Real world design constraints enable the students to learn the concepts of IoT.

UNIT I: INTRODUCTION TO IoT

Objective: To understand the fundamentals of Internet of Things.

Introduction to Internet of Things –Definition and Characteristics of IoT– Physical Design– Logical Design–IoT Enabling Technologies –IoT Levels & Deployment Templates – Domain Specific IoTs – Home – City – Environment – Energy – Retail – Logistics – Agriculture – Industry – health and Lifestyle.

UNIT II: M2M and IoT ARCHITECTURE

Objective: To understand the M2M and IoT Architecture

IoT and M2M – Difference between IoT and M2M –SDN –IoT System Management with NETCONF–YANG–IoT Platforms Design Methodology – M2M high–level ETSI architecture – IETF architecture for IoT– OGC architecture –Service Oriented Architecture – IoT reference architecture

UNIT III: IoT MODEL AND VIEWS

Objective:To understand the IoT Model And Views

IoT reference model – Domain model – information model – functional model – communication model – Functional View – Information View – Deployment and operational View – other relevant architectural views – data representation and visualization.

UNIT IV: IoT PROTOCOLS

Objective: To learn about the basics of IOT protocols.

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN –CoAP –

Security

UNIT V: REAL–WORLD APPLICATIONS

Objectives: Analyze applications of IoT in real time scenario.

Real world design constraints – Applications – Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities – participatory sensing – Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs – Cloud for IoT– Amazon Web Services for IoT.

TEXT BOOKS:

1. “Interconnecting Smart Objects with IP: The Next Internet”, Jean–Philippe Vasseur, Adam Dunkels, Morgan Kuffmann, 2010.
2. Internet of Things – A Hands–on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015.
3. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014.

REFERENCES:

1. “Internet of Things – A hands–on approach‖”, ArshdeepBahga, Vijay Madisetti, Universities Press, 2015
2. “Architecting the Internet of Things‖,”DieterUckelmann, Mark Harrison, Michahelles, Florian (Eds), Springer, 2011.
3. “The Internet of Things in the Cloud: A Middleware Perspective‖”, Honbo Zhou, CRC Press, 2012.
4. "From Machine–to–Machine to the Internet of Things – Introduction to a New Age of Intelligence", Jan Ho¨ ller, VlasiosTsiatsis, Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand, David Boyle, Elsevier, 2014.
5. “The Internet of Things – Key applications and Protocols”, Olivier Hersent, David Boswarthick, Omar Elloumi ,Wiley, 2012.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. MATHEMATICS DEGREE COURSE

(With effect from 2020 - 2021)
The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components / Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	5	3	Algebra	25	75	100
4.	III	Core Theory	Paper-2	5	3	Trigonometry	25	75	100
5.	III	Allied -1	Paper-1	4	3	**(to choose any 1 out of 4)**	25	75	100
	III	Allied- 1	Practical-1	2	0	(For Practical Allied subjects)	0	0	0
6.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
7.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**22**		**175**	**525**	**700**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
8.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9.	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
10.	III	Core Theory	Paper-3	4	3	Calculus	25	75	100
11.	III	Core Theory	Paper-4	4	3	Analytical Geometry of three dimensions	25	75	100
12.	III	Allied-1	Paper-2	4	3	**(to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
13.	III	Allied Practical - 1	Practical-1	2	2	**(to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
14.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
15.	IV	Value Education		2	2		25	75	100
16.	IV	Soft Skill		2	1		25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**
		SEMESTER III							
17.	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
18.	II	English	Paper-3	6	4	English	25	75	100
19.	III	Core Theory	Paper-5	6	5	Differential Equations	25	75	100
20.	III	Allied-2	Paper-3	4	3	**(to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
	III	Allied Practical - 2	Practical-2	3	0		0	0	0
21.	IV	Skill Based Subject	Paper-1	3	2	Mathematics for competitive Examinations - I	25	75	100
22.	IV	Non-Major Elective	Paper-1	2	2	Basic Mathematics	25	75	100
		Sem. Total		**30**	**20**		**150**	**450**	**600**
23.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100

24.	II	English	Paper-4	4	4	English	25	75	100
25.	III	Core Theory	Paper-6	5	4	Vector Analysis and Fourier Series	25	75	100
26.	III	Core Theory	Paper-7	4	4	Mechanics	25	75	100
27.	III	Allied-2	Paper-4	4	3	**(to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
28.	III	Allied Practical - 2	Practical-2	3	2		25	75	100
29.	IV	**NMSDC : Digital Skills for Employability**	**Paper-2**	**2**	**2**	**Office Fundamentals**	**25**	**75**	**100**
30.	IV	Non-Major Elective	Paper-2	2	2	Foundation Mathematics for Competitive Examinations	25	75	100
		Sem. Total		**30**	**25**		**200**	**600**	**800**
		SEMESTER V							
31.	III	Core Theory	Paper-8	6	4	Abstract Algebra	25	75	100
32.	III	Core Theory	Paper-9	6	4	Real Analysis - I	25	75	100
33.	III	Core Theory	Paper-10	6	4	Complex Analysis - I	25	75	100
34.	III	Core Theory	Paper-11	3	3	Programming in C Language	25	75	100
35.	III	Core Practical	Practical-1	3	2	C Language	25	75	100
36.	IV	Elective	Paper-1	3	3	**(to choose any 1 out of 2)** 1. Linear Programming 2. Special Functions	25	75	100
37.	IV	Skill Based Subject	Paper-3	3	2	Mathematics for Competitive Examinations - III	25	75	100
		Sem. Total		**30**	**22**		**175**	**525**	**700**
		SEMESTER VI							
38.	III	Core Theory	Paper-12	6	4	Linear Algebra	25	75	100
39.	III	Core Theory	Paper-13	6	4	Real Analysis II	25	75	100
40.	III	Core Theory	Paper-14	5	4	Complex Analysis - II	25	75	100
41.	III	Compulsory Project	Paper-15	5	5	Group / Individual Project	25	75	100
42.	III	Elective	Paper-2	3	3	**(to choose any 1 out of 2)** 1.Graph Theory 2. Discrete Mathematics	25	75	100
43.	III	Elective	Paper-3/ Elective Practical-1	3	3	**(to choose any 1 out of 2)** 1.Fuzzy Mathematics.(Theory) 2. R Programming (Practical Only)	25	75	100
44.	**III**	**Data Analytics with Advance Tools for Employability**	**Paper-4**	**2**	**2**	**Project Based Learning III**	**25**	**75**	**100**
45.	V	Extension Activities		0	1		100	0	100
		Sem. Total		**30**	**26**		**275**	**525**	**800**
		Grand Total			**140**				**4500**

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	2	4	8	100	200
Part II	Communicative English & English	2	4	8	100	200
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Allied Practical	2	2		100	200
	Electives	3	3	9	100	300
	Core	14	(3-5)	52	100	1400
	Core practical	1	2	2	100	100
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	**43**		**140**		**4500**

THIRUVALLUVAR UNIVERSITY

B.Sc. MATHEMATICS

SYLLABUS
CBCS PATTERN
(For the candidates admitted from 2020 - 2021)

SEMESTER III

PAPER - 5

DIFFERENTIAL EQUATIONS

Objectives

This course aims to provide logical skills in the formation of differential equations, to expose to different techniques of finding solutions to these equations and in addition stress is laid on the application of these equations in geometrical and physical problems.

UNIT - I

ORDINARY LINEAR DIFFERENTIAL EQUATIONS

Bernoulli Equation - Exact Differential Equations - Equations Reducible to Exact Equations - Equations of First order and Higher degree: Equations solvable for p, Equation solvable for x and Equations Solvable for y - Clairaut's Equation.

UNIT - II

ORDINARY LINEAR DIFFERENTIAL EQUATIONS [CONTD...]

Method of Variation of Parameters - 2^{nd} order Differential Equations with Constant Coefficients for finding the P.I's of the form e^{ax} V, where V is sin(mx) or cos(mx) or x^n - Equations reducible to Linear equations with constant coefficients - Cauchy's homogeneous Linear Equations - Legendre's Linear Equations.

UNIT - III

DIFFERENTIAL EQUATIONS OF OTHER TYPES

Simultaneous Equations with Constant coefficients - Total Differential Equations Simultaneous Total Differential Equations - Equations of the form $dx/P = dy/Q = dz/R$

UNIT - IV

LAPLACE TRANSFORM

Transform-Inverse Transform - Properties - Application of Laplace Transform to solution of first and second order Linear Differential equations [with constant coefficients].

UNIT - V

PARTIAL DIFFERENTIAL EQUATIONS

Formation of PDF - Complete Integral - Particular Integral - Singular Integral - Equations Solvable by direct Integration - Linear Equations of the first order - Non-linear Equations of the first Order:

Types: $f(p,q) = 0$, $f(x,p,q) = 0$, $f(y, p, q) = 0$, $f(z, p, q) = 0$, $f(x, q) = f(y, p)$, $z = px+qy + f(p, q)$.

Recommended Text

S.Narayanan and T.K.Manicavachagom Pillay[2004] , Calculus, S.Viswanathan Printers and publishers Private Ltd., Chennai.

Reference Books

1. M.D. Raisinghania, [2001] Ordinary and Partial Differential Equations, S.Chand and Co., New Delhi.
2. M.R.Spiegel [2005] Advanced mathematics for Engineers and Scientists, Tata McGraw Hill Edition, New Delhi.
3. M.R.Spiegel [2005] Laplace Transforms, Tata McGraw Hill Edition, New Delhi.
4. S.Sudha [2003] Differential Equations and Integral Transforms, Emerald Publishers, Chennai.
5. M.K.Venkataraman [1998] Higher Engineering Mathematics, III-B, National Publishing Co., Chennai.
6. P.R.Vittal [2004] Differential Equations and Laplace Transform, Margham Publications, Chennai.
7. P.Kandasamy, K.Thilagarathy [2004] Mathematics for B.Sc. Vol. III S.Chand& Co., Ltd., New Delhi-55.
8. B.S.Grewal [2002] Higher Engineering Mathematics, Khanna Publishers, New Delhi.
9. Sheply. L.Ross [1984] Differential Equations, III Edition john Wiley and Sons, New York.

Course Outcomes

At the end of the course the student will be able to

[1] solve the first order higher degree differential equations
[2] solve the second order differential equations
[3] know the concept of total differential equations
[4] know the applications of Laplace transform
[5] solve the partial differential equations.

SKILL BASED SUBJECT

PAPER - 1

MATHEMATICS FOR COMPETETIVE EXAMINATIONS - I

Objectives
To introduce concepts of mathematics with emphasis on analytical ability and computational skill needed in competitive examinations.

UNIT - I

Numbers, H.C.F. and L.C.M. of numbers, Decimal Fractions.

UNIT - II

Simplification, Square roots and Cube Roots, Average.

UNIT - III

Problems on numbers, problems on Ages.

UNIT - IV

Surds and Indices, Percentage, Profit and Loss.

UNIT -V

Ratio and Proportion, Partnership.

Text Books:-

1. R.S.Aggarwal, Quantitative Aptitude for competitive Examination,S.Chand and company,New Delhi.
2. Praveen R. V. Quantitative Aptitude and Reasoning, PHI Learning Pvt. Ltd, New Delhi.

Course Outcomes
At the end of the course the student should be able to
[1] know the idea H.C.F. and L.C.M.
[2] find the Average, square root and cubic root
[3] solve the problems on ages and numbers
[4] know the percentage, profit and loss
[5] analyze the proportion and partnership problems

NON-MAJOR ELECTIVE

PAPER -1

BASIC MATHEMATICS

Objectives

To introduce a few basic and elementary concepts of mathematics for other major students.

UNIT - I

SETS

Definition - Subsets - Power sets - Equality of sets - Finite and Infinite sets - Set operations - De-Morgan's laws - Distributive tables - Cartesian products.

UNIT - II

NUMBER SYSTEM

Binary, octal, hexadecimal numbers - conversion from one system to another system - addition and subtraction - one's complement.

UNIT - III

SYMBOLIC LOGICS

Logical statements - connectives - truth tables - tautologies operations - groups - (problems and simple properties only).

UNIT - IV

DETERMINANTS

Definition - properties (without proof) - application of determinants - Cramer's rule for the solution of a system of equations

UNIT - V

MATRICES

Definition - types of matrices - operations on matrices - adjoint and inverse - applications - solving non-homogeneous equations.

Recommended Texts

1. Dr.M.K.Venkataraman & others, "Discrete mathematics and structures", The National Publishing Company, Madras.
2. Trembly J.P and Manohar.R "Discrete Mathematical Structures with applications to computer science" Tata McGraw - Hill Pub., Co., Ltd. New Delhi 2003.

Reference Books

1. P.R.Vittal "Algebra, Analytical Geometry and trigonometry" Margham Publications, Chennai.
2. Richard Johnsonbaugh, "Discrete Mathematics" fifth Edn., Pearson Education Asia, New Delhi 2002.

SEMESTER - IV

PAPER - 6

VECTOR ANALYSIS AND FOURIER SERIES

Course Objectives

The aim of this course is to cover the topics in vector and tensor calculus which are essential in modern applied mathematics. To develop the deep knowledge of the vector differentiation, vector integration and Fourier series concepts and its applications in the branch of applied mathematics for engineers and scientists.

UNIT - I

DIFFERENTIAL VECTOR CALCULUS

Differentiation of a Vector - Geometrical Interpretation of the Derivative - Differentiation Formulae - Velocity and Acceleration Vectors - Scalar and Vector Point functions - Level surface - Gradient - Equation of tangent plae -Unit normal to the given Surface - Differentiation of dot and Cross Products - Partial Derivatives of Vectors - Differentials of Vectors.

UNIT - II

GRADIENT, DIVERGENCE AND CURL

Vector Differential Operator Del - Directional Derivative - Geometric Interpretation - Gradient of the sum of Functions; of the product of functions and of a function of function - Operations involving Del - Divergence of a Vector and its Physical Interpretation - Curl of a Vector and its Physical Interpretation - Expansion Formulae for Operators involving Del - Solenoidal and Irrotational - Simple Problems.

UNIT - III

VECTOR INTEGRATION

The Line Integral - Surface Integral and its Physical Meaning - Volume integral - Simple Problems.

UNIT - IV

VECTOR INTEGRATION(CONTD.)

Statements of Stoke's Theorem, Gauss Divergence Theorem and Green's Theorem - Simple Problems - Simple Problems Solved to Verify the Theorems.

UNIT - V

FOURIER SERIES

Euler's Formulae - Conditions for Fourier Expansion - Functions having Discontinuity - Change of Interval - Odd and Even Functions - Expansions of Odd or Even periodic Functions - Half-range Series - Parseval's Formula.

Recommended Text

Erwin Kreyszig (2011), Advanced Engineering Mathematics, John Wiley & Sons, Inc. (10^{th}edition), Printed in the United States of America

Reference Books

1. G.B.Thomas and R.L.Finney. (1998) *Calculus and Analytic Geometry*, Addison Wesley (9^{th} edition), Mass. (Indian Print).
2. M.K.Venkataraman. (1992) *Engineering Mathematics-Part B*. National Publishing Company, Chennai.
3. P.R.Vittal. (2004) *Vector Calculus, Fourier series and Fourier Transform*. Margham Publications, Chennai.
4. B.S.Grewal (2012). *Higher Engineering Mathematics*, Khanna Publishers(42^{nd}edition), Nai Sarak, New Delhi.

Course Outcomes

At the end of the course the student should be able to

[1] know the physical and geometrical meaning of the derivative

[2] know the physical and geometrical meaning of the divergence and curl

[3] evaluating line, surface and volume integrals

[4] know the applications of Stoke's Theorem, Gauss Divergence Theorem and Green's theorem

[5] analyze the Fourier series in both theory and application level

PAPER - 7

MECHANICS

OBJECTIVES

This course aims to introduce the students the basic concepts of forces, moments, couple, friction and the centre of gravity..

UNIT - I

Forces, Type of forces- Resolution of forces - Resultant of two forces acting on a particle - triangle of forces, Lamis theorem - Resultant of several forces acting on a particle - Condition of equilibrium - Equilibrium of a particle under several forces - simple problems.

UNIT - II

Moment of a force - Parallel forces - Varignon's theorem -Forces along the sides of a triangle - Couples - Resultant of several coplanar forces - Equation of line of action of the resultant - Equilibrium of a rigid body under three coplanar forces - Reduction of coplanar forces into a force and a couple - simple problems.

UNIT - III

Center of mass - Center of mass of a triangular lamina - Three particles of same mass - Three particles of certain masses - uniform rods forming a triangle - lamina in the form of a trapezium and solid tetrahedron - Center of mass using integration - circular arc - circular lamina - elliptic lamina - solid and hollow hemisphere - solid and hollow right circular cone - simple problems.

UNIT - IV

Velocity, Relative Velocity, Angular Velocity, Acceleration, Rectilinear motion, Rectilinear motion with constant acceleration, Relative angular velocity. The Components of Velocity and Acceleration in

a. Two Perpendicular directions
b. Radial and Transverse directions
c. Tangential and Normal directions.

UNIT - V

Motion of a projectile, Nature of a trajectory, Results pertaining to the motion of a projectile, Range on an inclined plane, Maximum range on the inclined plane - Impulsive force, Conservation of linear momentum, Impact of a sphere, Laws of impact, Impact of two smooth spheres, Direct impact of two smooth spheres - Oblique impact of two smooth spheres - Simple problems.

Recommended Text

P. Duraipandian, LaxmiDuraipandian ,MuthamizhJayapragasam, Mechanics, 6th edition, S. Chand and Company Ltd, 2005.

Reference Books

1. M.K.Venkataraman, Statics, Agasthiyar Publications, 17th edition, 2014.
2. S. Narayanan, R. HanumanthaRao, K. Sitaraman, P. Kandaswamy, *Statics*, S. Chand and Company Ltd, New Delhi.
3. S. L. Loney, *An Elementary Treatise on Statics*, Combridge University Press, 1951
4. A.V. Dharmapadam(1991) *Mechanics*. S. Viswanathan Printers & Publishers. Chennai
5. Joseph F. Shelley (2005) *Vector Mechanics for Engineers Vol-I: Statics*, Tata McGraw Hill Edition, New Delhi.

Course Outcomes

1. Provides basic knowledge of Resultant of forces and Equilibrium of a particle
2. Knowledge pertaining to Parallel forces and coplanar forces
3. To know about Center of mass
4. Gain the knowledge of projectile and its applications
5. Understand the concept of impact

SKILL BASED SUBJECT

PAPER - 2

MATHEMATICS FOR COMPETETIVE EXAMINATIONS - II

UNIT - I

Chain rule -Time and work.

UNIT - II

Time and Distance

UNIT - III

Problems on Trains.

UNIT - IV

Boats and Streams.

UNIT - V

Alligation or Mixture.

Text Book:-

Quantitative Aptitude for competitive Examination R.S. Aggarwal. S. Chand and company Ltd,152,Anna salai, Chennai. 2001

NON-MAJOR ELECTIVE

PAPER - 2

FOUNDATION MATHEMATICS FOR COMPETETIVE EXAMINATIONS

Objectives

To introduce concepts of mathematics with emphasis on analytical ability and computational skill needed in competitive examinations.

UNIT - I

Ratio and proportions

UNIT - II

Percentages

UNIT - III

Profit and loss, discounts.

UNIT - IV

Simple and compound interest**.**

UNIT - V

Time, Distance and Work

Recommended Text books:

1. R.S.Aggarwal, Quantitative Aptitude for competitive Examination,S.Chand and company,New Delhi.
2. Praveen R. V. Quantitative Aptitude and Reasoning, PHI Learning Pvt. Ltd, New Delhi.

Course Outcomes

At the end of the course the student should be able to

[1] know the idea of ratio and proportions
[2] find the percentages
[3] profit and loss problems
[4] know the simple and compound interest problems
[5] analyze the time and distance problems

YEAR - III		**Sub Code**
SEMESTER - V	**ABSTRACT ALGEBRA**	**Hrs / Week: 6**
CORE PAPER - 8		**Credit: 5**

OBJECTIVE:
To learn from basic algebra concepts to higher algebra Concepts

UNIT - I

GROUPS
Definition of a Group - Examples - Subgroups - simple problems.

UNIT - II

GROUP [CONTD]
Counting Principle - Normal Subgroups - Homomorphism - simple problems.

UNIT - III

GROUP [CONTD]
Automorphisms - Cayley's Theorem - Permutation Groups - simple problems.

UNIT - IV

RINGS
Definition and Examples - Integral Domain - Homomorphism of Rings - Ideals and Quotient Rings - simple problems.

UNIT - V

RINGS [CONTD]
Prime Ideal and Maximal Ideal - The field of quotients of an Integral domain - Euclidean rings - simple problems.

Text book:
I.N.Herstein.[1989], "Topics in Algebra",[2nd ed] Wiley Eastern Ltd. New Delhi.
Chapter:2 (Sec: 2.1 - 2.10 [Omit Applications 1 and 2 of 2.7]),
Chapter : 3 (Sec: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7)

Reference books:

1. S.Arumugam[2004], "Modern Algebra", SciTech Publications, Chennai.
2. J.B.Fraleigh [1987], "A First Course in Algebra", [3rd edition] Addison Wesley, Mass. [Indian Print]
3. Lloyd R.Jaisingh and Frank Ayres,Jr. [2005], "Abstract Algebra", [2nd edition], Tat McGraw Hill, New Delhi.
4. M.L.Santiago[2002], "Modern Algebra", Tat McGraw Hill, New Delhi
5. SurjeetSingh and Qazi Zameeruddin[1982], "Modern algebra", Vikas Publishing House Pvt.Ltd. New Delhi.

Course outcome:

At the end of the course

CO1: Students able to identify groups and subgroups.
CO2: Students able to understand homomorphism and isomorphism.
CO3: Students able to do the problems in permutation.
CO4: Students able to study the basics of rings, ideals and integral domain.
CO5: Students able to apply Euclidean rings in theorems**.**

PAPER - 9

REAL ANALYSIS I

Objectives

To understand various limiting behavior of sequences and series

To explore the various limiting processes viz.continuity, uniform continuity, differentiability and integrability and to enhance the mathematical maturity and to work comfortably with concepts.

UNIT - I

FUNCTIONS & SEQUENCES

Functions - real valued functions - equivalence - countability and real numbers - least upper bound - definition of sequence and subsequence - limit of a sequence - convergent sequence - Simple problems.

Ch. 1.4 to 1.7, 2.1 to 2.3.

UNIT - II

SEQUENCES [CONTD...]

Divergent sequences - Bounded sequences - Monotone sequence - Operations on convergent sequences - Operations on divergent sequences - Limit superior and Limit inferior - Cauchy sequences - Simple problems.

Ch. 2.4 to 2.10.

UNIT - III

SERIES OF REAL NUMBERS

Convergence and Divergence - Series with non negative terms - Alternating series - conditional convergence and Absolute convergence - Test for Absolute convergence - Simple problems.

Ch. 3.1 to 3.4 and 3.6.

UNIT - IV

SERIES OF REAL NUMBERS [CONTD...]

Test for Absolute convergence - The class ℓ^2 - Limit of a function on the real line - Metric spaces - Limits in Metric spaces - Simple problems.

Ch. 3.7, 3.10, 4.1 to 4.3.

UNIT - V

CONTINUOUS FUNCTIONS ON METRIC SPACES

Functions Continuous at a point on the real line - Reformulation - Functions Continuous on a Metric Spaces - Open Sets - Closed Sets - simple problems.

Ch. 5.1 to 5.5.

Recommended Text

R.Goldberg [2000] Methods of Real Analysis. Oxford & IBH Publishing Co., New Delhi.

Reference Books

1. Tom M.Apostol [1974] Mathematical Analysis, 2nd Edition, Addison-Wesley New York.
2. Bartle, R.G. and Shebert [1976] Real Analysis, John Wiley and Sons Inc., New York.
3. Malik, S.C. and SavitaArora [1991] Mathematical Analysis, Wiley Eastern Limited, New Delhi.
4. Sanjay Arora and BansiLal [1991], Introduction to Real Analysis, SatyaPrakashan, New Delhi.

Course Outcomes

At the end of the course the student should be able to

1. know the concept countability
2. identify convergent, divergent sequences
3. solve conditional convergence and absolute convergence problems
4. evaluate limit of a function
5. know the concepts of open, closed sets.

PAPER - 10

COMPLEX ANALYSIS - I

Objectives

This course provides

(i) a modern treatment of concepts and techniques of complex function theory

(ii) To gain knowledge about the complex number system, the complex function and complex integration.

UNIT - I

COMPLEX NUMBERS, MAPPINGS AND LIMITS.

Complex Numbers - Complex number system - Algebraic properties - Geometric Interpretation - Properties of Moduli - Polar form - Regions in the complex plane - Mappings - Limits - Theorems on Limits - simple problems.

UNIT - II

ANALYTIC FUNCTIONS

Continuity - Derivatives and Differentiation formulas - Cauchy-Riemann equations - Sufficient conditions - Cauchy - Riemann equations in polar form - properties of Analytic functions - Necessary and sufficient conditions for Analytic functions - problems.

UNIT - III

CONFORMAL MAPPINGS

Harmonic functions - Determination of Harmonic conjugate - Conformal mapping - Isogonal mapping - Further properties and examples - transformations of Harmonic functions - simple problems.

UNIT - IV

MAPPING BY ELEMENTARY FUNCTIONS

The transformations $w = z + d,\ w = \frac{1}{z},\ w = z^2,\ w = \sqrt{z},\ w = e^z,\ w = \sin z$ - Bilinear Transformation and special Bilinear Transformation - problems.

UNIT - V

INTEGRALS

Contours - Line Integrals - Cauchy-Goursat's Theorem (without proof) - Cauchy's Integral Formula - Derivatives of Analytic Functions - problems.

Recommended Text

R.V.Churchill and J.W.Brown, (1984) *Complex Variables and Applications*. McGraw Hill International Book Co., Singapore. (Fourth Edition)

UNIT 1	Chapter 1	Section 1 to 5, 8
	Chapter 2	Section 10, 11, 12
UNIT 2	Chapter 2	Section 13 to 19
UNIT 3	Chapter 2	Section 20
	Chapter 8	Section 74, 75, 76, 77
UNIT 4	Chapter 7	Section 63 to 68, 70, 71
UNIT 5	Chapter 4	Section 29 to 33, 38, 39

Reference Books:

1. P. Duraipandian and LaxmiDuraipandian Complex Analysis: Emerald Publishers, Chennai. 1976.
2. S. Ponnusamy. Foundations of Complex Analysis, Narosa Publishing House, New Delhi. 2000.
3. Tyagi B.S. Functions of Complex Variable, 17th Edition, PragatiPrakasham Publishing Company Ltd., Meerut, 1992 - 93.

Course Outcomes

At the end of the course

(i) The students can gain knowledge about Complex functions and its nature, limits and Analytic functions.

(ii) The students can gain knowledge about elementary transformations.

(iii) The students can gain knowledge about line integrals and techniques for solving problems.

PAPER - 11

A. PROGRAMMING IN C LANGUAGE

Objectives

To develop programming skill in the Computer Language C

UNIT - I

C Constants, variables, Data-type, Declaration of variables, assigning values to variables.
Chapter 2: Sections: 2.1 - 2.10

UNIT - II

OPERATORS, EXPRESSION AND INPUT OUTPUT OPERATIONS
Arithmetic, Relational, Logical, Assignment, Increment and decrement, Conditional, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic operators, Formatted input and output.
Chapter 3: Sections: 3.1 - 3.7, 3.10 - 3.12 and Chapter 4: Sections: 4.1 - 4.5

UNIT - III

DECISION MAKING: BRANCHING AND LOOPING
If, simple if, If else, Nesting of if - else, Else - If ladder, Switch statement, the?: operator, Go to statement. Decision making with looping: While, Do, for statement, Jumps in loops.
Chapter 5: Sections: 5.1 - 5.9, 6.1 - 6.5

UNIT - IV

ARRAYS
One - dimensional array, two - dimensional array, Multi - dimensional arrays.
Chapter 7: Sections: 7.1 - 7.7

UNIT - V

USER-DEFINED FUNCTION
Need for User-defined function, Multi-function program, the form of C-Function, Return Value and their types, Recursion.
Chapter 9: Sections: 9.1 - 9.6, 9.16

POINTERS:
Declaration, initialization of Pointer variables, Pointer expressions**.**
Chapter 11: Sections: 11.4 - 11.5, 11.8

Recommended Text

E.Balagurusamy. *Programming in* ANSI *C*. Fifth Edition Tata McGraw Hill, New Delhi

Reference Books

1. V.Rajaraman. (1995) *Computer Programming in C*. Prentice Hall, New Delhi.
2. AnanthiSheshasaayee and J.G.Sheshasaayee. *(2005)Programming Language C with Practicals*, Margham Publications.
3. H. Schildt, Obsborne. (1994) *Teach Yourself C* McGraw Hill. New York.
4. Mullish Cooper. *The Spirit of C- An Introduction to Modern Programming.*Jaico Publishing House. Delhi. 1998.
5. Yashavantkanetkar, let us C, 16TH edition BPB publication.
6. Dr.P.Rizwan Ahmed, Programming in C, Margham Publications, 2016.

PRACTICAL - 1

A. PRACTICAL IN C LANGUAGE

Objectives

This computer practice course aims to provide strong logical thinking and error-free syntax codes writing, to master the debugging techniques and to present the results in neat form in C Language for numerical methods. Students will be able to solve problems numerically whenever theoretical methods are not available.

The following exercises shall be performed as minimum mandatory requirements (for eligibility to take the practical examination) and a RECORD of the code-listing and outputs shall be maintained by each student.

1. Square of numbers: Using For loop, While loop, Do-While loop, Goto statement.
2. Solution of a quadratic equation.
3. Characters between two given characters.
4. Counting the number of vowels and consonants in a sentence.
5. 3x3 matrix addition and multiplication.
6. Prime numbers between two give numbers.
7. Simple interest and Compound Interest.
8. Fibonacci series developing and finding the nth tem of Fibonacci series.
9. Factorial numbers- Binomial Coefficient using function recursion.
10. Pascal's triangle development using recursion.
11. Power of a value - use a function in the name power.
12. Print an array of integers in reverse order using pointer.
13. Interchange sort in ascending or descending.

Note: Mathematics faculty should be appointed as an Examiner.

Reference Books

1. AnanthiSheshasaayee and J.G.Sheshasaayee. *(2005)Programming Language C with Practicals*, Margham Publications.
2. The spirit of C, Mullish Cooper, Indian Edition by Jaico Publishers, 1987.
3. Teach yourself C, Herbert Schildt, ObsbomeMegrawhill, 2nd Edition 1994.

Programming in C, Schaum Series.

ELECTIVE

PAPER - 1
(to choose 1 out of the given 2)

A. LINEAR PROGRAMMING

OBJECTIVES

The course aim is to introduce various techniques of Operations Research, linear programming, transportation methods, assignment models, and, game theory.

UNIT - I

Linear programming problem - Mathematical formulation of the problem - Graphical solution method - Simplex method - The Big-M method -Duality - Dual simplex method (Simple Problems).

UNIT - II

Definitions of the transportation model - Formulation and solution of transportation models - Finding an initial basic feasible solution (NWCM - LCM -VAM) - Degeneracy in Transportation Problem - Transportation Algorithm (MODI Method)

UNIT - III

Definition of Assignment models - Mathematical representation of assignment models - Comparison with the transportation models - Solution of the assignment model - The Hungarian methods for solution of the assignment models - variation of the assignment problem .Travelling salesman problem.

UNIT - IV

Games and Strategies - Two person zero sum - Some basic terms - the maximin-minimax principle - saddle points - Games without saddle points-Mixed strategies - graphic solution 2xn and mx2 games.

UNIT - V

Simulation - application - advantages and disadvantages - Monte Carlo method - simple problems.

Recommended Text

Gupta P.K.and Hira D.S., (2000) Problems in Operations Research, S.Chand & Co. Delhi

Reference Books

1. J.K.Sharma, (2001) Operations Research: Theory and Applications, Macmillan, Delhi
2. KantiSwaroop, Gupta P.K. and Manmohan, (1999) *Problems in Operations Research*, Sultan Chand & Sons., Delhi.
3. V.K.Kapoor [1989] *Operations Research*, sultan Chand & sons.
4. Ravindran A., Philips D.T. and Solberg J.J., (1987) *Operations research*, John Wiley & Sons, New York.
5. Taha H.A. (2003) *Operations Research,* Macmillan Publishing Company, New York.
6. S.J.Venkatesan, *Operations Research,* J.S. Publishers, Cheyyar-604 407.

Course Outcomes

At the end of the course the student should be able to

1. formulate any real world problem as LPP
2. understand various techniques of simplex method.
3. understand analogies between transportation problem and assignment models
4. interpret the solutions in game theory.
5. know the concept of simulation.

B. SPECIAL FUNCTIONS

Objectives

To develop computational skill in certain special functions which are frequently occurring in higher mathematics and mathematical physics.

UNIT - I

Properties of Linear Operators - Simultaneous Linear Differential Equations -

UNIT - II

Special Solvable Types of Nonlinear Equations. Numerical Solutions Using Taylor Series

UNIT - III

Adams and Modified Adams Method - Extrapolation with Differences Properties of Power Series - Examples

UNIT - IV

Singular Points of Linear Second Order Differential Equations - Method of Frobenius.

UNIT - V

Bessel Functions - Properties - Legendre Functions.

Recommended Text

F.B.Hildebrand. (1977) *Advanced Calculus for Applications.*Prentice Hall. New Jersey.

Reference Books

1. J.N.Sharma and R.K.Gupta (1998) *Special Functions*, Krishna PrakashanMandir, Meerut.
2. SatyaPrakash. (2004)*Mathematical Physics.* Sultan & Sons. New Delhi.
3. B.D.Gupta (1978) Mathematical Physics, Vikas Publishing House.

SKILL BASED SUBJECT

PAPER - 3

MATHEMATICS FOR COMPETETIVE EXAMINATIONS - III

UNIT - I

Simple Interest.

UNIT - II

Compound Interest

UNIT - III

Logarithms - Races and Games of Skill.

UNIT - IV

Area

UNIT - V

Volume and surface areas.

Text Book:-

Quantitative Aptitude for competitive Examination, R.S.Aggarwal. S.Chand and company Ltd, 152, Anna salai, Chennai. 2001

YEAR - III		**Sub Code**
SEMESTER - VI	**LINEAR ALGEBRA**	**Hrs / Week: 6**
CORE PAPER – 12		**Credit: 5**

Objectives:
Continue to learn Abstract Algebra and we study about Vector Spaces and its linear equations.

UNIT - I

VECTOR SPACES
Linear dependence and independence - Bases – Dimension - Definition and examples.

UNIT - II

VECTOR SPACES [CONTD]
Dual space - Annihilator of a Subspace - inner product spaces - Schwarz Inequality - Orthonormal Vectors - Orthogonal Complement

UNIT - III

LINEAR TRANSFORMATIONS
Algebra of linear transformations - Sub Algebra - Minimal Polynomial - Invertible - characteristics roots - Characteristic Vectors.

UNIT - IV

LINEAR TRANSFORMATIONS [CONTD]
Matrices - Matrix of a Linear Transformation and its Properties- canonical forms - triangular forms - Invariant Transformation - Triangular Matrix of 'T'

UNIT - V

LINEAR TRANSFORMATIONS [CONTD]
Trace and Transpose: Definition and Properties-Jacobson Lemma- Symmetric, Skew Symmetric and Adjoint of a matrix - Determinants: Definition and Properties- Solving system of Linear Equation-Secular Equation.

Text book:
I.N.Herstein [1989], "Topics in Algebra", Wiley Eastern Ltd. New Delhi.
Chapters - 4 & 6(Sec: 4.1, 4.2, 4.3, 4.4 & 6.1, 6.2, 6.3, 6.4, 6.8, 6.9).

Reference books:
1. S.Arumugam.[2004], "Modern Algebra", Scitech Publications, Chennai.
2.J.B.Fraleigh [1987], "A First Course in Algebra", [3rd edition] Addison Wesley, Mass. [Indian Print]
3. Lloyd R.Jaisingh and Frank Ayres,Jr. [2005], "Abstract Algebra", [2nd edition], Tata McGraw Hill, New Delhi.

4. M.L.Santiago[2002], “Modern Algebra”, Tata McGraw Hill, New Delhi
5. Surjeet Singh and Qazi Zameeruddin[1982], “Modern algebra”, Vikas Publishing House Pvt.Ltd. New Delhi.

Course Outcomes:

This paper will make the students to learn to convert Vector Spaces to Algebraic equations.

CO1: Beginning with Linear Dependence and Linear Independence on Vector Space

CO2: Knowing about Dual spaces and Inner product spaces on Vector space

CO3: Learning to study about Algebra of Linear transformations and its characteristic roots

CO4: Converting Linear equations of Vector space to Matrices its canonical and triangular forms

CO5: Deriving Trace and Transpose of Matrices.

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PAPER - 13

REAL ANALYSIS II

Objectives

To understand Integration process of Riemann

To develop the understanding of point wise and uniform convergence of sequence and series of functions.

To enhance the mathematical maturity and to work comfortably with concepts.

UNIT - I

CONNECTEDNESS, COMPLETENESS

Open Sets - Connected Sets - Bounded Sets and Totally Bounded Sets - Complete Metric Spaces - simple problems. Ch. 6.1 to 6.4 of Goldberg

UNIT - II

COMPACTNESS

Compact Metric Space - Continuous Functions on Compact Metric Spaces - Continuity of Inverse Functions - Uniform Continuity - simple problems.

Ch. 6.5 to 6.8 of Goldberg

UNIT - III

RIEMANN INTEGRATION

Sets of measure zero - Definition Riemann Integral - Properties of Riemann Integral - Derivatives - simple problems.

Ch. 7.1, 7.2 7.4, 7.5 of Goldberg.

UNIT - IV

RIEMANN INTEGRATION [CONTD...]

Rolle's Theorem - The law of mean - Fundamental theorems of calculus - Taylor's theorem - simple problems.

Ch. 7.6 to 7.8 and 8.5 of Goldberg.

UNIT - V

SEQUENCES AND SERIES OF FUNCTIONS

Pointwise convergence of sequences of functions - Uniform convergence of sequences of functions - consequences of uniform convergence - Convergence and uniform convergence of series of functions - simple problems.

Ch. 9.1 to 9.4 of Goldberg.

Recommended Text

R.Goldberg Methods of Real Analysis Oxford & IBH Publishing Co., New Delhi.

Reference Books

1. Tom M.Apostol [1974] Mathematical Analysis, 2nd Edition, Addison-Wesley Publishing Company Inc. New York.
2. Bartle, R.G. and Shebert [1976] Real Analysis, John Wiley and Sons Inc., New York,
3. Malik, S.C. and Savita Arora [1991] Mathematical Analysis, Wiley Eastern Limited, New Delhi.
4. Sanjay Arora and Bansi Lal [1991] Introduction to Real Analysis, Satya Prakashan, New Delhi.

Course Outcomes

At the end of the course the student should be able to

[1] understand the concept of complete metric space
[2] know the difference between continuity and uniform continuity
[3] know Riemann integration and its properties
[4] solve problems related to Rolle's theorem , law of mean
[5] know the convergence of sequences of functions.

PAPER - 14

COMPLEX ANALYSIS II

Objectives:

(1) To gain knowledge about complex Integration and series.

(2) This course provides methods to solve problems in pure as well as in applied mathematics.

UNIT - I

INTEGRALS

Morera's theorem - Maximum Moduli of functions - The fundamental theorem of Algebra - Liouville's theorem and the Fundamental Theorem on Algebra - convergence of sequences and series.

UNIT - II

POWER SERIES

Taylor's and Laurent's theorem - Examples - Integration and differentiation of power series - problems.

UNIT - III

SINGULARITIES AND RESIDUES

Singularities and classifications - Isolated singularties- Removable singularity, Pole and essential singularity - Residues - Cauchy's Residue theorem - problems.

UNIT - IV

CONTOUR INTEGRATION

Evaluation of Improper Real Integrals - Improper integrals involving Trigonometric functions - simple problems.

UNIT - V

ANALYTIC CONTINUATION

Zeros of Analytic functions - Poles and zeros - Essential singular points -Number of zeros and poles - The Argument principle - Rouchestheorem -simple problems.

Recommended Text

R.V.Churchill and J.W.Brown, (1984) *Complex Variables and Applications*. McGraw Hill International Book Co., Singapore. (Fourth Edition)

Unit 1	Chapter 4	Section 40 to 42
	Chapter 5	Section 43
Unit 2	Chapter 5	Section 44, 45, 46, 49
Unit 3	Chapter 6	Section 54 to 57
Unit 4	Chapter 6	Section 59, 60, 61
Unit 5	Chapter 5	Section 53
	Chapter 12	Section 106, 107, 108, 109

Reference Books

1. P. Duraipandian and Laxmi Duraipandian. Complex Analysis: Emerald Publishers, Chennai. 1976.
2. S. Ponnusamy. Foundations of Complex Analysis, Narosa Publishing House, New Delhi. 2000.
3. Tyagi B.S. Functions of Complex Variable, 17^{th} Edition, Pragati Prakasham Publishing Company Ltd., Meerut, 1992 - 93.

Course Outcomes

1. The students can gain knowledge about Contour integration and problem solving techniques.
2. The students can learn about singularities and Residues.
3. The students can gain knowledge about power series expansions of analytic functions.

COMPULSORY PROJECT

A Project in under graduate level should be submitted by the students with the guidance of allotted guide.

ELECTIVE
(to choose 1 out of the given 2)

PAPER - 2

A. GRAPH THEORY

Objectives

To study and develop the concepts of graphs, subgraphs, connectivity, Eulerian and Hamiltonian graphs, Ramsey numbers and trees.

UNIT - I

Graphs - subgraphs - Degree of a vertex - Isomorphism of graphs -Ramsey numbers - independent sets and coverings.

UNIT - II

Intersection graphs - Adjacency and incidence of matrices - Operations on graphs - Simple problems.

UNIT - III

Walks, trails and paths - Connectedness and components - cut points - bridges - blocks.

UNIT - IV

Connectivity theorems and simple problems –Trees - Theorems and simple problems.

UNIT - V

Eulerian graphs and Hamiltonian graphs - Necessary and sufficient conditions - Theorems and simple problems.

Recommended Text

S.Arumugam and S.Ramachandran, "Invitation to Graph Theory", SCITECH Publications India Pvt. Ltd., T.Nagar, Chennai - 17. 2001.

Unit 1	Chapter 2	Section 2.1 to 2.6
Unit 2	Chapter 2	Section 2.7 to 2.9
Unit 3	Chapter 4	Section 4.1 to 4.3
Unit 4	Chapter 4	Section 4.4
	Chapter 6	Section 6.1, 6.2
Unit 5	Chapter 5	Section 5.1, 5.2

Reference Books

1. S.Kumaravelu, SusheelaKumaravelu, Graph Theory, Publishers, Nagercoil-629 002.

2. S.A.Choudham, A First Course in Graph Theory, Macmillan India Ltd.

3. Robin J.Wilson, Introduction to Graph Theory, Longman Group Ltd.

Course Outcomes

(i) After studying this course the students know about the basic foundations of graphs, subgraphs and trees.

(ii) The students can learn about connected graphs, Eulerian graphs and Hamiltonian graphs.

B. DISCRETE MATHEMATICS

Objectives

This course aims to develop mathematical maturity and ability to deal with abstraction and to develop construction and verification of formal logical manipulation.

UNIT - I

RECURRENCE RELATIONS AND GENERATING FUNCTIONS
Recurrence - Polynomials and their Evaluations - Recurrence Relations - Solution of Finite OrderHomogeneous [linear] Relations - Solutions of Non-homogeneous Relations.

UNIT - II

MATHEMATICAL LOGIC
TF Statements - Connectives - Atomic and Compound Statements - Well-formed [Statement Formulae] - Parsing - Truth Table of a Formula - Tautology - Tautological Implications and Equivalence of Formulae.

UNIT - III

MATHEMATICAL LOGIC [CONTD..]
Replacement process - Functionally complete sets of connectives and Duality law - Normal Forms - Principal Normal Forms.

UNIT - IV

LATTICES
Lattices [omit example 15 Pp No.10.6) - Some properties of Lattices - New Lattices (omit remarkPp 10.14) - Modular and Distributive Lattices (omit theorem 10 and 17, Example 4 - Pp 10.23,Example 11 - Pp 10.24)

UNIT - V

BOOLEAN ALGEBRA
Boolean Algebra (omit theorem 25) - Boolean Polynomials - Karnaugh Maps (omit K-map for 5and 6 variables)

Recommended Text
M.K.Venkataraman, N.Sridharan and N.Chandrasekaran, [2003] Discrete Mathematics, The National Publishing Company, Chennai.

Reference Books
1. R.Johnsonbaugh [2001] Discrete Mathematics [5th Edn.] Pearson Education, Asia.,
2. C.L.Liu, [1985] elements of Discrete Mathematics, McGraw Hill, New York,
3. J.Truss. [2000] Discrete Mathematics for Computer Scientists [2nd Edn.] Pearson Education, Asia.
4. M.K.Sen and B.C.Chakraborthy [2002] Discrete Mathematics [2nd Edition,] Books and allied private Ltd., Kolkata.

ELECTIVE
(to choose 1 out of the given 2)

PAPER - 3 (THEORY)

A.FUZZY MATHEMATICS

Objectives

1. To know the fundamentals of fuzzy Algebra.
2. To know the basic definitions of fuzzy theory
3. To know the applications of fuzzy Technology.

UNIT - I

Introduction- Fuzzy subsets-Lattices and Boolean Algebras- L fuzzy sets-operations on fuzzy -α level sets - properties of fuzzy subsets of a set.
Sections 1.1-1.10

UNIT - II

Algebraic product and sum of two fuzzy subsets-properties satisfied by Addition and product-Cartesian product of fuzzy subsets.
Sections 1.11-1.13.

UNIT - III

Introduction- Algebra of fuzzy relations-logic-connectives.
Sections 2.1-2.4

UNIT - IV

Some more connectives-Introduction-fuzzy subgroup-homomorphic image and Pre-image of subgroupoid.
Sections 2.5,3.1-3.3

UNIT - V

Fuzzy invariant subgroups-fuzzy subrings.
Section 3.4 and 3.5.

Recommended Text

S.Nanda and N.R.Das "Fuzzy Mathematical concepts, Narosa Publishing House, New Delhi.

B. R Programming (Practical)

Objectives:

After taking the course, students will be able to

• Use R for statistical programming, computation, graphics, and modeling,

• Write functions and use R in an efficient way,

• fit some basic types of statistical models

• use R in their own research,

• be able to expand their knowledge of R on their own.

List of exercise:

Using R Programming develop the programmes in the following topics:

1. Arithmetic and matrix operations.
2. Simple functions
3. Plotting Bar chart and scatter plot
4. Plotting histogram and pie chart
5. Graphics for grouped data
6. Graphical display of distributions
7. Measures of central tendency -Mean, median, mode
8. Measures of Dispersion- std. deviation, mean deviation
9. Regression and correlation. Linear models.
10. Large sample tests
11. Small sample test t- tests
12. Small sample test F-tests
13. Small sample test Chi-square tests
14. ANOVA(one way)
15. ANOVA (Two way)

Textbooks and References:

1. Alain F. Zuur, Elena N. Ieno, Erik H.W.G. Meesters Beginner's Guide to R - Springer, 2009.
2. Allerhand M. Tiny Handbook of R - SpringerBriefs in Statistics, 2011
3. Baayen R. Analyzing Linguistic Data - A Practical Introduction to Statistics using R , 2008.
4. Gardener M. Beginning R - The Statistical Programming Language , 2012.
5. Jim Albert, Maria Rizzo R by Example, 2012.
6. Matloff N. Art of R Programming - A Tour of Statistical Software Design , 2011.

SKILL BASED SUBJECT

PAPER - 4

OPERATIONS RESEARCH

Objectives

To develop computational skill and logical thinking in formulating industry oriented problems as a mathematical problem and obtaining optimal solutions to the problems.

UNIT - I

Network logic-Numbering the events-construction of network diagram-Critical path method (CPM) - Three floats

UNIT - II

Three time estimates-Network scheduling by PERT Method- Cost consideration in PERT and CPM -Crashing

UNIT - III

Inventory models - EOQ model (a) Uniform demand rate infinite production rate with no shortages (b) Uniform demand rate infinite production rate with shortages allowed (c) Uniform demand rate finite production rate with no shortages (d) Uniform demand rate finite production rate with shortages allowed - Inventory control with Price Breaks.

UNIT - IV

Sequencing problem - n jobs through 2 machines, n jobs through 3 machines - two jobs through m machines - n jobs through m machines.

UNIT - V

Queuing Theory - Basic concepts - Steady state analysis of M/M/1 and M/M/N systems with finite and infinite capacities - Multi-channel queuing model (M/M/C)/FCFS/∞/∞) .

Recommended Text: Gupta P.K. and Hira D.S. (2000) *Problems in Operations Research*, S.Chand & Co. Delhi

Reference Books

1. J.K.Sharma, (2001) Operations Research: Theory and Applications, Macmillan, Delhi
2. KantiSwaroop, Gupta P.K. and Manmohan, (1999) *Problems in Operations Research*, Sultan Chand & Sons., Delhi.
3. V.K.Kapoor [1989] *Operations Research*, sultan Chand & sons.
4. Ravindran A., Philips D.T. and Solberg J.J., (1987) *Operations research*, John Wiley & Sons, New York.
5. Taha H.A. (2003) *Operations Research,* Macmillan Publishing Company, New York
6. S.J.Venkatesan, *Operations Research,* J.S. Publishers, Cheyyar-604 407.

Course Out Comes:

1. Interpret the solutions in network analysis
2. Knowledge about optimal use of resources
3. Understand to sequence the machines to do the job effectively
4. Analyze the system given and interpret the solutions

ALLIED SUBJECTS FOR MATHEMATICS STUDENTS

To choose any two out of the following Four Allied subjects as Allied I and Allied II. Each Allied subject consists of two papers as paper I and Paper II and one Practical paper.

1. Mathematical Statistics (Paper I and II)
2. Numerical Methods (Paper I and II)
3. Physics (Paper I and II)
4. Chemistry (Paper I and II)

ALLIED

MATHEMATICAL STATISTICS - I

Objective

To apply Statistics Methods for Mathematical Problems.

UNIT - I

Concept of Sample Space - Events - Definition of Probability (Classical, Statistical and Axiomatic) - Addition and Multiplication laws of Probability - Independence of Events - Conditional Probability - Baye's Theorem - Simple Problems.

UNIT - II

Random Variables (Discrete and Continuous) - Distribution Function - Expectation and Moments - Moment Generating Function - Probability Generating Function - Cumulant Generating Function - Simple Problems.

UNIT - III

Characteristic Function - Properties - Uniqueness and Inversion Theorem (Statement only) Chebychev's Inequality - Simple Problems

UNIT - IV

Concept of Bivariate Distribution - Correlation - Karl Pearson's Coefficient of Correlation - Rank Correlation - Linear Regression.

UNIT - V

Standard distributions: Discrete distributions - Binomial, Poisson, Hyper Geometric and Negative Binomial Distributions - Continuous Distributions Normal, Uniform, Exponential.

Recommanded text book:

S.C. Gupta & V.K. Kapoor : Fundamentals of Mathematical Statistics, Sultan & sons

Books for Reference

1. Hogg, R.V. &Craig.A.T.(1998) : Introduction to Mathematical Statistics, Macmillan
2. Mood. A.M. Graybill. F.A.&Boes.D.G.(1974) : Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967) : Statistical Methods, Oxford and IBH
4. Hoel, P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. Wilks S.S. Elementary Statistical Analysis, Oxford and IBH

ALLIED

MATHEMATICAL STATISTICS II

Objective

To apply Statistics for Mathematical problems

UNIT - I

Statistical Population Census and Sampling Survey - Parameter and Statistics - Sampling and Sampling Distribution and Standard Error. Sampling distributions - students 't', chi - square and F distributions.

UNIT - II

Test of significance - Large sample test for proportion, mean and standard deviation - Exact test based on 't', Chi - square and F distribution with respect to population mean, variance and correlation coefficient - Tests of independence of attributes - goodness of fit tests.

UNIT - III

Point estimation - Concept of unbiasedness, consistency, efficiency and sufficiency - Cramer- Rao Inequality - Methods of Estimation - Maximum Likelihood Estimation - Method of Moments.

UNIT - IV

Test of Hypothesis: Null and Alternate Hypothesis - Type I and Type II error - Power of the test - Neymann Pearson lemma - Likelihood Ratio Test - Concept of Most Powerful test (Statement and Results only) - Simple Problems

UNIT - V

Analysis of Variance - One - way and Two-way Classification - Basic Principles of Design of Experiments - Randomization, Replication, Local Control, Completely Randomized Design, Randomized Block Design and Latin Square Design.

Recommended Text:

S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan & sons

Books for Reference

1. Hogg, R.V. & Craig. A. T. (1998): Introduction to Mathematical Statistics, Macmillan
2. Mood.A.M.,Graybill. F.A.&Boes. D.G.(1974): Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967): Statistical Methods, Oxford and IBH
4. Hoel.P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. Wilks . S. S.Elementary Statistical Analysis, Oxford and IBH
6. O. Kempthone - Design of Experiments
7. Das and Giri : Design of Experiments Wiley Eastern

ALLIED PRACTICAL

MATHEMATICAL STATISTICS

1. Measures of location and Dispersion (absolute and relative)
2. Computation of Correlation Coefficient for raw and Grouped data, Rank Correlation Coefficient
3. Computation of Regression Equations for Raw and Grouped Data
4. Curve Fitting by the Method of Least Squares
   a. $y=ax+b$
   b. $y=ax^2+bx+c$
   c. $y=ae^{bx}$
   d. $y=ax^b$
5. Fitting of Binomial, Poisson, Normal distributions and tests of goodness of fit.
6. Large sample tests with regard to population mean, proportion, standard deviation
7. Exact tests with Respect to Mean, Variance and Coefficient of Correlation
8. Test for Independence of Attributes Based on Chi-Square Distribution
9. Confidence Interval based on Normal, t and Chi-square and F Distributions
10. Problems based on ANOVA-one way and two way Classification
11. Completely Randomized Design
12. Randomized Block Design
13. Latin Square Design

Note
Use of scientific calculator shall be permitted for practical examination. Statistical and Mathematical tables are to be provided to the students at the examination hall.

- Mathematics faculty alone should be appointed as examiners.

Books for Reference

1. Hogg, R.V. &Craig.A.T.(1998): Introduction to Mathematical Statistics, Macmillan.
2. Mood.A.M. ,Graybill. F.A.&Boes.D.G.(1974) : Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967): Statistical Methods, Oxford and IBH
4. Hoel.P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan &sons
6. S.C. Gupta & V.K. Kapoor: Fundamentals of Applied Statistics, Sultan & sons
7. Wilks . S. S. Elementary Statistical Analysis, Oxford and IBH
8. O. Kempthone - Design of Experiments.

ALLIED PAPERS

NUMERICAL METHODS - I

Objectives

This course will cover basic methods for finding the Finite differences, Central differences, Inverse interpolation, Summation of series, Interpolation for equal & unequal intervals, Solutions of simultaneous equations, Important principles, Method and Processes to get numerical results, Reliability of numerical result.

UNIT - I

FINITE DIFFERENCES

First and higher order differences - forward differences and Backward differences - Properties of operators - Differences of a Polynomial - Factorial Polynomials - Operator E, Relation between ▲,▼and E-Interpolation - Newton - Gregory forward & backward formulae for interpolation.

UNIT - II

CENTRAL DIFFERENCES

Central difference Operators - Central differences formulae: Gauss Forward and Backward formulae - Sterling's formula - Bessel's formula.

UNIT - III

INTERPOLATION FOR UNEQUAL INTERVALS

Divided differences - Newton's divided differences formula and Lagrange's - Estimating the Missing terms (With one or more missing values).

UNIT - IV

INVERSE INTERPOLATION

Lagrange's method and Reversion of series method (Using Newton's forward formula only).

Summation of series: Sum to n term of the series whose general term is the first difference of a function-summation by parts.

UNIT - V

SOLUTIONS OF SIMULTANEOUS LINEAR EQUATIONS

Gauss elimination method-matrix inversion method-Gauss-Jordan Method, Gauss-Seidal method (Three unknowns only).

Recommended Text

1. B.D. Gupta.(2001) *Numerical Analysis.*Konark Pub. Ltd., Delhi
2. M.K. Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.

Reference Books

1. S. Arumugham. (2003) *Numerical Methods*, New Gamma Publishing, Palamkottai.
2. H.C. Saxena. (1991) *Finite differences and Numerical analysis* S.Chand & Co., Delhi
3. A.Singaravelu (2004). *Numerical Methods*Meenakshi Agency, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite difference & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

NUMERICAL METHODS II

Objectives

This course covers the techniques of Numerical Differentiation and Numerical Integration. It also deals with solution of difference equations, Algebraic and Transcendental equations and Numerical solution of Ordinary differential equations of first order.

UNIT - I

NUMERICAL DIFFERENTIATION

Newton's forward and backward differences to compute derivatives-derivative using divided differences formula-maxima and minima using the above formulae.

UNIT - II

NUMERICAL INTEGRATION

General Quadrature formula-Trapezoidal rule-Simpson's one third rule- Simpson's three-eight rule, Weddle's rule- Euler-Maclaurin Summation Formula

UNIT - III

DIFFERENCE EQUATIONS

Linear differences equations-Linear homogeneous difference equation with constant co-efficient-Particular integrals for a^x, x^m, sinax, cosax and a^x f(x).

UNIT - IV

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Bisection method-Iteration method-Regula-falsi method (False Position Method)-Newton-Rapson Method.

UNIT - V

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS (FIRST ORDER ONLY)

Euler's method- Euler's modified method-Picard's method - Taylor's methods-Runge-Kutta method (Fourth order only).

Recommended Text

1. B.D. Gupta. (2001) *Numerical Analysis.*Konark Pub. Ltd., Delhi
2. M.K.Venkataraman. (1992) *Numerical methods for Science and Engineering* National

Publishing Company, Chennai.

Reference Books

1. Gupta-Malik, Calculus of finite differences and numerical Analysis, KrishbaPrakashanMandir, Meerut Seveenth Edition.
2. S.C.Saxena, Calculus of finite differences and Numerical Analysis, S.Chand& Co., New Delhi. IX Edition.
3. A.Singaravelu, Numerical methods, Meenakshi Publications-First Edition 1992.
4. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite Difference & Numerical Analysis, S.Chand& Company Ltd., New Delhi-55.

ALLIED PRACTICAL

NUMERICAL METHODS

LIST OF PROBLEMS

1. Derivatives by Newton’s method
2. Gauss elimination method.
3. Gauss-Jacobi method.
4. Gauss-Siedel method.
5. Newton's forward and backward interpolation.
6. Lagrange interpolation.
7. Trapezoidal and Simpson one-third rules.
8. Euler's method.
9. Picard’s method
10. Runge-Kutta's method.

ALLIED
PHYSICS
PAPER-1

Course Objectives

1. To understand the basics of gravitation and to study the properties of matter.
2. To learn the law of thermoelectric circuits and thermoelectric diagrams.
3. To teach the growth and decay of a transient current and magnetometer.
4. To explain production of ultrasonics and reverberation time.
5. To know the basics of laser and fibre optics principles and applications.

UNIT-1: Properties of Matter

Gravitation: Acceleration due to gravity -Determination of 'g' by Simple pendulum - Drawbacks of simple pendulum –Determination of time period of compound pendulum - 'g' by compound pendulum -Centre of Oscillation and Centre of Suspension are interchangeable-Determination of 'g' by Bar/compound pendulum.

Elasticity: Bending of beams -Expression for bending moment - Cantilever Depression at the loaded end of a cantilever Expression forYoung's modulus -non–uniform bending-Pin and microscope method.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period -Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid -Viscous force - Co-efficient of viscosity of a liquid – Poiseuille's formula -Experimental method using Burette- Effect of temperature and pressure on viscosity-applications.

Surface Tension: Surface tension of a liquid-Surface Tension and interfacial surface tension by the method of drops-applications.

UNIT-2: Thermo Electricity

Seeback, Peltier and Thomson effects - laws of thermoelectric circuits -Peltier coefficient - Thomson coefficient -application of thermodynamics to a thermocouple and expressions for Peltier and Thomson coefficients -thermo electric power and thermo electric diagrams.

UNIT-3: Transient Current and Magnetism

Growth and decay of current in a circuit containing resistance and inductance- Growth and decay of charge in circuit containing resistance and capacitor - growth and decay of charge in a LCR circuit – condition for the discharge to be oscillatory – frequency of oscillation.

Magnetism -Magnetic moment and pole strength of a magnet – Deflection magnetometer – Tan

C Position- Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer and the vibration magnetometer .

UNIT -4: Acoustics

Sound: Transverse vibration of strings -Velocity and frequency of vibrations of a stretched string -laws -Sonometer -A.C. Frequency - Steel wire- Brass wire.

Introduction to Ultrasonics – Piezo electric effect–production by Piezo electric method – properties –applications- Acoustics of buildings – reverberation time – derivation of Sabine's formula – determination of absorption coefficient-Acoustic aspects of halls and auditoria.

UNIT-5:Lasers and Fibre Optics

Laser: Introduction - Principles of laser -Einstein's explanation for stimulatedemission – Differences between stimulated and spontaneous emission - Population inversion –Properties of laser -Types of lasers - He- Ne Laser - Semiconductor Laser-Applications of laser.

Fibre optics: Basic principle of an optical fibre -Total internal reflection -Basic structure of an optical fibre -Numerical aperture –Coherent bundle – Attenuation and dispersion - classification of optical fibres-step index and graded index fibers – single mode and multi mode fibers-Fibre optic communication system block diagram.-applications.

Text Books

Unit 1 and Unit 4

1. R. Murugesan and KiruthigaSivaprasath, Properties of Matter and Acoustics, S. Chand & Co. New Delhi, Kindle edition.

Unit 2 and Unit 3

1. R. Murugesan, Electricity & Magnetism, S. Chand & Co. New Delhi, 2019.

Unit 5

1. N Subrahmanyam, BrijLal and M.N Avadhanulu, A Text Book of Optics, S. Chand &Co. New Delhi, Revised Edition as per UGC model syllabus.

Reference Books

1. BrijLal and N Subrahmanyam,Electricity and Magnetism, S Chand & Company Pvt Ltd, New Delhi, 2000.

2. D.C. Tayal, Electricity and Magnetism, Himalaya Publishing House,Bombay, 2014.
3. BrijLal and N.Subrahmanyam, A Text Book of Sound,Vikas Publications, New Delhi (2 Edition)
4. C.L.Arora, Physics for Degree Students B.Sc First Year, S. Chand Publishing, 2013.
5. K.Thyagarajan and Ajay Ghatak, Introduction to Fibre optics-, Cambridge University.
6. Ajay Ghatak and K.Thyagarajan, Fiber optics and Lasers-The two revolutions, Macmillan, 2006.
7. K.Thyagarajan and Ajay Ghatak, Lasers; Fundamentals and applications, Springer.
8. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2016.

E-MATERIALS

1. https://courses.lumenlearning.com/physics/chapter/16-4-the-simple-pendulum/
2. https://www.youtube.com/watch?v=aw0_seEt4v0
3. https://en.wikipedia.org/wiki/Thermoelectric_effect
4. https://www.youtube.com/watch?v=S0I37M2sx_0
5. https://physicscatalyst.com/elecmagnetism/growth-and-delay-charge-R-C-circuit.php
6. https://www.youtube.com/watch?v=PLQQPXot6vE
7. https://www.youtube.com/watch?v=d0_Eff4MXwM
8. https://www.techglads.com/cse/sem1/production-of-ultrasonics-by-piezoelectric-methods/
9. https://thefactfactor.com/facts/pure_science/physics/optical-fibre/5159/
10. https://www.youtube.com/watch?v=auk1OS0SVWc (Tamil video)

Course Objectives

1. After studied unit-1, the student will be able to find the acceleration due to gravity at a place using simple pendulum and compound pendulum. Also can know the properties of matter like elasticity, viscosity and surface tension.
2. After studied unit-2, the student will be able to learn thermo emf using Seebeck and Peltier effects and hence understand thermoelectric circuits.
3. After studied unit-3, the student will be able to explain growth and decay of a transient current in a circuit containing resistance-inductance, resistance-capacitance and LCR in series. Also will be able to determine the horizontal components of earth's magnetic induction at a place using deflection magnetometer in Tan C position.
4. After studied unit-4, the student will be able to derive the expression for the velocity of a sound in a stretched string and hence they can determine the frequency of A.C mains.
5. After studied unit-5, the student will be able to understanding the principle of laser and can demonstrate the working of He-Ne laser and applications of laser. Also, the student will be able to learn the fibre optics, structure and application in communication.

ALLIED
PHYSICS
PAPER-2

Course Objectives

1. To study the concept of special theory of relativity.
2. To expose the structure of atom with different models.
3. To know the definition of binding energy and to study about nuclear models
4. To learn the different number system in digital electronics and logic gates
5. To give an introduction about nanomaterial.

UNIT-1: Special Theory of Relativity

Frames of reference-inertial frames and non-inertial frames -Galilean transformations - Michelson-Morley experiment-interpretation of results - postulates of special theory of relativity Lorentz transformation equations -length contraction - time dilation - transformation of velocities -variation of mass with velocity -Mass-energy equation.

UNIT-2: Atomic Physics

Bohr atom model – Critical Potentials - Experimental determination of critical potentials - Franck and Hertz's experiment -Sommerfield's Relativistic atom model The vector atom model – spatial quantization–spinning of an electron –quantum numbers associated with the vector atom model – coupling schemes –LS and jj coupling – the Pauli's exclusion principle – Stern and Gerlach experiment

UNIT-3: Nuclear Physics

Binding energy-Binding energy per nucleon-Packing fraction-Nuclear models – liquid drop model – semi empirical mass formula – merits and demerits -shell model -evidences for shell model – nuclear radiation detectors –ionization chamber – G.M Counter-Wilson cloud chamber-Particle accelerators-Cyclotron-Betatron.

Unit-4: Digital Electronics

Number systems -Decimal, Binary, Octal and Hexadecimal system – Conversion from one number system to another- Binary Arithmetic -Addition –Subtraction- 1's and 2's complement - Binary codes- BCD code – Excess 3 code, Gray code.

NAND, NOR and EXOR – functions and truth tables. NAND & NOR as universal gates-Half adder and Full adder - Half subtractor and Full subtractor using NAND gate only.

UNIT-5: Nanomaterial

Introduction-Nanomaterial- Properties of nanomaterial (size dependent) -synthesis of nanomaterial- sol gel- hydrothermal method-Scanning Electron Microscope (SEM)- Principle and Instrumentation-Fullerenes- Carbon nanotubes- Fabrication and structure of carbon nanotubes - Properties of carbon nanotubes (Mechanical and Electrical) - Applications ofCNT's.

Text Books

Unit 1 to Unit 3

1. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2016

Unit 4

1. V.Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007

Unit 5

1. V. Raghavan, *Material Science and Engineering* ,Printice Hall India.,2004.

Reference Book

1. Allied Physics – R. Murugesan S. Chand & Co. New Delhi, 2005.
2. A Text book of Digital electronics – R.S.Sedha, S.Chand&Co, 2013
3. Malvino and Leech, Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi, 2000.
4. Dr. M.N. Avadhanulu, *Material science*, S.Chand& Company, New Delhi, 2014.
5. M.Arumugam, *Material science*, Anuradhapuplishers, 1990.
6. V. Rajendran, *Material Science*, Tata McGraw Hill Ltd, New Delhi,2001.
7. D.C.Tayal, Nuclear Physics, Himalaya Publishing House, 2009

E-MATERIALS

1. https://en.wikipedia.org/wiki/Galilean_transformation
2. https://www.youtube.com/watch?v=NH3_lIkSB9s
3. https://www.youtube.com/watch?v=EEWuUst2GK4
4. https://en.wikipedia.org/wiki/Vector_model_of_the_atom
5. https://www.tutorialspoint.com/what-is-a-geiger-muller-counter
6. https://www.youtube.com/watch?v=jxY6RC52Cf0
7. https://www.tutorialspoint.com/digital_circuits/digital_circuits_number_systems.htm
8. https://www.youtube.com/watch?v=4ae9sJBBkvw

9. https://en.wikipedia.org/wiki/Nanomaterials
10. https://www.youtube.com/watch?v=mPxoJz6treE (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to study the frames of reference, Galilean transformation equations and special theory of relativity.
2. After studied unit-2, the student will be able to describe the different atomic models and Stern and Gerlach Experiment.
3. After studied unit-3, the student will be able to explain binding energy, liquid drop model, G.M counter and particle accelerators.
4. After studied unit-4, the student will be able to know the conversion of number systems from one to other and also will be able to design universal gates using NAND and NOR gates.
5. After studied unit-5, the student will be able to understanding the basics of nanomaterial, synthesis and its applications.

ALLIED PRACTICAL- PHYSICS

List of Experiments (Any 12 Experiments only)

1. Determination of 'g' using Compound pendulum.
2. Young's modulus-Non-Uniform bending-Pin & microscope
3. Rigidity Modulus – Torsional oscillation method (without masses).
4. Rigidity Modulus – Static Torsion method using Scale and Telescope.
5. Surface tension and Interfacial Surface tension by Drop Weight method.
6. Sonometer – Frequency of a Tuning fork.
7. Sonometer –Determination of A.C. frequency- using steel and brass wire
8. Air Wedge – Determination of thickness of a thin wire
9. Newton's Rings – Radius of Curvature of a convex lens.
10. Spectrometer – Refractive index of a liquid – Hollow prism.
11. Spectrometer grating – Minimum Deviation- Wavelength of Mercury lines.
12. Potentiometer – Calibration of Low range voltmeter.
13. Deflection magnetometer and Vibration magnetometer-Tan C Position-Determination of m and B_H.
14. Figure of merit- Table galvanometer.
15. Construction of AND, OR gates using diodes and NOT gate using a transistor.
16. NAND/NOR as universal gate.
17. Half adder and Full adder using NAND gate.
18. Half subtractor and Full subtractor using NAND gate.
19. Lasers: Study of laser beam parameters.
20. Measurement of Numerical aperture (NA) of a telecommunication graded index optic fiber.
21. Fiber attenuation of a given optical fiber.

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai,2018.

2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Dr. S. Somasundaram, Practical Physics, Apsarapublications,Tiruchirapalli, 2012.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

ALLIED

PAPER - 1

CHEMISTRY - I

Objective:

- Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications wherever necessary are to be taught for I- Semester.

UNIT - I

General Metallurgy - Extraction of Metals - Minerals and Ores - Difference between Minerals and Ores - Minerals of Iron, Aluminum and Copper - Ore Dressing or Concentration of Ores - Types of Ore Dressing- Froth Floatation process, Gravity separation and Magnetic separation - Calcination, Smelting, Roasting, Fux, Slag - Definition - Reduction methods - Goldschmidt Aluminothermic process and Carbon Reduction method - Refining of Metals - Electrolytic, Van Arkel and Zone Refining - Ores of Titanium and Cobalt - Extraction of Titanium and Cobalt.

UNIT - II

Cycloalkanes - Preparation - Wurtz reaction and Dieckmann's condensation - Properties of Cycloalkanes - Substitution and Ring opening reactions - Polarisation - Inductive effect, Mesomeric effect and Steric effect (Acid and Base Strength) - Stereoisomerism - Types - Cause of Optical Activity - Enantiomers - Diastereomers - Meso form - Optical Activity of Lactic acid and Tartaric acid - Racemisation and Resolution - Definition and Methods - Geometrical isomerism - Definition and example - Maleic and Fumaric acid - Differences.

UNIT - III

Chemical Kinetics - Rate of a reaction - Definition of Order and Molecularity - Distinction between Order and Molecularity - Derivation of First order rate equation - Half Life Period of first order reaction - Catalysis - Catalyst - Autocatalyst - Enzyme catalyst - Promoters - Catalytic poisons - Active Centre - Differences between Homogeneous and Heterogeneous Catalysis - Industrial Applications of Catalysts - Photochemistry - Grothus-Draper's law - Stark-Einstein's law - Quantum yield -

Photosynthesis - Phosphorescence - Fluorescence.

UNIT - IV

VSEPR Theory - Hybridisation and Shapes of simple molecules BF_3, PCl_5, SF_6 and XeF_6. - Fuels - Classification of Fuels - Calorific value of Fuels - Water gas, Carbureted Water gas and Producer gas - Composition and Uses - Non-Conventional fuels - Need of Solar Energy - Applications - Biofuels - Oil gas, Natural gas and LPG - Uses - Osmosis - Osmotic pressure - Reverse osmosis - Definition - Desalination of Sea water.

UNIT - V

Nuclear Chemistry - Atomic number, Mass number - Isotopes, Isobars and Isotones - Definition and Examples - Definition of Half life period - Nuclear Binding Energy, Mass Defect and N/P ratio - Nuclear Fission and Nuclear Fusion (Elementary idea) - Applications of Radioisotopes in Medicine, Agriculture and Industries - Carbon Dating - Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking - Naphthalene - Preparation - Haworth's method - Properties - Oxidation, Reduction and Uses of Naphthalene - Structure of Naphthalene (Structural elucidation not necessary) - Conductors, Insulators, Semiconductors, N - and P - Type Semiconductors - Definitions and Examples.

ALLIED PAPER – 2

CHEMISTRY - II

OBJECTIVE:

Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins, Medicinal Chemistry, Corrosion and Applications wherever necessary are to be taught for II-semester.

UNIT - I

Coordination Chemistry - Nomenclature of Coordination Compounds - Ligands, Central Metal Ion and Complex Ion - Definition and Examples - Coordination Number - Werner's Theory of Coordination Compounds - Chelates - Functions and Structure of Haemoglobin and Chlorophyll - Industrial Chemistry - Fertilisers and Manures - Biofertilisers - Organic Manures and their importance - Role of NPK in plants - Preparation and Uses of Urea, Ammonium Nitrate, Potassium Nitrite and Super Phosphate of Lime - Contents in Match Sticks and Match Box - Industrial making of Safety Matches - Preparation and Uses of Chloroform, DDT, Gammexane and Freons.

UNIT - II

Carbohydrates - Definition and Examples - Classification - Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate - Amino Acids - Definition and Examples - Classification of Amino Acids - Preparation - Gabriel Phthalimide Synthesis - Properties - zwitterion and Isoelectric point - Structure of Glycine - Proteins - Definition - Classification of Proteins based on Physical properties and Biologcal functions - Primary and Secondary Structure of Proteins (Elementary Treatment only) - Composition of RNA and DNA and their Biological role - Tanning of Leather - Alum (Aluminum chloride tanning) - Vegetable tanning - Chrome Tanning.

UNIT - III

Electrochemistry - Electrolytes - Definition and Examples - Classification - Specific and Equivalent Conductance - their determination - Variation of Specific and Equivalent conductance with Dilution - Ostwald's Dilution Law and its Limitations - Kohlrausch's Law - Determination of Dissociation Constant of weak Electrolytes using Conductance measurement - Conductometric titrations - pH - Definition and pH determination by indicator method - Buffer solutions - Buffer action - Importance of buffers in the living systems.

UNIT - IV

Paints - Components of Paint - Requisites of a Good Paint - Pigments - Classification of Pigments on the basis of Colour - Examples - Dyes - Definition - Chromophores and Auxochromes - Examples - Colour and Dyes - Classification based on Constitution and Application - Examples - Vitamins - Definition - Classification - Water Soluble and Fat Soluble - Occurrence - Biological Activities and Deficiency Diseases caused by Vitamin A, B, C, D, E and K - Hormones - Definition and Examples - Biological Functions of Insulin and Adrenaline - Chromatography - Principles and Applications of Column and Paper chromatography- R_f value.

UNIT - V

Drugs - Sulpha Drugs - Preparation and Uses of Sulphapyridine and Sulphadiazine - Mode of Action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicol and Streptomycin - Drug Abuse and Their Implication - Alcohol - LSD - Anaesthetics - General and Local Anaesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS - Electrochemical Corrosion and its Prevention - Electroplating - Applications.

ALLIED PRACTICAL

CHEMISTRY

VOLUMETRIC ANALYSIS

1. Estimation of HCl - Standard sulphuric acid.
2. Estimation of Borax - Standard Sodium Carbonate.
3. Estimation of NaOH - Standard Oxalic Acid.
4. Estimation of $FeSO_4$ - Standard FAS.
5. Estimation of Oxalic acid - Standard $FeSO_4$.
6. Estimation of FAS - Standard Oxalic Acid.
7. Estimation of Oxalic acid - Standard Oxalic Acid.
8. Estimation of Fe^{2+} using Diphenylamine / N- Phenyl Anthranilic acid as indicator.

ORGANIC ANALYSIS

Systematic Analysis of Organic Compounds containing One Functional Group and Characterisation by Confirmatory Tests.

Reactions of Aromatic Aldehyde, Carbohydrates, Mono and Dicarboxylic acids, Phenol, Aromatic Primary Amine, Amide and Diamide.

Reference Books

- Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).
- Inorganic Chemistry - B. R.. Puri, L. R. Sharma and K. C. Kallia - Milestone Publications (2013).
- Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
- Text Book of Inorganic Chemistry - R. Gopalan, Universities Press - 2012.
- Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
- Advanced Organic Chemistry - Bahl and Arun Bahl - Sultan Chand and Co. Ltd - 2012.

- Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
- A Text Book of Organic Chemistry K. S. Tewari, N. K. Vishol, S. N. Mehrotra- Vikas Publishing House - 2011.
- Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishal Publishing Company - 2013.
- Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha andU. N. Dash - Sultan Chand & Co - 2006.
- Understanding Chemistry - C. N. R. Rao, Universities Press - 2011.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. MICROBIOLOGY
DEGREE COURSE

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3	III	Core Theory	Paper-1	6	4	Fundamentals of Microbiology	25	75	100
4	III	Core Practical	Practical-1	4	0	Experiments in Basic Microbiology	0	0	0
5	III	Allied -1	Paper-1	4	3	Biochemistry - I	25	75	100
6	III	Allied- 1	Practical-1	2	0	Biochemistry	0	0	0
7	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
8	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**20**		**150**	**450**	**600**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
10	III	Core Theory	Paper-2	5	4	Microbial Physiology	25	75	100
11	III	Core Practical	Practical-1	3	2	Experiments in Basic Microbiology (Contd.)	25	75	100
12	III	Allied-1	Paper-2	4	3	Biochemistry - II	25	75	100
13	III	Allied Practical - 1	Practical-1	2	2	Biochemistry (Contd.)	25	75	100
14	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
15	IV	Value Education		2	2	Value Education	25	75	100
16	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**

THIRUVALLUVAR UNIVERSITY

B.Sc. MICROBIOLOGY

SYLLABUS
CBCS PATTERN
(With effect from 2020 - 2021)

SEMESTER I

CORE PAPER - 1

FUNDAMENTALS OF MICROBIOLOGY

Course Objective: To provide an insight on the fundamentals of Microbiology and microbes as a major component of the ecosystem.

Course Outcomes:
At the end of the course, the student will be able to

1. Understand the scope and relevance of Microbiology as a scientific discipline.
2. Decide on the correct type of microscopy and staining.
3. Gain knowledge on the various classification of microorganisms.
4. Study the morphology and structure of microorganism.
5. Get acquainted with various sterilization techniques.

Unit 1: History of Microbiology - Definition and Scope of Microbiology; History of Microbiology; The origin of Microbial life - Theory of Spontaneous generation; Contributions of Anton Van Leewenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Thomas J. Burrill, Sergei N. Winogrdsky, Beijerinck, Emil Christian Hansen, S.A. Waksman, Alexander Fleming; Endosymbiotic theory; Microbiology and the future.

Unit 2: Microscopy and staining - Microscopy - Simple, Compound, Dark field, Phase contrast, Fluorescence and Electron microscopy; Staining methods and principles - Simple, Differential (Grams staining) and Special staining techniques (Acid fast staining, Spore staining, Capsule staining, Flagellar staining, Negative staining, Staining of metachromatic granules).

Unit 3: Classification of microorganisms - Microbial Diversity - Prokaryotes and Eukaryotes; Binomial nomenclature of Microbes; Classification – Three Kingdom, Five Kingdom, Eight Kingdom (Cavalier Smith) Concepts; Bacterial classification according to Bergey's Manual; Classification outlines of Algae, Fungi, Protozoa and Virus.

Unit 4: Structure of microorganisms - Morphology and Anatomy of bacteria - cell wall, cytoplasmic membrane, capsule, cilia, fimbriae and flagella - structure and types, intracellular organelles and cytoplasmic inclusions; Endospore – sporulation.

Unit 5: Concept of sterilization - Control of microbial growth by Sterilization and Disinfection – Definitions, methods; Physical, Chemical methods – Antiseptics; Antimicrobial agents – Antibacterial, antifungal and antiviral agents with examples – Resistance mechanisms.

Text Books

1. Microbiology. 6th Edition. Pelczar Jr. M.J., Chan E.C.S and Kreig, N.R. (2006). McGraw Hill Inc., New York.
2. Text Book of Microbiology. 9th edition. Ananthanarayan R and Paniker C.K.J. (2013). Universities Press, Hyderabad.
3. A Text of Microbiology. Revised edition. Dubey R.C and Maheswari D.K. (2012). S. Chand & Company Ltd., New Delhi.

Reference books

1. Microbiology. 8th Edition. Lansing M. Prescott, John P. Harley, Donald Klein. (2011). McGraw Hill Inc., New York.
2. General Microbiology. 2nd Edition. Robert F. Boyd (2000). Times Mirror / Moshy College Publishing, Virginia.
3. Principles of Microbiology. 1st Edition. Geeta Sumbali and Mehrotra R.S (2009). Tata McGraw Hill P. Ltd., New Delhi.
4. Microbiology. 5th edition. David B.D., Delbeco R., Eisen, H.N. and Ginsburg, H.S (1990). Harper and Row, New York.
5. Fundamental Principles of Bacteriology, 7th edition. Salee A.J (1992). McGraw Hill Publishing Co. Ltd., New York.

ALLIED - 1

PAPER – 1

BIOCHEMISTRY I

OBJECTIVE:

To acquire knowledge on the structure and functions of biomolecules

At the end of the course, the students will be able to

CO1	Explain the structure, biological importance of carbohydrates, from monosaccharides to polysaccharides
CO2	Identify the structure and classification of amino acids,
CO3	Classify proteins and explain their properties
CO4	Define and classify lipids with examples, explain the properties of fats and describe the structure and biological functions of phospholipids, glycolipids and sterols
CO5	Illustrate the structure of nucleotides, distinguish DNA and RNA and describe the structure of DNA, types of RNA and their biological functions

UNIT-I: Carbohydrates

Definition and Classification of carbohydrate. Monosaccharides–Glucose, Fructose and Arabinose, Linear and ring forms (Haworth formula)for glucose and fructose. Anomer, epimer and enatiomers-Definition with examples. Disaccharides –Definition- Sucrose, maltose and Lactose occurrence, structure and functions. Polysaccharides – Homopolysaccharides -Starch -Structure and functions. Heteropolysacharides-Aminosugars and sugar acids.

UNIT-II: Amino acids

Definition and classification of amino acids. Reaction of amino acids with ninhydrin, Color reactions of amino acids (Xanthoproteic test, Morners test, Millons test, Sakaguchi test, Lead acetate test and Pauly's test), Amphoteric nature, isoelectric pH and Zwitter ion.

UNIT-III: Proteins

Proteins-Definition. Peptide bond formation. Classification of proteins based on solubility, shape and size. Denaturation. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT-IV: Lipids

Definition, classification and functions of lipids. Occurrence, chemistry and biologicalfunctions of simple lipids, compound lipids (e.g. phospholipids) and derived

lipids:steroids (e.g. cholesterol). Physical property-emulsification. Chemical property-saponification. Functions of bile acids and bile salts.

UNIT- V: Nucleic acids

Nucleic acid- Composition of nucleic acid. Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNAand its biological functions. Chargaff's rule. RNA-Structure, types and functions of RNA: tRNA, mRNAand rRNA. Differences between DNA and RNA

REFERENCES

1. J. L. Jain, Nitin Jain, Sunjai Jai., Fundamentals of Biochemistry 7th editionS. Chand @ Co.Ltd .,2016
2. U. Satyanarayanan BiochemistryElseiver 2017
3. David.L.Nelson, Michael. M.Cox Lehninger principles of Biochemistry 7theditionFreeman. W.H. and Company2017
4. Victor Rodwell Harper's Illustrated Biochemistry McGrew. Hill 2018

SEMESTER I

CORE PAPER- 2

MICROBIAL PHYSIOLOGY

Course Objective: To provide an in depth understanding on the physiological requirements for the growth of microorganisms and microbial metabolism.

Course Outcomes:
At the end of the course, the student will be able to

1. Outline on the nutritional requirement and nutritional types of bacteria.
2. Demonstrate various techniques employed in the cultivation of microorganisms.
3. Discuss on the different phases of microbial growth.
4. Explain the basic concepts of microbial metabolism.
5. Elaborate on the biosynthesis of bacterial cell wall and mechanism of photosynthesis.

Unit 1: Nutritional requirements of microorganisms – micro and macro elements; Nutritional types of microorganisms - Autotrophs, Heterotrophs, Photoautotrophs, chemoautotrophs, Lithotrophs, oligotrophs; Transport of nutrients by active and passive transport mechanism.

Unit 2: Cultivation of microbes - Bacteria, Fungi and Virus; Preparation of Culture media – types of culture media, liquid and solid media preparation; Pure culture techniques - Streak, Pour and spread plate methods; Preservation of cultures.

Unit 3: Different phases of growth curve - generation time; Factors influencing microbial growth - oxygen, temperature, pH, pressure, salt concentration, nutrient; synchronous growth and continuous cultivation - diauxic growth.

Unit 4: Metabolism – TCA cycle - electron transport chain - oxidative and substrate level phosphorylation; Bacterial enzymes; Anaerobic respiration - Sulphur, nitrogenous compounds and carbon dioxide as final electron acceptor; Fermentations - alcoholic, propionic and mixed acid fermentation.

Unit 5: Photosynthesis - Oxygenic and anoxygenic carbon dioxide fixation; Biosynthesis of bacterial cell wall; biosynthesis of amino acids (glutamic acid family); Bioluminescence.

Text Books

1. Microbiology, 5th Edition. Pelczar Jr. M.J. Chan. E.C.S and Kreig. N.R (2006). McGraw Hill Inc. New York.
2. Essentials of Microbiology. Rajan. S and Selvi Christy (2015). Anjanaa Book House Publishers, Chennai.
3. The Physiology and Biochemistry of Prokaryotes. 4th edition. David white (2011). Oxford university press, UK

Reference books

1. General Microbiology, Schlegel H.G., (1993, 7th Edition), Cambridge University Press.
2. Microbial physiology, 4th edition. Moat G, John W. Foster and Michael P. Spector

(2002). A John Wiley sons, Inc. publication. New Delhi.
3. Microbiology. 8th Edition. Lansing M. Prescott, John P. Harley, Donald Klein. (2011). McGraw Hill Inc., New York.
4. Fundamental Pinciples of Bacteriology, 7th edition. Salee A.J (1992). McGraw Hill Publishing Co. Ltd., New York.
5. Microbial Physiology & metabolism, Caldwell, D.R., (1995) Wm. C. Brown Communications, Inc., USA.

CORE PRACTICAL - 1

EXPERIMENTS IN BASIC MICROBIOLOGY

Course Objective: To enable the students to perform sterilization of glasswares; to prepare culture media and sterilize them; to stain and observe various microorganisms; to perform biochemical test to differentiate bacteria.

LIST OF EXPERIMENTS

Rules and Regulations in Microbiology Laboratory

Safety precautions

Preparation of cleaning solutions

Sterilization of Glasswares and Culture Media

Microscopy – Parts and functions of a compound microscope

Staining – Simple staining, Gram staining

Motility demonstration: Hanging drop technique

Morphology of Algae – wet mount

Morphology of fungi – LPCB staining

Micrometry - Determination of size of Bacteria, yeast.

Media preparation - Liquid media, solid media, Agar slants, Agar plates

Pure culture technique - Streak plate

Oxidase and catalase tests

Biochemical tests - IMViC tests, urease test, TSI, Carbohydrate fermentation

Reference Manuals

1. Experimental Procedures in Life Sciences. Rajan. S and Selvi Christy (2015). Anjanaa Book House Publishers, Chennai.

2. Microbiology: A Laboratory Manual. Cappuccino and Sherman. (7th edition, 2004) Berjamin Cummings Publications.

ALLIED - 1

PAPER – 2

BIOCHEMISTRY II

OBJECTIVE:

To acquire a wide knowledge on metabolism, disorders of metabolism and biological functions of vitamins and minerals

At the end of the course, the students will be able to

CO1	Illustrate the reactions of various metabolic pathways
CO2	Acquire knowledge on the various metabolic disorders
CO3	Classify enzymes and explain their functions
CO4	Define and classify vitamins with examples, explain the sources, RDA and functions of fat soluble and water soluble vitamins
CO5	Illustrate the sources, RDA and functions of minerals

UNIT-I: Metabolism

Metabolism-Catabolism and anabolism-Definition. Reactions of glucose oxidation-Glycolysis, TCA cycle and its energetics, HMP shunt and its significance. Amino acid-transamination and Deamination,reaction, Urea cycle- Formation of urea.

UNIT-II: Metabolic Disorders

Diabetes mellitus- definition. Types and symptoms. Glycogen storage diseases-Types, Renal Glycosuria-Definition and causes. In born errors of amino acid metabolism- Phenylketonuria, Alkaptonuria (Black urine syndrome) and albinism

UNIT-III: Enzymes

Enzymes-Definition, IUB system of classification with one example. Mechanism of enzyme action- Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Coenzymes- Vitamins as coenzymes (Tabulation of Coenzymes with functions in metabolism)

UNIT-IV: Vitamins

Vitamins- fat soluble (Vitamin A, D, E and K) and water soluble vitamins (Vitamin B1, B2, B3 and B12),Vitamin C - sources, RDA, biological function and deficiency of Vitamins of the above mentioned vitamins

UNIT V-Minerals

Minerals- sources, RDA, biological functions and deficiency of Calcium, Iron, Phosporus, Sodium and potassium. Examples of minerals as cofactors in metabolism.

REFERENCES

1. J. L. Jain, Nitin Jain, Sunjai Jai., Fundamentals of Biochemistry 7th edition S. Chand @ Co.Ltd .,2016
2. U. Satyanarayanan BiochemistryElseiver 2017
3. David.L.Nelson, Michael. M.CoxLehninger principles of Biochemistry 7th editionFreeman. W.H. and Company2017
4. Victor RodwellHarper's Illustrated BiochemistryMcGrew. Hill 2018

ALLIED PRACTICAL

PRACTICAL I

BIOCHEMISTRY I & II

CO NUMBER	CO Statement
CO1	Quantify glucose in unknown solution by benedicts method
CO2	Quantify ascorbic acid in lemon by Dichlorophenol indo phenol dye method
CO3	Quantify glycine by Sorenson's formal titration method
CO4	Qualitatively analyze the carbohydrates and amino acids and report the type of carbohydrate based on specific tests
CO5	Differentiate the carbohydrates based microscopic examination of the crystal structure.

Volumetric Estimation

1. Estimation of Glucose by Benedict's method.
2. Estimation of Ascorbic acid by 2, 6 dichlorophenol indophenols dye method.
3. Estimation of Glycine by Sorenson's formal titration.

A) Qualitative analysis of Carbohydrates

1. Qualitative analysis of Glucose,
2. Qualitative analysis of Fructose,
3. Qualitative analysis of Sucrose
4. Qualitative analysis of Maltose,
5. Qualitative analysis of Starch

B) Qualitative analysis of Amino acids

1. Qualitative analysis of Arginine,
2. Qualitative analysis of Cysteine,
3. Qualitative analysis of Tryptophan
4. Qualitative analysis of Tyrosine
5. Qualitative analysis of Histidine

REFERENCES

1. J. Jayaraman,Laboratory Manual in Biochemistry New Age International Pvt Ltd Publishers

2011

2. S. K. SawhneyRandhir Singh Introductory Practical Biochemistry Alpha Science International, Ltd,2 edition, 2005.
3. Irwin H.Saegal Biochemical calculations Liss, Newyork 1991

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. MICROBIOLOGY
DEGREE COURSE

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	6	4	Fundamentals of Microbiology	25	75	100
	III	Core Practical	Practical-1	4	0	Experiments in Basic Microbiology	0	0	0
4.	III	Allied -1	Paper-1	4	3	Biochemistry - I	25	75	100
	III	Allied- 1	Practical-1	2	0	Biochemistry	0	0	0
5.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
6.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**20**		**150**	**450**	**600**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
7.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8.	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
9.	III	Core Theory	Paper-2	5	4	Microbial Physiology	25	75	100
10.	III	Core Practical	Practical-1	3	2	Experiments in Basic Microbiology (Contd.)	25	75	100
11.	III	Allied-1	Paper-2	4	3	Biochemistry - II	25	75	100
12.	III	Allied Practical - 1	Practical-1	2	2	Biochemistry (Contd.)	25	75	100
13.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
14.	IV	Value Education		2	2	Value Education	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**
		SEMESTER III					**CIA**	**Uni. Exam**	**Total**
16.	I	Language	Paper-3	6	4	Tamil/Other Languages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-3	4	4	Immunology	25	75	100

	III	Core Practical	Practical-2	3	-	Experiments in Immunology and Microbial Genetics	0	0	0
19.	III	Allied-3	Paper-3	4	3	Bioinstrumentation	25	75	100
		Allied Practical - 2	Practical-2	3	-	Bioinstrumentation and Biostatistics	0	0	0
20.	IV	Skill Based Subject	Paper-1	2	2	Haematology and Blood Banking	25	75	100
21.	IV	Non-Major Elective	Paper-1	2	2	Microbes in Human Welfare	25	75	100
		Sem. Total		**30**	**19**		**150**	**450**	**600**
		SEMESTER IV							
22.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
23.	II	English	Paper-4	6	4	English	25	75	100
24.	III	Core Theory	Paper-4	4	4	Microbial Genetics	25	75	100
25.	III	Core Practical	Practical-2 (Contd.)	3	3	Experiments in Immunology and Microbial Genetics (Contd.)	25	75	100
26.	III	Allied-4	Paper-4	4	3	Biostatistics	25	75	100
27.	III	Allied Practical - 2	Practical-2 (Contd.)	3	2	Bioinstrumentation and Biostatistics (Contd.)	25	75	100
28.	**IV**	**NMSDC : Digital Skills for Employability**	**Paper-2**	**2**	**2**	**Office Fundamentals**	**25**	**75**	**100**
29.	IV	Non-Major Elective	Paper-2	2	2	Emerging Microbial Diseases	25	75	100
		Sem. Total		**30**	**24**		**200**	**600**	**800**
		SEMESTER V							
30.	III	Core Theory	Paper-5	6	6	Medical Bacteriology and Mycology	25	75	100
31.	III	Core Theory	Paper-6	6	5	Agricultural and Environmental Microbiology	25	75	100
32.	III	Core Theory	Paper-7	5	5	Food Microbiology	25	75	100
	III	Core Practical	Practical-3	4	-	Experiments in Medical Microbiology	0	0	0
	III	Core Practical	Practical-4	4	-	Experiments in Applied Microbiology	0	0	0
33.	III	Internal Elective	Paper-1	3	3	(to choose one out of 3) A. Immunotechnology B. Human anatomy and physiology C. Cell Biology	25	75	100
34.	IV	Skill Based Subject	Paper-3	2	2	Mushroom Cultivation	25	75	100
		Sem. Total		**30**	**21**		**125**	**375**	**500**
		SEMESTER VI							
35.	III	Core Theory	Paper-8	6	6	Medical Virology and Parasitology	25	75	100
36.	III	Core Theory	Paper-9	5	5	Industrial Microbiology	25	75	100
37.	III	Core Practical	Practical-3	3	3	Experiments in Medical Microbiology (Contd.)	25	75	100
38.	III	Core Practical	Practical-4	3	3	Experiments in Applied Microbiology (Contd.)	25	75	100
39.	III	Compulsory Project	Paper-10	5	5	Group/Individual Project	25	75	100

40.	III	Internal Elective	Paper-2	3	3	(to choose one out of 3) A. Biotechnology B. Herbal Technology C. Genetic Engineering	25	75	100
41.	III	Internal Elective	Paper-3	3	3	(to choose one out of 3) A. Bioinoculants Technology B. Clinical Microbiology C. Food analysis and quality control	25	75	100
42.	IV	Skill based Subject	Paper-4	2	2	Medical Laboratory Techniques	25	75	100
43.	V	Extension Activities		-	1	-	100	0	100
44	-	**NMSDC : Employability Readiness**		-	-	**(choose any one)** • **Naandi** • **Unnati** • **Quest** • **Izpay** • **IBM Skills build**	-	-	-
		Sem. Total		**30**	**31**		**300**	**600**	**900**
									4300

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English & English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	3	10	100	200
	Allied Practical	2	2		100	200
	Electives	3	3	9	100	300
	Core	9	(3-5)	43	100	900
	Core practical	4	(2-3)	11	100	400
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	**43**		**140**		**4300**

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. MICROBIOLOGY

(With effect from 2020 - 2021)

SYLLABUS

SEMESTER III
CORE PAPER - 3
IMMUNOLOGY

Course Objective: To enable students to understand immune system, immunity and their implication on health and disease

Course Outcomes:
At the end of the course, the student will be able to

1. Outline the history and scope of Immunology.
2. Explain the structure, functions and properties of immune cells.
3. Compare the different types of antibodies and relate them to antigens.
4. Comprehend on the complement system and Major histocompatibility complex.
5. Familiarize with immunehaematology and hypersensitivity reaction.

UNIT - I

History and scope of Immunology. Types of Immunity - Innate and Acquired immunity - Active, Passive, Humoral and Cell Mediated Immunity.

UNIT - II

Structure, Functions and Properties of Immune Cells - Stem cell, T cell, B cell, NK cell, Macrophage, Neutrophil, Eosinophil, Basophil, Mast cell, Dendritic cell; and Immune Organs - Bone Marrow, Thymus, Lymph Node, Spleen, GALT, MALT, CALT.

UNIT - III

Antigens - Types, Characteristics of antigen, Haptens, Epitopes (T & B cell epitopes), Factors influencing antigenicity. T-dependent and T-independent antigens; Adjuvants. Antibodies - Structure, types, properties and functions of immunoglobulins.

UNIT - IV

Complement system - Structure, Components, Properties and Functions, Pathways of Complement activation. Major Histocompatibility complex proteins (MHC) – Definition, Types, physiological role, Antigen processing and presentation.

UNIT - V

Immunohaematology - Blood cell components, ABO blood grouping, RH typing, Pre-transfusion testing, Antibody detection, Cross matching, Investigation of immune hemolysis, Perinatal screening blood test. Hypersensitivity and Allergic reactions - Immediate and Delayed type, Methods to detect hypersensitivity.

Text Books

1. Immunology. 6th edition. Kuby J, Richard A. Goldsby, Thomas J. Kindt (2006). W.H. Freeman and company, New York.
2. Immunology. 3rd edition. Richard M. Hyde (2011). Williams & Wilkins, *Philadelphia.*
3. Immunology. An Introduction. 1st edition. Tizard K (1995). Saunders college publishing, Philadelphia.

Reference books

1. Roitts Essential Immunology. 13th edition. Peter J. delves, Seamus J. Martin, Dennis R. Burton & Ivan M. Roitt (2017). Wiley- Blackwell publishers, United States.
2. Cellular and Molecular Immunology. 9th edition. Abbas Abut K, Lightman Andrew K. and Pober Jordan S. (2017). Elsevier, Netherlands.
3. Fundamental Immunology, 7th edition. William E. Paul. (2012). Lippincott Williams and Wilkins, Philadelphia.
4. Immunology, 10th edition. Weir D.M and Stewart, J. (2000). Churchill Livingston, New York 2000.
5. Text Book of Immunology. 1st edition. Bashir S.F (2011). PHI Learning Private limited, New Delhi.

ALLIED - 2
PAPER - 3
BIOINSTRUMENTATION

Course Outcomes:
On completion of the course, the student will be able to
1. appreciate the importance of instrumentation in Biology labs
2. illustrate the design of the instruments
3. compare different instruments
4. make use of different instruments for analysis
5. apply the knowledge of instruments in biological analysis

UNIT-I
Centrifuge - Basic principles of sedimentation; relative centrifugal force, Types of centrifuges (clinical, high speed, refrigerated and ultra); Applications.

UNIT-II
Colorimetry - Principle, Beer-Lambert's law; Applications. Spectrophotometry – UV & Visible, IR, NMR and Atomic absorption spectrophotometry; Applications.

UNIT-III
Chromatography – Principle; Paper, TLC, Column, Adsorption, Ion exchange, GC and HPLC; Applications.

UNIT-IV
Electrophoresis techniques - Principle; Types of electrophoresis - Paper, Gel, proteins and nucleic acids; Immunoelectrophoresis; Applications.

UNIT-V
Radioisotopic techniques – Radioisotopes; Detection and measurement of radioactivity; GM counter, Scintillation counter, Autoradiography; Applications. Biosensors and their types and Applications.

Text book:
Bioinstrumentation. L. Veerakumari. 2019. MJP Publisher, Chennai.

Reference Books:

1. Bioinstrumentation. John G. Webster. 2007. Wiley Publications.
2. Practical Biochemistry – Principles and techniques. Keith Wilson and John Walker. 1994. Cambridge Press, New York.
3. Principles of Applied Biomedical Instrumentation. L.A. Geddes and L.E. Baker. 2008. John Wiley & Sons.

SKILL BASED SUBJECT

PAPER - 1

HAEMATOLOGY AND BLOOD BANKING

Course Outcomes:
At the end of the course, the student will be able to

1. Discuss in detail the collection and processing of blood.
2. Understand the appropriate methods of diagnosis and management of disorders.
3. Understand how to diagnose and manage hematological disorders and blood parasites.
4. Appreciate the various types of blood group systems.
5. Know the methods of preservation, storage and transportation of blood to distant places.

UNIT - I

COLLECTION OF BLOOD CELLS - Blood: Definition, Characters, Composition. Collection of Blood - Capillary Blood from Adults/Infants, Examinations employed, Advantages/Disadvantages - venous blood from Adults/Infants, Examinations employed, Advantages/Disadvantage. Anticoagulants: Definition - Type: Wintrobes /EDTA /Heparin /Citrate, Concentration, Examinations, Advantages /Disadvantage.

UNIT - II

COUNTING OF BLOOD CELLS: Neubaeur counting chamber - Total RBC count : diluting fluids, Macro dilution / Micro dilution technique, Falsely Law and High Counts, Normal values - Total WBC count: diluting fluids, Macro dilution / Micro dilution technique, Falsely Law and High Counts, Normal values - correction for TWBC - Absolute Eosinophil count - Differential Leucocyte count: Granulocyte / Agranulocytes, Morphology / Function, Staining Technique - Platelet Count: Morphological characters / Functions, Direct /Indirect method - Reticulocyte count, Dry/ Wet smear technique. Haemoglobin: Composition /Normal Values: Determinations.

UNIT - III

COAGULATION MECHANISM: Factors: Bleeding time, Clotting time. Halmotological indices: - Packed cell volume: Wintrobes / Micro HCT method - Mean corpuscular Volume - Mean corpuscular haemoglobin - Mean Corpuscular haemoglobin concentration - Volume index - volume thickness index - Mean corpuscular diameter - saturation index. Erythrocyte sedimentation etc, Principle-Determination: wintrobes / Westegren Method - advantages / disadvantages.

UNIT - IV

PREPARATIONS OF STAINS AND STAINING TECHNIQUES OF BLOOD SMEAR: Wright stain - Leishmans stain - Giemsa's stain - Jaswanthsingh and

Bhattarcharji stain - Fields stain - Peroxidase stain: Examination of Blood smear:- Peripheral smear report: Size/ colour/ shapes/ inclusions - Blood parasites: Malarial parasite/Microfilaria.

UNIT - V

BLOOD BANKING: ABO Grouping; History/Discovery - slide / Tube technique - Rh. Typing: Slide / Tube technique, Bovine replacement technique - Coombs test: Direct /Indirect - Donor screening - Cross matching: Major / Minor - Blood bank practices - Collection of blood / preservation /storage.

Text Books

1. Medical Laboratory Technologies Vol I - III. Mukerjee, K.L. (1988). Tata McGraw Hill. Publishers, New Delhi.
2. Basic & Applied Concepts of Blood Banking and Transfusion Practices. 4th edition, Paula R. Howard (2016). Mosby publishers, United States

Reference Books

1. A text book of Practical Physiology, 4th Edition. Pal, G.K and Pravathi Pal (2016). Universities Press (India) Pvt Ltd.
2. Laboratory Procedures in Haematology, 1st edition. Mehdi S.R (2006). Jaypee Publishers.
3.Textbook of Medical Laboratory Technology 2 Volume Set, 3rd Edition. 2014. Gadkar P.B and Gadakar D.P. Bhalani Publishing House, Mumbai India.

NON-MAJOR ELECTIVE

PAPER - 1

Microbes in Human Welfare

Course Outcomes:

At the end of the course, the student will be able to

1. Understand the scope and relevance of Microbiology in daily life
2. Gain knowledge on the various types of microorganisms
3. Understand the potential of microorganisms
4. Appreciate the beneficial aspects of microorganisms
5. Get acquainted with various ways of using microorganisms

UNIT - I

Definition and Scope of Microbiology - The five major groups of microorganisms - Brief history of Microbiology - Theory of Spontaneous generation - Microscopy and staining - Concepts like Pure culture, culture media, fermentation - Bacterial growth, exponential multiplication, nutrients required for microbial growth - Photosynthetic microorganisms - bacteria, algae, cyanobacteria

UNIT - II

Household fermented foods - Idly, Pickles; Fermented milk products - Single Cell Proteins - Mushrooms

UNIT - III

Microbial production of organic acids, alcohols, enzymes, antibiotics, pigments, Biopolymers

UNIT - IV

Biofertilizers and biopesticides; Seaweeds and their uses; Microalgae and their uses - *Spirulina*; Biodegradation of Organic pollutants, Heavy metals, Plastic Degradation

UNIT - V

Concept of immunization and Vaccines, Immunoglobulins as therapeutic agents - Microorganisms as model organisms in genetic studies; Probiotics

Text books

1. Microbiology. 6th Edition. vMcGraw Hill Inc., New York.
2. x A Text of Microbiology. Revised edition. Pelczar Jr. M.J., Chan E.C.S and Kreig, N.R. (2006). S. Chand & Company Ltd., New Delhi.

Reference books

1. Microbiology. 5th edition. David B.D., Delbeco R., Eisen, H.N. and Ginsburg, H.S (1990). Harper and Row, New York.
2. Industrial Microbiology. 3rd edition. Patel A.H (2001). Mac Millan India ltd, New Delhi.
3. Industrial Microbiology. 2nd edition. Casida J.E (2005). Wiley Blackwell publishers, UK

SEMESTER IV
CORE PAPER - 4
MICROBIAL GENETICS

Course Objective: To provide an insight on the genomic structure, its organization and regulation, methods of gene transfer in bacteria and to familiarize on the concept of mutation.

Course Outcomes:
At the end of the course, the student will be able to

1. Outline the structure, replication and function of DNA
2. Explain about mutation, types of mutation and DNA repair mechanism.
3. Elaborate the different gene transfer methods in bacteria.
4. Compile the gene regulation in prokaryotes and eukaryotes.
5. Describe transposons and gene mapping.

UNIT - I

Discovery of DNA as genetic material, Griffith's experiment, Hershy and Chase Warring blender experiment; Structure of DNA; Plasmids - types and significance; Replication of DNA - Messelson and Stahl's Experiment - Types of replication - DNA polymerases; Triplet nature of the Genetic code.

UNIT - II

Mutation - Spontaneous mutation - missense, nonsense and frame shift mutation; Induced mutation - Mutagens - UV, X-Rays - Chemical agents - NTG and Base Analogues, Reversion - AMES Test, DNA damage - SOS response - DNA repair.

UNIT - III

Transcription, Translation; Concept of Gene and operon; Gene transfer Mechanisms - Transformation, Conjugation, Transduction - Generalized and specialized.

UNIT - IV

Gene regulation in prokaryotes and eukaryotes, positive regulation, negative regulation, attenuation - Gene expression system - Lactose and tryptophan operon. RNA structure and RNA processing - post transcriptional regulation. Transcriptional and translational regulation. Post translational modification and protein stability.

UNIT - V

Transposable genetic elements and Gene Mapping - Introduction - Discovery, insertion sequences, complex and compound transposons - T10, T5, and retroposon. Genetic mapping - *E. coli* - Virus T4 phage - using r II system.

Text Books

1. Microbial Genetics. Stanley R Maloy, John E Cronan and David Freifelder. 2nd Edition 1994. Jones and Bartlett Publishers, Boston.
2. Principles of Genetics. 7th edition. Robert H Tamarin (2002). Tata McGraw Hill P. Ltd., New Delhi.
3. Instant Notes in Molecular Biology, 2001, (2nd Edition). Turner P. C., Mc Lennan A. G., Bates A. D and White M. R. H. Published by arrangement with Bios Scientific Publishers Ltd., Oxford.

Reference books

1. Modern Microbial Genetics, 2002 (2nd Edition). Streips, U. N. and R. E. Yasbin. Wiley-Liss, Inc., New York.
2. Principles of Genetics. 8th edition. Gardner Simion Snustad (2005). John Wiley and Sons Inc, New York.
3. Gene VII, 7th Edition, 2000. Benjamin Lewin. Oxford University Press.
4. Genetics: A Conceptual Approach. Benjamin A. Pierce (2002). W.H.Freeman and Company, United States.
5. Advanced Molecular Biology - A concise Reference. Twyman, R M. 1998, Viva Books Private Ltd., New Delhi.

CORE PRACTICAL - 2

EXPERIMENTS IN IMMUNOLOGY AND MICROBIAL GENETICS

LIST OF EXPERIMENTS

Separation of Serum and Plasma

Demonstration of buffy coat

Blood grouping

ASO test

RPR test

Widal slide test

Preparation of blood smear and observation of WBC

Differential Count – Blood smear

Single radial immune diffusion

Double immuno diffusion

Isolation of antibiotic resistant bacteria by induced mutation

Reference Manuals

1. District Laboratory Practice in Tropical Countries - Part I and II 2nd Edition. Monica Cheesbrough. Cambridge University Press, New Delhi. 2006.

2. Practical Medical Microbiology. Mackie and McCartney. South Asia Edition. 14th edition. 2006.

3. Laboratory Exercises in Microbiology. Harley and Prescott (1996). McGraw Hill Higher Education, 3rd Edition

ALLIED - 2
PAPER - 4

BIOSTATISTICS

Course Outcomes:
On completion of the course, the student will be able to
1. appreciate the importance of statistics
2. differentiate the basic terms and formulae in statistics
3. relate the formulae with the applications
4. plan analysis with statistical tools
5. apply statistical tools in biological subjects

UNIT-I
Introduction – Scope and limitations of Statistics. Classification and tabulation of statistical data. Frequency distribution: Simple and Cumulative.

UNIT-II
Measures of central tendency: Arithmetic Mean, Median and Mode. Measures of Dispersion: Standard Deviation and Coefficient of Variation.

UNIT-III
Correlation analysis: Karl Pearson's, Spearman's rank and Concurrent deviation methods. Regression Analysis: Simple regression equations.

UNIT-IV
Small sample: test of significance based on t, F and Chi-Square distributions with respect of mean, variance and correlation coefficients.

UNIT-V
Basic principles of design of experiments: Randomization, Replication and Local Control. Analysis of Variance - One way and two way classifications.

Text Book:
An Introduction to Biostatistics. Gurumani N. 2005. MJP Publishers, Chennai.

Reference Books:

1. Biostatistics- A Foundation for Analysis in the Health Sciences. Daniel, W. W. 2007. Wiley.
2. An Introduction to Probability and Statistics. Rohatgi, V.K. and Saleh, A.K. Md. 2001. John Wiley & Sons.
3. Medical Statistics - Principles and Methods. Sundaram, K.R. 2010. BI Publications, New Delhi.
4. Introductory Biological Statistics. John E. Havel, Raymond E. Hampton, Scott J. Meiners. 2019. Waveland Press, Inc.
5. Fundamentals of Biostatistics. Dutta, N. K. 2004. Kanishka Publishers, New Delhi.

ALLIED PRACTICAL - 2

BIOINSTRUMENTATION PRACTICAL

Course outcomes:
On completion of the course, the student will be able to

- understand the basic principles instruments
- care and maintain the instruments in Biology labs
- use different instruments for analysis

1. Centrifuge a mixture of solution and observe sedimentation
2. Observe the Optical density and Transmission of a coloured solution
3. Prepare OD Vs. Conc. graph for a coloured solution
4. Perform paper chromatography
5. Prepare agarose gel and cast
6. Perform DNA electrpophoresis

Biostatistics Practical

Course outcomes:
On completion of the course, the student will be able to

- understand the basic principles biostatistics
- perform simple calculations
- make use of statistical applications

1. Construction of Univariate and Bivariate frequency distributions with samples of size not exceeding 50.
2. Frequency distribution: Simple and Cumulative.
3. Measures of central tendency: Arithmetic Mean, Median and Mode.
4. Measures of Dispersion: Standard Deviation and Coefficient of Variation.
5. Correlation analysis: Karl Pearson's, Spearman's rank and Concurrent deviation methods.
6. Regression Analysis: Simple regression equations.
7. Small sample: test of significance based on t, F and Chi-Square distributions with respect of mean, variance and correlation coefficients.
8. Analysis of Variance - One way and two way classifications.

SKILL BASED SUBJECT
PAPER-2
MUSHROOM CULTIVATION

Course Objective: To provide the necessary skills in Mushroom cultivation.

Course Outcomes:
At the end of the course, the student will be able to

1. Outline the structure, cultivation of mushroom
2. Explain about Spawn preparation.
3. Elaborate the Cultivation of important Mushroom varieties.
4. Appreciate the nutritional value of mushrooms.
5. Describe the economic aspects of mushroom cultivation.

UNIT - I

Introduction, History of Mushroom Cultivation- Morphology and life Cycle of Mushroom - Edible and Non-Edible Mushroom (Most commonly cultivated Mushrooms in the World, Distribution and Production in various Countries).

UNIT - II

Spawn; Types Spawn, Preparation of Spawn, Mushroom Bed Preparation and factors affecting Mushroom bed preparation, Compost: Materials used for Compost preparation , Compost Technology in Mushroom production- Casing; Raw material used for casing, preparation of Casing Material. Important Sanitation during various stages of Mushroom cultivation.

UNIT - III

Cultivation of important Mushroom: General process for the cultivation of *Agaricus bisporus* (White button Mushroom), *Pleurotus flabelltus* (Oyster Mushroom), *Volvariella volvaceae* (Paddy Straw Mushroom).

UNIT - IV

Mushroom nutritional value; (Proteins, Amino acids, Vitamins, Minerals, Carbohydrates) - Pests and diseases of Edible Mushrooms (Environmental, Fungal, Bacterial, Viral, Insect Pests and Nematode diseases and competitor Moulds.

UNIT - V

Economics of mushroom cultivation (fixed assets, recurring expenditure, labour, economics of cultivation throughout the year and seasonal growing formulation of project report for getting finance from funding agencies). Precautions in mushroom cultivation (precaution to be taken while selecting the area, spawn preparation, spawn run, during cropping harvesting etc.). Mushroom recipes (Western and Indian recipes, pickles, powders, jams etc)

Text Books

1. Mushroom production and processing Technology, Pathak Yadav Gour (2010) Published by Agrobios (India).
2. Mushroom - the art of cultivation, Harander Sing (1991). Sterling Publishers.
3. Biology and conservation of mushroom, Kaul T N (2001). Oxford and IBH Publishing Company, New Delhi.

Reference books

1. Changs Biology and cultivation of Mushrooms. . T.W.A. Hanyanes. 1978. Acad press. N.Y.
2. Edible Mushroom, Biotechnology. Vol. 3. Zadrazil. F & K. Grabbe. 1983. Weinheim: verlag Chemie, Berlin.
3. Handbook of Edible Mushrooms. Kannaiyan. 2001. TNAU Publication.

NON-MAJOR ELECTIVE
PAPER - 2
EMERGING MICROBIAL DISEASES

Course Outcomes:

At the end of the course, the student will be able to

1. Understand the role of Microbiology in diseases
2. Get acquainted with various diseases caused by microorganisms
3. Gain knowledge on the various types of pathogenic microorganisms
4. Understand the mode of disease spread
5. Appreciate the methods of preventing diseases

UNIT - I

Diseases Vs Infections; Communicable versus Non-communicable diseases; Microbiology; Microorganisms - Pathogens; Transmission; Sources of infection - air, water, food, animals, hospitals; Diagnosis; Treatment - Antibiotics; Prevention - hygiene, vaccines

UNIT - II

Bacterial diseases - Symptoms, causative agent, diagnosis, treatment, prevention methods of tuberculosis, cholera, diarrhea, dysentery, typhoid, pertussis, diphtheria, tetanus, syphilis, gonorrhea, leptospirosis, plague, scrub typhus

UNIT - III

Fungal diseases - Symptoms, causative agent, diagnosis, treatment, prevention methods of candidiasis, aspergillosis, mycetoma, fungal eye infection, ringworm, athlete's foot, jock itchfungal nail infections

UNIT - IV

Parasitic diseases - Symptoms, causative agent, diagnosis, treatment, prevention methods of Malaria, Amoebic dysentery, leishmaniasis, filariasis

UNIT - V

Viral diseases - Symptoms, causative agent, diagnosis, treatment, prevention methods of Polio, Jaundice, Mumps, Measles, Chicken pox, Rabies, Dengue fever, Chikungunya, Japanese encephalitis, Influenza, SARS, Covid19, AIDS

Text books

1. Text Book of Microbiology. 9th edition. Ananthanarayan R and Paniker C.K.J. (2013). Universities Press, Hyderabad.
2. A Text of Microbiology. Revised edition. Dubey R.C and Maheswari D.K. (2012). S. Chand & Company Ltd., New Delhi.

Reference books

1. District Laboratory Practice in Tropical Countries - Part I and II. 2nd edition. Monica Cheesbrough. (2005). Cambridge University Press, New Delhi.
2. Microbiology. 6th Edition. Pelczar Jr. M.J., Chan E.C.S and Kreig, N.R. (2006). McGraw Hill Inc., New York.

SEMESTER V
Core Paper - 5
Medical Bacteriology and Mycology

Course Objective: To enable student to understand medically important bacteria and fungi that cause diseases in humans

Course Outcomes:
At the end of the course, the learners will be able to:
1. Outline the importance of Normal microbial flora of human body and Host-Parasite relationships.
2. Explain about the diseases caused by the bacterial pathogens, prevention and treatment.
3. Discuss the different modes of transmission of bacterial diseases and the preventive measures.
4. Compare the morphological classification of fungi, and perform isolation of fungi from clinical specimen.
5. Compile the common mycotic diseases, their pathogenicity and various antifungal agents used for treatment.

UNIT - I

Normal Microbial flora of human body. Host parasite relationship - Infection and types of infection (Primary, Secondary, Reinfection, cross infection, Nosocomial and Iatrogenic infection) - Virulence factors of bacteria causing infection. Specimen collection, Transport and storage; Specimen processing (Blood, Urine, CSF, Sputum and other body fluids).

UNIT - II

Morphology, classification, antigenic structure, cultural characteristics, pathogenicity, laboratory diagnosis, preventive measures and treatment of Human pathogens - *Staphylococcus aureus, Streptococcus pyogenes, Streptococcus pneumoniae, Neisseriae meningitides* and *Neisseriae gonorrhoeae, Corynebacterium diphtheriae, Mycobacterium tuberculosis* and *Mycobacterium leprae,, Clostridium botulinum, Clostridium tetani* and *Clostridium perfringens, Bacillus anthracis*. Family - Enterobacteriaceae (*Escherichia coli, Klebsiella, Salmonella, Shigella* and *Proteus*).

UNIT - III

Morphology, classification, antigenic structure, cultural characteristics, pathogenicity, laboratory diagnosis, preventive measures and treatment of *Vibrio cholerae* and *Vibrio parahaemolyticus, Pseudomonas aeruginosa, Brucella abortus, Bordetella pertussis*, *Haemophilus influenzae*, *Treponema pallidum,* Chlamydiae and Rickettsiae - Hospital waste disposal.

UNIT - IV

General introduction, Morphology and classification of fungi of medical importance - Detection and recovery of fungi from clinical specimens. Yeasts of medical importance - *Candida albicans, Cryptococcus neoformans*.

UNIT - V

Dermotophytes and agents of superficial mycosis - *Trichophyton*, *Epidermophyton* and *Microsporum* - Dimorphic fungi causing systemic mycoses - Histoplasmosis, Coccidiodomycosis, Blastomycosis - Mycetoma - Antifungal agents.

Text Books

1. Text Book of Microbiology, 9th edition. Ananthanarayan R & Paniker C.K.J. (2013). Universities Press, Hyderabad.
2. Medical Microbiology. 26th edition. Jawetz, Melnick, & Adelberg's. (2013). McGraw-Hill, New York.
3. An Introduction to Mycology. 1st edition. Mehrotra RS and Aneja KR. (2006). New age international publishers, Chennai.

Reference books

1. Diagnostic Microbiology, 13th edition. Tille P. Bailey and Scott (2013). Mosby Publishers, United States.
2. Medical Microbiology. 1st edition. Rajan S (2009). MJP Publishers, Chennai.
3. Essentials of Medical Microbiology. 3rd edition. Rajesh Bhatia and Ratan Lallchhpujani (2004). Jaypee Brothers, Medical Publishers (P) Ltd., New Delhi.
4. District Laboratory Practice in Tropical Countries. Part 1 & 2, Monica Cheesbrough (2003). Cambridge University Press.
5. Jagadish Chander (1996). A text book of Medical Mycology. 1st edition. Interprint, New Delhi.

Core Paper - 6
Agricultural and Environmental Microbiology

Course Objective: To enable students to understand the impact of microbial association in the field of Agriculture and the Environment.

Course Outcomes:
At the end of the course, the learners will be able to;
1. Outline the physical, chemical properties and microflora of soil.
2. Explain the role of microorganisms in biogeochemical cycles.
3. Compile the significance of microbial interactions and phytopathogens.
4. Demonstrate the air sampling techniques and summarize on air borne pathogens.
5. Apply the processes involved in the treatment of municipal water supplies

UNIT - I
Soil - Physical properties of soil - Soil color, Soil moisture, Soil temperature, Soil structure, Bulk density of soil- Types of soil. Chemical properties of soil- pH, Electrical conductivity, Nitrogen, Phosphate, Potash - Microflora of soil.

UNIT - II
Role of Microorganism in Biogeochemical cycles - Carbon, Nitrogen, Phosphorus, Sulphur and Iron. Organic matter decomposition - Composting (aerobic and anaerobic) - Vermicompost production - Biopesticides (Bacterial, Viral and Fungal).

UNIT - III
Microbial interaction-Symbiosis, Mutualism, Commensalism, Ammensalism, Parasitism-Rhizosphere; Phyllosphere - Plant pathogens- Bacteria (*Xanthomonas* sp.), Fungus (*Fusarium* sp.), Virus (Tobacco Mosaic Virus)

UNIT - IV
Microbiology of air - Sources of Microorganisms in air - Assessment of air quality-Air sampling techniques - Enumeration of airborne organisms - Air borne diseases - Air sanitation.

UNIT - V
Aquatic Microbiology - Ecosystems - Fresh water (River, Ponds, Lakes, Streams) Marine, Esturies.Microbial assessment of water quality - Water purification.Water borne diseases. Waste Water treatment- Municipal waste water treatment primary, Secondary (Biological) and Tertiary.

Text Books
1. Microbial Ecology, Fundamental and Application, 3rd edition. Atlas R.M. and Bartha R (1992). Bengamin and Cummings. United States.
2. Environmental Aspects of Microbiology. Joseph C. Daniel. Brightsun Publications. Chennai
3. Soil Microbiology. 4th edition. Subba Rao N.S (2004). Oxford and BH Publishing Co.Pvt. Ltd., New Delhi.

Reference books

1. Environmental Microbiology. 1st edition. Raina M. Maier, Ian L. Pepper, Charles, P. Gerba (2006). Academic press, United States.
2. Environmental Science and Biotechnology. 1st edition. Murugesan A.G and Rajakumari C (2005). MJP Publishers, Chennai.
3. Soil Microbiology. 1st edition. Mishra R.R (2004). CBS Publishers and distributors, New Delhi.
4. Disease of Crop Plants in India. 4th edition. Rangaswami G and Mahadevan A (2002). PHI Learning (P) Ltd., New Delhi.
5. Soil Microbiology. 1st edition. Robert L Tate (1995). John Wiley and Sons, Inc. New York.

CORE PAPER- 7

FOOD MICROBIOLOGY

Course Objective: To enable students to understand the beneficial and harmful association of microbes on food

Course Outcomes:
At the end of the course, the learners will be able to;
1. Outline the important microorganisms present in food.
2. Elaborate the principles and methods of food preservation.
3. Compile the contamination, spoilage and spoilage of various foods.
4. Demonstrate and prepare fermented foods.
5. Summarize bacterial and non-bacterial food borne diseases.

UNIT - I

Food as a substrate for microorganisms - important microorganisms associated with food (bacteria, mold and yeast). Factors affecting the growth of microorganisms in food -pH, moisture, oxidation - reduction potential , nutrient content and inhibitory substances and biological structure.

UNIT - II

Contamination and Spoilage of food - microorganisms involved in the spoilage of cereals, vegetables and fruits, egg, meat and meat products, poultry, sea foods and milk - canned foods; prevention of spoilage.

UNIT - III

Principles of food preservation - Methods of food preservation - Asepsis -techniques involved in removal of microorganisms from food - use of temperature - low temperature & high temperature - canning, drying, radiation and food additives.

UNIT - IV

Fermented foods -pickled cucumber, sauerkraut, soy sauce, bread, idli & Dosa; Fermented dairy products - kefir, yoghurt and cheese; health benefits of fermented foods.

UNIT - V
Food borne illness - Foodborne infections -Bacterial - food intoxication - bacterial toxins - Mycotoxins- investigation of food poisoning outbreaks. Food quality control measures - food standards & quality control. HACCP, FDA, WHO, FSSAI.

Text Books
1. Food Microbiology. 4th edition. Frazier W.C. and West Hoff D.C (2008). McGraw Hill, New York.
2. Food Microbiology. 2nd edition. Adam M.R. and Moss M.O (2004). New international pvt. Ltd., publishers. UK.
3. Food Microbiology. 1st edition. Vijaya Ramesh K (2007). MJP Publishers, Chennai.

Reference books

1. Food Processing and Preservation. 8th edition. Sivashankar B and Mosses (2011). PHI Learning P. Ltd., New Delhi.
2. Basic Food Microbiology. 2nd edition. Banwart G. J (2004). CBS Publishers and Distributors, New Delhi.
3. Modern Food Microbiology. 4th edition. James M. Jay (2003). CBS Publishers, New Delhi.
4. Dairy Microbiology. Robinson R.K,(1990). Elseveir Applied science, London.
5. Principles of Fermentation technology. 1st edition. Stanbury P.F., Whitaker A and Hall S.J (1995). Pergamon, UK.

INTERNAL ELECTIVE
PAPER - 1
(to choose one out of 3)

A. IMMUNOTECHNOLOGY

At the end of the course, the learners will be able to;
1. understand basic concepts of Immunotechnology
2. demonstrate Antigen - Antibody reactions
3. express the concept of Autoimmunity
4. explain the role of Cytokines
5. discuss the role of vaccines in preventing diseases

UNIT - I

Introduction and scope of Immunotechnology; Preparation and purification of antigens, Extraction of antigens from pathogens, Preparation of synthetic antigens, Recombinant antigens; Production, purification and characterization of antibodies, Purification of Immunoglobulin, Characterization of Immunoglobulin.

UNIT - II

Antigen - Antibody reactions - Agglutination, Precipitation, Passive agglutination, Complement fixation test, neutralization tests, Immunofluorescence, ELISA, RIA, Western blot analysis, Immunoelectrophoresis, Flow cytometry, Chemiluminescence assay, Fluorescence activated cell sorting (FACS) analysis.

UNIT - III

Autoimmunity- Autoimmune diseases- Hashimoto's disease, Systemic lupus erythematosus, Multiple sclerosis, Myasthenia gravis and their treatment. Transplantation Immunology - Tissue transplantation - Tissue typing methods for tissue and organ transplantations. Graft versus host reaction and rejection, xenotransplantation.

UNIT - IV

Cytokines: Interferons, Interleukinsand TNF - Production, Properties, biological functions and assay methods. Therapeutic uses of cytokines.Hybridoma technology - Production of monoclonal antibodies and their applications, chimeric antibodies.

UNIT - V

Principle of Immunization - Active and Passive Immunization; Kinds of vaccines - live, killed, attenuated, Toxoids, Purified Macromolecules as Vaccines, subunit vaccines, recombinant vector vaccines, DNA vaccines, peptide vaccines, conjugate vaccines; Recommended childhood immunization schedule.

Text Books

1. Immunology. 6th edition. Kuby J., Richard A. Goldsby, Thomas J. Kindt (2006). W.H. Freeman and company, New York.

2. Immunology. 3rd edition. Richard M. Hyde (2011). Williams & Wilkins, *Philadelphia.*
3. Immunology - An Introduction. 1st edition. Tizard K (1995). Saunders College Publishing, Philadelphia.

Reference books

1. Roitt's Essential Immunology. 13th edition. Peter J. delves, Seamus J. Martin, Dennis R. Burton& Ivan M. Roitt (2017). Wiley- Blackwell publishers, United States.
2. Cellular and Molecular Immunology. 9th edition. Abbas Abut K, Lightman Andrew K. and Pober Jordan S. (2017). Elsevier, Netherlands.
3. Fundamental Immunology, 7th edition. William E. Paul. (2012). Lippincott Williams and Wilkins, Philadelphia.
4. Immunology, 10th edition. Weir D.M & Stewart, J. (2000) Churchill Livingston, New York 2000.
5. Text Book of Immunology. 1st edition. Bashir S.F (2011). PHI Learning Private limited, New Delhi.

INTERNAL ELECTIVE
PAPER - 1
B. HUMAN ANATOMY AND PHYSIOLOGY

Course Outcomes:
At the end of the course, the learners will be able to;
1. Explain the organs and functions of Respiratory System.
2. Outline the structure of organs of Gastro Intestinal System.
3. Discuss about the Musculoskeletal and Nervous System.
4. Describe the features of Circulatory system and Endocrine System.
5. Compile the information on Reproductive and urinary System.

UNIT - I
Introduction to applied human anatomy and physiology; **Respiratory System:** Different organs of the Respiratory System. Functions of the different organs of the Respiratory System. **Special Sensory Organs:** Introduction to special sensory organs. Function and functions of eye, ear, nose, tongue, and skin.

UNIT - II
Gastro Intestinal System: Different organs associated with the Gastro Intestinal system: (Salivary glands, Pancreas, Liver and Gall bladder and others).

UNIT - III
Musculoskeletal and skin: Introduction of musculo-skeleton system. Different parts of involved in skeleton system. Function of skeleton. Parts and function of skin. **Nervous System:** Introduction to nervous system. Different organs and function of central nervous system (CNS) and peripheral nervous system PNS and related to infection

UNIT - IV
Circulatory system: Blood - Site of formation, composition, functions of blood cells, Different parts of the circulatory system and its function. **Endocrine System:** Introduction to endocrine system.

UNIT - V
Reproductive System: Introduction Male reproductive system - physiological anatomy, spermatogenesis and its regulation, testicular hormones, composition of semen Female reproductive system - menstrual cycle, pregnancy and parturition, lactation and family planning. **Urinary System:** Different organs and Functions of Urinary System. Mechanism of urine formation and composition of urine.

Text Books

1. Manipal Manual of Anatomy, 3rd Edition. Sampath Madhyastha, (2016) CBS Publishers and Distributors Pvt Ltd. Chennai.
2. Handbook of Human anatomy 3rd Edition. Chaurasia, B.D, (2005). CBS Publishers and Distributors Pvt Ltd. Chennai.
3. Human physiology, 2nd edition- BJ Mejer, HS Meij, AC Meyer, AITBs publishers abd distributers.

Reference Books

1. Text book of Anatomy. Srivastava, (2013). Books and Allied (P) Ltd, Kolkatha.
2. Anatomy and physiology in Health and illness. Cathleen JW Wilson OBE Anne Wangh. Churchill Livingstone Publication, UK, NK, 1996.
3. A Ross and Wilson's Anatomy and Physiology in Health and Illness, 9th Edition. Waugh A., Grant. Churchill Livingston, London.2001.
4. Guyton. Human Physiology and Mechanisms of Disease. Guyton AC and Hall JE. 1996. Hartcourt Publishers, Limited.
5. Gray's Anatomy. Williams PL (Ed). Churchill Livingstone, London.

INTERNAL ELECTIVE

PAPER - 1
C. CELL BIOLOGY

Course Outcomes:
On completion of the course the student is expected to be able to:
1. understand the structures and purposes of basic components of prokaryotic and eukaryotic cells
2. explain how the cellular components are used to generate and utilize energy in cells
3. understand the cellular components underlying mitotic cell division.
4. summarize the structure and function of the different cell components
5. outline how cell ultra structure is related to cell function

UNIT - I

INTRODUCTION TO CELL BIOLOGY - origin and evolution of cells, Diversity of cell size and shape Cell theory, cell as basic unit of life. Structure and organization of prokaryotic and eukaryotic cells. Comparison between plant and animal cells, General structure of cytoskeleton - structure, composition and functions of microfilaments , microtubules and intranuclear filaments.

UNIT - II

SUBCELLULAR ORGANELLES - The ultrastructure of cell wall, plasma membrane, nucleus, mitochondria, rough and smooth endoplasmic reticulum, Golgi apparatus structure and function lysosome structure and function, peroxisome, ribosomes, chloroplast and glyoxisome and their function. Organization of cells into tissue. Types of tissue. Cell - cell adhesion, cell matrix adhesion. Extracellular matrix- components and their biological role.

UNIT - III

BIOMEMBRANE - plasma structure, organization and basic functions, fluid mosaic model of structure, membrane proteins and their properties, membrane carbohydrates and their role. Transport across cell membrane - uniport, symport and antiport. Passive and active transport and water channel. Organization of cells into tissue. Types of tissue. Cell - cell adhesion, cell matrix adhesion. Extracellular matrix- components and their biological role.

UNIT - IV

ORGANIZATION OF GENOME - Organisation of prokaryotic, eukaryotic genome and chromosomes, types, structure and function. Cell division, mitosis, meiosis, their significance; Cell cycle - phases of cell cycle, comparison of mitosis and meiosis cell growth, kinetics of cell growth;

UNIT - V

CELL SIGNALING - Cell - to - Cell Signaling; Hormones and Receptors, Intracellular signaling in Development and Disease, Transport across Cell Membranes Protein Sorting: Organelle Biogenesis and Protein secretion, Stem Cell Biology, Cancer, Regulation of Cell Death; Apoptosis Circadian Rhythms.

Text Books

1. Cell and Molecular Biology: Concepts and Experiments (6th ed). Karp, G. (2010). John Wiley & Sons. Inc.
2. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology (14th ed). P.S.Verma and V.K.Agarwal. (2004). S. Chand and Company Ltd.
3. Essential Cell Biology (4th ed). Bruce Alberts and Dennis Bray (2013). Garland Science.

Reference Books

1. Cell and Molecular Biology.(8th ed). De Robertis, E.D.P. and De Robertis, E.M.F. (2010). Lippincott Williams and Wilkins, Philadelphia.
2. The Cell: A Molecular Approach. (5th ed). Cooper, G.M. and Hausman, R.E. (2009). Sunderland, Mass. Sinauer Associates, Inc.
3. The World of the Cell. (7th ed). Wayne M. Baker (2008). Pearson Benjamin Cummings Publishing, San Francisco.
4. Molecular Cell Biology 5th Edition. Harvey Lodish, Arnold Berk, Paul Matsudaira, Chris Kaiser, Monty Krieger, Matthew Scott, Lawrence Zipursky and James Darnell. W.H Freeman and Company.

SKILL BASED SUBJECT
PAPER-3
BIOINFORMATICS

Course Objective: To make students aware of Bioinformatic concepts and their applications.

Course Outcomes:
At the end of the course, the learners will be able to;
1. Explain Databases and Sequence analysis.
2. Outline the process of BLAST and Gene prediction.
3. Discuss about the concept of Comparative Genomics.
4. Describe the Genome projects and Model Organisms.
5. Compile the information on Proteomics.

UNIT - I

Historical introduction and overview - Databases - Formats - Sequence analysis - Alignment of pairs of sequences - Multiple sequence alignments - Phylogenetic tree.

UNIT - II

Database searching for similar sequences - Scoring matrices; BLAST; Gene prediction - Methods - Protein structure prediction.

UNIT - III

Comparative Genomics: Purpose and Methods of comparison, Tools for genomic comparison: Applications of Comparative Genomics.

UNIT - IV

Genome projects and Model Organism research - Human Genome Project - Yeast; Drosophila; *C. elegans*; and Mouse - a comparative analysis.

UNIT - V

Proteomics - Gene expression analysis by cDNA micro arrays - Experimental techniques (2D Electrophoresis, Mass Spectrophotometry, Protein Micro arrays) - Ligand Screening.

Text Books
1. Bioinformatics - Methods and Applications, Third edition, 2008. S.C. Rastogi, N. Mendiratta and P. Rastogi PHI Learning Private Limited, New Delhi.
2. Fundamental Concepts of Bioinformatics. Dan E. Krane and Michael L. Razmer. 2003. Pearson Education Inc. UK.

Reference Books
1. Bioinformatics. David W. Mount. 2001. CBS Publishers & Distributors, New Delhi - Bangalore.

2. Microarrays for an Integrative Genomics. Ed. I.S. Kohane, A.T. Kho and A.J. Buttle. 2004. Ane Books, New Delhi.
3. Biological Sequence Analysis: Probabilistic Models of Proteins. Anders Krogh, Richard M. Durbin, and Sean Eddy. 1998. Cambridge University Press.
4. Bioinformatics Data Skills: Reproducible and Robust Research with Open Source Tools. Vince Buffalo. 2015. O'Reilly Media Inc., USA.

SEMESTER VI

CORE PAPER- 8

MEDICAL VIROLOGY AND PARASITOLOGY

Course Objective: To provide an in depth knowledge on diseases caused by viruses and parasites, their epidemiology and control measures.

Course Outcomes:
At the end of the course, the learners will be able to;
1. Explain the properties, classification and cultivation of viruses.
2. Outline the zoonotic and arthropod borne diseases.
3. Discuss about the oncogenic viruses.
4. Describe the classification of parasites and demonstrate the laboratory diagnosis of parasitic diseases.
5. Compile the information on common parasites, protozoan and metazoan diseases.

UNIT - I

General properties of virus - Classification; Structure and properties of viroids, prions; Detection of viruses and antigens in clinical specimens - Serological diagnosis of virus infections, cultivation of viruses.

UNIT - II

Arthropod borne virus (Chickungunya virus, Dengue, Japanese Encephalitis, West Nile fever, Yellow fever) and rodent borne viral diseases (Lassa, Hanta and Ebola virus) - Picorna viruses (Polio, Rhino Virus) , Hepatitis viruses (Type A, B and C) , Rabies virus, Orthomyxo (H1N1 Influenza) and Paramyxo viruses (Measles, Mumps) - SARS and MERS.

UNIT - III

Pox viruses, Adeno viruses, Herpes Simplex virus, Reo virus, Rota virus and Human immunodeficiency virus - Oncogenic virus (Papilloma virus and Polyoma virus) - Antiviral drugs, Interferon, Viral vaccines.

UNIT - IV

Introduction to Medical Parasitology - Classification of parasites - Laboratory diagnosis of common parasitic diseases. Common protozoan diseases - Amoebiasis, Giardiasis, Trypanosomiasis, Malaria, Toxoplasmosis, Leishmaniasis.

UNIT - V

Morphology of common metazoans - Pathogenicity, clinical manifestation and diagnosis of Ascariasis, Hook worm infection, Filariasis, Hydatidosis, Fasciolopsis, Schistosomiasis and Taenia infection.

Text Books

1. Text Book of Microbiology, 9th edition. Ananthanarayan R & Paniker C.K.J. (2013). Universities Press, Hyderabad.
2. Introduction to modern virology 4th edition. Dimmok N.J and Primrose S.B (1994). Blackwell scientific company publications, United States.
3. Text book of Medical Parasitology. 4th edition. Subhash Chandra Parija (2013). All India Publishers and Distributors (Medical Books Publishers), New Delhi.

Reference books

1. Medical Microbiology. 26th edition. Jawetz, Melnick & Adelberg (2013). McGraw-Hill. New York.
2. Parasitology, Protozoology & Helminthology. 13th edition. Chatterjee K.D (2016). Joe media Publishers. Calcutta.
3. General virology. 3rd edition. Luria S.E, Darnell J.E, Baltimore D and Compare A (1978). John Wiley and Sons, New York.
4. Text book of Medical Parasitology. 5th edition. Jayaram Paniker C.K (2004). Jaypee Brothers Publishers (P) Ltd., New Delhi.
5. Medical Parasitology. Revised edition. Karyakarte R.P and Damle AS (2005). Books and Allied (P) Ltd., Kolkata.

CORE PAPER - 9
INDUSTRIAL MICROBIOLOGY

Course Objective: To familiarize the learners on the basic microbial processes carried out in Industries and its significance.

Course Outcomes:
At the end of the course, the learners will be able to;
1. Outline the history and scope of Industrial Microbiology.
2. Explain about the methods involved in screening and development of production strains.
3. Elaborate on the principles, design and types of bioreactors.
4. Compile on the fermentation process and downstream processing.
5. Discuss on the industrial production of various products using microorganisms.

UNIT - I

General concept of Industrial Microbiology; History and scope of Industrial Microbiology; Industrially important Microorganisms and their products; screening and strain development strategies; Preservation techniques of the production strains.

UNIT - II

Bioreactor - Principle, Design, mode of operation and types; Fermentation- types of fermentation process (Batch and Continuous fermentation); Fermentation media, Sterilization of media; Down Stream processing.

UNIT - III

Foods produced by Microbes - Fermented foods - Bread, Pickles; Fermented Beverages - Beer and Wine; Dairy products - Yoghurt, Cheese; Microbial cell as food - Single Cell Proteins.

UNIT - IV

Microbial production of Organic acids - Citric acid, Lactic acid, Acetic acid; Amino acid production - glutamic acid and lysine; Steroid transformations

UNIT - V

Production of enzymes - Amylase, Protease; Ethanol production; Antibiotics - Penicillin, Streptomycin; Vitamin - B12.

Text Books

1. Industrial Microbiology. 3rd edition. Patel A.H (2001). Mac Millan India ltd, New Delhi.
2. Industrial Microbiology. 2nd edition. Casida J.E (2005). Wiley Blackwell publishers, UK.
3. Pharmaceutical Microbiology. 4th edition. Hugo W.B and Russell A.D (2002). Blackwell scientific publications / oxford, London

Reference books

1. Principles of Fermentation technology. 1st edition. Stanbury P.F., Whitaker A and Hall S.J (1995). Pergamon, UK.
2. Principles and Applications of Fermentation Technology. 1st edition. Arindam Kuila & Vinay Sharma (2018). Scrivener Publishing LLC, Beverly.
3. Industrial Microbiology: An Introduction. 1st edition. Michael J. Waites, Neil L. Morgan, John S. Rockey, Gary Higton (2001). Blackwell publishers, USA
4. Industrial Microbiology. 1stedition. Prescott and Dunn (1982). AVI Publishing co., west port, Connecticut, USA.
5. The Complete Book of Tanning Skins & Furs. 1st edition. James Churchill (1983). Stackpole Books, UK.

CORE PRACTICAL -3

EXPERIMENTS IN MEDICAL MICROBIOLOGY

LIST OF EXPERIMENTS

Acid fast staining for *M. tuberculosis*

LPCB mounting of fungal pathogens

Examination of stool samples for parasites

Type study of the following bacteria - *Staphylococcus aureus*, *Streptococcus pyogenes*, *Escherichia coli*, *Klebsiella* sp., *Salmonella* sp., *Shigella* sp., *Proteus* sp., *Pseudomonas aeruginosa*.

Coagulase test for Staphylococci

Isolation of pathogenic bacteria from sputum

Isolation of pathogenic bacteria from urine

Isolation of pathogenic bacteria from faeces

Blood culture

Antibiotic susceptibility test

Reference Manuals

1. Monica Cheesbrough. District Laboratory Practice in Tropical Countries - Part I and II 2nd edition. Cambridge University Press, New Delhi. 2006.

2. Mackie and McCartney. Practical Medical Microbiology, South Asia Edition. 14th edition. 2006.

CORE PRACTICAL - 4

EXPERIMENTS IN APPLIED MICROBIOLOGY

LIST OF EXPERIMENTS

Microscopic observation of curd

Microscopic observation of spoiled food and vegetables

Methylene Blue Reduction test

Enumeration of microorganisms from air by Open plate method

Enumeration of bacteria from water sample

Enumeration of bacteria and fungi from soil sample

Test for coliforms in water by MPN method

Test for coliforms in water by Presence - Absence method

Demonstration of amylase producing bacteria

Demonstration of lipase producing bacteria

Demonstration of protease producing bacteria

Cross section of root nodules

Isolation of *Rhizobium* from root nodules

Reference Manuals

1. Rajan. S and Selvi Christy (2015). Experimental Procedures in Life Sciences, Anjanaa Book House Publishers, Chennai.

2. Cappuccino and Sherman. Microbiology: A Laboratory manual by (7^{th} edition) Berjamin Cummings Publications, 2004.

INTERNAL ELECTIVE
PAPER - 2
(to choose one out of 3)

A. BIOTECHNOLOGY

Course Outcomes:
At the end of the course, the learners will be able to;
1. understand basic concepts of Biotechnology
2. demonstrate the uses of enzymes
3. express the importance of plant biotechnology
4. explain the role of animal biotechnology
5. discuss the role of microorganisms in environment

UNIT - I

Concept of Biotechnology - Definition and history of Biotechnology - Major areas of Biotechnology - Indian scenario in Biotechnology - centers, activities achievements and bio-industries in India.

UNIT - II

Enzyme technology - Enzyme immobilisation, Products, Applications - Biotechnological potentials of Seaweeds, Microalgae - Biofuel - Hydrogen gas as fuel from Microorganisms - Biosensors-different types, applications - medical and non medical

UNIT - III

Genetic engineering of plants - Electroporation - Gene gun - Particle bombardment - Ti plasmid vectors - Applications - Transgenic plants - Insect resistant, Stress tolerant, Virus resistant plants, genetically modified foods - Terminator gene technology - concept and basics

UNIT - IV

Transgenic animals - Retroviral vector method, DNA micro injection method - Applications of rDNA technology - Recombinant products - insulin, tPA, vaccines - Gene therapy - Patents - IPR

UNIT - V

Bioremediation - Clean-up Biotechnology - Microbial removal of metal ions - Soil Bioremediation - Removal of oil spill - Biodegradation of hydrocarbons - Genetically modified organisms.

Text Books
1. Biotechnology. Singh B.D. 2006. Kalyani Publishers, New Delhi.
2. Genetics - A Molecular approach. 3rd edition. Brown J.A. 2001. Nelson Tornes.

Reference books

1. Text Book of Biotechnology. Pandian, T.T. and Kandavel, D.2008. I.K International Publishing House, New Delhi.
2. Essentials of Biotechnology. Ane Books Pvt. Ltd. New Delhi.
3. Text book of Biotechnology. Das, H.K. 2007. Wiley India Pvt. Ltd. New Delhi

INTERNAL ELECTIVE
PAPER - 2

B. HERBAL TECHNOLOGY

Course Outcomes:
At the end of the course, the student will be able to

1. Get acquainted with the basics of Pharmacognosy
2. Gain knowledge of medicinal plants
3. Understand the use of various medicinal plants
4. Appreciate the Herbal medicines used to treat human ailments
5. Understand the Propagation methods of medicinal plants

UNIT - I

Pharmacognosy: Pharmacology - Definition and history; Indian systems of medicine - Siddha, ayurvedha, and Unani systems; Classification of Crude drugs; Chemistry of Drugs; Future of pharmacognosy.

UNIT - II

Classification of medicinal plants; locally available medicinal plants - Vernacular name and family - Geographical Distribution; Crude drugs - chemical composition - pharmaceutical uses - processing and marketing.

UNIT - III

Medicinal plant parts as herbal medicines: Leaves - Adathoda, Eucalyptus; Flower - Clove; fruits seeds - Nux vomica Nutmegs, Gooseberry - unorganized drugs; Gum - Acacia - Resin - Turpentine, fixed oil - castor oil. Underground stem - ginger, Alpinia; Roots - Rauolfia, Belladona; Aerial parts - Bark - Cinchona.

UNIT - IV

Herbal medicines for Human ailments - Drugs acting on Blood pressure, cardiac diseases, cerebral diseases, Respiratory diseases - Drugs acting on Nervous system - Depressants. - stimulants - Urogenital system - Psychoactive plants; Drug adulteration - methods of Drug evaluation.

UNIT - V

Propagation of medicinal plants - cultivation of medicinal and aromatic plants - Micro and macro propagation - conservation of rare medicinal plants - seed banks - Role of biotechnology in medicinal plants - Herbal food - Food processing - packaging - Herbal sale and Export of medicinal plants - marketing - Intellectual property rights - Export laws.

Text Books

1. Herbal Drug Technology, 2nd Edition. Agarwal, S.S and Paridhavi, M (2012). Universities Press (India) Private Ltd.
2. Herbal Plants and their Applications in Cosmeceuticals. Kuntal Das (2014). CBS publishers and distributors Pvt. Ltd., Chennai.

Reference books

1. Pharmacognosy 12th edition. George Edward Trease and W.C. Evans. English Language Books Society, Baelliere Tindall.
2. Pharamcognosy by 2nd Edition. Handa, S.S. and Kapoor, V.K. Vallabh Prakashan Publishers, New Delhi.
3. Indian Medicinal plants. Jain, S.K (1980).
4. Pharmacognosy by 12th edition. Kokate, C.K., Durohit, A.P. and Gokhale, S.R. Nirali Prakasham Publishers, Pune.
5. Introduction to Medical Botany and Pharmacognosy. Kumar N.C. (1993).

INTERNAL ELECTIVE

PAPER - 2

C. GENETIC ENGINEERING

Course Outcomes:

At the end of the course, the student will be able to

1. Get acquainted with the basics of Genetic Engineering
2. Understand the role of various enzymes acting on DNA
3. Gain knowledge of Cloning vectors
4. Understand the Gene / DNA transfer techniques
5. Appreciate the applications of rDNA technology

UNIT - I

Milestones in Genetic Engineering - Definition of gene manipulation - Major steps involved in gene cloning - Isolation and Purification of Chromosomal and Plasmid DNA, Isolation and Purification of RNA - Chemical Synthesis of DNA, Genomic Library and cDNA Library - applications.

UNIT - II

Restriction endonucleases: Discovery, Type I, II and III and Mode of action, Applications of type II restriction endonucleases, Ligases, DNA polymerases, DNA modifying enzymes and topoisomerases.

UNIT - III

Cloning vectors: Definition and properties - Plasmid based vectors: Natural vectors (pSC101, pSF2124, pMB1), Artificial vectors (pBR322 and pUC) - Phage based vectors - Lamda) phage vectors and its derivatives - Hybrid Vectors; Phagemid and Cosmid, BAC and YAC - Expression systems - *E. coli*.

UNIT - IV

Gene/ DNA transfer techniques: Physical - Biolistic Method (Gene gun), Chemical- Calcium chloride and DEAE Methods, Biological in vitro packaging method in viruses - Selection and Screening of recombinants: Direct Method: Selection by Complementation, Marker inactivation methods - Indirect methods: Immunological and Genetic methods.

UNIT - V

Blotting (Southern, Western, Northern and North- eastern) techniques - PCR - basic steps in DNA amplification, RAPD, RFLP and their applications - DNA finger printing - DNA microarray analysis - Applications of recombinant DNA technology.

Text Books

1. An introduction to Gene Cloning, 3rd edition. Brown TA. 1995. Champman and Hall.
2. Gene Cloning and DNA Analysis, 7th edition. Brown TA. 2015. Wiley Blackwell.
3. Principles of Gene Manipulation and Genomics. Primrose SB and Twyman RM. 2006. Wiley Blackwell, 7th edition.

Reference Books

1. Principle of Gene Manipulation, 5th edition. Old RW and Primrose SB. 1995. Blackwell Scientific Publication, Boston.
2. Gene Cloning - Principles and Applications. Julia Lodge, Peter Lund and Steve Minchin. 2006. Taylor and Francis, UK.
3. From gene to clones, Introduction to Gene Technology. Winnecker ED. 1987. VCH Publication, FRG.
4. Molecular Biotechnology. Principles and Application of recombinant DNA, Glick BR and Pasternak JJ. 1994. ASM Press. Washington.

INTERNAL ELECTIVES
PAPER - 3
(to choose one out of 3)

A.BIOINOCULANTS TECHNOLOGY

Course Outcomes:
At the end of the course, the student will be able to

1. Understand the role of Plant Growth Promoting Rhizobacteria
2. Get acquainted with production and field application of *Rhizobium* and *Frankia*
3. Gain knowledge of Cyanobacteria as N_2 fixers
4. Understand the Phosphate solubilizing microbes
5. Appreciate the role of Mycorrhiza in plant growth promotion

UNIT - I

Biofertilizers, Plant Growth Promoting Rhizobacteria; Bioinoculants; General account of the microbes used as biofertilizers for crop plants and their advantages. Non - Symbiotic N_2 fixers - *Azospirillum* - *Azotobacter* - Taxonomic characters, isolation, characterization, mass production and field application.

UNIT - II

Symbiotic N_2 fixers: *Rhizobium* - Isolation, characterization, identification, Classification, inoculum production and field application. *Frankia* - Isolation, characterization - actinorrhizal nodules - non-leguminous crop symbiosis.

UNIT - III

Symbiotic N_2 fixers - Cyanobacteria, *Azolla* - *Anabaena* - Isolation, characterization, mass multiplication - Role in rice cultivation - Crop response - field application - immobilization.

UNIT - IV

Phosphate solubilizers - Phosphate solubilizing microbes - Isolation, characterization, mass inoculum production, field application - Phosphate solubilization mechanism.

UNIT - V

Mycorrhizal bioinoculants - Taxonomy of mycorrhizae - importance of mycorrizal Ectomycorzhizae - Endomycorrhizae - Ectendo mycorrhizae - Isolation of VA mycorrhizae - Quantification and assessment of VAM in roots - Mass inoculum production of VAM - field applications of Ectomycorrhizae and VAM.

Text Books

1. Bioetchnology of Biofertilizers. Kannaiyan, S. (2003). CHIPS, Texas.
2. Hand book of Microbial biofertilizers. Mahendra K. Rai (2005). The Haworth Press, Inc. New York.

3. Bioinoculants for sustainable agriculture and forestry. Reddy, S.M. et. al. (2002). Scientific Publishers.

Reference Books

1. Soil microorganisms and plant growth. Subba Rao N.S (1995) Oxford and IBH publishing co. Pvt. Ltd. New Delhi.
2. Biofertilizers in Agriculture and forestry. Subba Rao N.S. (1988) Oxford and IBH Publishing Co., Ltd., New Delhi.

INTERNAL ELECTIVES
PAPER - 3

B. CLINICAL MICROBIOLOGY

Objective: To familiarize students on clinical laboratory guidelines, infections of organs and organ systems, transmission and detection of diseases.

Course outcomes:

At the completion of the course, the learners will be able to

1. Collect various clinical specimens for microbiological examination.
2. Gain knowledge on infections of different organ and organ system.
3. Comprehend the different modes of transmission of infection, prevention and its control.
4. outline the importance of immunoprophylaxis, genetic disorders and gene therapy.
5. Perform laboratory tests to detect infection and diseases.

UNIT - I

Philosophy and General Approaches to clinical specimens - clinical laboratory standard guidelines - Collection and transportation of specimens for microbiological examination (Pus, Urine, blood, CSF, body fluids etc.). Collection of data and maintenance of laboratory records.

UNIT - II

Normal microbial flora of human body .Infection and infectious diseases- types of infection. Pathogenic/parasitic organisms: Bacterial, viral and protozoan infections of the gastrointestinal system, nervous system, lung, liver and eye- Transmission and spread of diseases - Disease epidemiology.

UNIT - III

Sexually transmitted diseases, arthropod borne diseases, skin infections and zoonosis. Control and prevention of infections - drugs and antibiotics - drug resistance; Immunodeficiency, Autoimmunity and hypersensitivity.

UNIT - IV

Blood parasites (Malaria, Filaria) - importance, lifecycle, spread and Control of vectors - Mosquito control. Laboratory control of antimicrobial therapy, Immunoprophylaxis. Vaccines - types and methods of action. Genetic disorders and Gene therapy.

UNIT - V

Biochemical changes due to different infections - Blood tests - blood smear preparation - thick and thin - Leishman and Giemsa staining ; tissue analysis. Isolation and identification of organisms from tissue samples. Disease detection - conventional and molecular techniques.

Text Books

1. Diagnostic Microbiology, 13th Edition. Bailey and Scott, (2013). Elsevier Health Sciences publishers.
2. Mackie, Mc Cartney's Practical Medical Microbiology,14th Edition. Collee, J.C. Dugrid, J.P., A.C., Marimion, B.P (2007). Churchill Livingstone.
3. Medical Microbiology. 14th edition. David Greenwood, Richard CD, Slack, John Forrest Peutherer. (2010). ELBS with Churchill Livingstone.

Reference Books

1. Essential Immunology. Ivan M. Roit. (2010). Wiley India Pvt. Ltd, New Delhi.
2. Topley & Wilsons's. (1990) Principles of Bacteriology, Virology and Immunity, VIII edition, Vol. III Bacterial Diseases, Edward Arnold, London.
3. Medical Microbiology. 26th edition. Jawetz, Melnick, & Adelberg's. (2013). McGraw-Hill, New York.
4. Text book of Medical Parasitology. 4th edition. Subhash Chandra Parija (2013). All India Publishers and Distributors (Medical Books Publishers), New Delhi.

INTERNAL ELECTIVES
PAPER - 3

C. FOOD ANALYSIS AND QUALITY CONTROL

Objectives: The paper focuses on analysis of food, concepts of quality control and quality management

Course Outcomes:
At the end of the course, the student will be able to

1. Understand the Techniques used in food analysis
2. Get acquainted with various food analysis methods
3. Gain knowledge on the various methods of food quality assessment
4. Understand the Food quality management procedures
5. Appreciate the role of Food Safety organizations

UNIT - I

Sampling - Sampling techniques and preparation of food samples. **Techniques used in food analysis -** Chromatography, Electrophoresis, Electrometric determinations, Refractometry and Polarimetry Spectrophotometry, Fluorimetry, Radio - active tracer techniques, Atomic absorption

UNIT - II

Physico chemical methods for food analysis - Moisture and Total solids, Carbohydrates, Proteins, Fats, Fiber, Ash and its types, Minerals, Vitamins. Enzymatic methods **Biological methods of food analysis -** Standard plate count; Plate loop method; Spiral plate; Droplet technique; Dye reduction; Catalase test and ELISA. Testing of food for organisms such as *B. cereus, C. botulinum, E. coli*, *L. monocytogenes, S.aureus, Salmonella* and *Shigella.*

UNIT - III

Sensory assessment of food quality - Appearance of food, Flavor of food, Texture of food. **Sensory Tests -** Difference, Rating and Sensitivity tests. Types of panels, Testing area and schedule. **Quality control of following food products -** Milk and milk products, Oils and Fats, Cereal grains and flours, Fruits and vegetable products, Canned foods, Egg and egg products, Meat and Meat products

UNIT - IV

Food quality management - Objectives, Importance and Functions of quality control. Total quality, management, Good manufacturing practices, seven principles of HACCP and codex in food. Quality control, methods of - a. raw materials, b. manufacturing process and c. finished products.

UNIT - V

Food Safety - Role of voluntary agencies and legal aspects of consumer protection. National and International food laws - PFA, FDA, BIS, AGMARK, Essential Commodity Act, Export (quality and inspection act, Consumer protection act), Nutritional labeling requirements of foods, Food adulteration.

Text Books

1. Food Analysis - Theory & Practice. Pomeranz.Y, Meloan.C.E, 1996. CBS Publiushers, New Delhi.
2. Food microbiology, 4th edition. Frazier, W.C and Westhoff, D.C (1988). Tata Mac Graw Hill, New Delhi.

Reference books

1. Chemical Analysis of Food & Food Products. Jacobs.M.B., 1999. CBS Publiishers, New Delhi.
2. Introduction to chemical Analysis of foods. Nielsen, S.S, 2004. CBS Publishers, New Delhi.
3. Handbook of Analysis & Quality control for Fruit & Vegetable Products. Ranganna. S., 2001. Tata McGraw Hill, New Delhi.

SKILL BASED SUBJECT
PAPER-4
MEDICAL LABORATORY TECHNIQUES

Course objective: To provide students an effective background on Medical Laboratory techniques.

Course outcomes:
At the completion of the course, the learners will be able to;
1. Outline the general laboratory procedures for collection of various specimens.
2. Explain the mechanism of coagulation and procedures carried out in estimation of blood cells.
3. Describe about chemical and microbiological examination of CSF, Urine, semen, stool and vaginal fluids.
4. Elaborate on the collection and testing of amniotic fluid, gastric juice, lymph, sputum and synovial fluid.
5. Apply the theoretical knowledge in practice.

UNIT - I

Medical laboratory practices; General Laboratory apparatus, procedures, glassware's, safety measures, first aid in lab- sterilization and disinfection procedures. Blood- components of blood (plasma and cellular elements) and their functions.

UNIT - II

Hematopoietic system of the body (Erythropoiesis, Leucopoiesis and Thrombopoeisis)- Abnormalities in blood cell morphology- types of Anaemia and Leukemia. Blood grouping, Blood bank, Blood transfusion (Coomb's test, cross matching).

UNIT - III

Coagulation system: Clotting time, bleeding time. Estimation of PCV, ESR, RBC count, WBC count, Differential count, Platelet count. Mechanism of coagulation and Platelet disorders.

UNIT - IV

Body fluids- Physical properties, compartments, solutes and movements. CSF- physical examination, functions of CSF, chemical analysis, microbiological examination. Urine analysis, semen analysis, stool and vaginal fluid analysis and Pap smear.

UNIT - V

Amniotic fluid- chemical composition, functions and collection. Testing -Alpha-fetoproteins, Acetylcholisnesterase, Neural tube defects. Collection of lymph, gastric juice, sputum, synovial fluid and testing.

Text Books

1. Textbook of Medical Laboratory Technology. 1st edition. Mrinalini Sant M D. (2020). CBS Publishers& Distributors.
2. Textbook of Medical Laboratory Technology. 1st edition. Praful B. Godkar and Darshan P. Godkar. (2014). Bhalani Publishing House.
3. District Laboratory Practice in Tropical Countries - Part I and II. 2nd edition. Monica Cheesbrough. (2005). Cambridge University Press, New Delhi.

Reference books

1. A Concise note on Medical Laboratory Technology. Maiti. C.R. (2002). New central book agency. New Delhi
2. Basic Clinical Laboratory Techniques. 6th edition. Barbara H. Estridge and Anna P. Reynolds (2011). Cengage learning publishers, United States
3. Concise Book of Medical Laboratory Technology Methods and Interpretations. 2nd edition. Ramnik Sood. (2015). Jaypee Health Science publishers.
4. Laboratory Procedures in Haematology, 1st edition. Mehdi S.R (2006). Jaypee Publishers.

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QUESTION PAPER PATTERN (Practical)

Internal Examination - Maximum = 25 Marks
External Examination - Maximum = 75 Marks
Total - Maximum = 100 Marks

External Examination - Maximum 75 Marks
(Will be conducted on two consecutive days of three hours each)

Question	Description	Marks
1	• Minor Experiment (to be reported on the same day)	**1 x 20 Marks = 20 Marks**
2	• Major Experiment (to be reported on the second day)	**1 x 30 Marks = 30 Marks**
3	• Spotters	**5 x 3 Marks = 15 Marks**
4	• Record Notebook	**10 Marks**
	Total	**75 Marks**

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. PHYSICSDEGREE COURSE

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3	III	Core Theory	Paper-1	6	4	Mechanics	25	75	100
4	III	Core Practical	Practical-1	4	0		0	0	0
5	III	Allied -1	Paper-1	4	3	Chemistry I or Biochemistry I	25	75	100
6	III	Allied Practical	Practical-1	2	0		0	0	0
7	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
8	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**20**		**150**	**450**	**600**
		SEME STER II					**CIA**	**Uni. Exam**	**Total**
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
10	III	Core Theory	Paper-2	5	4	Heat and Thermodynamics	25	75	100
11	III	Core Practical	Practical-1	3	2	Practical - I	25	75	100
12	III	Allied-1	Paper-2	4	3	Chemistry II or Biochemistry II	25	75	100
13	III	Allied Practical	Practical-1	2	2	Practical-Allied	25	75	100
14	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
15	IV	Value Education		2	2	Value Education	25	75	100
16	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**

THIRUVALLUVAR UNIVERSITY

B.Sc. PHYSICS

SYLLABUS
CBCS PATTERN
(With effect from 2020 - 2021)

SEMESTER I

CORE PAPER - 1

MECHANICS

Course Objectives

1. To know the basics of vectors algebra and the dynamic of a system
2. To understand the dynamics of rigid bodies
3. To learn the concept of work, energy and collisions
4. To study the basics of elasticity
5. To expose the knowledge on gravitation and satellites

UNIT-1: Vectors and Dynamics

Introduction to Vectors - Vector algebra-Scalar and vector products-Gradient of a scalar field - Divergence of a vector field - Line integral - Curl of a vector field - Surface and volume integrals -Stoke's theorem - Gauss theorem of divergence - Green's theorem -Newton's laws of motion-Principle of conservation of momentum-Impulse-Projectile-Range on an inclined plane- Range and Time of fight down an inclined plane-Two body problem and the reduced mass-Centre of mass-Centre of gravity-Centre of gravity of a solid tetrahedron-Analytical problems solving.

UNIT-2: Dynamics of rigid bodies

Rotational kinetic energy and moment of inertia-Angular acceleration and angular momentum-Law of conservation of angular momentum-Torque-Work done by a torque-Theorem of perpendicular and parallel axes-Moment of inertia of a thin uniform rod-rectangular lamina-uniform circular disc (through the centre of gravity for all)-Determination of acceleration due to gravity-Compound pendulum-Centre of suspension and centre of oscillation are interchangeable- Bifilar pendulum (parallel threads)- Analytical problems solving.

UNIT-3: Work, Energy & Collisions

Work-Energy Theorem – Conservative forces - Potential Energy-Force as gradient of potential energy-Principle of conservation of energy of a freely falling body.

Elastic and inelastic collisions-Coefficient of restitution-Oblique impact of a smooth sphere on a fixed smooth plane-Oblique impact of two smooth spheres-Loss of kinetic energy due to oblique impact- Analytical problems solving.

UNIT-IV: Elasticity

Elastic moduli-Hooke's law- Relation between elastic constants – Poisson's Ratio - Work done in stretching twisting a wire-Twisting couple on a cylinder-Rigidity modulus of a wire by Torsional pendulum-Rigidity modulus of a rod by Static torsion method-Bending of beams -Expression for bending moment – Cantilever -Expression for depression at the loaded end- Non-uniform bending-Determination of young's modulus pin & microscope and Koenig's method- Uniform bending-Expression for elevation – Experiment to determine young's modulus using optic lever method- Analytical problems solving,

UNIT-V: Gravitation

Law of gravitation-Acceleration due to gravity- Inertial mass and gravitational mass-Gravitational field-Gravitational potential-Gravitational potential energy- Potential and field due to spherical shell and solid sphere.

Kepler's Laws-Basic principles of rocket motion-Rocket Equation, thrust and acceleration-Escape velocity-Orbital velocity-Satellite in circular orbit-Geosynchronous orbits-Weightlessness- Basic idea of global positioning system (GPS)-Physiological effects on astronauts- Analytical problems solving.

Course outcomes

1. After studied unit-1, the student will be able to know fundamentals of vectors and able to formulate the expression for projectiles.
2. After studied unit-2, the student will be able to study the dynamics of rigid bodies in terms of moment inertia and also able to find the moment of inertia of different systems.
3. After studied unit-3, the student will be able to define work, energy and also able to understand the oblique impact between smooth spheres.
4. After studied unit-4, the student will be able to learn the elastic property of the solid materials and also derive the relation between elastic moduli.
5. After studied unit-5, the student will be able to explain the concept of gravitation and able to know the principles of rocket and satellite.

Text Books

Unit 1

1. R. Murugeshan, Mechanics and Mathematical methods, S.Chand&Co.Ltd, New Delhi, 2016

Unit 2

1. BrijLal and N. Subrahmanyam, Properties of Matter, S.Chand&Co.Ltd, New Delhi, 2002

Unit 3

1. M. Narayanamurti and N.Nagartnam, Dynamics, The National Publishing Company, Chennai, 2005.
2. Prof. D.S. Mathur revised byDr.P.S. Hemne, Mechanics, S. Chand and Company Limited, 2014

3. R. Murugeshan, Mechanics and Mathematical methods, S.Chand&Co.Ltd, New Delhi, 2016

Unit 4

1. R. Murugeshan, Properties of Matter and Acoustics, S.Chand&Co.Ltd, New Delhi, 2016
2. BrijLal and N. Subrahmanyam, Properties of Matter, S.Chand&Co.Ltd, New Delhi, 2002
3. K. Ilangovan, Properties of Matter and Sound, Ananda Book Depot, Chennai, 2018.
4. J.Jayachitra and M. Gunasekaran, Properties of Matter and Acoustics, KRU Publications, Kumbakonam, 2007.

Unit 5

1. BrijLal and N. Subrahmanyam, Properties of Matter, S.Chand&Co.Ltd, New Delhi, 2002
2. Prof. D.S. Mathur revised byDr.P.S. Hemne, Mechanics, S. Chand and Company Limited, 2014

Reference Books

1. Sathyaprakash, Mathematical Physics, Sultanchand& Sons, New Delhi, Revised Ed.
2. Resnick, Halliday and Walker, Physics, 8/e. 2008, Wiley
3. J.W. Jewett, R.A. Serway ,Physics for scientists and Engineers with Modern Phys., , 2010, Cengage Learning
4. R.P.Feynman, R.B.Leighton, M.Sands ,Feynman Lectures, Vol. I, , 2008, Pearson Education
5. M.R. Spiegel, Theoretical Mechanics, , 2006, Tata McGraw Hill.
6. C.Kittel, W.Knight, et.al, Mechanics, Berkeley Physics, vol.1. 2007, Tata McGraw-Hill.
7. G.R. Fowles and G.L. Cassiday, Analytical Mechanics,. 2005, Cengage Learning.
8. Higher Secondary Plus 1 and Plus 2 Physics Books- TN State Board and NCERT Books.

E-Materials

1. https://sites.google.com/a/euhsd.org/physics/
2. https://en.wikipedia.org/wiki/Euclidean_vector
3. https://www.youtube.com/watch?v=sXKiAKn0WCM
4. https://en.wikipedia.org/wiki/Center_of_mass
5. https://en.wikipedia.org/wiki/Moment_of_inertia
6. https://www.toppr.com/guides/physics/system-of-particles-and-rotational-dynamics/moment-of-inertia/
7. https://byjus.com/physics/work-energy-power/
8. https://www.physicsclassroom.com/class/energy
9. https://en.wikipedia.org/wiki/Bending_moment
10. https://www.youtube.com/watch?v=CQGlgu-8dmA (Tamil video)
11. https://en.wikipedia.org/wiki/Newton%27s_law_of_universal_gravitation
12. https://www.youtube.com/watch?v=kxkFaBG6a-A
13. http://hyperphysics.phy-astr.gsu.edu/hbase/rocket2.html
14. https://en.wikipedia.org/wiki/Global_Positioning_System
15. https://study.com/academy/lesson/the-global-positioning-system-and-its-uses.html
16. https://www.nasa.gov/centers/johnson/pdf/584739main_Wings-ch5d-pgs370-407.pdf

SEMESTER II

CORE PAPER - 2
HEAT AND THERMODYNAMICS

Course Objectives

1. Get clear idea about the specific heat capacity and kinetic theory of gases
2. Knowledge about the conduction, radiation and low temperature physicswill be gained
3. To know the thermodynamic system and its laws
4. To learn the concept of entropy and Mawell'sthermodynamical relations
5. To study the basic ideas of statistical mechanics

Unit-1: Specific Heat & Kinetic theory of gases

Specific heat capacity-Principle of method of mixtures-Specific heat capacity of liquid by method of mixtures-Newton's law of cooling-Specific heat capacity of a liquid by the method of cooling- Specific heat capacity of a liquid by Callender and Barne's method-Specific heat capacity of gases- Meyer's relation between C_P and C_v.

Kinetic theory of gases-Expression of pressure of gas-Boyle's law-Charle's law-Perfect gas equation- Mean free path-Expression for mean free path-Maxwell's velocity distribution law-Transport phenomena-Diffusion-Law of equipartition energy- Application to specific heat of gases.

Unit-2: Transmission of Heat & Low Temperature Physics

Conduction-Coefficient of thermal conductivity-thermal conductivity of a good conductor--Forbe's method – thermal conductivity of a poor conductor -Lee's disc method-Black body radiation-Stefan -Boltzmann law-determination of Stefan's constant -laboratory method-Solar energy-Solar cooker-solar constant- temperature of the Sun.

Joule-Kelvin effect-Porous plug experiment- liquefaction of hydrogen- liquefaction of helium-Kammerling-Onne's method-Helium I and II -Lambda point-Superconductivity-Type I and II superconductors -Meissner effect-applications of superconductors.

UNIT-3: Thermodynamics

Thermodynamic system- Zeroth law, First and Second law of thermodynamics -Carnot's theorem-Statement and proof-Otto (petrol) engine and Diesel engine –Construction, working and efficiency- Thermodynamic scale of temperature- Thermodynamic and perfect gas scale.

UNIT-4: Entropy & Enthalpy

Entropy- Change in entropy in a reversible/irreversible process-Temperature entropy diagram -Entropy of perfect gas- Third law of thermodynamics-Maxwell's thermo dynamical relations--Clapeyron latent heat equation-Clausius latent heat equation-Helmholtz and Gibb's free energy-Enthalpy.

UNIT-5:Statistical Mechanics

Phase space- Macrostate and Microstate- Entropy and Thermodynamic probability, Maxwell-Boltzmann law - distribution of velocity -Quantum statistics - Fermi-Dirac distribution law - electron gas - Bose-Einstein distribution law - photon gas - comparison of three statistics-Ensembles-Micro,canonical and grand canonical ensembles.

Text Books

Unit 1 to Unit 5

1. D. Jayaraman, K. Ilangovan, Thermal Physics &Stastical Mechanics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2016.
2. BrijLal and N Subrahmanyam,Heat Thermodynamics and Statistical Physics,S Chand & Company Pvt Ltd, New Delhi, 2016.

Reference Books

1. D.S. Mathur, Heat and Thermodynamics**,** S Chand & Company Pvt Ltd, 2008.
2. J.B. Rajam, Heat and thermodynamics,S Chand & Co., New Delhi, 1990.
3. R Murugeshan and KiruthigaSivaprasad, Thermal Physics, S Chand & Co., New Delhi, 2002.
4. Gupta and Kumar, Elements of Statistical Mechanics, PragatiPrakashan, Meerut, 2000.
5. SathyaPrakash and J P Agarwal , Statistical Mechanics , KedarNath& Ram Nath& Co., Meerut, 2002.

E- Materials

1. https://www.e-booksdirectory.com/details.php?ebook=1778
2. https://www.ugrad.math.ubc.ca/coursedoc/math100/notes/diffeqs/cool.html
3. https://www.youtube.com/watch?v=JLU0phEP7h4
4. https://www.youtube.com/watch?v=Q7qzc7-flMY (Tamil Video)
5. https://www.youtube.com/watch?v=Atnjo7dD_bA
6. https://www.youtube.com/watch?v=iENG9VnBeP0
7. http://www.iiserpune.ac.in/~bhasbapat/phy221_files/Lee's%20Method.pdf
8. https://vikaspedia.in/energy/energy-production/solar-energy/solar-cookers
9. https://www.youtube.com/watch?v=ZWDl1-oZLJQ (Tamil Video)
10. https://www.youtube.com/watch?v=6IRXVZKH6WQ
11. https://www.youtube.com/watch?v=DPjMPeU5OeM
12. https://statisticalphysics.openmetric.org/equilibrium/ensembles.html

Course Out Comes

1. After studied unit-1, the student will be able to know fundamentals specific heat capacity and able to explain the kinetic theory of gases.

2. After studied unit-2, the student will be able to describe the conduction and radiation of heat and also able to study the Joule-Kelvin effect based on the low temperature phenomena and its applications.
3. After studied unit-3, the student will be able to cite the laws of thermodynamics and their applications.
4. After studied unit-4, the student will be able to explore the equations governing second law of thermodynamics and entropy.
5. After studied unit-5, the student will be able to explain Phase-space, micro and macrostates and able to distinguish MB,FD and BE statistics.

CORE PRACTICAL-1

List of Experiments (Any 15 Experiments only)

1. Compound Pendulum -Determination of ‘g’ and ‘k’.
2. Young’s modulus -non uniform bending -Pin and microscope.
3. Young’s modulus -uniform bending -Optic lever.
4. Young’s modulus cantilever- depression- dynamic method-Mirror, Scale and Telescope.
5. Rigidity modulus -Torsional Pendulum -without masses.
6. Rigidity modulus and moment of inertia -Torsional Pendulum -with identical masses.
7. Rigidity modulus -Static torsion -Mirror, scale and telescope.
8. Surface tension and Interfacial surface tension - drop weight method.
9. Coefficient of viscosity of liquid-Graduated burette -Radius of capillary tube by using microscope.
10. Thermal conductivity of a poor conductor -Lee’s disc method.
11. Specific heat capacity of liquid -Newton’s law of cooling.
12. Sonometer -Frequency of Tuning fork.
13. Sonometer -Relative density of a solid and liquid.
14. Focal length -R and μ of a convex lens [focal length i) u-v and ii) conjugate foci method; Radius of curvature by telescope method].
15. Focal length -R and μ of a concave lens [focal length i) in contact and ii) auxiliary lens method; Radius of curvature by Boy’s method].
16. Spectrometer -Solid prism- Refractive indexof material of a prism.
17. Spectrometer- Hollow prism – Refractive index of a liquid.
18. Potentiometer -Calibration of low range voltmeter.
19. Potentiometer - Internal resistance of a Cell.
20. Post office box -Temperature coefficient of resistance of a coil.

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai,2018.
2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Samir Kumar Ghosh, A Textbook of Advanced Practical Physics, NCBA, Kolkatta, 2000.
2. D. Chattopadyay, P.C.Rakshit, An Advanced Course in Practical Physics,NCBA, Kolkatta, 2011
3. C.L.Arora, B.Sc., Practical Physics,S. Chand and Company., New Delhi.
4. D.P.Khandelwal , A Laboratory Manual of Physics for Undergraduate Classes,VaniPublications.
5. B.Saraf et al, Physics through Experiments,Vikas Publications.
6. Harnaam Singh., B.Sc., Practical Physics,S. Chand and Company., New Delhi.
7. D C Tayal, University Practical Physics, Himalaya Publishing House.
8. Gupta & Kumar, Practical Physics, Pragatiprakashan, Meerut

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. PHYSICS
DEGREE COURSE

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	6	4	Mechanics	25	75	100
	III	Core Practical	Practical-1	4	-		-	-	-
4.	III	Allied -1	Paper-1	4	3	Chemistry I or Biochemistry I	25	75	100
	III	Allied Practical	Practical-1	2	0		0	0	0
5.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
6.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**20**		**150**	**450**	**600**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
7.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8.	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
9.	III	Core Theory	Paper-2	4	4	Heat and Thermodynamics	25	75	100
10.	III	Core Practical	Practical-1	3	2	Practical - I	25	75	100
11.	III	Allied-1	Paper-2	4	3	Chemistry II or Biochemistry II	25	75	100
12.	III	Allied Practical	Practical-1	2	2	Practical-Allied	25	75	100
13.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
14.	IV	Value Education		2	2	Value Education	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
16.	I	Language	Paper-3	6	4	Tamil/Other Languages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-3	5	4	Electricity, Magnetism and Electromagnetism	25	75	100

	III	Core Practical	Paper-2	3	0		0	0	0
19.	III	Allied-2	Paper-3	6	3	Mathematics I	25	75	100
20.	IV	Skill Based Subject	Paper-1	2	2	Basic Electrical Technology	25	75	100
21.	IV	Non-Major Elective	Paper-1	2	2	Environmental Physics	25	75	100
		Sem. Total		**30**	**19**		**150**	**450**	**600**
SEMESTER IV									
22.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
23.	II	English	Paper-4	6	4	English	25	75	100
24.	III	Core Theory	Paper-4	5	5	Waves and Optics	25	75	100
25.	III	Core Practical	Practical-2	3	3	Any 15 Experiments given in the syllabus	25	75	100
26.	III	Allied-2	Paper-4	6	5	Mathematics II	25	75	100
27.	**IV**	**NMSDC : Digital Skills for Employability**	**Paper-2**	**2**	**2**	**Office Fundamentals**	**25**	**75**	**100**
28.	IV	Non-Major Elective	Paper-2	2	2	Everyday Physics	25	75	100
		Sem. Total		**30**	**25**		**175**	**525**	**700**
SEMESTER V									
29.	III	Core Theory	Paper-5	6	6	Atomic and Molecular Physics	25	75	100
30.	III	Core Theory	Paper-6	6	6	Relativity and Quantum mechanics	25	75	100
31.	III	Core Theory	Paper-7	6	6	Basic and Applied Electronics	25	75	100
	III	Core Practical	Practical-3	3	0	General Practical	0	0	0
	III	Core Practical	Practical-4	3	0	Electronics Practical	0	0	0
32.	III	Elective	Paper-1	4	3	Group (A) or (B) or (C)	25	75	100
33.	IV	Skill Based Subject	Paper-3	2	2	Cell Phone Technology	25	75	100
		Sem. Total		**30**	**23**		**125**	**375**	**500**
SEMESTER VI									
34.	III	Core Theory	Paper-8	5	4	Nuclear and Particle Physics	25	75	100
35.	III	Core Theory	Paper-9	4	4	Solid State Physics	25	75	100
36.	III	Core Practical	Practical-3	3	3	General Practical	25	75	100
37.	III	Core Practical	Practical-4	3	3	Electronics Practical	25	75	100
38.	III	Elective	Paper-2	4	3	Group (A) or (B) or (C)	25	75	100
39.	III	Elective	Paper-3	4	3	Group (A) or (B) or (C)	25	75	100
40.	III	Compulsory Project	Paper -10	5	5	Group / Individual Project	25	75	100
41.	III	**NMSDC : Emerging Technology for Employability III**	**Paper-4**	**2**	**2**	**Project based Learning II**	**25**	**75**	**100**
42.	V	Extension Activities		0	1		100	0	100
		Sem. Total		**30**	**28**		**300**	**600**	**900**
		Grand Total			**140**				**4200**

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English& English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Allied Practical	1	2		100	100
	Electives	3	3	9	100	300
	Core	9	(3-5)	43	100	900
	Core practical	4	(2-3)	11	100	400
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	**43**		**140**		**4200**

Note: Compulsory Project

The faculty/Guides are advised to give projects and suggest project titles focusing more on the current field of research/social relevance and ensure the level of innovation. Staff member cannot guide more than five studentsfor a group project.

A student may be permitted to work on projects in an Industrial/Research Organization, on the recommendations of the Head of his/her Department. In such cases, the Project work shall be jointly guided by a guide of the department and an expert from the organization. The student shall be instructed to meet the respective guide periodically for evaluating the progress.

ELECTIVE SUBJECTS

Students can choose any one of the groups (Elective I, II & III)

GROUP A

Elective 1: Digital Electronics

Elective 2: Fundamentals of Microprocessor-8085

Elective 3: Nanophysics

GROUP B

Elective 1: Digital Electronics

Elective 2: Materials Science

Elective 3: Medical Physics

GROUP C

Elective 1: Digital Electronics

Elective 2: Radiation Safety

Elective 3: Astrophysics

SEMESTER III

CORE PAPER-3

Electricity, Magnetism & Electromagnetism

Course Objectives

1. Familiarize with the concept of electric flux, electric potential and capacitors.
2. To know the principles current and thermo electricity.
3. Understand the magnetic effects of electric current.
4. Study the unification of electric and magnetic phenomena.
5. To gain knowledge about Maxwell's equations.

UNIT- I

ELECTROSTATICS

Coulomb's Law- Gauss's Law and its applications (Electric Field due to a uniformly charged sphere, hollow cylinder & solid cylinder)-Electric Potential - Potential at a point due to a uniformly charged conducting sphere-Principle of a capacitor-Capacity of a spherical and cylindrical capacitors- Capacitance of a parallel plate capacitor-Partially filled with dielectric-Energy stored in a charged capacitor-Loss of energy on sharing of charges between two capacitors-Problems solving.

UNIT - II

CURRENT ELECTRICITY AND THERMO ELECTRICITY

Carey Foster's Bridge-Determination of temperature coefficient of resistance of a coil– Potentiometer-Calibration of Ammeter and Voltmeter (Low range and High range) - Comparison of Resistances- Seebeck, Peltier and Thomson effects -Peltier coefficient - Thomson coefficient - application of thermodynamics to a thermocouple and expressions for Peltier and Thomson coefficients - thermo electric power and thermo electric diagrams-Problems solving.

UNIT- III

ELECTROMAGNETIC INDUCTION

Laws of electromagnetic induction- Self and mutual induction- Self-inductance ofa solenoid-Mutual inductance of a pair of solenoids-Coefficient of coupling-Experimental determination of self (Rayleigh's method) and mutual inductance-Growth and decay of current in a circuit containing L and R-Growth and decay ofcharge in a circuit containing C and R-Measurement of High resistance byleakage-Problems solving.

UNIT- IV

MAGNETISM

Intensity of Magnetization-Magnetic Susceptibility- Magnetic Permeability-Types of magnetic materials- Properties of para, dia and ferromagnetic materials-Langevin's theory of dia and para magnetism-Weiss's theory of ferromagnetism - B-H curve-Energy loss due to magnetic hysteresis- Ballistic Galvanometermethod for plotting B-H curve - Magnetic properties of iron and steel-Problems solving.

UNIT- V

MAXWELL'S EQUATIONS &EMT

Introduction-Displacement Current-Maxwell's equations in material media-Plane electromagnetic waves in free space-velocity of light-Electromagnetic waves in isotropic non-conducting media-Index or refraction-Poynting vector-Problems solving

Text Books

Unit 1 to Unit 4

1. R Murugeshan- Electricity and magnetism, S Chand & Co., New Delhi, 2006.

Unit 4 and Unit 5

1. R Murugeshan- Electricity and magnetism, S Chand & Co., New Delhi, 2006
2. K KTewari, Electricity & Magnetism by, S Chand & Co.,2001.

Reference Books

1. BrijLal and N Subrahmanyam,Electricity and Magnetism, S Chand & Company Pvt Ltd, New Delhi, 2000.
2. D.C. Tayal, Electricity and Magnetism, Himalay Publishing House,Bombay, 1992.
3. M Narayanamurthy& N Nagarathnam, Electricity & Magnetism, National Publishing Co., Meerut.
4. David J Griffiths, Introduction to Electrodynamics, Prentice Hall of India, Pvt. Ltd., New Delhi, 1997.

E-Materials

1. https://en.wikipedia.org/wiki/Coulomb%27s_law
2. https://www.toppr.com/guides/physics/electric-charges-and-fields/coulombs-law/
3. https://www.youtube.com/watch?v=rkntp3_cZl4
4. https://ask.learncbse.in/t/derive-an-expression-for-the-capacitance-of-a-parallel-plate-capacitor/66928

5. http://egyankosh.ac.in/bitstream/123456789/18820/1/Experiment-6.pdf
6. https://www.youtube.com/watch?v=vGpXTq-ITCE
7. https://en.wikipedia.org/wiki/Thermoelectric_effect
8. https://ww.topperlearning.com/answer/derive-the-formula-for-self-inductance-of-a-solenoid/8k8rlhzff
9. https://www.brainkart.com/article/Self-inductance-of-a-long-solenoid_12109/
10. https://byjus.com/physics/diamagnetic-paramagnetic-ferromagnetic/
11. https://www.youtube.com/watch?v=yWa_2P6CDpw
12. https://nptel.ac.in/courses/115/101/115101005/
13. https://www.youtube.com/watch?v=4vEeG-YmCJQ (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to know fundamentals coulomb's law and Gauss's law and also able to derive the expression for electric potential, capacitance of a parallel plate capacitor.
2. After studied unit-2, the student will be able to derive the expression for temperature coefficient resistance of a coil using Carey Foster's Bridge and able to know how to calibrate the ammeter and voltmeter. Also able to learn the thermo electricity concept.
3. After studied unit-3, the student will be able to explain the concepts of self and mutual inductance using electromagnetic induction phenomenon.
4. After studied unit-4, the student will be able to distinguish the dia, para and ferro magnetic materials based on different theories.
5. After studied unit-5, the student will be able formulate the expression for displacement current and Maxwell's equations.

ALLIED - 2

Paper -3

MATHEMATICS - I

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ.

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates-Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.

3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai

4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.

5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

SKILL BASED SUBJECT
PAPER-1
Basic Electrical Technology

Course Objectives

1. Students can know the basic principles of electricity.
2. To expose the knowledge on different kinds of cells and batteries.
3. To state the different theorems for DC circuits and know the function of DC generator/motor.
4. To acquire the basic ideas of alternating voltage and current.
5. To know the principle of transformers and motors.

UNIT- I

BASIC ELECTRICITY PRINCIPLES

Voltage, Current, Resistance, and Power-Ohm's law- Resistors Series, parallel - combinations - Series-Parallel combinations - Charge-Coulomb's law-Capacitors-Capacitance of capacitor–ACElectricity-LT/HT Line-Concept of neutral and earth-Application of fuse- MCB, ELCB- relays -Electrical Safety- Safety Precautions of Electricity -Electric Shock-Preventive measures of Electrical Shock.

UNIT- II

CELL AND BATTERIES

Dry Cell -Voltaic Cell-Daniel cell-Lechlanche cell-Secondary Cell and its Classification-Lithium Ion Battery- Disparity between Lead Acid Battery and Lithium Ion Battery-Hydrogen battery-UPS Battery -Solar cell-Principle and design.

UNIT- III

DC CIRCUITS

Kirchhoff's Current and Voltage Law-Wheatstone's bridge-Source conversion-Superposition theorem-Thevenin's theorem-Norton's theorem-Joule's law of electric heating-Electric power-D.C generator-Construction and working-D.C motor-Speed of a D.C motor.

UNIT - IV

AC FUNDAMENTALS

Generation of Alternating voltages and alternating currents-Equations of the alternating voltages and currents-Simple waveforms - Cycle-Time Period - Frequency-Amplitude-Different forms of emf equation - Phase-Phase difference-RMS, Average and Peak values-RLC circuit in series-Resonance in RLC circuit-Graphic representation of series resonance-Single phase and three phase connections-Star and delta connection.

UNIT- V

TRANSFORMERS & MOTORS

Transformer-Step and Step down transformers-Construction and working-Losses in a transformer-Efficiency of a transformer-Types of a transformers-AC generator/alternator-Principle and construction-Single phase and three phase induction motors-Principle and construction

Text Books

Unit-1 to Unit-5

1. B.L. Theraja, Fundamentals of Electrical Engineering and Electronics, S. Chand & Company Ltd., New Delhi,2008.

2. B.L. Theraja and A.K. Theraja, A Text book of Electrical Technology, Volume I & II, Chand & Company Ltd., New Delhi, 2007.

Reference Books

1. V.K. Mehta and Rohit Mehta, Basic Electrical Engineering,S. Chand & Company Ltd., New Delhi, 2009.
2. Basic Electrical Engineering-Vocational Theory-Plus One Text Book-TN State Board.

E-Materials

1. https://www.electrical4u.com/
2. https://www.youtube.com/watch?v=WtymNvcBdIU
3. https://www.atlantictraining.com/blog/15-safety-precautions-electricity/
4. https://www.explainthatstuff.com/solarcells.html
5. https://www.youtube.com/watch?v=L_q6LRgKpTw
6. https://www.youtube.com/watch?v=3rOvQ3qFZpI
7. https://en.wikipedia.org/wiki/Wheatstone_bridge
8. https://www.electronics-tutorials.ws/accircuits/series-resonance.html
9. https://www.youtube.com/watch?v=smXF1UeN0EI (Tamil video)
10. https://www.youtube.com/watch?v=hXLA5sdT9Cs
11. http://www.circuitstoday.com/transformer

Course Outcomes

1. After studied unit-1, the student will be able to know principle of Voltage, Current, Resistance, Ohm's law and Electrical safety.
2. After studied unit-2, the student will be able to distinguish between cells and batteries and able to explain the different types of batteries.

3. After studied unit-3, the student will be able to understand the Wheastone's bridge, Thevenin and Norton's theorem and also able to describe the function of DC generator and motor.
4. After studied unit-4, the student will be able to know the fundamentals of alternating currents and voltages and able to differentiate the single phase and three phase connections.
5. After studied unit-5, the student will be able to acquire the principle and construction of transformers and its types and also able to demonstrate the function of AC generator.

NON-MAJOR ELECTIVE

PAPER-1

Environmental Physics

Course Objectives

1. Students will have the basic knowledge about atmosphere, weather and cyclones.
2. To understand the reasons for climate change and global warming.
3. To analyse the need and usage of non-conventional energy resources.
4. To learn the concepts of Radiation detection.
5. To realise the importance of Radiation safety measures.

UNIT- I

ATMOSPHERIC PHYSICS

Basics of the structure and composition of atmosphere - Layers of atmosphere - Measurement of atmospheric pressure and temperature - Weather patterns - Weather analysis and forecasting - Characteristics of cyclones and anti-cyclones.

UNIT- II

CLIMATE CHANGE

Climate - Definition and classification - Basic reasons for climate change - Greenhouse effect and gases -Effects of global warming - Ozone depletion - Acid rain.

UNIT- III

ENERGY RESOURCES

Need for non-conventional energy resources- Solar water heater - Solar cell -Merits and Demerits of Solar energy - Wind energy conversion systems - Bio mass energy - Bio gas generation - Industrial applications.

UNIT- IV

RADIATION DETECTION

Nuclear reactions - Nuclear fission and fusion - Interaction between energetic particles and matter - Ionisation Chamber - Proportional counter - Geiger Muller Counter - Wilson cloud chamber - Diffusion cloud chamber - Bubble chamber - Nuclear emulsions - Scintillation counter - Cerenkov counter.

UNIT- V

RADIATION SAFETY

Biological effects of nuclear radiations - Radiation hazards - Radiation protection standards - Radiation protection methods -Nuclear waste disposal management - Nuclear disasters - Chernobyl disaster - Hiroshima and Nagasaki disaster - Nuclear reactors in India - Radiation safety measures in India.

Text Books

Unit 1 and Unit 2

1. Frederick Lutgens K, Edward J Tarbuck, Dennis Tasa,Atmosphere- An Introduction to Meteorology, Prentice Hall of India.
2. S.R.Ghadekar, Meteorology, ,Agromet Publishers, 2001.
3. AnupChatterjee,Global Warming and Climate Change, , Global publications.

Unit 3

1. B.H.Khan, Non-Conventional Energy Resources, , McGraw Hill Publications.
2. Agarwal, Renewable and Sustainable Energy Sources,

Unit 4 and Unit 5

1. R.Murugesan, Modern Physics, , KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2007
2. S.N.Ghoshal, Nuclear Physics,S.Chand& Co, New Delhi, 2006
3. AN.Subrahmaniyam, Brijlal, Atomic and Nuclear Physics, S.Chand&Co, New Delhi, 2006
4. K.Gopalakrishnan, Atomic and Nuclear Physic, Mcmillan Publishers, 2006

Reference Books

1. I.C.Joshi, Aviation Meteorology, , Himalayan Books, 201.4
2. V.Devanathan, Nuclear Physics, ,Narosa Publishing House, New Delhi, 2013.
3. D.P. Kothari,K.C. Singal&RakeshRanjan, Renewable Energy Sources and Emerging Technologies, Prentice Hall of India pvt. Ltd., New Delhi, 2008.
4. A.Martin and S.A.Harbisor, An Introduction to Radiation Protection, , John Wiley & Sons, 1981.
5. Atmospheric Science - An Introductory Survey , John M.Wallace, Peter V.Hobbs, Elsevier Publishers
6. NCRP, ICRP, ICRU, IAEA, AERB publications

E-Materials

1. https://easyengineering.net/non-conventional-energy-resources-khan/
2. http://nap.edu/631
3. https://ocw.mit.edu/courses/nuclear-engineering/22-091-nuclear-reactor-safety-spring-2008/

4. https://en.wikipedia.org/wiki/Atmosphere_of_Earth
5. https://www.youtube.com/watch?v=zaQWhEtLxeU (Tamil video)
6. https://www.youtube.com/watch?v=Nf8cuvl62Vc
7. https://en.wikipedia.org/wiki/Acid_rain
8. https://nptel.ac.in/content/storage2/courses/108108078/pdf/chap7/teach_slides07.pdf
9. https://www.youtube.com/watch?v=Rf9whdycpLI
10. https://www.youtube.com/watch?v=WyyIuiV4rKE
11. https://en.wikipedia.org/wiki/Geiger_counter

Course Outcomes

1. After studied unit-1, the student will be able to basic concepts of atmosphere and also able to know how it can be measured and study the characteristics of cyclones.
2. After studied unit-2, the student will be able to explain the details of climate, greenhouse effect and global warming.
3. After studied unit-3, the student will be able to describe the different renewable energy sources and its applications.
4. After studied unit-4, the student will be able to know how to detect the nuclear radiation with different instruments.
5. After studied unit-5, the student will be able to know how to saveourselves from nuclear radiation hazards.

SEMESTER IV

CORE PAPER-4

Waves and Optics

Course Objectives

1. To expose the knowledge of different types of waves motion and oscillations.
2. To study the property of surface tension and viscosity of a liquid.
3. To learn the different types of aberrations and phenomenon of interference.
4. To teach the Fresnel's and Fraunhofer's class diffraction and its applications.
5. To know the basics of polarization phenomenon.

UNIT- I

WAVES & OSCILLATIONS

Progressive waves-Equation for progressive wave-Simple harmonic motion - Superposition of Two Perpendicular Harmonic Oscillations - Lissajous Figures -Forced oscillations-Differential equation and solution-Laws of transverse vibration of stretched string - Sonometer-Frequency of AC mains - Acoustics-Intensity and Loudness-Reverberation and reverberation time - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria -Ultrasonics-Production-Piezoelectric oscillator - Applications-Non Destructive Testing (NDT)-B-Scan-Problems solving

UNIT- II

FLUIDS

Surface Tension-Excess pressure inside a curved liquid surface-Synclastic and anticlastic surface - Surface tension-Jaeger's method-Drop weight method-Interfacial surface tension- Variation of surface tension with temperature - Viscosity-Poiseuille's formula - Determination of coefficient of viscosity of aliquid -Burette method- Variations of viscosity of a liquid with temperature and pressure - Lubrication-Problems solving

UNIT- III

GEOMETRICAL OPTICS & INTERFERENCE

Spherical aberration in lenses -Condition for minimum spherical aberration in the case of two lenses separated by a distance-Chromatic aberration in lenses - Condition for achromatism of two thin lenses(in contact and out of contact) - Astigmatism-Huygen's and Ramsden's eyepieces - Air wedge- Determination of diameter of a thin wire by air wedge- Fringes of equal thickness-Michelson's Interferometer-Determination of wave length- Thickness of thin transparent material-Refractive index of gases -Jamin's& Rayleigh's Interferometers-Problems solving

UNIT- IV

DIFFRACTION

Fresnel's diffraction-Diffraction at circular aperture and straight edge- Fraunhofer's diffraction -Single slit-Theory of Plane diffraction grating -Experiment to determine wavelength-normal incidence- Determination of wavelengths-Missing orders-Overlapping spectra-Rayleigh's criteria -Resolving power of telescope-Microscope-Prism - Grating-Distinguish between prism and grating spectra-Problems solving

UNIT- V

POLARISATION

Introduction to polarisation-Brewster's law- Double refraction-Huygen's explanation of double refraction in uniaxial crystal-Nicol Prism-Double image polarizing prisms-Dichroism -Polaroids and their uses-Production and detection of Plane, circularly and elliptically and polarized light -Optical Activity -Fresnel's explanation of optical activity -Specific Rotation-Laurent's Half Shade Polarimeter -Faraday effect-Problems solving

Text Books

Unit 1 to Unit 2

1. K. Ilangovan, Properties of Matter and Sound, S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2018.
2. J.Jayachitra and M. Gunasekaran, Properties of Matter and Acoustics, KRU Publications, Kumbakonam, 2007.

Unit 3 to Unit 5

1. N.SubrahmanyamBrijlal and M.N Avadhanulu, A Text Book of Optics, S.Chand& Co.Ltd, New Delhi, 2015.
2. R. Murugeshan, Optics & Spectroscopy, S.Chand&Co.Ltd, New Delhi, 2016.

Reference Books

1. R. Murugeshan, Properties of Matter and Acoustics, S.Chand&Co.Ltd, New Delhi, 2016
2. BrijLal and N. Subrahmanyam, Properties of Matter, S.Chand&Co.Ltd, New Delhi, 2002
3. N.Subrahmanyam and BrijLal, A Text Book of Sound,Vikas Publications, New Delhi,1982.
4. C.L.Arora, Waves, Vibrations & Sound, S.Chand&Co.Ltd, New Delhi, 1984.
5. B.K. Mathur, Principles of Optics, Gopal Printing, 1995
6. H.R. Gulati and D.R. Khanna,Fundamentals of Optics, R. Chand Publication, 2011.

E-Materials

1. http://hyperphysics.phy-astr.gsu.edu/hbase/shm.html
2. https://www.youtube.com/watch?v=tudxily5Qu0
3. https://en.wikipedia.org/wiki/Surface_tension
4. https://www.youtube.com/watch?v=CC7Q5cvmuTA (Tamil video)
5. https://www.youtube.com/watch?v=aKY_GnwDyZc
6. https://ta.wikipedia.org/wiki/%E0%AE%AA%E0%AE%9F%E0%AE%BF%E0%AE%AE%E0%AE%AE%E0%AF%8D:Chromatic_aberration_lens_diagram.svg (Tamil)
7. https://www.diffen.com/difference/Fraunhofer_Diffraction_vs_Fresnel_Diffraction
8. https://www.youtube.com/watch?v=Q-oQKSLhLKw
9. https://www.slideshare.net/AnuroopAshok/polarization-birefringence-and-huygens-theory-of-double-refraction
10. https://www.youtube.com/watch?v=lhUUGWA_uFE

Course Outcomes

1. After studied unit-1, the student will be able to formulate the equation for plane progressive wave and able to understand the concept of simple harmonic motion and other types of waves
2. After studied unit-2, the student will be able study the property of surface tension of a liquid and know how the surface tension varies with temperature and also able to explain the property of viscosity of a liquid.
3. After studied unit-3, the student will be able to describe the different optical of a lens system and able to design the eyepieces. Also able to know the phenomenon of interference and its applications.
4. After studied unit-4, the student will be able to distinguish between Fresnel class of diffraction and Fraunhofer class of diffraction. Also formulate the expression for resolving power of telescope, microscope, prism and grating.
5. After studied unit-5, the student will be able to explain the phenomenon of polarization and able to study the double refraction in uniaxial crystals. Also they can define optical activity, specific rotation and know the applications of polaroids.

ALLIED - 2

Paper - 4

MATHEMATICS - II

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume - Fourier series for functions in $(0,2\pi)$ and $(-\pi, \pi)$.

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Guass, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

SKILL BASED SUBJECT
PAPER-2
Physics Workshop Skills

Course Objectives

1. Employ the specific skills in the testing of instruments.
2. Express the functions and working of different power supply system
3. To know the principle and working of different electrical and electronics appliances
4. State the concept of mobile Communication in real time process and digital communication.
5. Explain the Identification, classification, and working principle of various Biomedical Instruments and application of these instruments in diagnosis, therapeutic treatment and imaging fields

UNIT- I

TESTING OF DISCRETE COMPONENTS

Resistors- types - Characteristics -Colour coding -resistors in series and parallel - Capacitors - types -Capacitor in Series and Parallel - Multimeter Analog and Digital - How to Use a Multimeter -Testing of Voltage - Current Continuity (Testing of Fuse) - Resistance -Diode and Transistor-Design of Bread board-Soldering Technique used in PCBs.

UNIT- II

POWER SUPPLY

Power Supply Unit-Parts of Power Supply- Regulated power supply- Zener diode voltage regulator- IC Voltage - Regulators - Inverter-Uninterrupted power supply (UPS) - Switched mode power supply (SMPS)-Cathode Ray Oscilloscope (CRO) and measurement of time period and frequency - Function generator.

UNIT- III

ELECTRICAL & ELECTRONICS APPLIANCES

Electric iron Box-Electric Fan-Construction and Working of Ceiling and Table fans-Water Heater - Types-Function -Wet Grinder-Mixer Grinder-Principle and Design

Microwave Oven-Washing Machine - Function - Types-Semi and Fully Automatic-Top and Front loading-Fuzzy logic washing machine technology – Refrigerator-Air Conditioner-Principle and Design.

UNIT- IV

MASS AND MEDIA COMMUNICATION

Mobile Communication (GSM) -Android version- USB - Various Types of USB Cable and Connectors - VGA- AV port - HDMI- DVI - S Video and Display port- Bluetooth - Wi-fi and Li-fi - Direct broadcast satellite (DBS)- DTH and DTT- Radar Communication System.

UNIT-5

BIO-MEDICAL INSTRUMENTATION

Principle, description, function and recording of ECG, EMG and EEG -artificial pace maker- simulators -Heart lung machine –ventilators and nebulizers-Kidney dialysis machine- pH meter - Laser blood flow meter–Thermal scanner and pulse oximeter.

Text Books

Unit-1

1. B.L. Theraja, A Text book of Electrical Technology, S.Chand& Co., New Delhi, 2007.

Unit-2

1. I.Abraham, Switching Power Supply Design, Keith Billings, Taylor Morey -McGraw Hill.
2. Fundamentals of Power Supply Design: Technology from the Unitrode/Texas Instruments.
3. Robert A. Mammano, Power Supply Design Seminars, , Texas Instruments, 2017.

Unit-3

1. S.P. Bali, Consumer Electronics -, Pearson Education, New Delhi, 2005.
2. Basic Electrical Engineering -Vocational Theory-Plus One Text Book-TN State Board.

Unit-4

1. V.K. Metha, Principles of Electronics, V K Metha, S Chnd&Co.,New Delhi, 2001.
2. V. JeyasriArokiasamy, Mobile Communications,Technical Publications, 2009.
3. John Vivianand Peter Maurin, The Media of Mass Communication,Pearson Education Canada, 2008.
4. R.R. Gulati, Modern Television Practice Principles, Technology & Servicing, New Age International, 2007.
5. K. F. Ibrahim, Newness Guide to Television and Video Technology, Elsevier, 2007.
6. Richard Wise and Routledge, Multimedia: A Critical Introduction, 2005.
7. V.S.Bagad, ,RadarSystem,Technical Publications, 2009.

Unit-5

1. M.Arumugam M, Biomedical Instrumention, Anuradha Publications, Kumbakonam, 2011.
2. V.Yuvaraj, Instrumentation Techniques, Sri Krishna Publications, 2020.
3. Webster, Bioinstrumentation, John Wiley & Sons, 2007.

Reference Items: books, Journal

1. I.J. Nagrath and D. P. Kothari, Electrical Machines,Tata McGraw Hill, 1997.
2. M. D. Singh, K. B.Khanchandani Power Electronics, Tata McGraw Hill, 2006.

E- Materials

1. https://www.electronicsforu.com/
2. https://learnabout-electronics.org/
3. https://www.scienceabc.com/innovation/usb-type-c-different-usb-type-type-b.html
4. https://www.electronics-tutorials.ws/supplies/power-supplies-for-beginners-part-1.html
4. https://electronicspost.com/basic-electronics-tutorials/
5. https://www.electrical4u.com/
6. https://lecturenotes.in/subject/199/analytical-instrumentation-ai
7. https://blog.beaconstac.com/2016/05/li-fi-vs-wi-fi-vs-ibeacon-ble-technology/
8. https://www.makeuseof.com/tag/video-cables-explained-difference-vga-dvi-hdmi-ports/
9. https://www.ses.com/differences-between-dth-and-dtt
10. https://www.ifixit.com/Guide/How+To+Use+A+Multimeter/25632#s64987
11. http://electrotel.com.ar/handbook-of-analytical-instruments-r-s-khandpur-download-full-version.pdf
12. https://sidneymayireg.files.wordpress.com/2017/04/
13. https://en.wikipedia.org/wiki/Electrocardiography
14. https://www.youtube.com/watch?v=YbBSf8bnYgw
15. https://www.youtube.com/watch?v=1ndqOnjxAU0 (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to test the instruments with specific skills
2. After studied unit-2, the student will be able to express the functions and working of Linear power supply.
3. After studied unit-3, the student will be able to know the basics of analytical instruments and how to calibrate it.
4. After studied unit-4, the student will be able to explain mobile communication and radar communication system.
5. After studied unit-5, the student will be able to demonstrate the principle and working of various biomedical equipment.

NON MAJOR ELECTIVE

PAPER-2

Everyday Physics

Course Objectives

1. Students can able to understand the basic measurements and mechanics.
2. To learn the principle applied in Pressure cooker, Refrigerator and Air-conditioner.
3. To know the construction and working of various electrical appliances.
4. To study the fundamentals of laser and its applications.
5. To know the different biomedical instrumentation techniques.

UNIT- I

MEASUREMENTS & MECHANICS

Fundamental quantities-System of Units-CGS,FPS,MKS and SI-Verniercalliper, Screw gauge and their utility-Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet-Newton's law of motion-Lever mechanism - Pulleys-Force -Weight -Work -Energy -Power- Horsepower -Circular motion-Banking of curved tracks.

UNIT-II

THERMO AND HYDRODYNAMICS

Variation of boiling point with pressure - Pressure cooker - First and Second law of thermodynamics-Refrigerator - Air Conditioner - Principle and construction-Bernoulli Theorem-Applications.

UNIT - III

ELECTRICAL APPLIANCES

Electric iron Box-Electric Fan-Construction and Working of Ceiling and Table fans-Water Heater -Types-Function -Wet Grinder-Mixer Grinder-Principle and Design.

UNIT- IV

LASER

Power of a Lens-Human eye- Defects of vision - Laser-Spontaneous emission - Stimulated emission -Meta stable state -Population inversion -Pumping - Laser Characteristics- Ruby Laser - Helium-Neon Laser-Applications of Laser-Laser cutting - Welding- Drilling -Lasers in Surgery - Lasers in ophthalmology.

UNIT- V

BIOMEDICAL INSTRUMENTATION

Digital thermometer-Digital BP apparatus-One touch Glucometer–thermal scanner-pulse oximeter-Lipid profile test-pH meter-BMI calculator - Ventilator-Principle, description, function and recording of ECG, EMG and EEG- artificial pace maker.

Text Books

Unit 1& Unit 2

1. N. Subrahmanyam and BrijLal, Principles of Physics, S.Chand&Co.,Ltd, Chennai.
2. Plus one Physics Book-TN state Board and NCERT Books.
3. D. Jayaraman, K. Ilangovan, Thermal Physics &Stastical Mechanics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2016.
4. BrijLal and N Subrahmanyam, Heat and Thermodynamics, S Chand & Company Pvt Ltd, New Delhi, 2016.

Unit 3

1. S.P. Bali,Consumer Electronics -, Pearson Education, New Delhi, 2005.
2. Basic Electrical Engineering -Vocational Theory- Plus One Text Book-TN State Board.

Unit 4

1. R. Murugeshan, Optics & Spectroscopy, S.Chand&Co.Ltd, New Delhi, 2016.

Unit 5

1. M.Arumugam M, Biomedical Instrumentation, Anuradha Publications, Kumbakonam, 2011.
2. V.Yuvaraj, Instrumentation Techniques, Sri Krishna Publications, 2020.

Reference Books

1. Fundamentals of Physics by D. Hallidy, R. Rensick and J. Walker, 6th Edition, Wiley, NY,2001.
2. BrijLal and N Subrahmanyam,Heat and Thermodynamics, S Chand & Company Pvt Ltd, New Delhi, 2016.
3. R. Murugeshan, Optics & Spectroscopy, S.Chand&Co.Ltd, New Delhi, 2016.

E-materials

1. https://www.youtube.com/watch?v=M_kHKSKmT6o
2. https://www.toppr.com/content/concept/fundamental-quantities-and-fundamental-units-208185/

3. https://www.youtube.com/watch?v=T-mRqCjv6ak (Tamil video)
4. https://www.jagranjosh.com/general-knowledge/the-human-eye-and-its-defects-1456386342-1
5. https://www.youtube.com/watch?v=c4_5ftlYTbI
6. https://en.wikipedia.org/wiki/Laser
7. https://www.youtube.com/watch?v=oUEbMjtWc-A
8. https://techblog.livongo.com/how-do-blood-pressure-monitors-work/
9. https://www.youtube.com/watch?v=7oKNewTSF7M
10. https://www.youtube.com/watch?v=-UJf-GHz7x4 (Tamil video)
11. https://www.smartbmicalculator.com/

Course Outcomes

1. After studied unit-1, the student will be able to know the fundamental quantities and units and able to some basic ideas of mechanics.
2. After studied unit-2, the student will be able to demonstrate the construction and working of pressure cooker, refrigerator, air conditioner devices.
3. After studied unit-3, the student will be fundamental principles applied in our day today life electrical appliances.
4. After studied unit-4, the student will be able to know the basic properties of laser and characteristics and able to design solid and gas lasers.
5. After studied unit-5, the student will be able to demonstrate the principle and working of biomedical equipment will be used in our daily life.

CORE PRACTICAL-2

Semester: III & IV

Core Practical -2

List of Experiments (Any 15 Experiments only)

1. Young's modulus non-uniform bending –optic lever.
2. Young's modulus uniform bending-Pin and microscope.
3. Searle's double bar pendulum- Determination of Young's modulus, Rigidity modulus and Poisson's ratio
4. Sonometer- Frequency of AC mains - Steel and Brass wires.
5. Spectometer -i-d curve-μ of a Prism.
6. Spectometer -Grating -N and **λ** -Normal incidence method.
7. Spectometer -Grating -N and **λ** -Minimum deviation method.
8. Air wedge - Thickness of a thin wire.
9. Carey Foster's bridge - Temperature coefficient of resistance of a coil
10. Potentiometer -Calibration of highrange Ammeter.
11. Potentiometer - Resistance and specific resistance of a wire.
12. Figure of merit- Table Galvanometer.
13. Field along the axis of a circular coil carrying current-Determination of B_H.
14. BG- Figure of merit - Charge sensitiveness.
15. BG- Comparison of capacitances of capacitors.
16. BG- Comparison of emf of two cells.
17. Deflection magnetometer and vibration magnetometer-Determination of m and B_H-Tan C position.
18. Low range power pack –Bridge Rectifier.
19. Voltage regulator -Bridge Rectifier-Using a Zener diode.
20. Voltage regulator -Bridge Rectifier-Using IC 7805.
21. Transistor characteristics-Common emitter mode.
22. Logic gates-AND, OR (using diodes) and NOT (using transistor).
23. NAND and NOR gates-Universal gates.

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai,2018.
2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Samir Kumar Ghosh, A Textbook of Advanced Practical Physics, NCBA, Kolkatta, 2000.
2. D. Chattopadyay, P.C.Rakshit, An Advanced Course in Practical Physics, NCBA,

Kolkatta, 2011
3. C.L.Arora, B.Sc., Practical Physics,S. Chand and Company., New Delhi.
4. D.P..Khandelwal D.P., A Laboratory Manual of Physics for Undergraduate Classes. Vani Publications.
5. B.Saraf et al, Physics through Experiments,Vikas Publications.
6. Harnaam Singh., B.Sc., Practical Physics,S. Chand and Company., New Delhi.
7. D C Tayal, University Practical Physics, Himalaya Publishing House.
8. Gupta & Kumar, Practical Physics, Pragatiprakashan, Meerut.

SEMESTER V

CORE PAPER-5

Atomic and Molecular Physics

Objectives

1. To study the properties of cathode and positive rays and can formulate the expression for e/m
2. To know the structure of the atom and to understand the spectral lines.
3. To understand effects of magnetic field on atomic spectra
4. To acquire the knowledge about photoelectric effect and can derive the expression for Einstein's photoelectric equation.
5. To teach various energy levels viz., rotational, vibrational etc.and can understand the principle of Infrared spectroscopy, Raman effect and Laser

UNIT- I

CATHODE AND POSITIVE RAYS

Properties of cathode rays-Mass of an electron-Determination of the electronic charge: Milikan's oil drop method-Dunnington's method for determining e/m-Properties of positive rays-Positive ray analysis-Thomson's parabola method-Aston's Mass spectrograph-Bain Bridge Mass spectrograph- Dempster's Mass Spectrograph-Mass defect and packing fraction.

UNIT - II

ATOMIC STRUCTURE

Rutherford's Experiments on scattering of α-particle-Theory of α-particle Scattering-Rutherford formula-Bohr Atom model-Spectral series of hydrogen atom-Bohr Correspondence Principle-Critical potentials-Experimental determination of critical potentials-Drawbacks of Bohr Atom model- Sommerfeld's relativistic atom model-Vector atom model-Quantum numbers associated with the vector atom model-Coupling schemes

UNIT- III

EFFECTS OF MAGNETIC FIELD ON ATOMIC SPECTRA

Pauli's exclusion principle - Periodic table- Magnetic dipole moment due to orbital motion of the electron-Magnetic dipole moment due to spin-Optical spectra-Fine structure of H_α line-Zeeman effect-Larmor's theorem-Quantum mechanical explanation of Zeeman effect-Anomalous Zeeman effect – Paschen-Back effect-Stark effect.

UNIT- IV

PHOTOELECTRIC EFFECT

Introduction-Lenard' method to determine e/m-Richardson and Compton experiment-Experimental investigations on the photoelectric effect-Laws of photoelectric emission-Einstein's photoelectric equation-Photo-emissive cell-Photo-voltaic cell-Photoconductive cell-Applications of photoelectric cells-Planck's quantum theory-Wien's displacement law-Derivation of Planck's law of radiation.

UNIT- V

MOLECULAR PHYSICS

Introduction -Theory of the origin of pure rotational spectrum of a molecule-Non-Rigid Rotator-The energy of a diatomic molecule- Vibrating diatomic molecule as a harmonic oscillator-Infrared Radiation - Range of IR radiation-IR spectrometer – Instrumentation-Molecular vibrations of water molecule (H_2O)-Raman effect-Characteristics of Raman lines-Quantum theory of Raman effect-Raman spectrum of Nitrous oxide (N_2O) - Laser - Characteristics-Stimulated Emission-Population Inversion-Optical Pumping - He-Ne laser-Applications of Laser.

Text Books

Unit 1 to Unit 4

1. R. Murugeshan and KiruthigaSivaprasath, Modern Physics, S.Chand&CO.,Ltd, New Delhi,2016
2. B.L. Theraja, Modern Physics, S.Chand&CO.,Ltd, New Delhi,2016

Unit 4 and Unit 5

1. R. Murugeshan and KiruthigaSivaprasath, Modern Physics, S.Chand&Co.,Ltd, New Delhi,2016
2. R. Murugeshan, Optics & Spectroscopy, S.Chand&Co.Ltd, New Delhi, 2016

Reference Books

1. J.B. Rajam, Atomic Physics, S. Chand & Co Ltd., New Delhi, 2009.
2. Sehgal, Chopra and Sehgal, Modern physics, Sultan Chand & Sons, New Delhi.
3. S.N .Ghoshal, Atomic Physics, S. Chand & Co Ltd., New Delhi, 2004.
4. C.L.Arora, Modern Physics and Electronics, S. Chand & Co Ltd., New Delhi, 1992.
5. C.N. Banwell, Fundamentals of Molecular Spectroscopy,McGraw Hill Education; Fourth edition, 2017.
6. G. Aruldhas, Molecular structure and Spectroscopy, Prentice Hall of India, New Delhi, 2005.
7. William T. Silfvast, Laser fundamentals, University Press, Published in South Asia by Foundation books, New Delhi, 1998.
8. K. Thyagarajan and A.K. Ghatak, LASER Theory and Application, McMillan, India Ltd, 1984.

E-Materials

1. https://www.youtube.com/watch?v=wSe3oBZDTUI
2. https://vlab.amrita.edu/?sub=1&brch=195&sim=357&cnt=1
3. https://en.wikipedia.org/wiki/Vector_model_of_the_atom
4. https://www.youtube.com/watch?v=CBUjVHq6Grs
5. https://www.youtube.com/watch?v=Ju-3Eu133KE
6. https://en.wikipedia.org/wiki/Zeeman_effect
7. https://en.wikipedia.org/wiki/Photoelectric_effect
8. https://www.youtube.com/watch?v=O0wchw_Mi30
9. http://www.iiserpune.ac.in/~bhasbapat/phy420_files/Demtroeder_rotovibrazioni.pdf
10. https://www.youtube.com/watch?v=gJc4_6NNIhM
11. https://www.youtube.com/watch?v=djMVjULfRII (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to know the properties of cathode rays and positive rays. Also will be able to study the determination of specific charge of an electron.
2. After studied unit-2, the student will be know the different atom models and can get an idea about coupling schemes..
3. After studied unit-3, the student will be able to study the Zeeman effect, Paschen Back effect and Stark effect.
4. After studied unit-4, the student will be able to know the basic idea of photoelectric effect and can able to derive the equation for Einstein's photoelectric equation.
5. After studied unit-5, the student will be able to study the rotational and vibrational energy of a molecule and also learn the Infrared spectra, Raman Effect and Laser.

CORE PAPER-6

Relativity and Quantum Mechanics

Course Outcomes

1. To teach the fundamental aspects of relativity and special theory of relativity.
2. Ability to understand the concepts of matter waves and to study the phase velocity and group velocity.
3. To learn the Heisenberg's Uncertainty Principle and to derive the time dependent and time independent Schrödinger equation.
4. To apply the Schrödinger's equation to various quantum mechanical systems.
5. To expose the ideas of postulates of quantum mechanics and operators.

UNIT- I

RELATIVITY

Introduction - Frame of reference - Newtonian relativity - Galilean Transformation equations - The Ether hypothesis - The Michelson -Morley experiment - Special theory of relativity - The Lorentz Transformation equations - Length contraction - Time Dilation - relativity of simultaneity- addition of velocities - variation of mass with velocity - Mass Energy equivalence -Minkowski's Four dimensional Space-Time continuum-General theory of relativity-Gravitational red shift.

UNIT- II

WAVE MECHANICS

Inadequacy of classical mechanics -Matter waves - de Broglie wavelength - Expression for de Broglie wavelength-Other expressions for de Broglie wavelength- Phase velocity (wave velocity) of de Broglie waves-Group Velocity- Expression for Group velocity-Group velocity of de Broglie waves- Relation between group velocity and phase velocity-Davisson and Germer's experiment-G.P.Thomson's experiment.

UNIT- III

SCHRODINGER EQUATION

Electron microscope-Heisenberg's Uncertainty Principle-Determination of position with γ-ray microscope-Diffraction of a beam of electrons by a slit-Elementary proof between Displacement and Momentum, Energyand Time- Derivation of time dependent form of Schrödinger equation-Time independent form of Schrödinger equation-Eigenvalues and Eigenfunctions-Physical significance of wave function-Orthogonal wave function-Normalized wave function.

UNIT-4

APPLICATIONS OF SCHRÖDINGER EQUATION

The free particle-Particle in a box: Infinite square well potential-Rectangular Potential well-The Barrier Penetration problem-Tunnel effect-Linear harmonic oscillator-Energy levels-Zero point energy-Rigid rotator-Schrödinger's equation for the hydrogen atom-Separation of variables-Equations only.

UNIT-5

OPERATOR FORMALISM OF QUANTUM MECHANICS

Postulates of quantum mechanics-Operator for momentum, Kinetic energy,Total energy, Angular momentum-Commuting operators-Commutator algebra-Hermitian operator-Properties of Hermitian operator-Parity operator-Properties of Parity operator-Probability density-Probability current density-Wave packet-Ehrenfest's theorem-Hilbert space-Dirac's Bra and Ket notation-Properties of Bra and Ket notation.

Text Book

Unit 1 to Unit 5

1. R.Murugesan and KiruthigaSivaprasath, Modern Physics, S Chand & Co, New Delhi, 2016.

Reference Books

1. P.M Mathew and K.Venkatesan, A Text Book of Quantum Mechanics,Tata McGraw Hill Publishing Co.Ltd., New Delhi, 2016.
2. Gupta, Kumar and Sharma, Quantum Mechanics, Jai PrakashNath Publications, Meerut,Sathyaprakash, Quantum Mechanics, PragatiPrakashan, Meerut.
3. G. Aruldhas, Quantum Mechanics, Prentice-Hall Of India Pvt. Limited, 2008.
4. G.R.Chatwal and S.K.Anand, Quantum Mechanics, Himalaya Publishing House, Mumbai, 2010.
5. V. Devanathan, Quantum Mechanics, Narosa, Chennai.
6. V.K. Thangappan, Quantum mechanics, New Age International, 1993.
7. AjoyGhatak& S. Loganathan, Quantum Mechanics, Springer, 2004.

E-Materials

1. http://psi.phys.wits.ac.za/teaching/Connell/phys284/2005/lecture-01/lecture_01/node5.html
2. https://www.youtube.com/watch?v=NH3_lIkSB9s
3. https://en.wikipedia.org/wiki/Matter_wave
4. https://www.youtube.com/watch?v=X-m9L0_pKU8 (Tamil video)
5. https://www.youtube.com/watch?v=cH5QexEN0sk

6. https://en.wikipedia.org/wiki/Schr%C3%B6dinger_equation
7. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-007-electromagnetic-energy-from-motors-to-lasers-spring-2011/lecture-notes/MIT6_007S11_lec40.pdf
8. https://www.youtube.com/watch?v=uK60QAKooyM
9. https://www.youtube.com/watch?v=r2NMWEsNcTs
10. https://en.wikipedia.org/wiki/Bra%E2%80%93ket_notation

Course Outcomes

1. After studied unit-1, the student will be able to know the frames of reference and able to formulate the Galilean Transformation equations and Lorentz Transformation equations.
2. After studied unit-2, the student will be understand the matter waves and can derive an equation for de Broglie wavelength. Also able to distinguish between phase velocity and group velocity and demonstrate Davison &Germer experiment.
3. After studied unit-3, the student will be able to state the Heisenberg's Uncertainty Principle and able to derive the time dependent and time independent Schrödinger's equations.
4. After studied unit-4, the student will be able to know the basic idea of photoelectric effect and can able to derive the equation for Einstein's photoelectric equation.
5. After studied unit-5, the student will be able to learn postulates of quantum mechanics, operators and also able to acquire knowledge on Dirac's bra and ket notations.

CORE PAPER-7
Basic and Applied Electronics

Course Objectives

1. Students will gain knowledge about semiconducting diodes and transistors.
2. To teach the different types of amplifiers and oscillators.
3. To learn the working multivibrators and wave shaping circuits.
4. To study the basics of fabrication of integrated circuits and fundamentals of operational amplifiers.
5. To expose the various applications of OP-AMP and 555 Timer.

UNIT- I

SEMICONDUCTING DIODES & TRANSISTORS

Classification of solids and energy bands- PN Junction Diode-Full wave Bridge Rectifier-Zener Diode-Voltage Regulated Power supply-Tunnel diode - Characteristics-Tunnel diode as an oscillator-Construction and working of Photo diode -Photo transistor -Solar Cell-LED-FET-Construction and working-FET as an amplifier-Output Characteristics and parameters of FET-MOSFET-Construction and working Principle-SCR-Working of SCR-SCR as a switch and half wave rectifier- UJT-Equivalent circuit and V-I characteristics of UJT - UJT as relaxation oscillator.

UNIT- II

AMPLIFIERS & OSCILLATORS

R-C coupled amplifier (Two stage)-Power amplifiers-Class A,B and C-Push-Pull amplifier-Feedback amplifier-Principles of negative feedback in amplifier-Gain of negative feedback amplifier-Hybrid parameters-Determination of h parameters-h parameter equivalent circuit-Performance of a linear circuit in h parameters-h parameters for a transistor in CE mode - Sinusoidal oscillators -Circuit operation and frequency of oscillation of -Hartley, Colpitt's, Phase shift, Wein bridge and Crystal oscillator.

UNIT- III

MULTIVIBRATORS& WAVE SHAPING CIRCUITS

Multivibrators-Types of multivibrators-Transistor astable ,monostable and bistablemultivibrators - Differentiating and Integrating-Circuits-Clipping circuits-Positive clipper-Biased clipper-Combination clipper-Clamping circuits-Positive clamper-Negative clamper.

UNIT- IV

INTEGRATED CIRCUITS &OP-AMP

Integrated circuit-Classification of ICs-Advantages-Limitations-Integrated circuit technology- Fabrication of Transistors, diodes, capacitors and resistors - Symbol and Terminals of an OP-AMP- Parameters - Inverting and Non-inverting amplifier - Gain - Miller effect - Virtual ground - Offset voltage - offset current - PSRR - CMRR.

UNIT- V

OP-AMP APPLICATIONS & TIMER

OPAMP -Sign and Scale changer -Adder, subtractor and average-Integrator and differentiator -OP AMP Logarithmic amplifier -Antilogarthmic amplifier-OP-AMP-Comparator-Schmitt Trigger OP-AMP-Astablemultivibrator-Monostablemultivibrator-Bistablemultivibrator - 555 Timer-Internal structure- Pin configuration of 555 Timer-555 Timer as Schmitt Trigger-555 Timer as Astablemultivibrator.

Text Books

Unit 1 to Unit 5

1. V.K. Mehta and Rohit Mehta, Principles of Electronics, S Chand &Co., New Delhi, 2007.
2. M Arul Thalapathi, Basic and Applied Electronics, Comptek, Publishers, Chennai 2005.

Reference Books

1. B.L. Theraja, Fundamentals of Electrical Engineering and Electronics, S Chand &Co., New Delhi, 2008.
2. R.S.Sedha, A Text Book of Applied Electronics, S Chand &Co., New Delhi, 2010.
3. V. Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007
4. Hand Book of Electronics - Gupta & Kumar, PragatiPrakashan, Meerut, 2014.

E-Materials

1. https://www.electronics-tutorials.ws/diode/diode_6.html?nab=0&utm_referrer=https%3A%2F%2Fwww.google.com%2F
2. https://www.youtube.com/watch?v=EkHch86UXpY
3. https://www.youtube.com/watch?v=jZ-pD8nVD6s&app=desktop
4. https://www.electrical4u.com/hybrid-parameters-or-h-parameters/
5. http://www.circuitstoday.com/category/clipping-and-clamping-circuits
6. https://www.youtube.com/watch?v=XsawrtWmm9M
7. https://www.youtube.com/watch?v=ek_H6efvwxA (Tamil video)

8. https://www.electronicsforu.com/resources/learn-electronics/555-timer-working-specifications
9. https://www.youtube.com/watch?v=yBVGU02rlAg
10. https://www.electronics-tutorials.ws/waveforms/555_timer.html

Course Outcomes

1. After studied unit-1, the student will be able to classification of solids on the basis of band theory and know the construction, working and applications of semiconducting diodes and transistors.
2. After studied unit-2, the student will be able to design the RC-coupled amplifier and to study its frequency response curve. Also students will be able to classify the power amplifiers, to learn the h-parameters and to able to design oscillator circuits.
3. After studied unit-3, the student will be able to understand the multivibrators using transistors and can able to study the different wave shaping circuits.
4. After studied unit-4, the student will be able to know the basic idea of integrating circuits and able to fabricate diode, transistors, resistor and capacitors. Also students will be study the structure of operational amplifier and its parameters.
5. After studied unit-5, the student will be able to analyze the different applications of op-amp circuits like adder, subtractoretc.and also able to demonstrate 555 Timer and its applications.

SKILL BASED SUBJECT

PAPER-3

Cell Phone Technology

Course Objectives

1. To learn the back ground information about cellular system.
2. To study the various mobile standards.
3. To teach the chip level information of mobile phones.
4. To expose the idea about trouble shooting of problems in mobile phones.
5. To acquire the knowledge about mobile service tools.

UNIT- I

THE CELLULAR SYSTEM

Background - The cellular concept - interference Vs capacity, cell splitting, sectorisation.The cellular system-mobile location, in call handover and power control in cell planning.TACS standard. The cellular network - Base stations, MSC, services.

UNIT - II

MOBILE STANDARDS

SmartPhones (Android, IOS, Windows) APPs - Mobile Software (PC suite)-WPAN standards - IrDA, Bluetooth, 1G, 2G standards, 2.5G applications. 3G devices and applications. Network protocols - TDMA(2G), GSM(2G), cdma one(2G), PDC 2(G), GPRS(2.5G), CDMA 2000 1x(2.5G), EDGE(3G), CDMA 2000 1xEV(3G), WCMA(G)-WiMax (4G)

UNIT- III

CHIP LEVEL STUDY

Block Diagrams -Schematic Diagrams - Chip Level Information of Mobile -Phones - BGA -SMD Reworking Station - Soldering lead -Soldering paste -De- Soldering wire - Identification of IC's - Assembling &Disassembling ofSmart Phones.

UNIT- IV

TROUBLE SHOOTING

Causes for various problems & Troubleshooting of Problems in a SmartPhone - Network Problems - Display Problems -Touch Problems - Sim CardProblems -Charging problems - Battery Problems - Software Problems -IMEI information - Problems related tomobile phonehandsets - replacement of Various components ICS.

UNIT- V

MOBILE SERVICE TOOLS

Ultrasonic Cleaner - Computer Connectors - SIM Card Reader – MemoryCard Reader - Mobile Virus - Virus Prevention - Removing Virus – HealthHazards with Mobiles - SAR.

Text Books

Unit 1 to Unit 5

1. ManaharLotia , Modern Mobile phone Introduction & Servicing, BPB Publications, 2017

Reference Books

1. ManaharLotia, Modern Mobile Phone Repair using Computer Software & Service Devices , BPB Publications, 2017.
2. ManaharLotia, Modern Mobile Phone Unlocking & Utility Codes For GSM & CDMA Phones, BPB Publications, 2017
3. Mobile Telephony, Digit Magazine, Jasubhai Digital Media Publications.
4. Raj Pandya, Mobile & Personal Communication Systems & Services, PHI Publications
5. William C.Y.Lee, Mobile Cellular Telecommunications (Analog & Digital Systems), McGraw Hill, New Delhi,1995
6. Andy Dornan, The Essential Guide to Wireless Communications & Applications, Prentice Hall, New Delhi, 2002.

E-Materials

1. https://www.slideshare.net/priyahada/cellular-concepts-41556741
2. https://www.youtube.com/watch?v=whYljse4Abc
3. https://electronics.howstuffworks.com/cell-phone7.htm
4. https://www.youtube.com/watch?v=IvWYk3FAVak
5. https://www.youtube.com/watch?v=eRe_nD2t0Hk
6. https://en.wikipedia.org/wiki/Rework_(electronics)
7. https://www.mobiledic.com/android-tips/sim-card-can-not-be-detected.html
8. https://www.youtube.com/watch?v=MZz5zrNnAec (Tamil video)
9. https://www.youtube.com/watch?v=JmDz0HOzvVU
10. https://www.who.int/news-room/q-a-detail/what-are-the-health-risks-associated-with-mobile-phones-and-their-base-stations

Course Outcomes

1. After studied unit-1, the student will be able understand the cellular communication system.
2. After studied unit-2, the student will be able to study the smart phones and various mobile standards like 1G,2G, etc.
3. After studied unit-3, the student will be able to learn chip level information and soldering and desoldering the various components.
4. After studied unit-3, the student will be able to understand the network problems and SIM card problems and to learn the trouble shooting process.
5. After studied unit-5, the student will be able to know how to use the ultrasonic cleaner, mobile virus and other service tools.

SEMESTER VI

CORE PAPER-8

Nuclear and Particle Physics

Course Objectives

1. To have a clear idea about the fundamentals of nucleus and its structure.
2. To understand the concept of radioactivity.
3. To have a clear understanding of the design and working of particle accelerators and detectors.
4. To understand the nuclear reactions and the nuclear reactors.
5. To gain knowledge about the elementary particles

UNIT- I

GENERAL PROPERTIES OF NUCLEI AND NUCLEAR MODELS

Constituents of nuclei - Classification of nuclei - Nuclear mass and binding energy - Stability of nucleus, Mass defect and Packing fraction, Binding fraction Vs Mass number curve - Nuclear size - Nuclear spin - Nuclear energy levels - Nuclear magnetic moment -- Parity of nuclei - Nuclear forces - Yukawa's model of nuclear forces.

Nuclear models - Liquid drop model, Semi-empirical mass formula - Shell model - Salient features of shell model-Problems solving.

UNIT- II

RADIOACTIVITY.

Radioactive decay law - Half life and Average life - Activity or strength of a radioactive sample- Successive transformation - Radioactive chain- Radioactive equilibrium - Radioactive dating - α-decay - Geiger-Nuttall law - Tunnel effect - Gamow's theory of α-decay - β-decay - energetics of β-decay - Continuous β-spectrum - Inverse β-decay - Parity violation in β-decay - Neutrino hypothesis - Properties of neutrino - Gamma rays - Origin of the gamma rays - Internal conversion-Problems solving.

UNIT- III

PARTICLE ACCELERATORS AND DETECTORS

Linear accelerator - Cyclotron -Betatron - Electron synchrotron - Accelerators in India

Radiation detectors - Ionisation chamber - Proportional counter - G.M. Counter - Cloud chamber - Scintillation counter - Solid state track detector - Semiconductor detector-Problems solving.

UNIT- IV

NUCLEAR REACTIONS AND NUCLEAR REACTORS

Nuclear reactions - Types of nuclear reactions - Conservation laws in nuclear reactions - Energetics of nuclear reactions - Kinematics of nuclear reactions -Threshold energy of nuclear reactions - Solution of the Q-value equation - Cross-section of nuclear reactions.
Nuclear fission - Fission of light nuclei - Prompt and delayed neutrons - Neutron speed, Classifications - Nuclear chain reaction - Neutron cycle - Nuclear reactor - Types of reactor - Fission bomb - Nuclear power in India- Fusion -Thermonuclear reaction - Hydrogen bomb - Possibility of fusion reactor-Problems solving.

UNIT- V

ELEMENTARY PARTICLES

Classification of elementary particles -Pions and Muons - K-mesons -Hyperons - Conservation laws - Exact laws - Approximate conservative laws- Fundamental interactions - Antiparticles - Resonance particles -Hypernucleus - Symmetry classification of elementary particles - Quark model.

Text Books

Unit 1 to Unit 5

1. R. Murugeshan and KiruthigaSivaprasath, Modern Physics,S Chand &Co.New Delhi,2006.
2. Gupta and Roy., Physics of the Nucleus, Books and Allied (P) Ltd. Kolkatta, 2011
3. J. B. Rajam, Nuclear Physics, S Chand Publishing Co.
4. D.C.Tayal, Nuclear Physics, Himalaya Publishing House, 2009

Reference Books

1. SatyaPrakash, Nuclear Physics, APragatiPrakasan Publication, 2011.
2. S. N. Ghoshal, Nuclear Physics, S. Chand & Co., Edition, 2003
3. M. L. Pandya& R.P.S. Yadav, Elements of Nuclear Physics, KedarNath& Ram Nath, 2000
4. Jahan Singh, Fundamentals of Nuclear Physics, APragati Publication, 2012.
5. V.Devanathan, Nuclear Physics, Narosa Publications, New Delhi, 2016.

E-Materials

1. https://courses.lumenlearning.com/introchem/chapter/nuclear-binding-energy-and-mass-defect/
2. https://www.khanacademy.org/science/physics/quantum-physics/in-in-nuclei/v/mass-defect-and-binding-energy
3. https://www.youtube.com/watch?v=ZqdxGZOipD4
4. http://hyperphysics.phy-astr.gsu.edu/hbase/Nuclear/halfli2.html
5. https://www.slideshare.net/sailakshmipullookkar/linac-ppt

6. https://www.youtube.com/watch?v=jSgnWfbEx1A
7. https://en.wikipedia.org/wiki/Nuclear_fission
8. https://www.youtube.com/watch?v=vurL9UVa95A (Tamil video)
9. https://www.youtube.com/watch?v=2zZ1kv6vlq0
10. https://en.wikipedia.org/wiki/Elementary_particle

Course Outcomes

1. After studying Unit 1, the student will have a clear idea about the fundamentals of nucleus and its structure.
2. After studying Unit 2, the student would have understood the concept of radioactivity.
3. After studying Unit 3, the student will be having a clear understanding of the design and working of particle accelerators and detectors.
4. After studying Unit 4, the student will be having a thorough understanding about the nuclear reactions and nuclear reactors.
5. After studying Unit 5, the student would have gained adequate knowledge about the elementary particles like pions, muons, hyperons etc.

CORE PAPER-9

Solid State Physics

Course Objectives

1. To gain the knowledge of the crystal system and to know the different crystal structure
2. To know the different types of bonding in crystals and to know the basics of superconductors and their applications.
3. To learn how the X-ray diffraction helps to know the crystal structure and to know the defects present in the crystals
4. To know the different types of magnetism and their theories.
5. To understand the electric polarization in a dielectric material.

UNIT- I

CRYSTALLOGRAPHY

Crystalline and amorphous solids -Crystal lattice -Basis -Unit cell -Primitive and non-primitive unit cell -Elements of Symmetry - Seven Classes of Crystals - Bravais lattices - Miller indices -Calculation of atomic radius, coordination number and atomic packing factor for SC, FCC, BCC and HCP structures- simple numerical problems- Structure of KCl, NaCl and diamond crystals **.**

UNIT- II

DIFFRACTION IN CRYSTALS & CRYSTAL DEFECTS

Bragg's law- conditions for X-ray diffraction - Experimental Method- Laue Method, Rotating Crystal Method - Powder Photograph Method - Crystal defects - point, line, surface and volume defects - effects of crystal imperfections.

UNIT- III

CHEMICAL BONDS & SPECIFIC HEAT CAPACITY

Types of bonding in crystals - ionic, valence, metallic, Vanderwaal's and hydrogen bonding-optical properties -Specific heat capacity -Dulong and Pettit's law -Einstein's and Debye's theory of specific heat capacity

UNIT- IV

MAGNETISM IN SOLIDS& SUPER CONDUCTIVITY

Basic terms in magnetism -Classification of magnetic materials -Weiss theory of Paramagnetism- Domain theory of ferromagnetism- Hysteresis- Soft and hard magnetic materials - Superconductivity - Properties of Superconductors - Types of

Superconductors -Meissner effect-BCS theory of superconductivity- Cooper Pair- First and Second London equation-Josephson effect-Application of Superconductors.

UNIT- V

DIELECTRIC IN SOLIDS

Introduction to dielectrics- Basic definitions- - Different types of Electric polarization - dependency on frequency and temperature - Dielectric Loss -Local or Internal Field-Clausius-Mosotti Relation -Determination of dielectric constant- Dielectric Breakdown-Uses of dielectric materials.

Text Books

Unit 1 to Unit 5

1. K. Elangovan, Solid State Physics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007.
2. S.O.Pillari, Solid State Phsics, New Age International Publishers,New Delhi,2015

Reference Books

1. Gupta and Kumar, Solid State Physics,
2. R. Murugeshan and KiruthigaSivaprasath, Modern Physics,S Chand & Co.,2006
3. M. Arumguarn, Material Science,Anuradha Publishers.
4. Kittel, Introduction to Solid State Physics, Wiley and Sons,

E- Materials

1. https://www3.nd.edu/~amoukasi/CBE30361/Lecture__crystallography_A.pdf
2. https://ocw.mit.edu/courses/chemistry/5-069-crystal-structure-analysis-spring-2010/lecture-notes/
3. http://www.issp.ac.ru/ebooks/books/open/Superconductivity_-Theory_and_Applications.pdf
4. https://www.iitk.ac.in/che/pdf/resources/XRD-reading-material.pdf
5. https://nptel.ac.in/content/storage2/courses/112108150/pdf/Lecture_Notes/MLN_03.pdf
6. http://tiiciiitm.com/profanurag/Physics-Class/Unit-2-DM.pdf
7. https://www.youtube.com/watch?v=D81zc-LK6fc
8. https://en.wikipedia.org/wiki/Crystallographic_defect
9. https://www.youtube.com/watch?v=D-9M3GWoBrw
10. https://www.youtube.com/watch?v=ByViA0H--5c (Tamil video)

Course Out Comes

1. After studied unit-1, the student will be able to Distinguish between crystalline and amorphous solids, Classify the crystal systems and able to understand the crystal structure
2. After studied unit-2, the student will be able to Relate the X-ray diffraction with crystal structure and explain the various differences in properties of solids due to crystal imperfections

3. After studied unit-3, the student will be able tounderstand the different types of bonding in crystals, apply this to understand the optical , specific heat capacity of solids
4. After studied unit-4, the student will be able togain the knowledge of magnetism in materialsand able to distinguish different magnetic materials. Also able to understand the phenomena of superconductivity and their applications
5. After studied unit-5, the student will be able to explain the electric polarization in dielectric materials and also gain the knowledge in dielectric breakdown mechanisms in a dielectric material.

SKILL BASED SUBJECT
PAPER - 4
Weather forecasting

Course Objectives

1. To learn about the elementary idea of atmosphere, atmospheric pressure etc.
2. To study how to measure wind speed, direction, rain fall etc.
3. To teach the different weather systems and hurricanes
4. To explain the climate and environmental issues related to climate
5. To give and idea about weather forecasting

UNIT- I

INTRODUCTION TO ATMOSPHERE
Elementary idea of atmosphere: physical structure and composition; compositional layering of the atmosphere; variation of pressure and temperature with height; air temperature; requirements to measure air temperature; temperature sensors: types; atmospheric pressure: its measurement; cyclones and anticyclones: its characteristics.

UNIT- II

MEASURING THE WEATHER
Wind; forces acting to produce wind; wind speed direction: units, its direction; measuring wind speed and direction; humidity, clouds and rainfall, radiation: absorption, emission and scattering in atmosphere; radiation laws.

UNIT- III

WEATHER SYSTEMS
Global wind systems; air masses and fronts: classifications; jet streams; local thunderstorms; tropical cyclones: classification;-naming tropical cyclonestornadoes; hurricanes

UNIT- IV

CLIMATE AND CLIMATE CHANGE
Climate: its classification; causes of climate change; global warming and its outcomes; air pollution; aerosols, ozone depletion, acid rain, environmental issues related to climate.

UNIT- V

BASICS OF WEATHER FORECASTING

Weather forecasting: analysis and its historical background; need of measuring weather; types of weather forecasting; weather forecasting methods; criteria of choosing weather station; basics of choosing site and exposure; satellites observations in weather forecasting; weather maps; uncertainty and predictability; probability forecasts.

Text Books

Unit 1 to Unit 5

1. Chandrasekar, Basics of AtomsphericScience,PHI Learning Pvt Ltd, New Delhi,2010.
2. Howard J Critcchfield, General Climatology, Prentice Hall of India, Pvt Ltd, New Delhi, 1975.

Reference Books

1. I.C. Joshi , Aviation Meteorology, Himalayan Books, 2014.
2. Stephen Burt, The weather Observers Hand book, Cambridge University Press, 2012.
3. S.R. Ghadekar ,Meteorology,Agromet Publishers, Nagpur, 2001.
4. S.R. Ghadekar ,Text Book of Agrometeorology, AgrometPublishers,Nagpur, 2005.
5. Charls Franklin Brooks Why the weather, Chpraman& Hall, London. 1924.
6. John G. Harvey,Atmosphere and Ocean, The Artemis Press, 1995.

E-Materials

1. https://en.wikipedia.org/wiki/Atmosphere
2. https://www.youtube.com/watch?v=6LkmD6B2ncs
3. https://www.youtube.com/watch?v=jTWwnUIygc8
4. https://weatherstationguide.com/measure-wind-speed/
5. https://en.wikipedia.org/wiki/Thunderstorm
6. https://en.wikipedia.org/wiki/Cyclone
7. https://www.toppr.com/guides/science/winds-storms-and-cyclones/thunderstorms-and-cyclones/
8. https://climatekids.nasa.gov/weather-climate/
9. https://en.wikipedia.org/wiki/Climate
10. https://en.wikipedia.org/wiki/Weather_forecasting
11. https://www.skymetweather.com/15-days-rainfall-forecast-for-india/
12. https://www.youtube.com/watch?v=Q4-Ufqv6kLo (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to study the atmosphere and its physical structure and also to know the variation of pressure and temperature with height.

2. After studied unit-2, the student will be able to describe the measurement of wind speed, direction humidity, rainfall and can state the radiation laws.
3. After studied unit-3, the student will be able to explain the global wind systems and able to know thunderstorms and cyclones.
4. After studied unit-4, the student will be able to conceptualize the classification of climate, ozone depletion, acid rain and environmental hazards due to climate change.
5. After studied unit-5, the student will be able to understand the analysis and historical background of weather forecasting and know the predictability, probability of forecasts.

GROUP (A)

INTERNAL ELECTIVE

PAPER-1

Digital Electronics

Course Objectives

1. Understanding the different number systems and conversion between them and also to study the basic logic gates.
2. To teach the laws of Boolean Algebra, De Morgan's theorems and other logic circuits.
3. To Study combination of logiccircuits and understanding concepts of various flip- flops.
4. To expose the knowledge on various registers and counters.
5. To learn the digital to analog and analog to digital converters.

UNIT - I

NUMBER SYSTEMS AND BASIC LOGIC GATES

Number systems -Decimal, Binary, Octal and Hexadecimal system - Conversion from one number system to another- Binary Arithmetic -Addition -Subtraction-Multiplication-Division- 1's and 2's complement - Subtraction using Complements-Signed Binary Numbers-Binary codes- BCD code - Excess 3 code, Gray code - ASCII code - Basic logic gates-NOT,OR,AND-Design of AND, OR gates using diodes and NOT gate using transistor-Logic circuits and logic expressions-Sum of Products-Product of Sum- NAND, NOR and EX-OR -functions and truth tables.

UNIT- II

BOOLEAN ALGEBRA AND LOGIC CIRCUITS

Laws of Boolean algebra - De Morgan's theorems-NAND & NOR as Universal gates (AND,OR and NOT only)-Karnaugh map - Minterms-Relationship between K-Map and truth table- 2,3 and 4 variable K Map using minterms- Simplification of Boolean function using K Map - Arithmetic Circuits-Half adder and Full adder- Four Bit Adder-BCD Adder- Half subtractor and Full subtractor-Four Bit Adder/Subtractor.

UNIT- III

COMBINATION OF CIRCUITS & FLIP-FLOPS

Multiplexer-Demultiplexer- Decoder- 2 to 4 and 3 to 8 Decoder-BCD to seven segment decoder- BCD to decimal decoder-Encoder-Programmable Logic Array (PLA)-Binary to

Gray and Gray to Binary Conversion using EX-OR gates-Parity Generator and Checker - Flip Flops -SR Flip Flop -Clocked SR-Edge triggered Flip – Flops- D Flip-Flop - JK Flip-Flop -JK Master-Slave Flip - Flop-T Flip-Flop.

UNIT- IV

REGISTERS & COUNTERS

Registers-Shift Registers- Shift Right and Shift Left Shift Registers-Ring CounterJohnson'sCounter-Asynchronous/Ripple Counter-Mod-2, Mod-4, Mod-8 and Mod-16 Counter-4-Bit BinaryDow Counter-4-Bit Up/Down Counter-Synchronous Counters-Design of Synchronous Counters-Mod-3, Mod-5 Counter- Synchronous BCD counter.

UNIT- V

D/A AND A/D CONVERTERS

Binary weighted resistors D/A converter-R-2R Resistive Ladder - Analog to Digital Converter (ADC)-Counter Type A/D Converter-Successive Approximation A/D Converter-Dual Slope A/D Converter-Parallel Comparator A/D Converter.

Text Book

Unit 1 to Unit 5

1. V.Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007.

Reference Books

1. Malvino and Leech, Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi, 2000.
2. V.Vijayendran, Digital Fundamentals, S.Viswanathan, Printers & Publishers Private Ltd, Chennai,2004.
3. R.P. Jain, Modern Digital Electronics, 2/e, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
4. H. Taub and D. Schilling , Digital Integrated Electronics -, McGraw-Hill Book Company.
5. T.L. Floyd , Digital Fundamentals -, Pearson Education, 8/e.
6. W.H. Gothmann , Digital Electronics -, Prentice Hall of India Private Limited, 2/e.

E-Materials

1. https://www.youtube.com/watch?v=4ae9sJBBkvw
2. https://learnabout-electronics.org/Digital/dig11.php
3. https://www.youtube.com/watch?v=RrynEQ7sG5A
4. https://www.sciencedirect.com/topics/computer-science/de-morgans-theorem

5. https://en.wikipedia.org/wiki/Flip-flop_(electronics)
6. https://www.youtube.com/watch?v=tSti91b6qec
7. https://www.youtube.com/watch?v=vRBnZMJA0LY
8. https://en.wikipedia.org/wiki/Shift_register
9. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_digital_to_analog_converters.htm
10. https://www.youtube.com/watch?v=Y2OPnrgb0pY
11. https://www.youtube.com/watch?v=_xxQZEVbPwU (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to gain knowledge between different types of number systems, and their conversions. Also able to study the various Binary codes and to design basic logic gates.
2. After studied unit-2, the student will be able to describe laws of Boolean Algebra, De Morgan's theorems. Also able to demonstrate K-Map and simplification of logic expressions and to design universal gates using NAND and NOR gates.
3. After studied unit-3, the student will be able to explain the Multiplexer, Demultiplexer and Decoder. Students can know the functions of various Flip-Flop circuits.
4. After studied unit-4, the student will be able to conceptualize the classification of registers and counters.
5. After studied unit-5, the student will be able to know how to convert digital to analog and analog to digital using different methods.

GROUP (A)

INTERNAL ELECTIVE
PAPER-2

Fundamentals of Microprocessor-8085

Couse Objectives

1. To know the complete basic details and architecture of microprocessor 8085
2. To study the different types of instructions and addressing modes
3. To write the simple assembly language programs for arithmetic operations and to learn about the instruction cycles
4. To understand the functions of ROM/RAM memory devices and peripheral devices
5. To expose the idea of pin function, working and interacting of peripheral devices with microprocessor

UNIT- I

MICROPROCESSOR ARCHITECTURE

Evolution of Microprocessor-Applications of Microprocessors of Different Generations-The system bus and bus structure-Execution of an instruction-Pin functions of 8085-Architecture of 8085-Block diagram-Register array-ALU and associated circuitry - Instruction Register and Decoder-Timing and Control Unit- Interrupt and Serial I/O units-Types of Interrupts-Programmer's model of 8085.

UNIT- II

INSTRUCTIONS & ADDRESSING MODES

Data transfer/ copy Instructions-Arithmetic, Logical- Two examples each instructions-Branch instructions-Unconditional and conditional jump- Call and Return instructions-Stack and Stack related instructions- I/O and Machine control instructions- Addressing modes.

UNIT- III

ALP & INSTRUCTION TIMINGS

Assembly language programs-Addition, Subtraction, Multiplication and Division (8-bit only)-Largest/smallest in an array-Sum of series of a set- T-State-Machine cycle-Instruction cycle-Memory read cycle-Memory write cycle-Wait state-Halt state-Hold state- Delay calculations-Time delay using a single register.

UNIT- IV

MEMORY AND I/O INTERFACE

Memory interface basics-Demultiplexing address/data bus-Generation control signals-2K × 8 ROM/RAM Interface - Direct I/O Interface-In FE instruction and its timing diagram-Design of Output Port using octal latch only-Memory mapped I/O- Difference between Direct I/O and Memory mapped interface.

UNIT- V

PERIPHERAL DEVICES & APPLICATIONS

Hand shake signals-Single Handshake I/O and Double Handshake I/O- Pin function and Block diagram and working of 8255-Pin function and Block diagram and working of 8279-LED Interface-Temperature Controller.

Text Book

Unit 1 to Unit 5

1. Fundamental of Microprocessor - 8085 - Architecture, Programming and interfacing – V. Vijyendran, S. Viswanathan, Pvt. Ltd., 2003.
2. A. NagoorKani, 8085 Microprocessor and its Applications, Tata McGraw Hill, New Delhi, 2013.

Reference Books

1. R.S. Goankar , Microprocessor Architecture, Programming and Applications with the 8085, 3rd Edn. Prentice Hall,
2. B.Ram, Fundamentals of Microprocessors and Microcomputers,DhanpatRai Publications, New Delhi.
3. Aditya P Mathur, Introduction to Microprocessors, Tata McGraw Hill Publishing Company Ltd., New Delhi,

E-Materials

1. https://www.youtube.com/watch?v=ii7PCV2zvms
2. https://www.tutorialspoint.com/microprocessor/microprocessor_8085_pin_configuration.htm
3. https://www.youtube.com/watch?v=7nWt5dixiX0 (Tamil video)
4. https://www.tutorialspoint.com/microprocessor/microprocessor_8085_instruction_set
5. https://www.youtube.com/watch?v=G3iUO96XhC4
6. https://www.youtube.com/watch?v=MIx6khOFFoU (Tamil video)
7. https://www.geeksforgeeks.org/8085-program-to-divide-two-8-bit-numbers/
8. http://www.psnacet.edu.in/courses/ECE/Microcontroller%20and%20Microprocessor/lecture4.pdf

9. https://www.youtube.com/watch?v=-FGw_MPlfbk&vl=en
10. https://www.youtube.com/watch?v=_M8hDkRAL6M&vl=en
11. https://www.geeksforgeeks.org/programmable-peripheral-interface-8255/

Course Outcomes

1. After studied unit-1, the student will be able to know the evolution of microprocessor, pin and architecture of 8085 microprocessor in detail.
2. After studied unit-2, the student will be able to describe different types of instructions like data transfer, arithmetic, logical and branching instructions with examples and it will be used for writing the assembly language programs.
3. After studied unit-3, the student will be able to write assembly language programs for simple arithmetic operations and hence they can apply it for interfacing applications.
4. After studied unit-4, the student will be able to learn the memory interface and peripheral interface devices.
5. After studied unit-5, the student will be able to know how to interface the peripheral device with microprocessor 8085 and they are able to write the programs for LED and Temperature control interface system.

GROUP (A)

INTERNAL ELECTIVE

PAPER-3

Nanophysics

Course Objectives

1. To know the fundamentals of nanotechnology.
2. To learn about carbon nanostructures and its properties.
3. To study the preparation of nanomaterial by different methods.
4. To analyse the synthesized nanomaterial by various characterization techniques.
5. To understand the various applications of nanotechnology.

UNIT- I

INTRODUCTION TO NANO AND TYPES OF NANOMATERIAL

Need and origin of nano - Emergence of nanotechnology with special reference to Feynman.Size & Scales: definition of nanostructures;Top-down and bottom-up approaches- Introductory ideas of 1D, 2D and 3D nanostructured material– Quantumdots - Quantum wire - Quantum well - Exciton confinement in quantum dots-surface to volume ratio-semiconducting and magnetic nanoparticles.

UNIT- II

CARBON NANOSTRUCTURES

Carbon molecules and carbon bond-C60: Discovery and structure of C60 and its crystal - Superconductivity in C60-Carbon nanotubes: Fabrication - Structure-Electrical properties - Vibrational properties -Mechanical properties - Applications(fuel cells, chemical sensors, catalysts).

UNIT- III

FABRICATION OF NANOMATERIAL

Synthesis of nanoparticles- wet chemical precipitation method-Synthesis of metal oxide nanoparticles by sol-gel method –Hydrothermal method-Sonochemical method-Electrochemical depositionmethod–Ball milling method.

UNIT- IV

CHARACTERIZATION OF NANOMATERIAL

Principle, Design and utility-XRD (X-ray diffraction)-particle size analysis using Scherer

formula-UV-Visible spectroscopy-Band gap energy-Tau plot-FTIR spectroscopy-structural analysis-EDAX-elemental analysis-Scanning electron microscopy (SEM)-Transmission electron microscopy (TEM)-morphology.

UNIT - V

APPLICATIONS

Nanoelectronics–OLEDs-OTFTs-SWNT FETs-Nanorobots–Nanomedicine-bio sensors-targeted drug delivery-Energy storage applications-nanosilicon for solar cells-MEMS and NEMS-Photonic crystals.

Text Books

Unit 1 to Unit 5

1. T.Pradeep et al., A Textbook ofNanoscience and Nanotechnology,Tata McGraw Hill, New Delhi, 2012.
2. T.Pradeep , Nano: The Essentials,Tata McGraw Hill, New Delhi, 2012.
3. R.W. Kelsall, I.W. Hamley and M. Geoghegan, Nanoscale Science and Nanotechnology (John-Wiley & Sons, Chichester, 2005.
4. G. Cao, Nanostructures and Nanomaterials,Imperial College Press, London, 2004.
5. C.P. Poole and F.J. Owens, Introduction to Nanotechnology,Wiley, New Delhi, 2003.

Reference Books

1. H.S. Nalwa, Nanostructured Materials and Nanotechnology,Academic Press, San Diego, 2002.
2. M. Wilson, K. Kannangara, G. Smith, M. Simmons, B. Raguse, Nanotechnology:
3. Basic Science and Emerging Technologies,Overseas Press, New Delhi, 2005.

E-Materials

1. https://en.wikipedia.org/wiki/Nanotechnology
2. https://en.wikipedia.org/wiki/Carbon_nanotube
3. https://www.nanowerk.com/nanotechnology/introduction/introduction_to_nanotechnology_22.php
4. https://www.youtube.com/watch?v=sbuIluJhT4A (Tamil video)
5. https://www.youtube.com/watch?v=14DqBIG96W0
6. https://www.sciencedirect.com/topics/chemistry/sol-gel-process (Journal)
7. https://www.slideshare.net/RamalingamGopal/sol-gel-synthesis-of-nanoparticles
8. https://en.wikipedia.org/wiki/Scanning_electron_microscope
9. https://www.youtube.com/watch?v=kdb6dHEHCA0
10. https://interestingengineering.com/15-medical-robots-that-are-changing-the-world
11. https://en.wikipedia.org/wiki/Nanorobotics

Course Outcomes

1. After studied unit-1, the student will be able to know the origin and emergence of nanotechnology and also able to define different nanostructures.
2. After studied unit-2, the student will be able to describe carbon nanostructures and its fabrication. Also they can know the electrical, vibrational and mechanical properties of carbon nanostructure and its applications.
3. After studied unit-3, the student will be able to know how to fabricate the nanomaterial by electrochemical method, lithographic techniques, atomic layer deposition method etc.
4. After studied unit-4, the student will be able to learn the characterization techniques like SEM,TEM etc for the synthesized nanostructures.
5. After studied unit-5, the student will be able to know the applications of nanotechnology in different field.

Thiruvalluvar University, Vellore - 632115

GROUP (B)

INTERNAL ELECTIVE

PAPER-1

Digital Electronics

Course Objectives

1. Understanding the different number systems and conversion between them and also to study the basic logic gates.
2. To teach the laws of Boolean Algebra, De Morgan's theorems and other logic circuits.
3. To Study combination of logic circuits and understanding concepts of various flip- flops.
4. To expose the knowledge on various registers and counters.
5. To learn the digital to analog and analog to digital converters.

UNIT - I

NUMBER SYSTEMS AND BASIC LOGIC GATES

Number systems -Decimal, Binary, Octal and Hexadecimal system - Conversion from one number system to another- Binary Arithmetic -Addition -Subtraction-Multiplication - Division- 1's and 2's complement - Subtraction using Complements-Signed Binary Numbers-Binary codes- BCD code - Excess 3 code, Gray code - ASCII code - Basic logic gates-NOT,OR, AND-Design of AND, OR gates using diodes and NOT gate using transistor-Logic circuits and logic expressions-Sum of Products-Product of Sum- NAND, NOR and EX-OR -functions and truth tables.

UNIT- II

BOOLEAN ALGEBRA AND LOGIC CIRCUITS

Laws of Boolean algebra - De Morgan's theorems-NAND & NOR as Universal gates (AND,OR and NOT only)-Karnaugh map - Minterms-Relationship between K-Map and truth table- 2,3 and 4 variable K Map using minterms- Simplification of Boolean function using K Map - Arithmetic Circuits-Half adder and Full adder- Four Bit Adder-BCD Adder- Half subtractor and Full subtractor-Four Bit Adder/Subtractor.

UNIT- III

COMBINATION OF CIRCUITS & FLIP-FLOPS

Multiplexer-Demultiplexer- Decoder- 2 to 4 and 3 to 8 Decoder-BCD to seven segment

decoder- BCD to decimal decoder - Encoder-Programmable Logic Array (PLA)-Binary to Gray and Gray to Binary Conversion using EX-OR gates-Parity Generator and Checker - Flip Flops -SR Flip Flop -Clocked SR-Edge triggered Flip –Flops- D Flip-Flop - JK Flip-Flop -JK Master-Slave Flip-Flop-T Flip-Flop.

UNIT- IV

REGISTERS & COUNTERS

Registers-Shift Registers- Shift Right and Shift Left Shift Registers-Ring CounterJohnson's Counter-Asynchronous/Ripple Counter-Mod-2, Mod-4, Mod-8 and Mod-16 Counter-4-Bit Binary Dow Counter-4-Bit Up/Down Counter-Synchronous Counters-Design of Synchronous Counters-Mod-3, Mod-5 Counter- Synchronous BCD counter.

UNIT- V

D/A AND A/D CONVERTERS

Binary weighted resistors D/A converter-R-2R Resistive Ladder - Analog to Digital Converter (ADC)-Counter Type A/D Converter-Successive Approximation A/D Converter-Dual Slope A/D Converter-Parallel Comparator A/D Converter.

Text Book

Unit 1 to Unit 5

1. V.Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007

Reference Books

1. Malvino and Leech, Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi, 2000.
2. V.Vijayendran, Digital Fundamentals, S.Viswanathan, Printers & Publishers Private Ltd, Chennai,2004.
3. R.P. Jain, Modern Digital Electronics, 2/e, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
4. H. Tauband D. Schilling , Digital Integrated Electronics -, McGraw-Hill Book Company.
5. T.L. Floyd , Digital Fundamentals -, Pearson Education, 8/e.

E-Materials

1. https://www.youtube.com/watch?v=4ae9sJBBkvw
2. https://learnabout-electronics.org/Digital/dig11.php

3. https://www.youtube.com/watch?v=RrynEQ7sG5A
4. https://www.sciencedirect.com/topics/computer-science/de-morgans-theorem
5. https://en.wikipedia.org/wiki/Flip-flop_(electronics)
6. https://www.youtube.com/watch?v=tSti91b6qec
7. https://www.youtube.com/watch?v=vRBnZMJA0LY
8. https://en.wikipedia.org/wiki/Shift_register
9. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_digital_to_analog_converters.htm
10. https://www.youtube.com/watch?v=Y2OPnrgb0pY
11. https://www.youtube.com/watch?v=_xxQZEVbPwU (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to gain knowledge between different types of number systems, and their conversions. Also able to study the various Binary codes and to design basic logic gates.
2. After studied unit-2, the student will be able to describe laws of Boolean Algebra, De Morgan's theorems. Also able to demonstrate K-Map and simplification of logic expressions and to design universal gates using NAND and NOR gates.
3. After studied unit-3, the student will be able to explain the Multiplexer, Demultiplexer and Decoder. Students can know the functions of various Flip-Flop circuits.
4. After studied unit-4, the student will be able to conceptualize the classification of registers and counters.
5. After studied unit-5, the student will be able to know how to convert digital to analog and analog to digital using different methods.

GROUP (B)

INTERNAL ELECTIVE

PAPER-2

Materials Science

Course Contents

1. To teach the classification of engineering materials and properties.
2. To discuss the mechanical and thermal behavior of materials.
3. To expose the knowledge on polymers, ceramics and nanomaterial.
4. To study the basics of smart materials.
5. To learn the idea of energy storage materials.

UNIT - I

ENGINEERING MATERIALS AND CHEMICALBONDING

Classification of engineering materials- levels of structure - structure-property relationship in materials-stability and metastability- bond energy- bond type and bond length- ionic and covalent bonding -Metallic bonding-secondary bonding-lattice energy-Born Haber cycle -cohesive energy -variation in bonding character and properties.

UNIT- II

MECHANICAL AND THERMAL BEHAVIOUR OFMATERIALS

Elastic behaviour -atomic model of elastic behaviour -Young's modulus -Poisson's ratio - shear modulus- bulk modulus-composite materials - the modulus as a parameter of design- rubber like elasticity -plastic deformation -tensile -yield strength -toughness - elongation - hardness- impact strength -stress - strain curve -Heat capacity, thermalconductivity, thermal expansion of materials.

UNIT- III

POLYMERS, CERAMICS AND NANOMATERIAL

Polymers - Polymerization mechanism - Polymer structures - Deformation of polymers - Behaviour of polymers-Ceramics-Ceramic phases - Structure - classes - Effect of structureon the behaviour of ceramic phases - composites - Nanomaterial-Need and origin of nano-Introductory ideas of 1D, 2D and 3D nanostructured material-Synthesis of oxide nanoparticles by sol-gel method -fullurences-Carbon nanotubes- Fabrication and structure of carbon nanotubes

UNIT- IV

SMART MATERIALS

Definition of smart materials- Types -Piezoelectric materials-Materials for MEMS and NEMS- Ferro fluid- Magnetic shapememoryalloys (MSMAs)- Shape memory alloy (SMA)- Oneway and Two way memory effect- Dielectric elastomers (DEs).

UNIT- V

ENERGY STORAGE MATERIALS

Solar cells: Organic solar cells - Polymer composites for solar cells-Polymer membranes for fuel cells - Acid/ alkaline fuel cells -design of fuel cells-Carbon Nanotubes for energy storage - Hydrogen Storage in Carbon Nanotubes.

Text Books

Unit 1 to Unit 5

1. V. RaghavanV,Materials science and engineering - A FirstCourse, 5th Ed, Prentice Hall India, New Delhi, 2012.
2. M. Arumugam, Materials Science - Anuradha Agencies, 1990.

Reference Books

1. V. Rajendran, Material Science, Tata McGraw Hill Ltd, New Delhi,2001.
2. Dr. M.N. Avadhanulu, Material science, S.Chand& Company, New Delhi, 2014.
3. G.K.Narula, K.S. Narula, V.K. Gupta Materials Science, Tata McGraw Hill Publishing, New Delhi, 1994.
4. M V Gandhi and B S Thompson B S, Smart Materials andStructures. Chapman & Hall 1992.

E-Materials

1. https://www.learnpick.in/prime/documents/ppts/details/729/classification-of-engineering-materials-part-1
2. https://www.youtube.com/watch?v=5hJhRFCUilo
3. https://www.youtube.com/watch?v=iegJ76DS3lc
4. https://nptel.ac.in/content/storage2/courses/112108150/pdf/Web_Pages/WEBP_M15.pdf
5. https://plastics.americanchemistry.com/plastics/The-Basics/
6. https://study.com/academy/lesson/what-are-polymers-properties-applications-examples.html
7. https://internetofthingsagenda.techtarget.com/definition/micro-electromechanical-systems-MEMS
8. https://en.wikipedia.org/wiki/Microelectromechanical_systems

9. https://www.iitk.ac.in/reach/2008/Energy/REACH2008-SolarCells-SundarIyer.pdf
10. https://www.youtube.com/watch?v=zMLrhgSAPHc
11. https://www.youtube.com/watch?v=4Homfj_ne0Q (Tamil video)

Course Objectives

1. After studied unit-1, the student will be able to know the origin engineering materials and its classification. Also students will be able to learn the bonding character and its Properties
2. After studied unit-2, the student will be able to describe mechanical properties like elastic behavior and thermal properties like heat capacity, thermal conductivity etc.
3. After studied unit-3, the student will be able to know the basics of polymers, ceramics and nanomaterial.
4. After studied unit-4, the student will be able to explain definition and types of smart materials.
5. After studied unit-5, the student will be able to conceptualize the energy storage materials.

GROUP (B)

INTERNAL ELECTIVE

PAPER-3

Medical Physics

Course Objectives

1. To have a fundamental knowledge about the characteristics and production of X-rays.
2. To understand the concept of radiation physics.
3. To have a clear understanding of the design and working of Medical imaging techniques.
4. To understand the concepts and ideas behind radiation therapy.
5. To gain knowledge about the protective measures in radiation therapy.

UNIT- I

X - RAYS

Electromagnetic spectrum, production of x-rays, x-ray spectra-Brehmsstrahlung, Characteristic x-ray- Coolidge tube, x-ray tubedesign, tube cooling stationary mode, Rotating anode x-ray tube, Tube rating, qualityand intensity of x-ray. X-ray generator circuits, half wave and full wave rectification,filament circuit, kilo voltage circuit, types of X-Ray Generator, high frequencygenerator, exposure timers and switches, HT cables, HT generation.

UNIT- II

RADIATION PHYSICS

Radiation units exposure, absorbed dose, units: rad, gray,relative biological effectiveness, effective dose, inverse square law- Interaction ofradiation with matter Compton & photoelectric effect, Rem & Sievert, linear attenuationcoefficient - Radiation Detectors: Thimble chamber, condenser chambers, GeigerMuller counter, Scintillation counters and Solid State detectors, ionization chamber, Dosimeters, survey methods, area monitors, TLD, Semiconductor detectors.

UNIT- III

MEDICAL IMAGING PHYSICS

Evolution of Medical Imaging, X-ray diagnostics and imaging, Physics of nuclear magnetic resonance (NMR), NMR imaging, MRI Radiological imaging, Ultrasound imaging, Physics of Doppler with applications and modes, Vascular Doppler. Radiography: Filters, grids, cassette, X-ray film, film processing, fluoroscopy- Computed

tomography scanner- principle & function,display, generations, mammography. Thyroid uptake system and Gamma camera (OnlyPrinciple, function and display)

UNIT- IV

RADIATION THERAPHY PHYSICS

Diagnostic nuclear medicine: Radiopharmaceuticals for radioisotope imaging, -Radioisotope imaging equipment, Single photon and positron emission tomography-Therapeutic nuclear medicine: Interaction between radiation and matter -Dose and isodose in radiation treatment - Medical Instrumentation: Basic Ideas of Endoscope and Cautery, Sleep Apnea and Cpap Machines, Ventilator and its modes

UNIT- V

RADIATION PROTECTION

Principles of radiation protection,protective materials-radiation effects, somatic, genetic stochastic and deterministiceffect. Personal monitoring devices: TLD film badge -pocket dosimeter, OSL dosimeter- Radiation dosimeter- Natural radioactivity, Biological effects of radiation, Radiationmonitors-Steps to reduce radiation to Patient, Staff and Public-Dose Limits forOccupational workers and Public-AERB: Existence and Purpose.

Text Books

Unit 1 to Unit 5

1. Dr. K. Thayalan, Basic Radiological Physics, Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi, 2003.
2. Curry, Dowdey and Murrey, Christensen's Physics of Diagnostic Radiology, Lippincot Williams and Wilkins,1990.
3. FM Khan-Williams and Wilkins,Physics of Radiation Theraphy, Third edition,2003.

Reference Books

1. Chandra-LippincotWillams and Wilkins, Nuclear Medicine Physics,1998.
2. William R Hendee-Mosby Medical Imaging Physics, 3rd edition,1992.
3. K.N. Govindarajan,Advanced Medical Radiation Dosimetry, Prentice Hall of India Pvt. Ltd. New Delhi ,1992.
4. Muhammad Maqbool, Introduction to Medical Physics ,Springer International Publishing, 2017.

E-Materials

1. https://www.youtube.com/watch?v=T1WwHh4b__M
2. https://en.wikipedia.org/wiki/X-ray
3. https://www.studyandscore.com/studymaterial-detail/geiger-muller-counter-construction-principle-working-plateau-graph-and-applications

4. https://www.youtube.com/watch?v=Sr1BdM89RnA
5. https://en.wikipedia.org/wiki/Magnetic_resonance_imaging
6. https://www.youtube.com/watch?v=Q9-X4uV8ymk
7. https://www.adacap.com/nuclear-medicine/
8. http://jnm.snmjournals.org/content/57/1/163.full
9. https://www.youtube.com/watch?v=gXR5Wdmeu_s (Tamil video)
10. https://www.healthline.com/health/endoscopy

Course Outcomes

1. After studying Unit 1, the student will have a clear idea about the fundamentals of the production and characteristics of X-rays.
2. After studying Unit 2, the student would have understood the concept of radiation units and radiation detectors.
3. After studying Unit 3, the student will have a clear understanding of the design and working of Medical imaging techniques and computer tomography scanner.
4. After studying Unit 4, the student will be having a thorough understanding about the diagnostic nuclear medicine and some medical instrumentation.
5. After studying Unit 5, the student would have gained adequate knowledge about the protective measures to be undertaken in radiation therapy.

GROUP (C)

INTERNAL ELECTIVE

PAPER-1

Digital Electronics

Course Objectives

1. Understanding the different number systems and conversion between them and also to study the basic logic gates.
2. To teach the laws of Boolean algebra, De Morgan's theorems and other logic circuits.
3. To Study combination of logic circuits and understanding concepts of various flip- flops.
4. To expose the knowledge on various registers and counters.
5. To learn the digital to analog and analog to digital converters.

UNIT - I

NUMBER SYSTEMS AND BASIC LOGIC GATES

Number systems -Decimal, Binary, Octal and Hexadecimal system - Conversion from one number system to another- Binary Arithmetic -Addition - Subtraction-Multiplication - Division- 1's and 2's complement - Subtraction using Complements-Signed Binary Numbers-Binary codes- BCD code - Excess 3 code, Gray code - ASCII code - Basic logic gates-NOT,OR, AND-Design of AND, OR gates using diodes and NOT gate using transistor-Logic circuits and logic expressions-Sum of Products-Product of Sum- NAND, NOR and EX-OR -functions and truth tables.

UNIT- II

BOOLEAN ALGEBRA AND LOGIC CIRCUITS

Laws of Boolean algebra - De Morgan's theorems-NAND & NOR as Universal gates (AND,OR and NOT only)-Karnaugh map - Minterms-Relationship between K-Map and truth table- 2,3 and 4 variable K Map using minterms- Simplification of Boolean function using K Map - Arithmetic Circuits-Half adder and Full adder- Four Bit Adder-BCD Adder- Half subtractor and Full subtractor-Four Bit Adder/Subtractor.

UNIT- III

COMBINATION OF CIRCUITS & FLIP-FLOPS

Multiplexer - Demultiplexer - Decoder- 2 to 4 and 3 to 8 Decoder-BCD to seven segment decoder- BCD to decimal decoder - Encoder-Programmable Logic Array (PLA)-Binary to Gray and Gray to Binary Conversion using EX-OR gates-Parity Generator and Checker - Flip Flops -SR Flip Flop -Clocked SR-Edge triggered Flip -Flops- D Flip-Flop - JK Flip-Flop -JK Master-Slave Flip-Flop-T Flip-Flop.

UNIT- IV

REGISTERS & COUNTERS

Registers-Shift Registers- Shift Right and Shift Left Shift Registers-Ring CounterJohnson's Counter-Asynchronous/Ripple Counter-Mod-2, Mod-4, Mod-8 and Mod-16 Counter-4-Bit Binary Dow Counter-4-Bit Up/Down Counter-Synchronous Counters-Design of Synchronous Counters-Mod-3, Mod-5 Counter- Synchronous BCD counter.

UNIT- V

D/A AND A/D CONVERTERS

Binary weighted resistors D/A converter-R-2R Resistive Ladder - Analog to Digital Converter (ADC)-Counter Type A/D Converter-Successive Approximation A/D Converter-Dual Slope A/D Converter-Parallel Comparator A/D Converter.

Text Book

Unit 1 to Unit 5

1. V.Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007.

Reference Books

1. Malvino and Leech, Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi, 2000.
2. V.Vijayendran, Digital Fundamentals, S.Viswanathan, Printers & Publishers Private Ltd, Chennai,2004.
3. R.P. Jain, Modern Digital Electronics, 2/e, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
4. H. Tauband D. Schilling , Digital Integrated Electronics -, McGraw-Hill Book Company.
5. T.L. Floyd , Digital Fundamentals -, Pearson Education, 8/e.

E-Materials

1. https://www.youtube.com/watch?v=4ae9sJBBkvw
2. https://learnabout-electronics.org/Digital/dig11.php
3. https://www.youtube.com/watch?v=RrynEQ7sG5A
4. https://www.sciencedirect.com/topics/computer-science/de-morgans-theorem
5. https://en.wikipedia.org/wiki/Flip-flop_(electronics)
6. https://www.youtube.com/watch?v=tSti91b6qec
7. https://www.youtube.com/watch?v=vRBnZMJA0LY

8. https://en.wikipedia.org/wiki/Shift_register
9. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_digital_to_analog_converters.htm
10. https://www.youtube.com/watch?v=Y2OPnrgb0pY
11. https://www.youtube.com/watch?v=_xxQZEVbPwU (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to gain knowledge between different types of number systems, and their conversions. Also able to study the various Binary codes and to design basic logic gates
2. After studied unit-2, the student will be able to describe laws of Boolean Algebra, De Morgan's theorems. Also able to demonstrate K-Map and simplification of logic expressions and to design universal gates using NAND and NOR gates.
3. After studied unit-3, the student will be able to explain the Multiplexer, Demultiplexer and Decoder. Students can know the functions of various Flip-Flop circuits.
4. After studied unit-4, the student will be able to conceptualize the classification of registers and counters.
5. After studied unit-5, the student will be able to know how to convert digital to analog and analog to digital using different methods.

GROUP (C)

INTERNAL ELECTIVE

PAPER-2

Radiation Safety

Course Contents

1. The students can learn the basic concepts of atomic and nuclear physics
2. To teach the different types of radiation and interaction of charged particles
3. To study the basic idea of different units of activity and working principle of radiation detectors
4. To understand the concept of radiation safety management
5. To give the application of nuclear techniques

UNIT- I

BASICS OF ATOMIC AND NUCLEAR PHYSICS

Basic concept of atomic structure; X rayscharacteristic and production; concept of bremsstrahlung and auger electron-Thecomposition of nucleus and its properties, mass number, isotopes of element, spin,binding energy, stable and unstable isotopes, law of radioactive decay- Mean life and half-life, -Basic concept of alpha, beta and gamma decay, concept of cross section and kinematics of nuclear reactions- Types of nuclear reaction, fusion, fission.

UNIT- II

INTERACTION OF RADIATION WITH MATTER

Types of Radiation: Alpha, Beta, Gamma and Neutron and their sources, sealed and unsealed sources, Interaction of Photons - Photoelectric effect, Compton Scattering, Pair Production- Linear and Mass Attenuation Coefficients- Interaction of Charged Particles: Heavy charged particles - Beth-Bloch Formula, Scaling laws, Mass Stopping Power, Range, Straggling, Channeling and Cherenkov radiation- Beta Particles- Collision and Radiation loss (Bremsstrahlung)-Interaction of Neutrons- Collision, slowing down and Moderation.

UNIT- III

RADIATION DETECTION AND MONITORING DEVICES

Radiation Quantities and Units: Basicidea of different units of activity, KERMA, exposure, absorbed dose, equivalent dose,effective dose, collective equivalent dose, Annual Limit of Intake (ALI) and derived AirConcentration (DAC) - Radiation detection: Basic concept and working principle ofgas detectors (Ionization Chambers, Proportional

Counter, Multi-Wire ProportionalCounters (MWPC) and Gieger Muller Counter), Scintillation Detectors (Inorganic andOrganic Scintillators), Solid States Detectors and Neutron Detectors, Thermo luminescent Dosimetr.

UNIT- IV

RADIATION SAFETY MANAGEMENT

Biological effects of ionizing radiations-Operationallimits and basics of radiation hazards evaluation and control: radiation protectionstandards-International Commission on Radiological Protection (ICRP) principles,justification, optimization, limitation, introduction of safety and risk management ofradiation. Nuclear waste and disposal management.Brief idea about Accelerator drivenSub-critical system (ADS) for waste management.

UNIT- IV

APPLICATION OF NUCLEAR TECHNIQUES

Application in medical science (e.g., MRI, PET,Projection Imaging Gamma Camera, radiation therapy), Archaeology, Art, Crime detection, Mining and oil-Industrial Uses: Tracing, Gauging, Material Modification,Sterization, Food preservation.

Text Books

Unit 1 to Unit 5

1. R. Murugeshan and KiruthigaSivaprasath, Modern Physics,S Chand &Co.New Delhi,2006.
2. H. Cember and T. E. Johnson, Introduction to Health Physics, 4th Ed.,McGraw Hill, 2008.
3. K. Thayalan, Handbook of Radiological Safety ,JaypeeBrothers,Medical ,Publishers, 2009.

Reference Books

1. Dr. K. Thayalan, Basic Radiological Physics ,Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi, 2003.
2. R. F. Mould Radiation Protection in Hospital (Adam Hilger Ltd., Bristol, 1985.
3. Martin, S. Harbison, K. Beach and P. Cole, An Introduction to Radiation Protection, 6th Ed. CRC Press, 2013.
4. AERB Radiation Protection Rules, 2004.
5. IAEA Safety Series 41

E-Materials

1. https://en.wikipedia.org/wiki/Radioactive_decay
2. https://www.toppr.com/guides/physics/nuclei/radioactivity-law-of-radioactive-decay/
3. https://www.youtube.com/watch?v=9UhmFr2WctU (Tamil video)
4. https://ta.wikipedia.org/wiki/%E0%AE%92%E0%AE%B3%E0%AE%BF%E0%AE%AE%E0%AE%BF%E0%AE%A9%E0%AF%8D_%E0%AE%B5%E0%AE%BF%E0%AE%B3%E0%AF%88%E0%AE%B5%E0%AF%81

5. https://www2.lbl.gov/abc/wallchart/chapters/15/2.html
6. https://www.radiologyinfo.org/en/info.cfm?pg=safety-hiw_09
7. https://www.youtube.com/watch?v=DvSNlmGu55c
8. http://webfiles.ehs.ufl.edu/rssc_stdy_chp_5.pdf
9. https://www.world-nuclear.org/information-library/non-power-nuclear-applications/overview/the-many-uses-of-nuclear-technology.aspx
10. https://www.youtube.com/watch?v=ySnG4JZa7Go

Course Outcomes

1. After studied unit-1, the student will be able to study the basics of atomic structure and nuclear composition.
2. After studied unit-2, the student will be able to describe properties of alpha, beta and gamma rays and also to study the interaction of charged particles.
3. After studied unit-3, the student will be able to explain radiation qunatities and units and also able to know the principle and working of radiation detectors.
4. After studied unit-4, the student will be able to conceptualize the radiation safety management.
5. After studied unit-5, the student will be able to know the application of nuclear techniques in medicinal science.

GROUP (C)

INTERNAL ELECTIVE

PAPER-3

Astrophysics

Course Contents

1. To give basic principle and types of astronomical instruments.
2. To study the big bang theory, types of galaxies and to astronomical units.
3. To learn the birth and age of stars and to know about comets.
4. To teach the structure of the sun and other planets.
5. To give the overview of India's space programme and calendars.

UNIT- I

ASTRONOMICAL INSTRUMENTS

Optical telescope - reflecting telescope - types of reflecting telescope - advantages of reflecting telescopes - radio telescope - astronomical spectrographs - photographic photometry - photoelectric spectrometry- detectors and image processing.

UNIT- II

SPACE

Introduction -Hubble's Law -Big bang theory - Shape of Universe -Expanding universe in space - Galaxies- Types of Galaxies- Spiral, Elliptical and Irregular Galaxies - Clusters of Galaxies - Milky Way - Quasars - Cislunar space -Translunar space - Inter planetary distance -Interesteller space - Inter galactic space - Light Year - Astronomical Unit- Astronomical Map.Astronomical Systems -Astronomical co-ordinates - Celestial Sphere - Celestial Equators - Celestial Poles.

UNIT- III

STARS

Birth of Stars -Colour and Age- Life of Stars - Red giant stars - With dwarf star - Neutron Star -Black hole - Supernovae - Constellations - Zodiac - Asteroids - Meteors - Meteorites-Comets.

UNIT- IV

SOLAR SYSTEM

Introduction - Sun - Structure of Sun - Nuclear reactions in sun - Sun spot and solar flares- Earth - Structure of earth - Atmosphere - Moon and its structure - Inner planets

Outer planets - Introduction - Sidereal month - Synodic month - daily motion of the moon- age of moon - phase of moon - position of moon at rising and setting-Eclipses- Introduction - umbra and penumbra - lunar eclipse - solar eclipse -durationof lunar and solar eclipse - comparison of solar and lunar eclipses.

UNIT- V

INDIA'S SPACE PROGRAMME

Overview - Methodological issues in cost beneficial analysis of spaceprogramme - The INSAT system - Broadcasting - Telecommunication -Meteorology - Indian remote sensing programme-Geoinformatics (basic idea only) - The launching program-Latest Launchers- PSLV and GSLV - Mission-Chandrayan 2 - Lunar and Solar calendars - Egyptian - Mayan - Roman - Julian andGregorian calendars - Indian National calendar - Tamil and Malayalamcalendars.

Text Books

1. BaidyanathBasu, An introduction to Astrophysics,Pentice Hall of India Private Ltd., New Delhi - 2001.
2. A.Hewish, Physics of the Universe , CSIR publication, New Delhi, 1992.
3. BimanBasu, Inside Stars, CSIR Publication, New Delhi, 1992.
4. K.S.Krishnasamy, Astro Physics a Modern Perspective, New Age International, New Delhi.
5. R. Murugesan, Modern Physics, S. Chand &Co.,New Delhi, 2003.

Reference Books

1. Prof. P. Devadas, The fascinating Astronomy, Devadas Telescopies, Chennai.
2. S. Kumaravelu and SusheelaKumaravelu,Astronomy,2013.
3. Textbook of astronomy an astrophysics with elements of cosmology, V.B.Bhatia, Narosapublishing house, 2001.
4. Astrophysics - Stars and Galaxies, K. D. Abhyankar, University Press, 2001.
5. Theoritical Astrophysics (Vols. I,II,III) - T. Padmanavan (CUP)
6. Black Holes, White Dwarfs and Neutron Stars -S.L.Shapiro and S.A.Teukolsky (John Wiley, 1983).

E-Materials

1. https://www.youtube.com/watch?v=zlioUjguQk8
2. https://en.wikipedia.org/wiki/Reflecting_telescope
3. https://en.wikipedia.org/wiki/Milky_Way
4. https://www.youtube.com/watch?v=BcjmoEspoRI
5. https://www.youtube.com/watch?v=ZrS3Ye8p61Y
6. https://en.wikipedia.org/wiki/Star

7. https://en.wikipedia.org/wiki/Solar_System
8. https://www.youtube.com/watch?v=AC0HdUD1RfA (Tamil video)
9. https://www.youtube.com/watch?v=eeS7byxWDM4
10. https://en.wikipedia.org/wiki/Indian_National_Satellite_System

Course Outcomes

1. After studied unit-1, the student will be able to study the different types of optical instruments like telescopes and spectrographs will be used for observing/recording the space objects.
2. After studied unit-2, the student will be able to describe big bang theory, different types of galaxies, milky way and astronomical unit.
3. After studied unit-3, the student will be able to explain about stars, constellations, asteroids, meteorites and comets.
4. After studied unit-4, the student will be able to know the details of solar system and able to know the formation eclipse due to sun, moon and earth.
5. After studied unit-5, the student will be able to understanding the different space programmers/missions carried out by our Indian Space Research Organization (ISRO) and also to study the lunar and solar calendars.

CORE PRACTICAL

Semester: V & VI

PAPER - 3

Core Practical - 3 (General)

List of Experiments (Any 15 Experiments only)

1. Bifilar Pendulum - Parallel Threads - Verification of Parallel and Perpendicular axes theorems.
2. Young's modulus - Koenig's method - non- uniform bending.
3. Young's modulus -Koenig's method - uniform bending.
4. Newton's rings -Refractive index of material a convex lines.
5. Spectrometer i- i' Curve.
6. Spectrometer -Narrow angled prism - angle of deviation - normal incidence and normal emergence - refractive index.
7. Spectrometer-Dispersive power of a prism.
8. Spectrometer-Dispersive power of a grating.
9. Field along the axis of circular coil -Deflection magnetometer -M and B_H- Null Deflection Method.
10. Field along the axis of circular coil -Vibrating magnetic needle -Determination of B_H.
11. Potentiometer - EMF of a Thermocouple.
12. Potentiometer -Calibration of High range Voltmeter.
13. Potentiometer - Conversion of galvanometer into Voltmeter.
14. Potentiometer - Conversion of galvanometer into Ammeter.
15. BG - Absolute capacitance of a capacitor.
16. BG - Comparison mutual inductances.
17. BG --High resistance by leakage.
18. BG - Internal resistance of a cell.
19. Hartley Oscillator- Using transistor.
20. Colpitt's oscillator-Using transistor.
21. RC Coupled Amplifier- Single stage.
22. FET -Characteristics.
23. UJT - Characteristics.
24. SCR- Characteristics
25. Clipping and Clamping circuits

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai,2018.

2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Samir Kumar Ghosh, A Textbook of Advanced Practical Physics, NCBA, Kolkatta, 2000.
2. D. Chattopadyay, P.C.Rakshit, An Advanced Course in Practical Physics, NCBA, Kolkatta, 2011
3. C.L.Arora, B.Sc., Practical Physics,S. Chand and Company., New Delhi.
4. D.P..Khandelwal D.P., A Laboratory Manual of Physics for Undergraduate Classes. Vani Publications.
5. B.Saraf et al, Physics through Experiments,Vikas Publications.
6. Harnaam Singh., B.Sc., Practical Physics,S. Chand and Company., New Delhi.
7. D C Tayal, University Practical Physics, Himalaya Publishing House.
8. Gupta & Kumar, Practical Physics, Pragatiprakashan, Meerut.

Thiruvalluvar University, Vellore - 632115

CORE PRACTICAL

Semester: V & VI

PAPER-4

Core Practical-4 (Electronics)

List of Experiments (Any 12 Experiments only)

1. Transistor - Phase shift oscillator.
2. Transistor - Wien bridge oscillator.
3. Emitter Follower.
4. FET-Amplifier.
5. UJT-Relaxation Oscillator.
6. Verification of De Morgan's Theorems.
7. K-Map reduction and logic circuit implementation.
8. Half adder and Full adder - using NAND gate.
9. Half subtractor and Full subtractor- using NAND gate.
10. RS, Clocked RS, and D Flip Flops using NAND gate.
11. Four bit ripple counter - 7473 / 7476.
12. Shift Register - Four bit left / right - 7473 / 7476.
13. D/A converter-4-bit binary weighted resistor method.
14. OP-AMP-Voltage follower, Adder, Subtractor, Averager (inverting mode).
15. OP-AMP- Differentiator and Integrator
16. OP-AMP- Inverting amplifier with frequency gain response.
17. OP-AMP-Astablemultivibrator.
18. Microprocessor 8085-ALP for Number conversion-8 bit -BCD to binary-Binary to BCD
19. Microprocessor 8085-ALP for 8 bit addition, Subtraction -using BCD & Hexadecimal.
20. Microprocessor 8085- ALP for Sum of N elements

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai,2018.
2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Samir Kumar Ghosh, A Textbook of Advanced Practical Physics, NCBA, Kolkatta, 2000.
2. D. Chattopadyay, P.C.Rakshit, An Advanced Course in Practical Physics, NCBA, Kolkatta, 2011
3. C.L.Arora, B.Sc., Practical Physics,S. Chand and Company., New Delhi.

4. D.P..Khandelwal D.P., A Laboratory Manual of Physics for Undergraduate Classes. Vani Publications.
5. B.Saraf et al, Physics through Experiments,Vikas Publications.
6. Harnaam Singh., B.Sc., Practical Physics,S. Chand and Company., New Delhi.
7. D C Tayal, University Practical Physics, Himalaya Publishing House.
8. Gupta & Kumar, Practical Physics, Pragatiprakashan, Meerut.

CORE PAPER-COMPULSORY

Project with viva voce

Preamble

The concept of introducing the project will help the student community to learn and apply the principles of Physics and explore the new research avenues - In the course of the project the student will refer books, Journals or collect literature / data by the way of visiting research institutes/ industries or social relevance problem. He/she may even do experimental /theoretical work in his/her college and submit a dissertation report with a minimum of 25 pages not exceeding 30 pages.

Format for Preparation of Project

The sequence in which project should be arranged and bound should be as follows

1. Cover Page and title Page
2. Declaration
3. Certificate
4. Abstract (not exceeding one page)
5. Acknowledgement (not exceeding one page)
6. Contents (12 Font size, Times new Roman with double line spacing)
7. List of Figures/ Exhibits/Charts
8. List of tables
9. Symbols and notations
10. Chapters
11. References

Distribution of marks for Project: (25+75 = 100 Marks)

Internal : 25 Marks

External : 75 Marks

(a) For Organization and presentation of Project	- 40 marks
(b) For the novelty /Social relevance	- 10 marks
(c) Presentation of work /Participation in state/ National level Seminar/publication	- 5 marks
(d) Viva voce (Preparation, Presentation of work and Response to questions)	- 20 marks

THIRUVALLUVARUNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS DEGREE COURSE

CBCS PATTERN

(With effect from 2020-2021)

S. No.	Part	Study Components / Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	6	4	Programming in C	25	75	100
4.	III	Core Practical	Practical-1	3	2	Programming in C Lab	25	75	100
5.	III	Allied -1	Paper-1	7	3	Mathematical Foundations - I	25	75	100
6.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
7.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**22**		**175**	**525**	**700**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
8.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9.	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
10.	III	Core Theory	Paper-2	5	4	C++ & Data Structure	25	75	100
11.	III	Core Practical	Practical-2	2	2	C++ and Data Structures Lab	25	75	100
12.	III	Allied-1	Paper-2	7	5	Mathematical Foundations - II	25	75	100
13.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
14.	IV	Value Education		2	2	Value Education	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		**36**	**25**		**200**	**600**	**800**

		SEMESTER III					**CIA**	**Uni. Exam**	**Total**
16.	III	Core Theory	Paper-3	5	4	Programming in JAVA	25	75	100
17.	III	Core Theory	Paper-4	4	4	E-Commerce	25	75	100
18.	III	Core Theory	Paper-5	5	4	Operations Research	25	75	100
19.	III	Core Practical	Practical-3	4	3	Programming in JAVA Lab	25	75	100

20.	III	ALLIED-2	Paper-3	7	3	Financial Accounting-I	25	75	100
21.	IV	Skill based Subject I	Paper-1	3	2	Web Technology	25	75	100
22.	IV	Non-Major Elective	Paper-1	2	2	Introduction to Information Technology	25	75	100
		Sem. Total		**30**	**22**		**175**	**525**	**700**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
23.	III	Core Theory	Paper-6	5	4	Relational Database Management Systems	25	75	100
24.	III	Core Theory	Paper-7	5	4	Enterprise Resource Planning	25	75	100
25.	III	Core Theory	Paper-8	5	4	Wireless Data Communications	25	75	100
26.	III	Core Practical	Practical-4	4	3	RDBMS Lab	25	75	100
27.	III	ALLIED-2	Paper-4	7	5	Financial Accounting-II	25	75	100
28.	**IV**	**NMSDC : Digital Skills for Employability**	**Paper-2**	**2**	**2**	**Office Fundamentals**	**25**	**75**	**100**
29.	IV	Non-Major Elective	Paper-2	2	2	Internet Technology	25	75	100
		Sem. Total		**30**	**24**		**175**	**525**	**700**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
30.	III	Core Theory	Paper-9	6	4	Mobile Applications Development	25	75	100
31.	III	Core Theory	Paper-10	6	4	Operating System	25	75	100
32.	III	Core Theory	Paper –11	4	2	Design and Analysis of Algorithms	25	75	100
33.	III	Core Practical	Practical-5	4	3	Mobile Applications Development-Lab	25	75	100
34.	III	Core Practical	Practical-6	4	3	Operating System-Lab	25	75	100
35.	III	Internal Elective I	Paper-1	3	3	**(Choose any one)** A. Data Mining B. Information Security C. Software Testing	25	75	100
36.	IV	Skill Based Subject III	Paper– 3	3	2	Software Engineering	25	75	100
		Sem. Total		**30**	**21**		**175**	**525**	**700**

SEMESTER VI							CIA	Uni. Exam	Total
37.	III	Core Theory	Paper-12	5	4	Open Source Software	25	75	100
38.	III	Core Theory	Paper-13	4	4	Python programming	25	75	100
39.	III	Core Practical	Practical-7	4	2	Python programming Lab	25	75	100
40.	III	Core Practical	Practical-8	4	2	Open Source Software - Lab	25	75	100
41.	III	Core Project		5	5	Group/ Individual Project Work	25	75	100
42.	III	Internal Elective II	Paper-2	3	3	**(Choose any one)** 1. Big Data Analytics 2. Cryptography 3. Digital Image Processing	25	75	100
43.	III	Internal Elective III	Paper-3	3	3	**(Choose any one)** 1.Artificial Intelligence 2. System Software 3. Mobile Computing	25	75	100
44.	III	**NMSDC : Emerging Technology for Employability II**	**Paper-4**	**2**	**2**	**(Choose any one)** • **PBL Android App Development** • **Machine Learning**	**25**	**75**	**100**
45.	V	Extension Activities		0	1		100	0	100
		Sem. Total		30	**26**		**300**	**600**	**900**
					140				**4500**

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	2	4	8	100	200
Part II	Communicative English & English	2	4	8	100	200
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Electives	3	3	9	100	300
	Core	13	(3-5)	50	100	1300
	Core practical	8	(2-3)	20	100	800
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	**45**		**140**		**4500**

III SEMESTER

CORE PAPER-3

PROGRAMMING IN JAVA

COURSE OBJECTIVES:

- Knowing about a General-purpose and Purely object-oriented programming language including data types, control statements, and classes
- Secured, well-suited for internet programming using applets and GUI-based

UNIT I

Declarations and Access Control: Identifiers and Keywords: Oracle's Java Code Conventions. Define Classes: Import Statements and the Java API - Static Import Statements. Use Interfaces: Declaring an Interface- Declaring Interface Constants. Declare Class Members: Access Modifiers - Non access Member Modifiers - Constructor Declarations - Variable Declarations. Declare and Use enums: Declaring enums. Object Orientation: Encapsulation - Inheritance and Polymorphism- Polymorphism - Overriding / Overloading: Overridden Methods -Overloaded Methods.

UNIT II

Object Orientation: Casting - Implementing an Interface - Legal Return Types: Return Type Declarations - Returning a Value. Constructors and Instantiation: Overloaded Constructors - Initialization Blocks. Statics: Static Variables and Methods. Assignments: Stack and Heap - Literals, Assignments, and Variables: Literal Values for All Primitive Types. Scope - Variable Initialization - Passing Variables into Methods: Passing Object Reference Variables - Passing Primitive Variables. Garbage Collection. Operators: Java Operators - Assignment Operators - Relational Operators - instanceof Comparison - Arithmetic Operators - Conditional Operator - Logical Operators.

UNIT III

Working with Strings, Arrays, and Array Lists: Using String and StringBuilder: The String Class - The StringBuilder Class - Important Methods in the StringBuilder Class. Using Arrays: Declaring an Array -Constructing an Array - Initializing an Array. Using ArrayList:ArrayList Methods in Action - Important Methods in the ArrayList Class. Flow Control and Exceptions: Using if and switch Statements -Creating Loops Constructs - Handling Exceptions - Catching an Exception Using try and catch - Using finally. String Processing, Data Formatting Resource Bundles: String, StringBuilder, and StringBuffer -Dates, Numbers, Currencies, and Locales.

UNIT IV

I/O and NIO: File Navigation and I/O: Creating Files Using the File Class - Using FileWriter and FileReader. File and Directory Attributes -DirectoryStream - Serialization. Generics and Collections: toString(), hashCode(), and equals(): The toString() Method - Generic Types -Generic Methods - Generic Declarations. Inner Classes: Method –

Local. Inner Classes - Static Nested Classes - Threads: Defining, Instantiating, and Starting Threads - Thread States and Transitions - Synchronizing Code, Thread Problems - Thread Interaction. Concurrency: Concurrency with the java.util.concurrent Package - Apply Atomic Variables and Locks - Use java.util.concurrent Collections - Use Executors and ThreadPools.

UNIT V

Applets: Applet fundamentals - Applet class - Applet life cycle - Steps for developing an applet program - Passing values through parameters - Graphics in an applet - Event-handling. GUI Applications - Part 1: Graphical user interface - Creating windows - Dialog boxes - Layout managers - AWT component classes - Swing component classes. GUI Applications - Part 2: Event handling - Other AWT components - AWT graphics classes - Other swing controls.

TEXT BOOK(S):

1. Kathy Sierra, Bert Bates — OCA/OCP Java SE 7 Programmer I & II Study Guide, Oracle Press. (Unit I,II,III,IV).

2. Sagayaraj, Denis, Karthik and Gajalakshmi, 2018, Java Programming - For Core and Advanced Learners, University Press (India) Private Limited, Hyderabad.(Unit V).

REFERENCE BOOKS:

1. Hebert Schild, 2002, The Complete Reference Java2, [Fifth Edition]. Tata McGraw-Hill, New Delhi.

2. John Hubbard, R.2004. Programming with Java. [Second Edition]. Tata McGraw-Hill,New Delhi.

3. Debasish Jana. 2005. Java and Object-Oriented Programming Paradigm, [Second Printing]. Prentice-Hall of India, New Delhi.

4. Sagayaraj, Denis, Karthik and Gajalakshmi 2018, Java Programming for core and advanced Learners, University Press India Pvt. Ltd., Hyderabad.

Course Outcomes:

- Students are able to know about a General-purpose and Purely object-oriented programming language including data types, control statements, and classes
- Students are able to Secured, well-suited for internet programming using applets and GUI-based

CORE PAPER-4

E-COMMERCE

Objectives:

- ✓ To provide the knowledge about commerce through electronic medium & information system.
- ✓ To understand the concepts of security.
- ✓ To understand the basic knowledge of E- Payments.
- ✓ To understand the concepts of EDI.
- ✓ To understand the concepts of Trading relationships.

UNIT I **15 Hours**

Electronic Commerce Framework, Traditional Vs. Electronic Business Application, The Anatomy of E-Commerce Applications. Network infrastructure for E-Commerce – Components of the I-way – Global Information Distribution Networks – Public policy issues shaping the I – way. Network Access Equipment

UNIT II **15 Hours**

The internet as a Network Infrastructure, Network Security and Firewalls – Client Server Network Security – Firewalls and Network Security – Data and Message Security – Encrypted Documents and Electronic Mail.

UNIT III **15 Hours**

Electronic Commerce and World Wide Web, Consumer Oriented E-Commerce, Electronic Payment Systems

UNIT IV **15 Hours**

Electronic Data Interchange (EDI), EDI application in business, EDI and E- commerce – EDI implementation.Intra-organizational Electronic Commerce - Supply Chain Management.

UNIT V **15 Hours**

Corporate Digital Library – Advertising and marketing on the Internet – E-Commerce Catalogs or Directories- On demand Education and Digital Copyright – Applets, Browsers & Software Agents.

TEXTBOOK:

1. Frontiers of Electronic Commerce, R. Kalakota and Andrew. B. Whinston, Pearson , 11th Edition , 2011.

REFERENCES:

1. Understanding Electronic Commerce, DaidKosiur, Microsoft Press, 1997.
2. From EDI to Electronic Commerce, Soka, McGraw Hill, 1995.
3. Electronic Commerce Management, Saily Chan, John Wiley, 1998.

Course Outcomes:

- The Student will be able to understand the concepts of E-commerce and its different typesand describe the network infrastructure for E-commerce.
- The Student will be able to understand the concepts of networks and fundamental of security concepts, security services to counter them, understand the fundamental properties of cryptography Techniques.
- The Student will be able to understand the concepts of electronic payment systems,online security and understand the fundamentals of create a E-commerce web site.
- The Student will be able to understand the concepts of the basic fundamentals of electronic document interchange EDI, supply chain management process.
- The Student will be able to understand the concepts of internet trading relationships including inter organization and intra-organizations.

CORE PAPER-5

OPERATION RESEARCH

Objectives:

- ✓ To understand the concepts of Liner Programming.
- ✓ To understand the concepts ofTransportation, Assignment problem.
- ✓ To understand the concepts of sequence problem.
- ✓ To understand the concepts of PERT and CPM.
- ✓ To understand the concepts of Cost Flow Problem.

UNIT- I: 9 Hours

LINEAR MODELS: Basics of OR & Decision making - Role of computers in OR, Linear Programming Problem – Formulation, Graphical solution of two variables Canonical & standard form of LPP, Simplex method, Charne's method of penalties.

UNIT- II: 9 Hours

TRANSPORTATION AND ASSIGNMENT PROBLEMS: Transportation algorithm - Degeneracy algorithm- Unbalanced Transportation problem Unbalanced assignment algorithm.

UNIT – III: 9 Hours

SEQUENCING PROBLEM: Processing of n jobs through two machines -Processing of n jobs through three machines- Processing of n jobs through m machines.

UNIT- IV: 9 Hours

PERT & CPM: Network - Fulkerson's rule- Measure of activity- PERT computation- CPM computation.

UNIT –V: 9 Hours

NETWORK MODELS: Network definition- Minimal spanning tree problem- Shortest route problem- Maximal flow problem- Minimal cost capacitated flow problem.

TEXT BOOK

1. Hamdy A. Taha, Operations Research An Introduction, Eighth Edition, Pearson Education, Inc., 2008 2. Kantiswaroop,Gupta P.K and Manmohan, Operations Research, Sultan Chand & Sons, New Delhi,2008

REFERENCES

1. Prem Kumar Gupta and D.S. Hira, Operations Research, S. Chand and Co., Ltd.New Delhi, 2008.

2. Gupta R. K., Linear Programming,KrishnaPrakashanMedia(P) Ltd. , 2009.

E - REFERENCES

1. Lecture Series on Fundamentals of Operations Research by Prof.G.Srinivasan, Department of Management Studies, IIT Madras. For more details on NPTEL visit http://nptel.iitm.ac.in

Course Outcomes:

- The Student will be able to understand the concepts of optimization and to formulate and Solve Linear Programming problems.
- The Student will be able to understand the concepts of Transportation problem and Assignment problem.
- The Student will be able to understand the concepts of sequencing problem.
- The Student will be able to understand the concepts of PERT-CPM and their applications in product planning control.
- The Student will be able to understand the concepts of Solve the Minimal Spanning Tree Problem, Shortest Route Problem, Maximal Flow Problem and Minimal Cost Capacitated Flow Problem.

CORE PRACTICAL - Practical-3

PROGRAMMING IN JAVA LAB

List of Practical's

1. Implementation of Classes and Objects

2. Implementation of Inheritance and Polymorphism

3. Implementation of Interface and Package concepts

4. Implementation of Flow, Border ,Grid Layouts

5. Implementation of Tic-Tac Toe Application Using Applets

6. Implementation of Frames, Menus, Dialog

7. Implementation of Swing concepts

8. Implementation of Exception Handling

9. Implementation of Multi Threading

10. Implementation of I/O Streams

11. Implementation of Java Networking concepts

12. Implementation of Java Servlets (Connecting Database)

13. Implementation of RMI

14. Implementation of Java Beans

ALLIED - 2

PAPER - 3

FINANCIAL ACCOUNTING– I

COURSE OBJECTIVES:

- The objective of this paper is to help the students to acquire conceptual knowledge of accounting.

COURSE OUTCOMES:

On the successful completion of the course, the student will be able

CO NUMBER	CO STATEMENT
CO1	To introduce the basic concepts and conventions to the students, this would help in development of accounting knowledge.
CO2	To understand the concept of Double entry system this helps in preparation of various books of accounts.
CO3	To develop the capability of students to prepare the Final Accounts of a Small Business Concern.
CO4	To introduce the concept of Single entry system of Accounting which helps them to prepare the accounts from incomplete records.
CO5	To enhance the Accounting Knowledge by introducing the practical uses of Average Due Date and Bank Reconciliation Statement.

Unit-I

INTRODUCTION TO ACCOUNTING

Meaning- Definition- Functions- Objectives- Users of Accounting Information- Accounting Concepts and Conventions – Advantages and Limitations of Accounting.

Unit-II

DOUBLE ENTRY SYSTEM OF ACCOUNTING

Meaning and concepts - Golden Accounting Rules- Journal Entries- Ledger- Trail Balance – Rectification of Errors (Simple Problems).

Unit-III

FINAL ACCOUNTS

Preparation of Trading Account, Profit and Loss Account and Balance Sheet- Adjustment Entries (Simple Problems).

Unit-IV

SINGLE ENTRY SYSTEM

Meaning - Features - Advantages - Limitations - Methods- Net Worth Method – Conversion Method (Simple Problems).

Unit-V

AVERAGE DUE DATE AND BANK RECONCILIATION STATEMENT

Average Due Date - Meaning -Uses – Problems - Bank Reconciliation Statement- Meaning- Reasons for Preparation- Procedures and Preparation of Bank Reconciliation statement (Simple Problems).

DISTRIBUTION OF MARKS: THEORY 20% AND PROBLEMS 80%

TEXT BOOK

S.No	Author	Title	Publisher	Year of Publication
1	T.S.Reddy and Murthy	Financial Accounting	Margham Publications	2018

REFERENCE BOOKS

S.No	Author	Title	Publisher	Year of Publication
1	M.C. Shukla and T.S. Grewal&co	Advanced Accounts	S. Chand & Co	2016
2	R.L. Gupta	Financial Accounting	Sultan chand	2014
3	S.P. Jain &K.L Narang,	Financial Accounting	Kalyani Publication	2017
4	R.S.N Pillai&V.Bagavathi	Fundamental of Advanced Accounting, Volume – I	S. Chand & Co	2013

SKILL BASED SUBJECT

PAPER-1

WEB TECHNOLOGY

Objective:

- ✓ This course introduces the concepts of HTML.ASP, VB Script,.
- ✓ This course introduces the concepts of control statements and looping statements in Java script.
- ✓ This course introduces the concepts of Java Script Cookies.
- ✓ This course introduces the concepts of ASP.NET
- ✓ This course introduces the concepts of OLEDB connection.

Unit I: **8 Hours**

Introduction to VBScript - Adding VBScript Code to an HTML Page - VB Script Basics - VBScript Data Types - VBScript Variables - VBScript Constants - VBScript Operators – mathematical- comparison-logical - Using Conditional Statements - Looping Through Code - VBScript Procedures – type casting variables - math functions –date functions – string functions –other functions - VBScript Coding Conventions - Dictionary Object in VBScript - Err Object

Unit-II: **8 Hours**

Introduction to Javascript – Advantages of Javascript – Javascript syntax - Data type –Variable - Array – Operator & Expression – Looping – control structures - Constructor Function – user defined function Dialog Box .

Unit III: **8 Hours**

Javascript document object model – Introduction – Object in HTML – Event Handling – Window object – Document object – Browser object – Form object – Navigator object – Screen object – Build in object – User defined object – Cookies.

Unit IV: **8 Hours**

ASP.NET Language Structure – Page Structure – Page event , Properties & Compiler Directives . HTML server controls – Anchor, Tables, Forms, Files . Basic Web server Controls – Label, Text box, Button, Image Links, Check & radio Button, Hyperlink,

Data List Web Server Controls – Check box list. Radio button list, Drop down list, List box, Data grid, Repeater.

Unit V: **8 Hours**

Request and Response Objects, Cookies, Working with Data – OLEDB connection class, command class, transaction class, data adaptor class, data set class. Advanced issues – email, Application issues, working with IIS and page Directives , error handling. Security – Authentication, IP Address, Secure by SSL & Client Certificates.

TEXT BOOKS:

1. I.Bayross, 2000, Web Enable Commercial Application Development Using HTML, DHTML, Javascript, Perl CGI, BPB Publications.
2. A.Russell Jones, Mastering Active Server Pages 3, BPB Publications.

REFERENCE BOOKS:

1. HathleenKalata, Internet Programming with VBScript and JavaScript, Thomson Learning
2. Mike McGrath, XML Harness the Power of XML in easy steps, Dreamtech Publications
3. T.A. Powell, 2002,Complete Reference HTML , TMH.
4. J.Jaworski, 1999, Mastering Javascript, BPB Publications.
5. Powell, Thomas; Schneider, Fritz, JavaScript: The Complete Reference, 2nd edition2004, TMH

Course Outcomes:

- The Student will be able to understand the concepts of HTML.
- The Student will be able to understand the concepts of java scripts.
- The Student will be able to understand the concepts of user defined functions.
- The Student will be able to understand the concepts of Active Server Page.
- The Student will be able to understand the concepts of – OLEDB connection class.

NON-MAJOR ELECTIVE

PAPER-1

Introduction to Information Technology

OBJECTIVES:

The subject aims to build the concepts regarding:

- Major components of Computer System and its working principles.
- Role of an Operating System and basic terminologies of networks.
- How the Information Technology aids for the Current Scenario.
- To understand the Computer Software.
- To understand internet applications

UNIT-I

Introduction: Characteristics of Computers-Technological Evolution of Computers-The Computer Generations-Categories of Computer. **Data and Information:** Introduction-Types of Data-A Simple Model of a Computer-Data Processing Using a Computer-Desktop Computer. **Acquisition of Number and Textual Data:** Introduction- Input Units-Internal Representation of Numeric Data-Representation of Characters in Computers–Error-Detecting Codes.

UNIT-II

Data Storage: Introduction-Memory Cell-Physical Devices Used as Memory Cells-Random Access Memory-Read Only Memory- Secondary Memory- Floppy Disk Drive- Compact Disk Read Only Memory (CDROM)-Archival Memory. **Central Processing Unit:** The Structure of a Central Processing Unit-Specification of a CPU-Interconnection of CPU with Memory and I/O Units.

UNIT-III

Computer Networks: Introduction-Local Area Network (LAN)- Applications of LAN-Wide Area Network (WAN)–The Future of Internet Technology. **Output Devices:** Introduction-Video Display Devices-Flat Panel Displays–Printers.

UNIT-IV

Computer Software: Introduction-Operating System-Programming Languages–A Classification of Programming Languages. **Data Organization:** Introduction-Organizing a Database-Structure of a Database- Database Management System-Example of Database Design.

UNIT-V

Some Internet Applications: Introduction- E-mail- Information Browsing Service- The World Wide Web- Information Retrieval from the World WideWeb-Other Facilities Provided by Browsers - Audio on the Internet.**Societal Impactsof Information Technology:** CareersinInformation Technology.

TEXTBOOKS:

1. *Rajaraman,V.*2008.**IntroductiontoInformationTechnology.**[SixthPrinting]. PrenticeHall of India Pvt. Limited, New Delhi.(UNIT I toV)

2. *Nagpal,D.P.*2010.**ComputerFundamentals**.[FirstEdition,Revised].S.Chand &CompanyLtd, New Delhi. (**UNIT I(Introduction: Characteristics of Computers to Categories of Computer**))

REFERENCE BOOKS:

1. *ITL EducationsSolution Limited.* 2009. **Introduction toComputer Science**. [Fourth Impression].Pearson Education, New Delhi.
2. *Alexis Leon and Mathews Leon.* 1999. **Fundamentals of Information Technology.**[FirstEdition]. Leon TECHWorld, New Delhi.

COURSE OUT COMES :

- Students understand Major components of Computer System and its working principles.
- Students learn and understand the Role of an Operating System and basic terminologies of networks.
- Students understand how the Information Technology aids for the Current Scenario.
- Students understand the Computer Software.
- Students understand internet applications

SEMESTER IV
CORE PAPER-6

RELATIONAL DATABASE MANAGEMENT SYSTEMS

Objective:

- ✓ The students are able to understand database concepts and database management system software and have a high-level understanding of major DBMS components and their function.
- ✓ The students are able to understand the E R model and relational model.
- ✓ The students are able to be able to write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.
- ✓ The students are able to Understand Functional Dependency and Functional Decomposition.
- ✓ The students are able to understand the architecture of database management system and also understand the various different architecture such as server system architecture, parallel sytems and distributed database systems.

UNIT- I : DATABASE ARCHITECTURE AND ER DIAGRAM 12 Hours

Database system applications - Purpose of database systems - View of data- Database languages - Database architecture - Database users and administrators - History of database systems-Entity relationship modeling: entity types, entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, sub classes; super classes, inheritance, specialization and generalization

UNIT- II: RELATIONAL DATA MODEL 12 Hours

Relational model concepts, Relational constraints, Relational Languages : Relational Algebra, The Tuple Relational Calculus - The Domain Relational Calculus - SQL: Basic Structure-Set Operations- Aggregate Functions-Null Value-Nested Sub Queries-Views Complex Queries Modification Of Database-Joined Relations-DDL-Embedded SQL-Dynamic SQL-Other SQL Functions- -Integrity and Security.

UNIT – III: DATA NORMALIZATION 12 Hours

Pitfalls in relational database design – Decomposition – Functional dependencies – Normalization – First normal form – Second normal form – Third normal form – Boyce-codd normal form – Fourth normal form – Fifth normal form

UNIT- IV: STORAGE AND FILE ORGANIZATION 12 Hours

Disks - RAID -Tertiary storage - Storage Access -File Organization – organization of files - Data Dictionary storage

UNIT- V: QUERY PROCESSING AND TRANSACTION MANAGEMENT 12 Hours

Query Processing - Transaction Concept - Concurrency Control –Locks based protocolDeadlock Handling -Recovery Systems

TEXT BOOK:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, McGraw Hill, 2010. 2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition,2002

REFERENCES

1. Bipin Desai, An Introduction to database systems, Galgotia Publications, 2010. 2. RamezElamassri, Shankant B-Navathe, Fundamentals of Database Systems, Pearson, 7th Edition, 2015

E - REFERENCES

1. NPTEL, Introduction to database desigh, Dr P Sreenivasa Kumar Professor CS&E, Department, IIT, Madras
2. 2. NPTEL, Indexing and Searching TechniquesinDatabasesDr. ArnabBhattacharya,IIT Kanpur

Course Outcomes:

- Describe the database architecture and its applications Sketch the ER diagram for real world applications Uses various ER diagram for a similar concepts from various sources.
- Discuss about the relational algebra and calculus Construct various queries in SQL and PL/SQL Compiles various queries in SQL, Relational Calculus and Algebra.

- Describe the various normalization forms Apply the normalization concepts for a table of data Practices a table and implement the normalization concepts.
- Explain the storage and accessing of data.
- Illustrate the query processing in database management. Define the concurrency control and deadlock concept

CORE PAPER - 7

ENTERPRISE RESOURCE PLANNING

Objective:

- ✓ With the basic concepts of ERP systems the students are able to understand the business process, business function and differences between business process and business functions. They also came to know the key differences between raw data and raw materials.
- ✓ The students are able to understand the exchange of information between AF, SCM, HR and MS. And they also learn about CRM, budget and preparing balance sheets.
- ✓ The students are able to understand the key factors related to marketing and sales in the companies, and the differences among (Material Requirement Planning) MRP, MRP II, and ERP systems.
- ✓ They also understand the inter relationship between the other functional areas like SCM, AF, HR and customer. Concepts and techniques.
- ✓ The students are able to understand the power of human resources such as managing man power, job skills preparing paybills and taking legal actions to the compliances and hiring needs.

UNIT -I : INTRODUCTION **8 Hours**

ERP: An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM

UNIT- II: ERP IMPLEMENTATION **8 Hours**

ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contract with Vendors.

UNIT- III: THE BUSINESS MODULES **8 Hours**

Business modules in an ERP Package, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution

UNIT- IV: ERP PACKAGES **8 Hours**

ERP Market Place, SAP AG, PeopleSoft, Baan, JD Edwards, Oracle, QAD, SSA

UNIT- V: ERP –PRESENT AND FUTURE **8 Hours**

Turbo Charge the ERP System, EIA, ERP and e-Commerce, ERP and Internet, Future Directions.

TEXT BOOK:

1. Alexis Leon, "ERP Demystified", Tata McGraw Hill, New Delhi, 2000

REFERENCES

1.Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", ThompsonCourseTechnology,USA,2001.

2. Vinod Kumar Garg and Venkatakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, New Delhi, 2003

E- REFERENCES

1. ERP, Prof. P. K. Biswas, Dept. of Electronics and Elecrical Communication Engg., IIT, Kharagpur

Course Outcomes:

- Understanding the functionalities of Enterprise resource planning
- Understanding Characterize the ERP implementation procedures
- Understanding the elements of ERP
- Understanding the available ERP packages
- Understanding the models of ERP with other related technologies

CORE PAPER - 8

WIRELESS DATA COMMUNICATION

Objectives:

- ✓ This course introduces the concepts and theories of networking
- ✓ To apply them to various situations, classifying networks, analyzing performance and implementing new technologies.
- ✓ To implement the various new wireless technologies.
- ✓ To implement the various TCP/IP protocols.
- ✓ To implement the various security threads.

UNIT-1 BASIC CONCEPTS OF OSI LAYERS **9 Hours**

Data Communication – Networks – Protocol and Standards – Line Configuration – Topology – Transmission Modes – Categories of Networks – Internetworks- OSI Models – Functions of OSI Layers.

UNIT-II SIGNALS AND TRANSMISSION MEDIA **9 Hours**

Analog and digital – Periodic and Non Periodic signals – Analog Signals – Time And Frequency Domain - Composite Signals- Digital signals – Guided Media – UnGuided Media – Transmission Impairment – Performance.

UNIT-III ERROR DETECTION, CORRECTION AND DATA LINK CONTROL **9 Hours**

Type of errors –Detection-Vertical Redundancy Check (VRC) -Longitudinal Redundancy Check (LRC) Cyclic Redundancy Check (CRC) – check sum – Error Corrections – Flow Control – Error Control.)**SWITCHING & NETWORK DEVICES:** Circuit Switching-Packet Switching-Message Switching Repeaters – Bridges – Routers – Gateways-other Devices - Routing Algorithms-Distance Vectors Routing-Link State Routing.

UNIT- IV: WIRELESS NETWORKS **9 Hours**

Wireless LAN: Advantages and Disadvantages-Infrared Vs Radio Transmission – Infrastructure Networks- Ad hoc Networks – Bluetooth- Wireless ATM: Working GroupServices- Reference Model – Functions – Radio Access Layer – Handover-Handover reference model- Requirements and Types.

UNIT-V TCP/IP PROTOCOL SUITE: PART I, PROTOCOLS & NETWORK SECURITY
9 Hours

Overview Of TCP/IP – Network Layer – Addressing – Subnetting – Other Protocols In The Network Layer – Transport Layer – Client/Server Model – BootStrap Protocol and DHCP - Domain Name System (DNS) – Tel Net –File Transmission Protocol (FTP) – Simple Mail Transfer Protocol (SMTP) – SNMP Protocol – Hyper Text Transmission Protocol (HTTP) – World Wide Web (WWW) –Four Aspects of Security – Privacy – Digital Signature – PGP – Access Authorization.

Text Book:

1. Data Communication and Networking 2nd Edition Behrouz A. Forouzan, McGraw Hill Education 2014.
2. Stojmenovic and Cacute, Handbook of Wireless Networks and Mobile Computing, Wiley, 2002, ISBN 0471419028.

Reference Books:

1. Data and Communication Network, William Stalling PHI 2014.

2. Computer Networks, Andrew S. Tanenbaum, David J. Wetherall, 5th Edition,Prentice Hall. 2010

E REFERENCES

1. http://nptel.ac.in/video.php?subjectId=117102062

Course Outcomes:

- To understand the concepts of basic OSI layers.
- To understand the concepts of signals and transmission media.
- To understand the basic concepts of error detection and DLC
- To understand the Characterize of wireless transmission technologies
- To understand the concepts of Security.

Core Practical (Practical-4)

RDBMS LAB

Objectives:

- ✓ To understand the concepts of DDL/DML/DCL/TCL commands.
- ✓ To understand the concepts of Join queries.
- ✓ To understand the concepts of exception handling.
- ✓ To understand the concepts of cursors.
- ✓ To understand the concepts of packages.

LAB EXERCISES:

1. Execute a single line query and group functions.
2. Execute DDL Commands.
3. Execute DML Commands
4. Execute DCL and TCL Commands.
5. Implement the Nested Queries.
6. Implement Join operations in SQL
7. Create views for a particular table
8. Implement Locks for a particular table.
9. Write PL/SQL procedure for an application using exception handling.
10. Write PL/SQL procedure for an application using cursors.
11. Write a PL/SQL procedure for an application using functions
12. Write a PL/SQL procedure for an application using package

REFERENCE BOOK:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, McGraw Hill, 2010. 2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition,2002

Course Outcomes:

- Design and Implement a database schema for a given problem domain.

- Populate and Query a database using SQL, DDL/DML Commands.
- Build well formed in String Date/Aggregate Functions.
- Design and Implement a database query using Joins, Sub-Queries and Set Operations.
- Program in SQL including Objects (Functions, Procedures, Triggers)

ALLIED - 2

PAPER - 4

FINANCIAL ACCOUNTING - II

COURSE OBJECTIVE:

- To develop the skills for recording the various kinds of Business Transactions.

COURSE OUTCOME

On successful completion of this course, the students will be able

CO NUMBER	CO STATEMENT
CO1	To Understand the concept of Branch Accounting and enable the students to prepare Accounts for various types of Branches.
CO2	To enhance the procedure for preparing Departmental Accounts.
CO3	To Develop the skill of the students in preparing Hire Purchase Accounting, both in the books of Hire Purchaser and Hire Vendor.
CO4	To Understand the Accounting procedure for Partnership in cases like Admission, Retirement, Death.
CO5	To Understand the Accounting procedure for Dissolution and Insolvency of a Partner.

Unit – I
BRANCH ACCOUNTS

Branch Accounts –Objectives – Types of Branches – Debtors System (at cost price and Invoice Price) – Independent Branch.

Unit – II
DEPARTMENTAL ACCOUNTS

Departmental Accounts – Objectives – Distinction between Departments and Branches – Allocation of common expenses – Expenses which cannot be allocated – Inter Department transfer at cost price and selling price.

Unit – III
HIRE PURCHASE SYSTEM

Hire Purchase system – Meaning – Journal Entries and Ledger Accounts in the books of Hire Purchaser and Hire Vendor – Default and Repossession -Complete Repossession only.

Unit – IV
PARTNERSHIP ACCOUNTS – I

Partnership Accounts – Admission of Partner– Retirement of Partner – Death of a Partner (Simple Problems)

Unit – V

PARTNERSHIP ACCOUNTS – II

Dissolution of Partnership Firm - Insolvency of a Partner -Insolvency of all Partners (Garner vs. Murray). (Simple Problems)

DISTRIBUTION OF MARKS: THEORY 20% AND PROBLEMS 80%

TEXT BOOK

S.No	Author	Title	Publisher	Year of Publication
1	T.S.Reddy and Murthy	Financial Accounting	Margham Publications	2018

REFERENCE BOOKS

S.No	Author	Title	Publisher	Year of Publication
1	M.C. Shukla and T.S. Grewal&co	Advanced Accounts	S. Chand & Co	2016
2	R.L. Gupta	Financial Accounting	Sultan chand	2014
3	S.P. Jain &K.L Narang,	Financial Accounting	Kalyani Publication	2017
4	R.S.N Pillai&V.Bagavathi	Fundamental of Advanced Accounting, Volume – I	S. Chand & Co	2013

SKILL BASED SUBJECT II

PAPER-2

INTERNET OF THINGS

Objectives

- ✓ To learn about the basics of IOT protocols
- ✓ To understand the fundamentals of Internet of Things
- ✓ To build a small low cost embedded system using Raspberry Pi.
- ✓ To apply the concept of Internet of Things in the real world scenario.
- ✓ To understand the real world application concepts.

UNIT I: INTRODUCTION TO IoT **9 Hours**

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.

UNIT II:IoT ARCHITECTURE **9 Hours**

M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

UNITIII: IoT PROTOCOLS **9 Hours**

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP– Security.

UNIT IV: BUILDING IoT WITH RASPBERRY PI & ARDUINO **9 Hours**

Building IOT with RASPERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board - Linux on Raspberry Pi - Raspberry Pi Interfaces -Programming Raspberry Pi with Python - Other IoT Platforms - Arduino.

UNIT V: CASE STUDIES AND REAL-WORLD APPLICATIONS 9 Hours

Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.

TEXT /REFERENCES BOOKS:

1. ArshdeepBahga, Vijay Madisetti, —Internet of Things – A hands-on approach‖, Universities Press, 2015

2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things‖, Springer, 2011.

3. Honbo Zhou, —The Internet of Things in the Cloud: A Middleware Perspective‖, CRC Press, 2012.

4. Jan Ho¨ ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.

5. Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things – Key applications and Protocols‖, Wiley, 2012

Course Outcomes:

- Analyze various protocols for IoT
- Develop web services to access/control IoT devices.
- Design a portable IoT using Rasperry Pi
- Deploy an IoT application and connect to the cloud.
- Analyze applications of IoT in real time scenario

NON-MAJOR ELECTIVE

PAPER-2

INTERNET TECHNOLOGY

OBJECTIVS

The subject aims to build the concepts regarding:

- Fundamentals of Internet, Connectivity and its Resource Requirements.
- To understand the Internet Technology and its applications
- To Understand WWW and Web Browsers.
- Mailing system and applications of Internet.
- To Understand relay chat

UNIT-I

Introduction to internet: What is Internet? Evolution and History of Internet- Growth of Internet-Owners of Internet- Internet Services- How does the Internet Works?-Anatomy of Internet-Internet Addressing-Internet vs Intranet-Impact of Internet- Governance of Internet.

UNIT-II **Internet**

Technology and Protocol: ISO-OSI Reference Model-**Internet Connectivity:** Getting Connected- Different Types of Connections- Levels of Internet Connectivity- Internet Service Provider. **Internet Tools and Multimedia:** Current Trends on Internet-Multimedia and Animation.

UNIT-III

WWW and Web Browser: WWW-Evolution of Web-Basic Elements of WWW-Web Browsers- Search Engines- Search Criteria. **Web Publishing:** Web Publishing- Web Page Design.

UNIT-IV

Email: E-Mail Basics- E-Mail System-E-Mail Protocol-E-Mail Addresses-Structure of an E-Mail Message-E-Mail Clients&Servers-MailingList-E-MailSecurity.

UNIT-V

Usenet and Internet Relay Chat: What is Usenet?-Newsgroup Hierarchies-What is a Newsreader?- How do you Read Newsgroups?- Who Administers Usenet?- Common News reading Tasks- How to Read Articles from Network News?- Relationship between Netnews and E-Mail-What is IRC?-Channels-Nicknames- Microsoft NetMeeting. **Internet and Web Security**: Overview of Internet Security-
Aspects and Need of Security-E-Mail Threats and Secure E-mail-Web Security and Privacy Concepts-Firewall.

TEXTBOOK:

1. *ISRD Group*. 2012. **Internet Technology andWebDesign.** [Fourth reprint]. Tata McGraw-HillEducationPrivateLimited., New Delhi.

REFERENCE BOOKS:

1. *Deitel,H.M Dietel,P.J.andGoldbergA.B*.2008.**Internet&Worldwide Web- How toProgram.**[Third Edition].PHL,New Delhi.
2. *Comdex.*2000.**Teachyourselfcomputersandtheinternetvisually**.[First Edition]. IDGBookIndia (p)Ltd.
3. *Ramachandran,T.M.Nambissan*.2003.**AnOverviewofinternetandweb development**. [FirstEdition].T M-Dhruv Publications.

COURSE OUT COMES :

- Students understand the Fundamentals of Internet, Connectivity and its Resource Requirements.
- Students understand the Internet Technology and its applications
- Students Understand the basis of WWW and Web Browsers.
- Students learn how to Mailing system and applications of Internet.
- Students Understand relay chat that is how to read e- contents.

SEMESTER V

CORE PAPER - 9

MOBILE APPLICATIONS DEVELOPMENT

Objectives:

To provide the students with a detailed knowledge on Mobile Application Development and Deployment about Android programming from basics to buildingmobile applications for digital world.

UNIT I: INTRODUCTION TO ANDROIDPLATFORM

Objective: To understand the basics of smart phones and android platforms**.**

Introduction to Mobile Application Development – Various platforms– Smartphones–Android platform: features – Architecture – Versions–ART(Android Runtime)–ADB(Android Debug Bridge) –Development environment/IDE: Android studio and its working environment – Emulator setup –Application framework basics–XML representation and Android manifest file –Creating a simpleapplication.

UNIT II: ANDROID UI DESIGN

Objective: To understand the basic concepts of user interface related to app development.

GUI for Android: activities lifecycle–Android v7 support library –Intent: Intent object – Intent filters– Adding categories – Linking activities – User Interface design components–Basic Views – Picker Views – List View –Specialized Fragment– Gallery and Image View – Image Switcher – Grid View, Options Menu – Context Menu – Clock View –Web view–Recycler View.

UNIT III: DATA PERSISTENCE

Objective: To understand the important of data persistence in mobile environment.

Different Data Persistence schemes: Shared preferences–FileHandling–Managing data using SQLite database –Content providers: user content provider– Android in build content providers.

UNIT IV: ANDROID SERVICES & NETWORK ENVIRONMENT

Objective: To understand the various services and network facilities provided by android platform.

Services: Introduction to services – Local service – Remote service – Binding the service –Communication between service and activity –Intent Service – Multi–Threading: Handlers – AsyncTask– Android network programming:HttpUrlConnection– Connecting to REST–based –SOAP based Web services –Broad cast receivers:LocalBroadcastManager–Dynamic broadcast receiver – System Broadcast –Telephony Manager:Sending SMS and making calls.

UNIT V: ADVANCED APPLICATIONS

Objective: To understand the various apps deployed and developed on by mobile platform.

Location based services: Google maps V2 services usingGoogle API–Animations and Graphics: Property Animation –View Animations –Drawable Animations –Media and Camera API: Working with video and audio inputs – camera API –Sensor programming: Motion sensors–Position sensors– Environmental sensors – Publishing Android Apps: Guide lines– policies and processof uploading Apps to Google play.

TEXT BOOKS:

1. "Head First: Android Development", Dawn Griffiths, David Griffiths, OReilly, 1st Edition, 2015.

2. Barry Burd, "Android Application Development – All–in–one for Dummies", 2nd Edition,Wiley India, 2016.

REFERENCES:

1. "Professional Android™ Sensor Programming",Greg Milette,Adam Stroud, John Wiley and Sons, Inc2012.

2. "Android 6 for Programmers, App Driven approach", Paul Deital, Harvey Deital, Alexander Wald, Prentice Hall, 2015.

CORE PAPER - 10

OPERATING SYSTEM

Objectives: Enable the student to get sufficient knowledge on concepts, functions and various system resources of operating systems.

UNIT I: OPERATING SYSTEM BASICS

Objective: To understand the structure and functions of operating systems.

Basic Concepts of Operating System – Services of Operating System – Operating System Types – Computer System Operation – I/O Structure – Storage Structure – Memory Hierarchy – System Components – System Calls – System Programs – System Design and Implementation – Introduction to Process – Process State – Process Control Block – Process Scheduling – Operations on Process – Interprocess Communication – Communication in Client/Server Systems – Threads .

UNIT II: CPU SCHEDULING ALGORITHM AND PREVENTION

Objective: To understand the principles of scheduler, scheduler algorithms and Deadlock.

Types of CPU Scheduler – Scheduling Criteria – Scheduling Algorithms – Semaphores – Classic Problems of Synchronization – Basic Concept of Deadlocks – Deadlock Characterization – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery of Deadlock.

UNIT III: STORAGE MANAGEMENT

Objective: To learn various memory management schemes.

Memory Management – Basics Concept of Memory – Address Binding – Logical and Physical Address Space – Memory Partitioning – Memory Allocation – Paging – Segmentation – Segmentation and Paging – Protection – Fragmentation – Compaction – Demand Paging – Page Replacement Algorithm – Classification of Page Replacement Algorithm .

UNIT IV: I/O SYSTEMS

Objective: To study I/O management, File system and Mass Storage Structure.

File System Storage – File Concept– File Access Methods – Directory Structure – File Sharing – File Protection – File System Implementation – File System Structure – Allocation Methods – Free Space Management – Mass Storage Structure – Disk structure – Disk Scheduling and Management – RAID Levels.

UNIT V: CASE STUDIES

Objective: To learn the basics of UNIX, LINUX systems and perform administrative tasks on LINUX servers.

UNIX System – A Case Study – LINUX System – Case Study – Design Principles – Process Management – Scheduling – Memory Management – File Systems – Security .

TEXT BOOKS:

1. "Operating System Concepts" –Abraham Silberschatz Peter B. Galvin, G. Gagne, Sixth Edition, Addison Wesley Publishing Co., 2003.
2. "Operating System" – Willam Stalling, Fourth Edition, Pearson Education,2003.

REFERENCES:

1. "Operating systems – Internals and Design Principles", W. Stallings, 6th Edition, Pearson.
2. "Modern Operating Systems", Andrew S.Tanenbaum, Second Edition Addison Wesley, 2001.
3. "Fundamentals of Operating System", Prof. R. Sriddhar, Dynaram Publication, Bangalore Company.

CORE PAPER - 11

DESIGN AND ANALYSIS OF ALGORITHMS

Objectives: To build a solid foundation of the most important fundamental subject in computer science. Creative thinking is essential to algorithm design and mathematical Acumen and programming skills.

UNIT – I: ALGORITHM AND ANALYSIS

Objective: Understanding various algorithm design techniques.
Elementary Data Structures: Stack – Queues – Trees – Priority Queue – Graphs – What is an Algorithm? – Algorithm Specification – Performance Analysis: Space Complexity – Time Complexity – Asymptotic Notation – Randomized Algorithms.

UNIT – II: DIVIDE AND CONQUER

Objective: This technique is the basis of efficient algorithms for all kinds of problems**.**

General Method – Binary Search – Recurrence Equation for Divide and Conquer – Finding the Maximum and Minimum—– Merge Sort – Quick Sort – Performance Measurement – Randomized Sorting Algorithm – Selection Sort – A Worst Case Optimal Algorithm – Implementation of Select2 – Stassen's Matrix Multiplications.

UNIT – III: THE GREEDY METHOD

Objective: This is a simple approach which tries to find the best solution at every step.

The General Method – Container Loading – Knapsack Problem – Tree Vertex Splitting – Job Sequencing with Deadlines – Minimum Cost Spanning Trees – Prim's Algorithm – Kruskal's Algorithm – An optimal Randomized Algorithm – Optimal Storage on Tapes – Optimal Merge Pattern – Single Source Shortest Paths.

UNIT – IV: DYNAMIC POGRAMMING, TRAVERSAL & SEARCHING

Objective: Providing a general insight into the dynamic programming approach.
The General Method – Multistage Graphs – All Pair Shortest Path – Optimal Binary Search Trees – String Editing – 0/1 Knapsack – Reliability Design – The Traveling Salesperson Problem. Techniques for Binary Trees – Techniques for Graphs – BFS – DFS.

UNIT – V: BACKTRACKING & BRANCH AND BOUND

Objective: Algorithm design paradigm for discrete and combinatorial optimization problems.

The General Method – The 8– Queens Problem – Sum of Subsets– Graph Coloring – Hamiltonian Cycles – Branch and Bound: General Method – LC Branch and Bound – FIFO Branch and Bound.

TEXT BOOKS:

1. "Fundamentals of Computer Algorithms", Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Galgotia Publications, Second Edition 2015.
2. "Introduction to Algorithms", Coremen T.H., Leiserson C.E. and Rivest R.L., PHI Publications, Third Edition, 1998.

REFERENCES:

1. "Introduction to the Design and Analysis of Algorithms", AnanyLevitin, Pearson Education, 2nd Edition.
2. "Introduction to Algorithms" Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, Prentice Hall of India, New Delhi, Second Edition, 2007.
3. "Computer Algorithms – Introduction to Design & Analysis" Sara Baase and Allen Van Gelder, Pearson Education New Delhi, Third Edition, 2000.

CORE PRACTICAL (Practical - 5)

MOBILE APPLICATIONS DEVELOPMENT LAB

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Intent and Acitivity.
3. Develop an application that uses Layout Managers and event listeners.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of RSS Feed.
6. Implement an application that implements Multi threading.
7. Develop an application that create alarm clock.
8. Develop an application Using Widgets.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Develop an application that makes use of database.

CORE PRACTICAL (Practical - 6)

OPERATING SYSTEM LAB

1. Basics of UNIX commands.
2. Shell Programming.
3. Implement the following CPU scheduling algorithms

   a) Round Robin b) SJF c) FCFS d) Priority
4. Implement all file allocation strategies

   a) Sequential b) Indexed c) Linked
5. Implement Semaphores
6. Implement all File Organization Techniques

   a) Single level directory b) Two level c) Hierarchical d) DAG
7. Implement Bankers Algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement e all page replacement algorithms

   a) FIFO b) LRU c) LFU
10. Implement Shared memory and IPC
11. Implement Paging Technique of memory management.
12. Implement Threading & Synchronization Applications.

INTERNAL ELECTIVE

PAPER - 1

(to choose one out of 3)

A. DATA MINING

Objectives: To enable the students to understand the importance of Data Mining and its techniques with recent trends and tools.

UNIT I: DATA MINING BASICS

Objective: To understand about the basics of Data Mining and Data

What is Data Mining– Kinds of Data – Kinds of patterns – Technologies used for Data Mining– Major Issues in Data Mining– Data –Data Objects and Attribute types– Data Visualization– Measuring Data Similarity and Dissimilarity–Data Preprocessing– overview– Data Cleaning– Data Integration– Data Reduction– Data Transformation and Data Discretization.

UNIT II: DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING

Objective: To understand about the methods of Data Warehousing

Data Warehouse– Basic concepts–Data Warehouse Modelling: Data Cube and OLAP– Data Warehouse Design and Usage– Data Warehouse Implementation– Data Generalization by Attribute–Oriented Induction– Data Cube Technology– Data Cube Computation Methods– Exploring Cube Technology–Multidimensional Data Analysis in cube space.

UNIT III: PATTERNS AND CLASSIFICATION

Objective: To understand about the techniques of Data Mining

Patterns– Basic concepts– Pattern Evaluation Methods–Pattern Mining: Pattern Mining in Multilevel– Multidimensional space–Constraint–Based Frequent Pattern Mining– Mining High Dimensional Data and Colossal patterns– Mining compressed or Approximate patterns– Pattern Exploration and Application. Classification– Decision tree Induction– Bayes Classification methods– Rule based Classification– Model Evaluation and selection– Techniques to Improve Classification Accuracy– Other Classification methods.

UNIT IV: CLUSTERING AND OUTLIER DETECTION

Objective: To understand about the importance of Cluster and outlier detection

Cluster Analysis– Partitioning Methods – Hierarchical Methods – Density – Based Methods– Grid – Based Methods – Evaluation of Clustering.– Clustering High – Dimensional Data–Clustering Graph and Network Data – Clustering with Constraints – Web Mining – Spatial Mining. Outlier Detection – Outliers and Outliers Analysis – Outlier Detection Methods–Outlier Approaches – Statistical – Proximity–Based – Clustering–Based– Classification Based – High–Dimensional Data.

UNIT V: RECENT TRENDS IN DATA MINING AND TOOLS

Objective: To improve the student's knowledge with recent trends and tools

Other Methodologies of Data Mining – Data Mining Applications – Data Mining Trends – Recent Data Mining Tools – Rapidminer – Orange – Weka–Knime–Sisense –Ssdt (SQL Server Data Tools) – Oracle – Rattle – Data melt – Apache Mahout.

TEXT BOOKS:

1. "Data Warehousing Fundamentals", PaulrajPonnaiah, Wiley Publishers, 2001.
2. "Data Mining: Concepts and Techniques", Jiawei Han, MichelineKamber, Morgan Kaufman Publishers, 2006.
3. "Introduction to Data mining with case studies", G.K. Gupta, PHI Private limited, New Delhi, 2008. 2nd Edition, PHI, 2011

REFERENCES:

1. "Advances in Knowledge Discover and Data Mining", Usama M. Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth RamasamyUthurusamy, the M.I.T. Press, 2007.
2. "The Data Warehouse Toolkit", Ralph Kimball, Margy Ross, John Wiley and Sons Inc., 2002

3. “Building Data Mining Applications for CRM”, Alex Berson, Stephen Smith, Kurt Thearling, Tata McGraw Hill, 2000.

4. “Data Mining: Introductory and Advanced Topics”, Margaret Dunham, Prentice Hall, 2002.

5. “Discovering Knowledge in Data: An Introduction to Data Mining”, Daniel T. Larose John Wiley & Sons, Hoboken, New Jersey, 2004

INTERNAL ELECTIVE

PAPER - 1

B. INFORMATION SECURITY

Objectives: To enable the student to understand various methodologies available for securing information.

UNIT I: INFORMATION SECURITY BASICS

Objective: To understand the basic concepts of Information Security

Introduction –History – What is Information Security? – Critical Characteristics of Information – NSTISSC Security Model – Components of an Information System – Securing the Components – Balancing Security and Access – The SDLC – The Security SDLC.

UNIT II SECURITY INVESTIGATION

Objective: To understand the legal, ethical and professional issues in Information Security

Security – Business Needs – Threats – Attacks – Legal – Ethical and Professional Issues – Relevant U.S. Laws – International Laws and Legal Bodies – Ethics and Information Security – Codes of Ethics and Professional Organizations

UNIT III SECURITY ANALYSIS

Objective: To know about risk management

Risk Management – Introduction – An Overview of Risk Management – Risk Identification – Risk Assessment – Risk Control Strategies – Selecting a Risk Control Strategy –Quantitativeversus Qualitative Risk Control Practices – Risk Management Discussion Points

UNIT IV SECURITY MODELS

Objective: To understand the technological aspects of Information Security

Logical Design – Blueprint for Security – Information Security Policy – Standards and Practices– ISO 17799/BS 7799– NIST Models– VISA International Security Model –

Design of Security Architecture – Planning for Continuity – Security Physical Design –Firewalls –Security Technology – IDS – IPS – Honey Pots – Honey Nets – Padded cell Systems Scanning and Analysis Tools – Access Control Devices.

UNIT V: CRYPTOGRAPHY AND ETHICAL HACKING

Objective: To understand the concepts of Cryptography and Hacking methods

Cipher methods – Cryptographic Algorithms and Tools – Attacks on Cryptosystems– Hacking – Effects of Hacking – Hacker – Types of Hacker– Ethical Hacker – Hacktivism– Networking & Computer Attacks – Malicious Software (Malware) – Protection Against Malware – Intruder Attacks on Networks and Computers – Wireless Hacking– Windows Hacking – Linux Hacking Session.

TEXT BOOKS:

1. "Principles of Information Security", Michael E Whitman and Herbert J Mattord, 5th Edition, Vikas Publishing House, New Delhi, 2003.
2. "Fundamentals of Information Systems Security", David Kim,MichaelG.Solomon, 3rd Edition ,Jones & Bartlett Learning, October 2016.
3. "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", Patrick Engebretson, 2nd Edition, Syngress Basics Series – Elsevier, 2011.
4. "Hands-On Ethical Hacking and Network Defense", Michael T. Simpson, Kent Backman, James E. Corley, Second Edition, CENGAGE Learning, 2010.

REFERENCES:

1. "Handbook of Information Security Management", Micki Krause, Harold F. Tipton, sixth Edition, CRC Press LLC, 2004.
2. "Hacking Exposed", Stuart McClure, Joel Scrambray, George Kurtz, Tata McGraw–Hill, 2003.
3. "Computer Security Art and Science", Matt Bishop, 2ndEdition , Pearson/PHI, 2002.

INTERNAL ELECTIVE

PAPER - 1

C. SOFTWARE TESTING

Objectives:

To study the concepts of software engineering with the aim of acquiring skills to develop Software applications, following all standardized procedures and techniques.

UNIT I: INTRODUCTION TO SOFTWARE TESTING

Objective: To understand the concept of software testing, and software quality

Fundamentals of software testing – need for software testing– Psychology of testing – various approaches – characteristics of testing – principles of testing – testing strategies – verification and validation – Defect and Prevention strategies.

UNIT II: SOFTWARE DEVELOPMENT MODEL AND TESTING

Objective: To learn to inspect and detect errors by going through each and every code segment

Water fall model– V–model– Spiral model– Agile model – Life cycle of testing– Static Testing – dynamic testing – White box testing – Block box testing – Regression testing – Integration Testing – System and Performance Testing – Usability Testing

UNIT III: FUNCTIONAL AND STRUCTURAL TESTING

Objective: To gain knowledge of various functional and structural testing techniques

Boundary Value Analysis – Equivalence Class Testing – Decision Table – Based Testing – Cause Effect Graphing Technique – Path testing –Cyclomatic Complexity – Graph Metrics – Data Flow Testing – Slice based testing

UNIT IV: TEST MANAGEMENT AND TOOLS

Objective: To understand basic concept of Software Management tools and object oriented testing

Test planning – cost–benefit analysis of testing – monitoring and control– test

reporting – test control – Specialized testing – Object Oriented Testing – Automated Tools for Testing – Tool Selection and Implementation – Challenges in test automation– GUI Testing

UNIT V: SOFTWARE QUALITY AND SOFTWARE QUALITY ASSURANCE

Objective: To understand basic concept of Software quality and software quality assurance

Introduction to software quality and software quality assurance – basic principles about the software quality and software quality assurance – Planning for SQA – various models for software product quality and process quality – SCM – RAD – System Documentation

TEXT BOOKS:

1. "Software Testing– A Craftsman's Approach" – Paul C. Jorgensen – Second Edition – CRC Press 2008
2. "Software Testing", – Ron Patton, Second Edition –Sams Publishing, Pearson Education, 2007.
3. "Software Testing– A Craftsman's Approach" – Paul C. Jorgensen, Second Edition – CRC Press, 2008

REFERENCES:

1. "Software Testing and Analysis: Process, Principles and Techniques" – Mauro Pezze, Michal Young – Wiley India , 2008
2. "Software Engineering" – K.K. Aggarwal&Yogesh Singh – New Age International Publishers – New Delhi, 2003.
3. "Software Testing – Principles and Practices" –SrinivasanDesikan and Gopalaswamy Ramesh, Pearson Education, 2006.

SKILL BASED SUBJECT
PAPER-3

SOFTWARE ENGINEERING

Objectives:

This course is intended to provide the students with an overall view over Software Engineering discipline and with insight into the processes of software development.

UNIT–I: INTRODUCTION TO EVOLVING SOFTWARE

Objective: Introduces the concepts and methods required for the construction of large software intensive systems.

Evolving Role of Software – Nature of Software – Software Engineering – The Software Process– Software Engineering Practices – Software Myths – A Generic View of Process Model – Process Assessment and Improvement – Process Models : Waterfall Model – Incremental Process Models – Evolutionary Process Models – Concurrent Models.

UNIT–II: REQUIREMENTS ENGINEERING

Objective: Gets the idea of choosing the Requirements in Software Engineering.

Requirements Engineering: Establishing the Groundwork – Initiating the Requirements Engineering Process – Eliciting Requirements – Collaborative Requirements Gathering – Quality Function Deployment – Usage Scenarios – Elicitation work Products – Building the Requirements Model – Elements of Requirements Model – Analysis Pattern – Requirements Analysis – Data Modeling Concepts.

UNIT–III: DATA ENGINEERING

Objective: Gives an understanding the concept of Data Engineering.

Data Engineering: Design Process and Design Quality – Design Concepts – The Design Model - Creating an Architectural Design – Software Architecture – Data Design – Architectural style – Architectural Design – Architectural Mapping Using Data Flow – Performing User Interface Design – Golden Rules.

UNIT–IV: TESTING STRATEGIES

Objective: To impart knowledge on Testing and Debugging.

Testing Strategies: Strategic Approach to Software Testing – Strategic Issues – Test Strategies for Conventional and Object Oriented Software – Validation Testing – System Testing – Art of Debugging. Software Testing Fundamentals – White Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing – Model Based Testing.

UNIT–V: PROJECT MANAGEMENT

Objective: To enable the students to learn the basic of Project Management & Scheduling.

Project Management: Management Spectrum – People – Product – Process – Project – Critical Practices – Estimation: Project Planning Process – Software Scope and Feasibility – Resources – Software Project Estimation – Project Scheduling – Quality Concepts – Software Quality Assurance – Elements of Software Quality Assurance – Formal Technical Reviews.

TEXT BOOKS:

1. ”Software Engineering – A Practitioner’s Approach”, Roger S Pressman, McGraw Hill International Edition, New York: 2005, Seventh Edition

2. ” Software Engineering”, Mall Rajib, PHI Learning, 2009, 3 Third Edition.

REFERENCES:

1. “Software Engineering”, Ian Somerville, Pearson Education, 2006, 7th Edition.

2. “Software Engineering Concepts” Richard Fairley, Tata McGraw–Hill Education, 2011.

3. “Software Engineering: Theory and Practice “, Pfleeger and Lawrence, Pearson Education, 2001, Second Edition.

SEMESTER VI

CORE PAPER - 12

OPEN SOURCE SOFTWARE

Objectives:

To study the concepts of open source techniques that can be effectively applied in practice about HTML5, JavaScript, PHP, and PERL.

UNIT I: INTRODUCTION TO HTML, CSS

Objective: To understand the concept of HTML, HTML5 and CSS.

Need of Open Source –Advantages of Open source –Application of Open Source – HTML – HTML tags –Dynamic Web content– HTTP Request and Response Procedure–Introduction to HTML5– HTML5 Canvas – HTML5 Audio and Video– Introduction to CSS– CSS Rules–Style Types–CSS Selectors– CSS Colors.

UNIT II: LINUX

Objective: To learn to inspect and detect errors by going through each and every code segment.

Introduction: Linux Essential Commands – Kernel Mode and user mode –File system Concept – Standard Files – The Linux Security Model – Vi Editor – Partitions Creation – Shell Introduction – String Processing – Investigation and Managing Processes – Network Clients – Installing Application.

UNIT III:JAVA SCRIPT AND MYSQL

Objective: To understand basic concept of Java Script and MySQL.

Java script :Advantages of JavaScript –JavaScript Syntax–Data type– Variable– Array – Operators and Expressions– Loops – functions – Dialog box– MySQL – The show Databases and Table – The USE command –Create Database and Tables – Describe Table – Select, Insert, Update, and Delete statement.

UNIT IV: PHP

Objective: To understand basic concept of PHP

PHP Introduction – General Syntactic Characteristics – PHP Scripting – Commenting your code – Primitives, Operations and Expressions – PHP Variables – Operations and Expressions Control Statement – Array – Functions – Basic Form Processing – File and Folder Access – Cooking – Sessions – Database Access with PHO.

UNIT V: PERL

Objective: To understand basic concept of PERL

PERL : Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines, Packages, and Modules– Working with Files – Data Manipulation.

TEXT BOOKS:

1. "The Complete Reference Linux", Peterson, Tata McGraw HILL–2010

2. "Perl: The Complete Reference", Martin C. Brown, Tata McGraw Hill Publishing Company Limited, Indian Reprint 2009.
3. "MYSQL: The Complete Reference", VikramVaswani, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009
4. "PHP: The Complete Reference", Steven Holzner, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009.
5. "Complete Reference HTML", T. A. Powell, 3rd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2002.
6. "Mastering Java script" –J. Jaworski, BPB Publications, 1999

REFERENCES:

1. "Fundamentals of Open Source Software", by M.N. Rao, PHI publishers.
2. "MySQL Bible", Steve Suchring, John Wiley, 2002
3. "The Linux Kernel Book", Remy Card, Eric Dumas and Frank Mevel, Wiley Publications, 2003
4. Ivan Byross, HTML, DHTML, Javascript, Perl, BPB Publication

CORE PAPER - 13

PYTHON PROGRAMMING

UNIT I:

Identifiers – Keywords - Statements and Expressions – Variables – Operators – Arithmetic operators – Assignment operators – Comparison operators – Logical operators – Bitwise operators - Precedence and Associativity – Data types - Number – Booleans – Strings - Indentation – Comments – Single line comment – Multiline comments - Reading Input – Print Output – Type Conversions – int function – float function – str() function – chr() function – complex() function – ord() function – hex() function – oct() function - type() function and Is operator – Dynamic and Strongly typed language.

UNIT II:

Control Flow Statements – If statement – If else statement – If elif else statement – nested if statement - while loop – for loop – continue and break statements – catching exceptions using try and except statement – syntax errors – exceptions – exception handling – Strings – str() function - Basic string operations – String comparison – Built in functions using strings – Accessing characters in string – String slicing – String joining – split() method – string traversing.

UNIT III:

Functions – Built in functions – function definition and calling - return statement – void function – scope and lifetime of variables – args and kwargs – command line arguments - Tuples – creation – basic tuple operations – tuple() function – indexing – slicing – built-in functions used on tuples – tuple methods – packing – unpacking – traversing of tuples – populating tuples – zip() function - Sets – Traversing of sets – set methods – frozenset.

UNIT IV:

Lists: Using List- List Assignment and Equivalence – List Bounds- Slicing - Lists and Functions- Prime Generation with a List. List Processing: Sorting-Flexible Sorting-Search- List Permutations- Randomly Permuting a List- Reversing a List.

UNIT V:

Objects: Using Objects- String Objects- List Objects. Custom Types: Geometric Points- Methods- Custom Type Examples- Class Inheritance. Handling Exceptions: Motivation- Exception Examples- Using Exceptions - Custom Exceptions.

TEXT BOOKS:

1. Gowrishankar S, Veena A, "Introduction to Python programming", 1st Edition, CRC Press/Taylor & Francis, 2008. (Units 1-3)
2. Learn to Program with Python, 3th Edition, Richard L. Halterman, Southern Adventist University. (Units 4-5)

REFERENCE BOOKS:

1. Core Python Programming, 2thEdition, Wesley J. Chun, Prentice Hall.
2. Jake VanderPlas,"Python Data Science Handbook:Essential Tools for working with Data",1st edition, O'Reilly Media, 2016.

CORE PRACTICAL (PRACTICAL-7)

PYTHON PROGRAMMING LAB

1. Write a Python program to find the area and perimeter of a circle.
2. Write a Python program to generate Fibonacci series.
3. Write a Python program to compute the GCD of two numbers.
4. Write a Python program to generate first n prime numbers.
5. Write a Python program to find the sum of squares of n natural numbers.
6. Write a Python program to find the sum of the elements in an array.
7. Write a Python program to find the largest element in the array.
8. Write a Python program to check if the given string is a palindrome or not.
9. Write a Python program to store strings in a list and print them.
10. Write a Python program to find the length of a list, reverse it, copy it and then clear it.

OPEN SOURCE SOFTWARE LAB

CORE PRACTICAL (Practical– 8)

1. Create a web page with Frames and Tables.
2. Create a web page incorporating CSS (Cascading Style Sheets).
3. Write a shell program to find the factorial of an integer positive number.
4. Write a shell program to find the details of a user session.
5. Create a simple calculator in JavaScript.
6. Write a JavaScript program to scroll your name in the scrollbar.
7. Develop a program and check message passing mechanism between pages.
8. Application for Email Registration and Login using PHP and MySQL.
9. Program to Create a File and write the Data into it using PHP.
10. Program to perform the String Operation using Perl.

INTERNAL ELECTIVE - 2

PAPER-2

(to choose one out of 3)

A. BIG DATA ANALYTICS

Objectives:

- To explore the fundamental concepts of big data analytics.
- To learn to analyze the big data using intelligent techniques and mining data stream.
- To understand the applications using Map Reduce Concepts.

UNIT–I: INTRODUCTION TO BIG DATA

Objective: To explore the fundamental concepts of big data analytics.

Introduction to big data: Introduction to Big Data Platform – Challenges ofConventional Systems – Intelligent data analysis – Nature of Data – .Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data – Volume, Velocity, Variety – Other Characteristics of Data – Need for Big Data–Analytic Processesand Tools – Analysis vs. Reporting.

UNIT–II: MINING DATA STREAMS

Objective:To learn to use various techniques for mining data stream.

Mining data streams: Introduction To Streams Concepts – Stream Data Model andArchitecture – Stream Computing – Sampling Data in a Stream – Filtering Streams –Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness ina Window – Decaying Window – Real time Analytics Platform(RTAP) Applications – CaseStudies – Real Time Sentiment Analysis– Stock Market Predictions.

UNIT III: BIG DATA FROM DIFFERENT PERSPECTIVES

Objective: To learn the Big data Business Perspective

Big data from business Perspective: Introduction of big data–Characteristics of big data–Data in the warehouse and data in Hadoop– Importance of Big data– Big data Use cases– Patterns for Big data deployment. Big data from

Technology Perspective:–Application Development in Hadoop–Getting your data in Hadoop.

UNIT –IV:HADOOP AND MAP REDUCE

Objective:To understand the applications using Map Reduce Concepts.

Hadoop: The Hadoop Distributed File System – Components ofHadoopAnalysing the Data with Hadoop– Scaling Out–Hadoop Streaming– Design ofHDFS–Java interfaces to HDFS Basics– Developing a Map Reduce Application–How MapReduce Works–Anatomy of a Map Reduce Job run–Failures–Job Scheduling–Shuffle andSort – Task execution – Map Reduce Types and Formats– Map Reduce Features–Hadoop environment.

UNIT – V:FRAMEWORKS

Objective:To introduce programming tools HIVE in Hadoop echo system.

Frameworks: Applications on Big Data Using Pig and Hive – Data processing operatorsin Pig – Hive services – HiveQL – Querying Data in Hive – fundamentals of HBase andZooKeeper– IBM InfoSphereBigInsights and Streams.

TEXT BOOKS:

1. “Intelligent Data Analysis”, Michael Berthold, David J. Hand, Springer, 2007.
2. “Hadoop: The Definitive Guide “, Tom White Third Edition, Oreilly Media, 2012.

REFERENCES:

1. “Big Data and Analytics" SeemaAcharya, SubhasiniChellappan, Wiley 2015.
2. “Mining of Massive Datasets”,AnandRajaraman and Jeffrey David Ullman,CUP,2012.
3. “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data” .Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,McGrawHill Publishing, 2012.
4. “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, Bill Franks, John Wiley& sons, 2012.
5. “Making Sense of Data”, Glenn J. Myatt, John Wiley & Sons, 2007.

INTERNAL ELECTIVE

PAPER-2

B. CRYPTOGRAPHY

Objectives:

- Understand various Security practices and System security standards
- Understand different cryptographic operations
- Understand the various Authentication schemes to simulate different applications.

UNIT – I: COMPUTER AND NETWORK SECURITY

Objective: Understand OSI security architecture and classical encryption techniques**.**

Computer Security Concepts –OSI security architecture –Security trends–Security attacks – Security Services– Security Mechanisms –Fundamental Security Design Principles – Attack Surfaces and Attack Trees – Model for Network Security – Network Standards.

UNIT – II:SYMMETRIC CRYPTOGRAPHY

Objective: Understand the different cryptographic operations of symmetric cryptographic algorithm**s.**

Symmetric Cipher – Classical Encryption Technique – Symmetric Cipher Model – Substitution Techniques, Transposition Technique – Steganography – Block Cipher and the Data Encryption Standard – The Data Encryption Standard – Differential and Linear Cryptanalysis – Block Cipher Principles.Advanced Encryption Standard – AES Structure – AES Transformation Function.

UNIT – III:PUBLIC KEY CRYPTOGRAPHY

Objective: Understand the different cryptographic operations of Public key cryptographic algorithms.

Public Key Cryptography and RSA Principles– RSA Algorithm, Key Management and other Public Key Cryptosystems Key Management, Diffie–Hellman Key Exchange,

Elliptic Curve Arithmetic – Elliptic Curve Cryptography – Psedorandom Number Generation**.**

UNIT –IV:HASH FUNCTIONS AND DIGITAL SIGNATURES

Objective: To make use of application protocols to design and manage a secure system.

Cryptographic Hash Functions – Application of Hash Functions – Two Simple Hash Functions – Secure Hash Algorithm(SHA) –Message Authentication Codes – Authentication requirement – Authentication function – MAC – HMAC – CMAC – Digital signature and authentication protocols – Digital Signature Standards –Digital Signatures Schemes– Digital Certificate – Key Management and Distribution.

UNIT –V: SECURITY APPLICATIONS

Objective: To learn the configuration and manage E–mail and WLAN Security.

Intrusion Detection System– Password Management – Introduction to Firewall– Firewall Generations– Web Security – Wireless network Security – Electronic Mail Security– Internet Mail Architecture–S/MIME – Pretty Good Privacy (PGP).

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TEXT BOOKS:

1. “Cryptography and Network security Principles and Practices”,William Stallings,Pearson/PHI,Seventh Edition, 2017.
2. “CRYPTOGRAPHY & NETWORK SECURITY” – Principles and Practices, William Stallings, Pearson Education, Third Edition.

REFERENCES:

1. “Modern Cryptography Theory and Practice”, Wenbo Mao, Pearson Education, 2004.
2. “Cryptography and Network Security “,BehourzForouzan, DebdeepMukhopadyay,Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2010.
3. “Quantum Cryptography and Secret–Key Distillation”, Gilles van Assche, Cambridge
University Press, 2010.

INTERNAL ELECTIVE

PAPER-2

C. DIGITAL IMAGE PROCESSING

Objectives:

This course enables the student knowledge about various image processing concepts like enhancement, restoration, segmentation, compression and recognition.

UNIT – I: FUNDAMENTALS

Objective: To know the basics of Digital image and techniques.

Introduction – Origin – Steps in Digital Image Processing – Components – Applications of DIP – Elements of Visual Perception – Light and Electro Magnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization – Images in Matlab– Pixels – Color models – Digital Image Processing in Multimedia.

UNIT – II: IMAGE ENHANCEMENT

Objective: To understand various Image enhancement ideas.

Spatial Domain – Gray level transformations – Histogram Quantization – Histogram matching and processing – Basics of Spatial Filtering – Smoothing and Sharpening Spatial Filtering – Introduction to Fourier Series – Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal – Butterworth and Gaussian filters

UNIT – III: IMAGE RESTORATION AND SEGMENTATION

Objective: To understand Image restoration techniques.

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation– Active Contour Models – Snakes – Fuzzy Connectivity – Morphological processing– erosion and dilation.

UNIT – IV: WAVELETS AND IMAGE COMPRESSION

Objective: To understand degrees of image resolution and compression methods.

Wavelets – Subband coding – Multi resolution expansions – Compression: Fundamentals – Image Compression models – Error Free Compression – Predictive

Compression Methods – Vector Quantization – Variable Length Coding – Bit–Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards

UNIT – V: IMAGE REPRESENTATION AND RECOGNITION

Objective: To understand concepts of image representation and recognition.

Knowledge Representation – Statistical Pattern Recognition – Neural Nets – Fuzzy Systems – Chain Code – Polygonal approximation, signature, boundary segments – Shape number – Fourier Descriptor moments – Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching.

TEXT BOOKS

1. "Digital Image Processing," Rafael C. Gonzalez, Richard E.Woods, Prentice Hall, Third Edition, 2008.
2. "Digital Image Processing and Computer Vision," Sonka, Hlavac, Boyle, Cengage Learning, 2009
3. “Fundamentals of Digital Image Processing”, Anil Jain K, PHI Learning Pvt. Ltd., 2011.

REFERENCES:

1. “Digital Image Processing”, S. Sridhar, Oxford University Press; Second edition, 2016.
2. “Digital Image Processing”, Gonzalez &woods, Pearson Education India, 2016.

INTERNAL ELECTIVE

PAPER - 3

(to choose one out of 3)

A. ARTIFICIAL INTELLIGENCE

Objectives:

To induce the innovative ideas of students, related to Robotics, Artificial Intelligence and Machine Learning. This course enables the student's level to compete in the world of information and technology era.

UNIT I: INTRODUCTION TO ARTIFICIAL INTELLIGENCE:

Objective: To know the basics of Artificial Intelligence.

History of AI – Artificial Narrow Intelligence (ANI) – Artificial General Intelligence (AGI) – Artificial Super Intelligence (ASI) – Characteristics – Types of AI – Domains – Programming Languages of AI – Applications of AI – Future of AI.

UNIT II: AI – PROBLEM SOLVING METHODS:

Objective: To Understand the Methods and algorithms in AI.

Problem solving Methods – Search Strategies: Uninformed – Informed – Heuristics – Generate and test – hill climbing – Best first search – problem reduction – Local Search Algorithms and Optimization – Game Playing mini–max procedure – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games

UNIT III: AI – KNOWLEDGE REPRESENTATION:

Objective: To learn to represent knowledge in solving AI problems.

Procedural Versus declarative knowledge – logic programming – Forward Versus backward reasoning – Matching – Control knowledge – Ontological Engineering– Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories –Reasoning with Default Information.

UNIT IV: STATISTICAL REASONING AND AGENTS:

Objective: To Understand Statistical logics and know about Software agents.

Probability and Bayes Theorem – Certainty factors – Probabilistic Graphical Models – Bayesian Networks – Markov Networks – Fuzzy Logic. Architecture for Intelligent

Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi–agent systems.

UNIT V: MACHINE LEARNING AND APPLICATIONS

Objective: To learn how Machine learning is related to AI.

Types of Machine Learning – Neural Networks – Deep Learning – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

TEXT BOOKS:

1. “Artificial Intelligence”, Elaine Rich, Kevin Knight, Tata McGraw Hill, II Edition.
2. "Artificial Intelligence: A Modern Approach," Stuart Russell, Peter Norvig, Third Edition, Prentice Hall of India, New Delhi, 2010.
3. “Prolog: Programming for Artificial Intelligence”, I. Bratko, Addison – Wesley Educational Publishers Inc., Fourth edition 2011.

REFERENCES:

1. “Machine Learning for Beginners 2019”, Matt Henderson, This Is Charlotte, 2019
2. “Introduction to Artificial Intelligence and Expert Systems”, Dan W. Patterson, Pearson, 2015

INTERNAL ELECTIVE
PAPER - 3
B. SYSTEM SOFTWARE

Objectives:

To have an understanding the basic design of assemblers, loaders, linkers, macro processor.

UNIT I: INTRODUCTION TO SYSTEM SOFTWARE

Objective: To understand the basic concepts of system software

System software vs. Application software – Different types of system software – SIC& SIC/XE Architecture – traditional (CISC) machines – RISC machines.

UNIT II: ASSEMBLERS

Objective: Ability to trace the path of a source code to object code and to executable file.

Basic assembler functions– Machine dependent and independent assembler features– Assembler design options–One pass assemblers–Multi pass assemblers– MASM assembler.

UNIT III: LOADERS AND LINKERS

Objective: To design and implementation of loaders and linkers

Basic loader functions–Simple bootstrap loaders – Machine dependent and independent loader features–Linkage editors– Dynamic linking.

UNIT IV: MACRO PROCESSOR

Objective: To understand the concepts of macro processor

Basic macro processor functions–Machine dependent and independent macro processor features–Macro processor design options.

UNIT V: COMPILERS

Objective: Ability to analyze the functions of compilers

Basic compiler functions–Machine dependent compiler features–Machine independent compiler features–Compiler design options the YACC compiler– Compiler.

TEXT BOOKS:

1. "System Software–An introduction to system programming", Leland L. Beck & D. Manjula, Pearson Education, 3rd edition, 2007.

2. "Compilers – Principles, techniques and tools", A.V. Aho, Ravi Sethi, J.D. Ullman, 2nd Edition, Pearson Education, 2011.

REFERENCES:

1. "Systems Programming and Operating Systems", D.M. Dhamdhere, Second Revised Edition, Tata McGraw Hill, 2000.

2. "Systems Programming", John J. Donovan, Tata McGraw Hill Edition, 2000.

3. "Systems Programming", Srimanta Pal, Oxford University Press, 2011.

INTERNAL ELECTIVE
PAPER - 3
C. MOBILE COMPUTING

Objectives:

- To understand the challenges of wireless communication and the solutions that is in use.
- To study about various types of wireless data networks, wireless protocols and wireless voice networks.
- To design and implement mobile applications.

UNIT I: WIRELESS COMMUNICATION FUNDAMENTALS

Objective: To understand basic concepts of mobile computing.

Introduction–Applications–A short History of wireless Communications–Wireless Transmission – Frequencies for Radio transmission–Signals–Antennas–Signal Propagation–Multiplexing–Modulations–Amplitude shift keying–Frequency shift keying–Phase shift keying–Spread Spectrum.

UNIT II: MEDIUM ACCESS CONTROL AND TELECOMMUNICATION SYSTEM

Objective: To learn the basics of mobile telecommunication system.

SDMA–FDMA–TDMA–Fixed TDM–Classical Aloha–CDMA–Global System for Mobile Communications –GPRS–Satellite Systems –Basics –Applications–Broadcast Systems – Digital Audio Broadcasting – Digital Video Broadcasting.

UNIT III: WIRELESS NETWORKS

Objective: To comprehend wireless LAN and cellular systems.

Infrared vs. Radio Transmission– Infrastructure Networks–Ad hoc Networks – IEEE 802.11 –System Architecture–Protocol Architecture–Bluetooth–User scenarios– Bluetooth Architecture–Introduction to Wireless ATM –Services–Location Reference Model.

UNIT IV: MOBILE NETWORK LAYER

Objective: To understand protocols at network and transport layer.

Mobile IP–Goals– Assumption–Entities and Terminology– IP Packet delivery – Agent

advertisement and discovery–Registration–Tunneling and encapsulation–Optimizations–Dynamic Host Configuration Protocol (DHCP) –Routing –DSDV–DSR – Alternative Metrics.

UNIT V: WIRELESS APPLICATION PROTOCOL

Objective: To learn development of applications in mobile computing platform.

Introduction–Protocol Architecture–Wireless Markup Language(WML)–WML Script– Applications–Wireless Telephony Application (WTA) – Wireless Telephony Application Architecture.

TEXT BOOKS:

1. "Mobile Communications", Jochen Schiller –PHI/Pearson Education, Second Edition, 2003.

2. " Mobile Computing", Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal – Tata McGraw Hill Publications, Second edition, 2010.

REFERENCES:

1. "Principles of Wireless Networks", KavehPahalavan, PrasanthKrishnamoorthy, PHI/Pearson Education, 2003.

2. "Fundamentals of Mobile and Pervasive Computing", Frank Adelstein, ,SandeepK.S.Gupta, Golden G.Richard III, Loren Schwiebert –Tata McGraw Hill Publications, 2005.

3. "Wireless Communications and Networks", Williams Stallings–Pearson Education, Second Edition, 2009.

SKILL BASED SUBJECT

PAPER - 4

OBJECT ORIENTED ANALYSIS AND DESIGN

Objectives: The student should be made to learn the basics of OO analysis and design skills.

UNIT I UML DIAGRAMS

Objective: Learn the UML analysis and design diagrams.

Introduction to OOAD – Role of Analysis and Design in Software Development – Meaning of Object Orientation – Overview of Various OOAD Methodologies – Unified Process – UML diagrams Goals of UML – Use Case – Actors and Use Cases – Use Case Relationships – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.

UNIT II OBJECT MODEL AND DESIGN PATTERNS

Objective: Apply appropriate object model and design patterns.

The Object Model – The Evolution of the Object Model – Foundations of the Object Model – Elements of the Object Model – Applying the Object Model.GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller – Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioral – Strategy – observer.

UNIT III APPLYING DESIGN PATTERNS

Objective: Create object code from design Patterns

The Nature of an Object – Relationships among Objects – The Nature of a Class – Relationships among Classes – The Interplay of Classes and Objects – On Building Quality Classes and Objects –System sequence diagrams – Relationship between sequence diagrams and use cases diagrams –Notations: The Unified Modeling Language – Package Diagrams – Component Diagrams – Deployment Diagrams – Activity Diagrams – Logical architecture refinement – UML class diagrams – UML interaction diagrams – Applying GoF design patterns.

UNIT IV CLASSIFICATION, CODING AND TESTING

Objective: Learn to map design to code, Compare and contrast various testing techniques.

Classification: The importance of proper classification – Identifying classes and objects – Key abstractions and Mechanisms – Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing.

UNIT V CASE STUDY

Objective: At the end of the course, the student should be able to: Design and implement projects using OO concepts.

Case study – the Next Gen POS system, Inception –Use case Modeling – Relating Use cases – include, extend and generalization – Elaboration – Domain Models – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition.

TEXT BOOKS:

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object–Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2005.

2. Mahesh P. Matha, "Object – Oriented Analysis and D esign Using UML" , PHI Learning Private Limited, New Delhi, 2008.

3. Grady Booch Robert A. Maksimchuk Michael W. Engle Bobbi J. Young, Ph.D. Jim Conallen Kelli A. Houston "Object–Oriented Analysis and Design with Applications" Third Edition, Pearson Education, Inc.,April 2007.

REFERENCES: Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", Fourth Edition, Mc–Graw Hill Education, 2010.

1. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, “Design patterns: Elements of Reusable Object–Oriented Software”, Addison–Wesley, 1995.

2. Martin Fowler, “UML Distilled: A Brief Guide to the Standard Object Modeling Language”, Third edition, Addison Wesley, 2003.

3. Paul C. Jorgensen, “Software Testing:– A Craftsman‟s Approach”, Third Edition, Auerbach Publications, Taylor and Francis Group, 2008.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS

CBCS PATTERN

(With effect from 2020-2021)

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3	III	Core Theory	Paper-1	6	4	Programming in C	25	75	100
4	III	Core Practical	Practical-1	3	2	Programming in C Lab	25	75	100
5	III	Allied -1	Paper-1	7	3	Mathematical Foundations - I	25	75	100
6	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
7	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**22**		**175**	**525**	**700**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
7	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
9	III	Core Theory	Paper-2	5	4	C++ & Data Structure	25	75	100
10	III	Core Practical	Practical-2	2	2	C++ and Data Structures Lab	25	75	100
11	III	Allied-1	Paper-2	7	5	Mathematical Foundations - II	25	75	100
12	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
13	IV	Value Education		2	2	Value Education	25	75	100
14	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		**36**	**25**		**200**	**600**	**800**

THIRUVALLUVAR UNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS

SYLLABUS
UNDER CBCS
(With effect from 2020-2021)

SEMESTER I

CORE THEORY PAPER -1

PROGRAMMING IN C

OBJECTIVES:

1. To understand simple algorithms,
2. To understand language constructs
3. To understand and develop programming skills in C.
4. To understand the basic concepts of decision making and looping statements.
5. To understand the concepts of arrays , structures, union, pointers and files.

UNIT – I

Overview of C: History – Importance – Sample Programs – Basic Structure – Programming Style – Executing – Unix System – MS-DOS System - **Constants, Variables, and Data Types:** Character Set – C Token – Keyword and Identifiers – Constants – Variables – Data Types – Declaration of Storage Class – Assigning Values to Variables – Defining Symbolic Constants – Declaration – Overflow and Underflow of Data - **Operators and Expressions:** Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Special Operators – Arithmetic Expressions, Evaluation of Expressions – Precedence of Arithmetic Operators – Some Computational Problems – Type Conversions in Expressions – Operator Precedence and Associativity – Mathematical Functions .

UNIT – II

Managing Input and Output Operations: Reading, Writing a Character – Formatted Input, Output - **Decision Making and Branching:** Decision Making with If statement – Simple If Statement – The If…Else Statement – Nesting of If…Else Statements – The Else If Ladder – The Switch Statement- The ?: Operator – The Goto Statement - **Decision Making and Looping:** The while Statement – The do Statement – The for Statement – Jumps in Loops – Concise Test Expressions.

UNIT – III

Arrays: One-Dimensional Arrays - Declaration, Initialization of One-Dimensional Arrays – Two-Dimensional Arrays - Initializing Two-Dimensional Arrays – Multi-Dimensional Arrays – Dynamic Arrays - **Character Arrays and Strings:** Declaring and Initializing String Variables – Reading Strings from Terminal – Writing Strings to Screen – Arithmetic

Operations on Characters – Putting String Together – Comparison of Two Strings –String-Handling Functions – Table of Strings – Other Features of Strings - **User Defined Functions**: Need for User-Defined Functions – A Multi-Function Program – Elements of User-Defined Functions – Definition of Functions – Return Values and Their Types – Function Calls – Function Declaration – Category of Functions – No Arguments and No Return Values – Arguments but no return values – Arguments with Return Values – No Arguments but Returns a value – Functions that Return Multiple Values – Nesting of Functions – Recursion – Passing Arrays, Strings to Functions – The Scope, Visibility and Lifetime of Variables – Multi file Programs.

UNIT – IV

Structure and Unions: Defining a Structure – Declaring Structure Variables – Accessing Structure Members – Structure Initialization and Copying and Comparing Structure Variable – Operations on Individual Members – Arrays of Structures – Arrays within Structures – Structures within Structures – Structures and Functions – Unions – Size of Structures – Bit Fields **Pointers:** Understanding Pointers – Accessing the Address of Variable – Declaring, Initialization of Pointer Variables – Accessing a Variable through its pointer – Chain of Pointers – Pointer Expression – Pointer Increments and Scale Factor – Pointers and Arrays – Pointers and Character Strings – Array of Pointers – Pointers as Function Arguments – Functions Returning Pointers – Pointers to Functions – Pointers and Structures – Troubles with Pointers **File Management in C**: Defining and Opening a File – Closing a File – Input/Output Operations on File – Error Handling During I/O Operations – Random Access to Files – Command Line Arguments.

UNIT – V

Fundamental Algorithms: Exchanging the values of Two Variables- Counting- Summation of a Set of Numbers-Factorial Computation -Sine Function Computation –Generation of the Fibonacci Sequence-Reversing the Digits of an Integer- Base Conversion – Character to Number Conversion - **Factoring Methods:** Finding the square Root of a Number –The Smallest Divisor of an Integer-The Greatest Common Divisor of the two integers-Generating Prime Numbers- Computing the Prime Factors of an integer –Generation of Pseudo-random Numbers-Raising a Number to a Large Power-Computing the nth Fibonacci Number (Chapters: 2 & 3)

TEXT BOOK:

1. Programming in ANSI C, E. Balagurusamy, Tata McGrawhill Education, 6th Edition, 2013. (Unit I to IV)
2. How to Solve it by Computer, R.G.Dromey, PHI International (Unit V)

REFERENCE BOOKS:

1. The C Programming Language (ANSI C), Kernighan, B.W. and Ritchie, D.M., PHI.
2. C by Discovery , Foster & Foster , Penram International Publishers, Mumbai.

E - REFERENCES

1. NPTEL, Introduction to C Programming, Prof.SatyadevNandakumar ,IIT, Computer Science and Engineering Kanpur.
2. NPTEL, Introduction to Problem Solving & Programming, by Prof. Deepak Gupta Department of Computer Science and Engineering IIT Kanpur.

Course Outcomes:

- The Student will be able to understand the concepts of Constants, Variables, and Data Types, Operators and Expressions
- The Student will be able to understand the concepts of Managing Input and Output Operations, Decision Making and Branching, Decision Making and Looping.
- The Student will be able to understand the concepts of Arrays, Character Arrays and Strings, User Defined Functions.
- The Student will be able to understand the concepts of Structure and Unions, Pointers, File Management in C.
- The Student will be able to understand the concepts of Fundamental Algorithms, Factoring Methods.

CORE PRACTICAL-1

Programming in C – Lab

Objectives:

1. To understand concepts of for/while loop and switch.
2. To understand language Functions and recursions.
3. To understand and develop String Manipulations.
4. To understand the basic concepts of searching and sorting.
5. To understand the concepts of structures.

Outcomes:

CO1 - Enhance the analyzing and problem solving skills and use the same for writing programs in C.
CO2 - Write diversified solutions, draw flowcharts and develop a well-documented and indented
program according to coding standards.
CO3 - Learn to debug a given program and execute the C program.
CO4 - To have enough practice the use of conditional and looping statements.
CO5 - To implement arrays, functions and pointers.

Control Statements:
1. Print n Fibonacci numbers – (using for)

2. Print n Prime numbers – (using while)

3. Simple arithmetic on two numbers – (using switch/case)

Functions:
4. Swap two values using call by value / call by reference.

Recursion:
5. To compute NcR and NpR

6. To Compute GCD and LCM

String Manipulation.
7. Operations on string such as length, concatenation, reverse, counting, and copy of a string to another.

Matrices:
8. Matrix Addition, Subtraction, Multiplication, Transpose of n x m matrices.

9. Inverse of a square matrix.

Searching:
10. Binary Search.

Sorting:
11. Bubble Sort

12. Insertion Sort

Structures:
13. Students Mark statement

Pointers:
14. Arithmetic operations on pointers.

Files
15. Creating/ Reading/ Writing a text/binary file.

REFERENCE BOOK:
1. Programming in ANSI C, E. Balagurusamy, Tata McGrawhill Education, 6th Edition, 2013.

ALLIED 1

PAPER - I

MATHEMATICAL FOUNDATIONS - I

Objectives

To know about Logical operators, validity of arguments, set theory and set operations, relations and functions, Binary operations, Binary algebra, Permutations & Combinations, Differentiation, Straight lines, pair of straight lines, Circles, Parabola, Ellipse, Hyperbola.

UNIT-I: SYMBOLIC LOGIC

Proposition, Logical operators, conjunction, disjunction, negation, conditional and bi-conditional operators, converse, Inverse, Contra Positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

UNIT-II: SET THEORY

Sets, set operations, venndiagram, Properties of sets, number of elements in a set, Cartesian product, relations & functions,

Relations : Equivalence relation. Equivalence class, Partially and Totally Ordered sets,

Functions: Types of Functions, Composition of Functions.

UNIT-III: BINARY OPERATIONS

Types of Binary Operations: Commutative, Associative, Distributive and identity, Boolean algebra: simple properties. Permutations and Combinations.

UNIT-IV: DIFFERENTIATION

Simple problems using standard limits,

$$\lim_{x \to a} \frac{x^n - a^n}{x - a}, \quad \lim_{x \to 0} \frac{\sin x}{x}, \quad \lim_{x \to 0} \frac{\tan x}{x}, \quad \lim_{n \to \infty} \left(1 + \frac{1}{n}\right)^n, \quad \lim_{n \to 0} (1+n)^{1/n}, \quad \lim_{x \to 0} \frac{e^x - 1}{x}$$

Differentiation, successive differentiation, Leibnitz theorem, partial differentiation, Applications of differentiation, Tangent and normal, angle between two curves.

UNIT-V: TWO DIMENSIONAL ANALYTICAL GEOMETRY

Straight Lines - Pair Straight Lines

Text Book.

P.R. Vittal, Mathematical Foundations – Maragham Publication,

Chennai.

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V.Sundaram& Others, Dircrete Mathematical Foundation - A.P.Publication, sirkali.
3. P.Duraipandian& Others, Analytical Geometry 2 Dimension - Emerald publication 1992 Reprint.
4. Manicavachagompillay&Natarajan. Analytical Geometry part I - Two Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

SEMESTER II

CORE THEORY PAPER -2

C++ & DATA STRUCTURES

Objectives:

1. To understand the concepts of object-oriented programming and master OOP using C++.
2. To understand the concepts of Inheritance, polymorphism and templates.
3. To understand the concepts of different view of data, stack and queues.
4. To understand the concepts of Programming with Recursion, Binary Search Tree and graphs.
5. To understand the concepts of Sorting and Searching Algorithms.

UNIT-I :

Principles of Object Oriented Programming – Beginning with C++ – Token , Expressions and Control Structures- Functions in C++ – Classes and Objects – Constructors and Destructors.

UNIT-II :

Operator Overloading and Type Conversions – Inheritance : Extending Classes – Pointers, Virtual Functions and Polymorphism - Managing Console I/O Operations. Working with Files - Templates – Exception Handling – Manipulating Strings.

UNIT-III:

Data Design & implementations: Different views of data – Abstraction and Built-in Types – Arrays
ADTs Stacks and Queue (Linear and Linked) , Stack (Array and Pointer)- Applications- Infix to Postfix Conversions – Queue(Array and Pointer) – List(Array and Pointer) – Applications: (Polynomial Addition) - Doubly Linked Lists.

UNIT – IV:
Programming with Recursion : Recursion – Verifying and Writing Recursive Functions **– Binary Search Tree :** Implementation – Tree Traversal **– Graphs:** Implementations – BFS – DFS – Dijkstras Shortest Path Algorithm.*(Chapter 7:Section 7.1,7.4 7.5, Chapter 8:Section 8.1,8.4, Chapter 9:Section 9.3)*

UNIT-V:

Sorting and Searching Algorithms: Sorting – Searching – Hashing *(Chapter 10: Section 10.1,10.2,10.3)*

TEXT BOOK:

1. Object Oriented Programming with C++, E Balagurusamy , Tata McGraw Hill, 6th Edition, 2014.
(Units I, II)
2. C++ Plus Data Structure, Nell Dale, Jones & Bartlett Publishers , 4th Edition, 2010. (Units III, VI & V)

REFERENCES:

1. C++ The Complete Reference, Herbert Schildt, Tata McGraw Hill, 4th Edition, 2003.
2. OOP In ANSI C and Turbo C, Ashok N.Kamthene, Pearson Education, 6th Edition, 2008.
3. Data Structures and Algorithms, Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, Addison Wesley Longman Inc., 2nd Edition, 1999.

Course Outcomes:

- The Student will be able to understand the concepts of object oriented programming Apply structure and inline functions.
- The Student will be able to understand the concepts of the types of inheritances and Applying various levels of Inheritance for real time problems Apply the OOPs concepts class and object. Understand Explain the file concept and exception handlings in C++
- The Student will be able to understand the concepts of Stacks and Queue using array and pointers.
- The Student will be able to understand the concepts of Recursion, Binary Search Tree and graphs.
- The Student will be able to understand the concepts of Sorting and Searching Algorithms.

CORE PRACTICAL -2

C++ & DATA STRUCTURES LAB

Objectives:

1. To develop C++ programming skills in design
2. To understand the basic concepts of different abstract types and structure of data.
3. To understand the concepts of Function Overloading
4. To understand the concepts of Stack, Queue, List, Doubly Linked List - using Pointers- using Arrays.
5. To understand the concepts of Searching and Sorting Algorithms.

LIST OF LAB EXERCISES

1. Constructors & Destructors, Copy Constructor.
2. Friend Function & Friend Class.
3. Inheritance.
4. Polymorphism & Function Overloading.
5. Virtual Functions.
6. Overload Unary & Binary Operators Both as Member Function & Non Member Function.
7. Class Templates & Function Templates.
8. Exception Handling Mechanism.
9. Standard Template Library concept.
10. File Stream classes.
11. Array implementation of Stack, Queue : Infix to postfix
12. Implementation of Stack, Queue, List, Doubly Linked List - using Pointers- Polynomial Addition
13. Implementation of Binary Search Tree, Traversal
14. Implementation of Searching and Sorting Algorithms.
15. Graph Implementation of shortest path (Djikstras)

REFERENCE :

1. Object Oriented Programming with C++, E Balagurusamy , Tata McGraw Hill, 6th Edition, 2014.
2. C++ Plus Data Structure, Nell Dale, Jones & Bartlett Publishers , 4th Edition, 2010.

Course Outcomes:

- Understand the Creating and Deleting the Objects with the Concepts of Constructors and Destructors.
- Demonstrate the Polymorphism Concepts and Operator Overloading.
- Understand basic Data Structures such as Arrays, Linked Lists, Stacks, Queues, Doubly Linked List and Infix to Postfix Conversion.
- Apply Algorithm for solving problems like Sorting and Searching.
- Apply Algorithms and use Graphs and Trees as tools to visualize and simplify Problems

ALLIED – 1
PAPER –2
MATHEMATICAL FOUNDATIONS II

Objectives

To know about Matrix Operations, Symmetric, Skew-Symmetric, Hermitian, Skew-Hermitian, Orthogonal, Unitary Matrices. Rank of a Matrix Solutions of linear equations Consistency and Inconsistency, Characteristic roots and Characteristics Vectors, Cayley - Hamilton Theorem, Integration of rational functions, Integration by parts, Reduction formulae, Area and volume using integration, Planes, Straight lines, Spheres, Curves, Cylinders.

UNIT-I: MATRICES

Multiplication of matrices, Singular and Non-Singular matrices, Adjoint of a Matrix, Inverse of a matrix Symmetric and Skew-Symmetric, Hermitian and Skew-Hermition, Orthogonal and unitary matrices, Rank of a matrix, Solution of Simultaneous Linear equations by

(i) Cramer's rule.

(ii) Matrix Inversion Method.

UNIT-II: MATRICES

Test for Consistency and Inconsistency of linear equations, (Rank Method), characteristic roots and characteristic vectors, Cayley - Hamilton theorem, matrix of linear transformations: reflection about the x, y axes and the line y=x, rotation about the origin through an angle, expansion or compression, shears, translation.

UNIT-III

Integration Simple problems, integration of rational function involving algebraic expressions of the form

$$\frac{1}{\sqrt{ax^2+bx+c}}, \frac{1}{ax^2+bx+c}, \frac{px+q}{\sqrt{ax^2+bx+c}}, \frac{px+q}{ax^2+bx+c}, px+q\sqrt{ax^2+bx+c}$$

integrations using simple substitutions integrations involving trigonometric functions of the form

$$\frac{1}{a+b\cos x}, \frac{1}{a^2\sin^2 x+b^2\cos^2 x},$$ Integration by parts.

UNIT-IV

Properties of definite integrals. Reduction formulae for

$\int x^n e^{ax} dx$, $\int \sin^n x dx$, $\int \cos^n x dx$, $\int x^m (1-x)^n dx$, applications of integration for (i) Area under plane caurves, (ii) Volume of solid of revolution.

UNIT-V: ANALYTICAL GEOMETRY OF THREE DIMENSION

Planes, straight lines.

Text Book.

P.R.Vittal, Mathematical Foundations - Margham Publication,

Chennai.

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V.Sundaram& Others, Dircrete Mathematical Foundation - A.P.Publication, sirkali.
3. P.Duraipandian& Others, Analytical Geometry 3 Dimension – Emerald publication 1992 Reprint.
4. Manicavachagompillay&Natarajan. Analytical Geometry part II - three Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. MATHEMATICS DEGREE COURSE

(With effect from 2020 - 2021)
The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3	III	Core Theory	Paper-1	5	3	Algebra	25	75	100
4	III	Core Theory	Paper-2	5	3	Trigonometry	25	75	100
5	III	Allied -1	Paper-1	4	3	**(to choose any 1 out of 4)**	25	75	100
6	III	Allied- 1	Practical-1	2	0	(For Practical Allied subjects)	0	0	0
7	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
8	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**22**		**175**	**525**	**700**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
10	III	Core Theory	Paper-3	4	3	Calculus	25	75	100
11	III	Core Theory	Paper-4	4	3	Analytical Geometry of three dimensions	25	75	100
12	III	Allied-1	Paper-2	4	3	**(to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
13	III	Allied Practical - 1	Practical-1	2	2	**(to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
14	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
15	IV	Value Education		2	2		25	75	100
16	IV	Soft Skill		2	1		25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**

THIRUVALLUVAR UNIVERSITY

B.Sc. MATHEMATICS

SYLLABUS
CBCS PATTERN
(with effect from 2020 - 2021)

SEMESTER I

PAPER - 1

ALGEBRA

Objectives

In this Course students are exposed to topics like Theory of Equations, Summation of Series, Matrices, Continued Fractions and Elementary Number Theory. The stress is on the development of problem solving skills.

UNIT-I: THEORY OF EQUATIONS

Polynomial Equations – Relation between roots and coefficients - Symmetric Functions of roots in terms of Coefficients - Transformation of Equations - Reciprocal Equations.

UNIT-II: THEORY OF EQUATIONS (Contd...)

Descartes Rule of Signs - Approximate Solutions of Polynomials by Horner's method - Newton - Raphson method of Solving a Cubic Polynomial.

UNIT-III: SUMMATION OF SERIES

Summation of series using Binomial - Exponential and Logarithmic series (Theorems without proofs) - Approximation using Binomial, Exponential and Logarithmic series - simple problems.

UNIT-IV: MATRICES

Symmetric - Skew Symmetric, - Hermitian - Skew Hermitian - Orthogonal and Unitary Matrices - Eigen Values - Eigen Vectors – Cayley-Hamilton Theorem (without proof) - Similar Matrices - Diagonalisation of a Matrix.

UNIT-V: ELEMENTARY NUMBER THEORY

Prime Number - Composite Number - Decomposition of a Composite Number as a Product of Primes uniquely (without proof) - Divisors of a Positive Integer - Congruence Modulo *n* - Euler Function (without Proof) - Highest Power of a Prime Number p contained in *n!*- Fermat's and Wilson's Theorems (statements only) - simple problems.

Recommended Texts

T.K.Manicavachagom Pillay, T.Natarajan and K.S.Ganapathy.(2004) *Algebra,* Volume I & II S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books

1. P.Kandasamy, K.Thilagavathy (2004), Mathematics for B.Sc. Vol-I, II, III & IV, S.Chand& Company Ltd., New Delhi-55.
2. S.Arumugam (2003) *Algebra*. New Gamma Publishing House, Palayamkottai.
3. A.Singaravelu (2003) *Algebra and Trigonometry*, Vol.-I & II Meenakshi Agency, Chennai.
4. S.Sudha(1998) *Algebra and Trigonometry,* Emerald Publishers, Chennai.

Course Outcomes

At the end of the course the student will be able to

[1] know the relationship between roots and coefficients.
[2] identify the nature of the roots of the given equation .
[3] evaluate sum to infinity of the given binomial, exponential and logarithmic series.
[4] identify the types of matrices and calculate the Eigen values of a given square matrix.
[5] know the number theory concepts.

PAPER - 2

TRIGONOMETRY

Objectives

This course is a fundamental one for many courses of this Degree Programme. This covers topics on the expansions of trigonometric functions, hyperbolic functions, inverse circular, inverse hyperbolic functions and it aims to develop computational skills.

UNIT-I

Expansions of cosnθ, sinnθ in powers of cosθ and sinθ - Expansion of tannθ in powers of tan θ - Expansion of tan(A+B+C+…) - Formation of Equations.
Chapter III section 1 to 3

UNIT-II

Powers of sines and cosines of θ in terms of functions of multiples of θ - Expansions of sinθ, cosθ and tanθ in a series of ascending powers of θ –Approximation problems - Expansions of Inverse Circular Functions.
Chapter III Sections 4 and 5

UNIT-III:

Hyperbolic Functions: Definition – Relation between Hyperbolic and Circular Functions - Inverse Hyperbolic Functions.
Chapter IV sections 1 to 2.3

UNIT-IV

Resolution into Factors - simple problems only - DeMoivre's Property on the Circle and Cote's Property on the Circle - Logarithm of complex quantities.
Chapter V Sections 2 and 3(Problems only) 4, 4.1, 4.2, 5, 5.1, 5.2.

UNIT-V

Summation of Trigonometric Series: Method of Differences - Angles are in A.P, C+iS method of summation - Gregory Series - Euler Series.
Chapter VI Sections 1, 2 ,3 ,3.1, 3.2.

Recommended Text

1. S.Narayanan and T.K. Manicavachagom Pillay (2004) *Trigonometry.*S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books

1. P.Kandasamy, K.Thilagavathy (2004), Mathematics for B.Sc. Vol.-I, II, III & IV, S.Chand & Company Ltd., New Delhi-55.
2. S.Duraipandian and LaxmiDuraipandian (1984) *Trigonometry*. Emerald Publishers, Chennai.
3. B.S.Grewal. (2002) *Higher Engineering Mathematics.* Khanna Publishers. New Delhi.
4. S.L.Loney. (1982) *Plane Trigonometry,* Part II*,* Cambridge University Press, London.
5. A.Singaravelu (2003) *Algebra and Trigonometry*, Vol.-I Meenakshi Agency, Chennai.
6. P.R.Vittal. (2004) *Trigonometry*, Margham Publications, Chennai.

Course Outcomes

At the end of the course the student will be able to

[1] know the expansions of $\cos n\theta$, $\sin n\theta$ in powers of $\cos\theta$ and $\sin\theta$
[2] expand powers of sines and cosines of θ in terms of functions of multiples of θ
[3] know the concept of hyperbolic functions
[4] know the logarithm of complex quantities
[5] find the summation of trigonometric series.

SEMESTER II

PAPER - 3

CALCULUS

Objectives

The course introduces students to the fundamental principles, concepts and knowledge in the areas of Differential and Integral Calculus. This prepares the students to apply these fundamental concepts and working knowledge to other courses.

UNIT-I: Differential Calculus

n^{th} derivative - Leibnitz's theorem (Without proof) and its application - Jacobians - Total differential - Maxima and Minima functions of two and three independent variables - Lagrange's method (without proof) - Simple problems.

UNIT-II: Differential Calculus (Contd…)

Polar coordinates – Relation between Cartesian and Polar coordinates - Polar Equation of a Straight line, Circle and Conic only (Related problems not necessary) - Angle between radius vector and tangent – Angle between two curves – Curvature - Radius of Curvature in Cartesian and Polar coordinates.

UNIT-III: Differential Calculus (Contd…)

Centre of Curvature – Evolutes – Envelopes – Asymptotes – General method of finding asymptotes (First Section - Rational algebraic curves only).

UNIT-IV: Integral Calculus

Reduction formula for $\sin^n x$, $\cos^n x$, $\tan^n x$, $\sin^m x \cos^n x$ - Beta and Gamma Functions - Properties and Problems – Definite Integral – Properties - Simple Problems.

UNIT-V: Integral Calculus (Contd…)

Double Integrals - Change of order of Integration - Triple Integrals - Applications to Area, Surface Area and Volume.

Recommended Text

S.Narayanan and T.K.Manicavachagom Pillay (2004) *Calculus.*S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books

1. P.Kandasamy, K.Thilagavathy (2004), Mathematic for B.Sc. Vol.-I, II, III & IV, S.Chand& Company Ltd., New Delhi-55.
2. Shanti Narayan (2001) *Differential Calculus*. Shyamlal Charitable Trust, New Delhi.
3. Shanti Narayan (2001) *Integral Calculus.*S.Chand& Co. New Delhi.
4. S.Sudha (1998) *Calculus.* Emerald Publishers, Chennai.
5. G.B.Thomas and R.L.Finney. (1998) *Calculus and Analytic Geometry*, Addison Wesley (9^{th}Edn.), Mass. (Indian Print)
6. P.R.Vittal. (2004) *Calculus*, Margham Publication, Chennai.

Course Outcomes

At the end of the course the student will be able to

[1] determine extreme values of the given function
[2] know the concept of Cartesian and polar coordinates
[3] gain the knowledge of curvature, evolutes and envelope concepts
[4] solve integration problems
[5] evaluate double and triple integrals.

PAPER - 4

ANALYTICAL GEOMETRY OF THREE DIMENSIONS

Objective:

To deepen the knowledge of the students in various concepts of Analytical Solid Geometry.

Unit I: Plane

General equation of a plane – Equation of a plane in the normal form – Angle between planes – Plane through three given points – Equation of a plane through the line of intersection of two planes.

UNIT II: Straight Line

Symmetrical form of a straight line – Image of a point with respect to a plane – Image of a line with respect to a plane – Length and equation of the shortest distance between two skew lines - Coplanar lines.

UNIT III: Sphere

Equation of the sphere – Length of the tangent – Tangent plane – Section of a sphere by a plane – Orthogonal spheres – Equation of a sphere through a given circle.

UNIT IV: Cone

Equation of a cone with a given vertex and a given guiding curve - Equation of a cone with its vertex at the origin - Condition for the general equation of the second degree to represent a cone - Right circular cone – Enveloping cone - Tangency of a plane to a cone.

UNIT V: Cylinder

Equation of a cylinder with a given generator and a given guiding curve - Right circular cylinder - Enveloping cylinder – Enveloping cylinder as a limiting form of an enveloping cone.

Recommended Text

T.K.Manickavachagom Pillay & others. (2004) *Analytical Geometry* (Three Dimensions) S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books

1. P.Duraipandian and LaxmiDuraipandian (1965) *Analytical Geometry-2D,* Asia Publishing company, Bombay
2. P.Duraipandian and LaxmiDuriapandian (1975) *Analytical Geometry-3 D*, Emerald Publishers, Chennai.
3. G.B.Thomas and R.L.Finney.(1998) *Calculus and Analytic Geometr*y, Addison Wesley (9^{th}Edn.), Mass. (Indian Print).
4. P.R.Vittal (2003) *Coordinate Geometry.* Margham Publishers, Chennai

Course Outcomes

At the end of the course the student will be able to

[1] know the equation of the plane and its applications
[2] gain the knowledge of straight line and its applications
[3] solve sphere related problems
[4] know the concepts of cone, right circular cone and enveloping cone
[5] know the concepts related to cylinder.

ALLIED SUBJECTS FOR MATHEMATICS STUDENTS

To choose any two out of the following Four Allied subjects as Allied I and Allied II. Each Allied subject consists of two papers as paper I and Paper II and one Practical paper.

1. Mathematical Statistics (Paper I and II)
2. Numerical Methods (Paper I and II)
3. Physics (Paper I and II)
4. Chemistry (Paper I and II)

ALLIED

MATHEMATICAL STATISTICS - I

Objective

To apply Statistics Methods for Mathematical Problems.

UNIT-I

Concept of Sample Space - Events - Definition of Probability (Classical, Statistical and Axiomatic) - Addition and Multiplication laws of Probability - Independence of Events - Conditional Probability - Baye's Theorem - Simple Problems.

UNIT -II

Random Variables (Discrete and Continuous) - Distribution Function - Expectation and Moments - Moment Generating Function - Probability Generating Function - Cumulant Generating Function - Simple Problems.

UNIT-III

Characteristic Function - Properties - Uniqueness and Inversion Theorem (Statement only) Chebychev's Inequality - Simple Problems

UNIT-IV

Concept of Bivariate Distribution - Correlation - Karl Pearson's Coefficient of Correlation - Rank Correlation - Linear Regression.

UNIT-V

Standard distributions: Discrete distributions - Binomial, Poisson, Hyper Geometric and Negative Binomial Distributions - Continuous Distributions Normal, Uniform, Exponential.

Recommanded text book:

S.C. Gupta & V.K. Kapoor : Fundamentals of Mathematical Statistics, Sultan & sons

Books for Reference

1. Hogg, R.V. &Craig.A.T.(1998) : Introduction to Mathematical Statistics, Macmillan
2. Mood. A.M. Graybill. F.A.&Boes.D.G.(1974) : Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967) : Statistical Methods, Oxford and IBH
4. Hoel, P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. Wilks S.S. Elementary Statistical Analysis, Oxford and IBH

ALLIED

MATHEMATICAL STATISTICS II

Objective

To apply Statistics for Mathematical problems

UNIT-I

Statistical Population Census and Sampling Survey - Parameter and Statistics - Sampling and Sampling Distribution and Standard Error. Sampling distributions - students 't', chi - square and F distributions.

UNIT-II

Test of significance - Large sample test for proportion, mean and standard deviation - Exact test based on 't', Chi - square and F distribution with respect to population mean, variance and correlation coefficient - Tests of independence of attributes - goodness of fit tests.

UNIT-III

Point estimation - Concept of unbiasedness, consistency, efficiency and sufficiency - Cramer- Rao Inequality - Methods of Estimation - Maximum Likelihood Estimation - Method of Moments.

UNIT-IV

Test of Hypothesis: Null and Alternate Hypothesis - Type I and Type II error - Power of the test - Neymann Pearson lemma - Likelihood Ratio Test - Concept of Most Powerful test (Statement and Results only) - Simple Problems

UNIT-V

Analysis of Variance - One - way and Two-way Classification - Basic Principles of Design of Experiments - Randomization, Replication, Local Control, Completely Randomized Design, Randomized Block Design and Latin Square Design.

Recommended Text:

S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan & sons

Books for Reference

1. Hogg, R.V. & Craig. A. T. (1998): Introduction to Mathematical Statistics, Macmillan
2. Mood.A.M.,Graybill. F.A.&Boes. D.G.(1974): Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967): Statistical Methods, Oxford and IBH
4. Hoel.P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. Wilks . S. S.Elementary Statistical Analysis, Oxford and IBH

6. O. Kempthone - Design of Experiments
7. Das and Giri : Design of Experiments Wiley Eastern

ALLIED PRACTICAL

MATHEMATICAL STATISTICS

ALLIED PRACTICAL

MATHEMATICAL STATISTICS

1. Measures of location and Dispersion (absolute and relative)
2. Computation of Correlation Coefficient for raw and Grouped data, Rank Correlation Coefficient
3. Computation of Regression Equations for Raw and Grouped Data
4. Curve Fitting by the Method of Least Squares
   a. $y=ax+b$
   b. $y=ax^2+bx+c$
   c. $y=ae^{bx}$
   d. $y=ax^b$
5. Fitting of Binomial, Poisson, Normal distributions and tests of goodness of fit.
6. Large sample tests with regard to population mean, proportion, standard deviation
7. Exact tests with Respect to Mean, Variance and Coefficient of Correlation
8. Test for Independence of Attributes Based on Chi-Square Distribution
9. Confidence Interval based on Normal, t and Chi-square and F Distributions
10. Problems based on ANOVA-one way and two way Classification
11. Completely Randomized Design
12. Randomized Block Design
13. Latin Square Design

Note
Use of scientific calculator shall be permitted for practical examination.
Statistical and Mathematical tables are to be provided to the students at the examination hall.

- Mathematics faculty alone should be appointed as examiners.

Books for Reference

1. Hogg, R.V. &Craig.A.T.(1998): Introduction to Mathematical Statistics, Macmillan.
2. Mood.A.M. ,Graybill. F.A.&Boes.D.G.(1974) : Introduction to theory of Statistics, McGraw Hill.
1. Snedecor.G.W. &Cochran.W.G.(1967): Statistical Methods, Oxford and IBH
2. Hoel.P.G (1971): Introduction to Mathematical Statistics, Wiley.
3. S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan &sons
4. S.C. Gupta & V.K. Kapoor: Fundamentals of Applied Statistics, Sultan & sons

5. Wilks . S. S. Elementary Statistical Analysis, Oxford and IBH
6. O. Kempthone - Design of Experiments.

ALLIED PAPERS

NUMERICAL METHODS - I

Objectives

This course will cover basic methods for finding the Finite differences, Central differences, Inverse interpolation, Summation of series, Interpolation for equal & unequal intervals, Solutions of simultaneous equations, Important principles, Method and Processes to get numerical results, Reliability of numerical result.

UNIT-I: Finite Differences

First and higher order differences-forward differences and Backward differences-Properties of operators-Differences of a Polynomial-Factorial Polynomials-Operator E, Relation between ▲,▼and E–Interpolation - Newton - Gregory forward & backward formulae for interpolation.

UNIT-II: Central Differences

Central difference Operators-Central differences formulae: Gauss Forward and Backward formulae-Sterling's formula-Bessel's formula.

UNIT-III: Interpolation for Unequal Intervals

Divided differences-Newton's divided differences formula and Lagrange's-Estimating the Missing terms (With one or more missing values).

UNIT-IV: Inverse Interpolation

Lagrange's method and Reversion of series method (Using Newton's forward formula only).

Summation of series: Sum to n term of the series whose general term is the first difference of a function-summation by parts.

UNIT-V: Solutions of Simultaneous Linear Equations

Gauss elimination method-matrix inversion method-Gauss-Jordan Method, Gauss-Seidal method (Three unknowns only).

Recommended Text

1. B.D. Gupta.(2001) *Numerical Analysis.*Konark Pub. Ltd., Delhi
2. M.K. Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.

Reference Books

1. S. Arumugham. (2003) *Numerical Methods*, New Gamma Publishing, Palamkottai.
2. H.C. Saxena. (1991) *Finite differences and Numerical analysis* S.Chand & Co.,

Delhi
3. A.Singaravelu (2004). *Numerical Methods*Meenakshi Agency, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite difference & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

NUMERICAL METHODS II

Objectives

This course covers the techniques of Numerical Differentiation and Numerical Integration. It also deals with solution of difference equations, Algebraic and Transcendental equations and Numerical solution of Ordinary differential equations of first order.

UNIT-I: Numerical Differentiation

Newton's forward and backward differences to compute derivatives-derivative using divided differences formula-maxima and minima using the above formulae.

UNIT-II: Numerical Integration

General Quadrature formula-Trapezoidal rule-Simpson's one third rule-Simpson's three-eight rule, Weddle's rule- Euler-Maclaurin Summation Formula

UNIT-III: Difference Equations

Linear differences equations-Linear homogeneous difference equation with constant co-efficient-Particular integrals for a^x, x^m, sinax, cosax and a^x f(x).

UNIT-IV: Solution of Algebraic and Transcendental Equations

Bisection method-Iteration method-Regula-falsi method (False Position Method)-Newton-Rapson Method.

UNIT-V: Numerical Solution of Ordinary Differential Equations (First order only)

Euler's method- Euler's modified method-Picard's method - Taylor's methods-Runge-Kutta method (Fourth order only).

Recommended Text

1. B.D. Gupta. (2001) *Numerical Analysis.*Konark Pub. Ltd., Delhi
2. M.K.Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.

Reference Books

1. Gupta-Malik, Calculus of finite differences and numerical Analysis, KrishbaPrakashanMandir, Meerut Seveenth Edition.
2. S.C.Saxena, Calculus of finite differences and Numerical Analysis, S.Chand& Co., New Delhi. IX Edition.
3. A.Singaravelu, Numerical methods, Meenakshi Publications-First Edition 1992.
4. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite Difference & Numerical Analysis, S.Chand& Company Ltd., New Delhi-55.

ALLIED PRACTICAL

NUMERICAL METHODS

LIST OF PROBLEMS

1. Derivatives by Newton’s method
2. Gauss elimination method.
3. Gauss-Jacobi method.
4. Gauss-Siedel method.
5. Newton's forward and backward interpolation.
6. Lagrange interpolation.
7. Trapezoidal and Simpson one-third rules.
8. Euler's method.
9. Picard’s method
10. Runge-Kutta's method.

ALLIED
PHYSICS
PAPER-1

Course Objectives

1. To understand the basics of gravitation and to study the properties of matter.
2. To learn the law of thermoelectric circuits and thermoelectric diagrams.
3. To teach the growth and decay of a transient current and magnetometer.
4. To explain production of ultrasonics and reverberation time.
5. To know the basics of laser and fibre optics principles and applications.

UNIT-1: Properties of Matter

Gravitation: Acceleration due to gravity -Determination of 'g' by Simple pendulum - Drawbacks of simple pendulum –Determination of time period of compound pendulum - 'g' by compound pendulum -Centre of Oscillation and Centre of Suspension are interchangeable-Determination of 'g' by Bar/compound pendulum.

Elasticity: Bending of beams -Expression for bending moment - Cantilever Depression at the loaded end of a cantilever Expression forYoung's modulus -non–uniform bending-Pin and microscope method.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period -Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid -Viscous force - Co-efficient of viscosity of a liquid – Poiseuille's formula -Experimental method using Burette- Effect of temperature and pressure on viscosity-applications.

Surface Tension: Surface tension of a liquid-Surface Tension and interfacial surface tension by the method of drops-applications.

UNIT-2: Thermo Electricity

Seeback, Peltier and Thomson effects - laws of thermoelectric circuits -Peltier coefficient - Thomson coefficient -application of thermodynamics to a thermocouple and expressions for Peltier and Thomson coefficients -thermo electric power and thermo electric diagrams.

UNIT-3: Transient Current and Magnetism

Growth and decay of current in a circuit containing resistance and inductance- Growth and decay of charge in circuit containing resistance and capacitor - growth and decay of charge in a LCR circuit – condition for the discharge to be oscillatory – frequency of oscillation.

Magnetism -Magnetic moment and pole strength of a magnet – Deflection magnetometer – Tan C Position- Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer and the vibration magnetometer .

UNIT -4: Acoustics

Sound: Transverse vibration of strings -Velocity and frequency of vibrations of a stretched string -laws -Sonometer -A.C. Frequency - Steel wire- Brass wire.

Introduction to Ultrasonics – Piezo electric effect–production by Piezo electric method – properties –applications- Acoustics of buildings – reverberation time – derivation of Sabine's formula – determination of absorption coefficient-Acoustic aspects of halls and auditoria.

UNIT-5:Lasers and Fibre Optics

Laser: Introduction - Principles of laser -Einstein's explanation for stimulatedemission – Differences between stimulated and spontaneous emission - Population inversion –Properties of laser -Types of lasers - He- Ne Laser - Semiconductor Laser-Applications of laser.

Fibre optics: Basic principle of an optical fibre -Total internal reflection -Basic structure of an optical fibre -Numerical aperture –Coherent bundle – Attenuation and dispersion - classification of optical fibres-step index and graded index fibers – single mode and multi mode fibers-Fibre optic communication system block diagram.-applications.

Text Books

Unit 1 and Unit 4

1. R. Murugesan and KiruthigaSivaprasath, Properties of Matter and Acoustics, S. Chand & Co. New Delhi, Kindle edition.

Unit 2 and Unit 3

1. R. Murugesan, Electricity & Magnetism, S. Chand & Co. New Delhi, 2019.

Unit 5

1. N Subrahmanyam, BrijLal and M.N Avadhanulu, A Text Book of Optics, S. Chand &Co. New Delhi, Revised Edition as per UGC model syllabus.

Reference Books

1. BrijLal and N Subrahmanyam,Electricity and Magnetism, S Chand & Company Pvt Ltd, New Delhi, 2000.
2. D.C. Tayal, Electricity and Magnetism, Himalaya Publishing House,Bombay, 2014.
3. BrijLal and N.Subrahmanyam, A Text Book of Sound,Vikas Publications, New Delhi (2 Edition)
4. C.L.Arora, Physics for Degree Students B.Sc First Year, S. Chand Publishing, 2013.
5. K.Thyagarajan and Ajay Ghatak, Introduction to Fibre optics-, Cambridge University.

6. Ajay Ghatak and K.Thyagarajan, Fiber optics and Lasers-The two revolutions, Macmillan, 2006.
7. K.Thyagarajan and Ajay Ghatak, Lasers; Fundamentals and applications, Springer.
8. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2016.

E-MATERIALS

1. https://courses.lumenlearning.com/physics/chapter/16-4-the-simple-pendulum/
2. https://www.youtube.com/watch?v=aw0_seEt4v0
3. https://en.wikipedia.org/wiki/Thermoelectric_effect
4. https://www.youtube.com/watch?v=S0I37M2sx_0
5. https://physicscatalyst.com/elecmagnetism/growth-and-delay-charge-R-C-circuit.php
6. https://www.youtube.com/watch?v=PLQQPXot6vE
7. https://www.youtube.com/watch?v=d0_Eff4MXwM
8. https://www.techglads.com/cse/sem1/production-of-ultrasonics-by-piezoelectric-methods/
9. https://thefactfactor.com/facts/pure_science/physics/optical-fibre/5159/
10. https://www.youtube.com/watch?v=auk1OS0SVWc (Tamil video)

Course Objectives

1. After studied unit-1, the student will be able to find the acceleration due to gravity at a place using simple pendulum and compound pendulum. Also can know the properties of matter like elasticity, viscosity and surface tension.
2. After studied unit-2, the student will be able to learn thermo emf using Seebeck and Peltier effects and hence understand thermoelectric circuits.
3. After studied unit-3, the student will be able to explain growth and decay of a transient current in a circuit containing resistance-inductance, resistance-capacitance and LCR in series. Also will be able to determine the horizontal components of earth's magnetic induction at a place using deflection magnetometer in Tan C position.
4. After studied unit-4, the student will be able to derive the expression for the velocity of a sound in a stretched string and hence they can determine the frequency of A.C mains.
5. After studied unit-5, the student will be able to understanding the principle of laser and can demonstrate the working of He-Ne laser and applications of laser. Also, the student will be able to learn the fibre optics, structure and application in communication.

ALLIED
PHYSICS
PAPER-2

Course Objectives

1. To study the concept of special theory of relativity.
2. To expose the structure of atom with different models.
3. To know the definition of binding energy and to study about nuclear models
4. To learn the different number system in digital electronics and logic gates
5. To give an introduction about nanomaterial.

UNIT-1: Special Theory of Relativity

Frames of reference-inertial frames and non-inertial frames -Galilean transformations - Michelson-Morley experiment-interpretation of results - postulates of special theory of relativity Lorentz transformation equations -length contraction - time dilation - transformation of velocities -variation of mass with velocity -Mass-energy equation.

UNIT-2: Atomic Physics

Bohr atom model – Critical Potentials - Experimental determination of critical potentials - Franck and Hertz's experiment -Sommerfield's Relativistic atom model The vector atom model – spatial quantization–spinning of an electron –quantum numbers associated with the vector atom model – coupling schemes –LS and jj coupling – the Pauli's exclusion principle – Stern and Gerlach experiment

UNIT-3: Nuclear Physics

Binding energy-Binding energy per nucleon-Packing fraction-Nuclear models – liquid drop model – semi empirical mass formula – merits and demerits -shell model -evidences for shell model – nuclear radiation detectors –ionization chamber – G.M Counter-Wilson cloud chamber-Particle accelerators-Cyclotron-Betatron.

Unit-4: Digital Electronics

Number systems -Decimal, Binary, Octal and Hexadecimal system – Conversion from one number system to another- Binary Arithmetic -Addition –Subtraction- 1's and 2's complement -Binary codes- BCD code – Excess 3 code, Gray code.

NAND, NOR and EXOR – functions and truth tables. NAND & NOR as universal gates-Half adder and Full adder - Half subtractor and Full subtractor using NAND gate only.

UNIT-5: Nanomaterial

Introduction-Nanomaterial- Properties of nanomaterial (size dependent) -synthesis of nanomaterial- sol gel- hydrothermal method-Scanning Electron Microscope (SEM)- Principle and Instrumentation-Fullerenes- Carbon nanotubes- Fabrication and structure of carbon nanotubes - Properties of carbon nanotubes (Mechanical and Electrical) - Applications ofCNT's.

Text Books

Unit 1 to Unit 3

1. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2016

Unit 4

1. V.Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007

Unit 5

1. V. Raghavan, *Material Science and Engineering* ,Printice Hall India.,2004.

Reference Book

1. Allied Physics – R. Murugesan S. Chand & Co. New Delhi, 2005.
2. A Text book of Digital electronics – R.S.Sedha, S.Chand&Co, 2013
3. Malvino and Leech, Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi, 2000.
4. Dr. M.N. Avadhanulu, *Material science*, S.Chand& Company, New Delhi, 2014.
5. M.Arumugam, *Material science*, Anuradhapuplishers, 1990.
6. V. Rajendran, *Material Science*, Tata McGraw Hill Ltd, New Delhi,2001.
7. D.C.Tayal, Nuclear Physics, Himalaya Publishing House, 2009

E-MATERIALS

1. https://en.wikipedia.org/wiki/Galilean_transformation
2. https://www.youtube.com/watch?v=NH3_lIkSB9s
3. https://www.youtube.com/watch?v=EEWuUst2GK4
4. https://en.wikipedia.org/wiki/Vector_model_of_the_atom
5. https://www.tutorialspoint.com/what-is-a-geiger-muller-counter
6. https://www.youtube.com/watch?v=jxY6RC52Cf0
7. https://www.tutorialspoint.com/digital_circuits/digital_circuits_number_systems.htm
8. https://www.youtube.com/watch?v=4ae9sJBBkvw
9. https://en.wikipedia.org/wiki/Nanomaterials
10. https://www.youtube.com/watch?v=mPxoJz6treE (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to study the frames of reference, Galilean transformation equations and special theory of relativity.
2. After studied unit-2, the student will be able to describe the different atomic models and Stern and Gerlach Experiment.
3. After studied unit-3, the student will be able to explain binding energy, liquid drop model, G.M counter and particle accelerators.
4. After studied unit-4, the student will be able to know the conversion of number systems from one to other and also will be able to design universal gates using NAND and NOR gates.
5. After studied unit-5, the student will be able to understanding the basics of nanomaterial, synthesis and its applications.

ALLIED PRACTICAL- PHYSICS

ALLIED PRACTICAL- PHYSICS

List of Experiments (Any 12 Experiments only)

1. Determination of 'g' using Compound pendulum.
2. Young's modulus-Non-Uniform bending-Pin & microscope
3. Rigidity Modulus – Torsional oscillation method (without masses).
4. Rigidity Modulus – Static Torsion method using Scale and Telescope.
5. Surface tension and Interfacial Surface tension by Drop Weight method.
6. Sonometer – Frequency of a Tuning fork.
7. Sonometer –Determination of A.C. frequency- using steel and brass wire
8. Air Wedge – Determination of thickness of a thin wire
9. Newton's Rings – Radius of Curvature of a convex lens.
10. Spectrometer – Refractive index of a liquid – Hollow prism.
11. Spectrometer grating – Minimum Deviation- Wavelength of Mercury lines.
12. Potentiometer – Calibration of Low range voltmeter.
13. Deflection magnetometer and Vibration magnetometer-Tan C Position-Determination of m and B_H.
14. Figure of merit- Table galvanometer.
15. Construction of AND, OR gates using diodes and NOT gate using a transistor.
16. NAND/NOR as universal gate.
17. Half adder and Full adder using NAND gate.
18. Half subtractor and Full subtractor using NAND gate.
19. Lasers: Study of laser beam parameters.
20. Measurement of Numerical aperture (NA) of a telecommunication graded index optic fiber.
21. Fiber attenuation of a given optical fiber.

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai,2018.
2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Dr. S. Somasundaram, Practical Physics, Apsarapublications,Tiruchirapalli, 2012.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

ALLIED

PAPER – 1

CHEMISTRY – I

OBJECTIVE:

- Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications wherever necessary are to be taught for I- Semester.

UNIT – I

1.1General Metallurgy - Extraction of Metals - Minerals and Ores- Difference between Minerals and Ores – Minerals of Iron, Aluminum and Copper - Ore Dressing or Concentration of Ores - Types of Ore Dressing- Froth Floatation process, Gravity separation and Magnetic separation.

1.2 Calcination, Smelting, Roasting, Fux, Slag - Definition - Reduction methods - Goldschmidt Aluminothermic process and Carbon Reduction method - Refining of Metals - Electrolytic, Van Arkel and Zone Refining.

1.3 Ores of Titanium and Cobalt - Extraction of Titanium and Cobalt.

UNIT – II

2. Cycloalkanes - Preparation – Wurtz reaction and Dieckmann's condensation - Properties of Cycloalkanes – Substitution and Ring opening reactions.

2.2 Polarisation - Inductive effect, Mesomeric effect and Steric effect (Acid and Base Strength).

2.3Stereoisomerism – Types - Cause of Optical Activity – Enantiomers - Diastereomers - Meso form - Optical Activity of Lactic acid and Tartaric acid - Racemisation and Resolution – Definition and Methods - Geometrical isomerism – Definition and example - Maleic and Fumaric acid – Differences.

UNIT – III

3.1 Chemical Kinetics – Rate of a reaction – Definition of Order and Molecularity – Distinction between Order and Molecularity - Derivation of First order rate equation - Half Life Period of first order reaction.

3.2 Catalysis - Catalyst - Autocatalyst - Enzyme catalyst - Promoters - Catalytic poisons –
Active Centre - Differences between Homogeneous and Heterogeneous Catalysis - Industrial Applications of Catalysts.

3.3 Photochemistry – Grothus-Draper's law – Stark-Einstein's law - Quantum yield – Photosynthesis - Phosphorescence – Fluorescence.

UNIT – IV

4.1 VSEPR Theory – Hybridisation and Shapes of simple molecules BF_3, PCl_5, SF_6 and XeF_6.

4.2 Fuels – Classification of Fuels - Calorific value of Fuels – Water gas, Carbureted Water gas and Producer gas – Composition and Uses - Non-Conventional fuels - Need of Solar Energy - Applications - Biofuels – Oil gas, Natural gas and LPG – Uses.
4.3 Osmosis - Osmotic pressure - Reverse osmosis – Definition - Desalination of Sea water.

UNIT – V

5.1Nuclear Chemistry – Atomic number, Mass number - Isotopes, Isobars and Isotones – Definition and Examples - Definition of Half life period - Nuclear Binding Energy, Mass Defect and N/P ratio - Nuclear Fission and Nuclear Fusion (Elementary idea) - Applications of Radioisotopes in Medicine, Agriculture and Industries – Carbon Dating.

5.2 Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking –

Naphthalene – Preparation – Haworth's method – Properties – Oxidation, Reduction and Uses of Naphthalene - Structure of Naphthalene (Structural elucidation not necessary).

5.3 Conductors, Insulators, Semiconductors, N- and P- Type Semiconductors – Definitions and Examples.

ALLIED PAPER – 2

CHEMISTRY – II

OBJECTIVE:

- Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins, Medicinal Chemistry, Corrosion and Applications wherever necessary are to be taught for II- semester.

UNIT – I

1.1 Coordination Chemistry - Nomenclature of Coordination Compounds - Ligands, Central Metal Ion and Complex Ion – Definition and Examples – Coordination Number - Werner's Theory of Coordination Compounds - Chelates - Functions and Structure of Haemoglobin and Chlorophyll.

1.2 Industrial Chemistry - Fertilisers and Manures – Biofertilisers - Organic Manures and their importance - Role of NPK in plants - Preparation and Uses of Urea, Ammonium Nitrate, Potassium Nitrite and Super Phosphate of Lime.

1.3 Contents in Match Sticks and Match Box - Industrial making of Safety Matches – Preparation and Uses of Chloroform, DDT, Gammexane and Freons.

UNIT – II

2.1 Carbohydrates - Definition and Examples - Classification – Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate.

2.2 Amino Acids – Definition and Examples - Classification of Amino Acids -

Preparation - Gabriel Phthalimide Synthesis – Properties – zwitterion and Isoelectric point - Structure of Glycine.

2.3 Proteins – Definition - Classification of Proteins based on Physical properties and Biologcal functions - Primary and Secondary Structure of Proteins (Elementary Treatment only) – Composition of RNA and DNA and their Biological role - Tanning of Leather - Alum (Aluminum chloride tanning) - Vegetable tanning – Chrome Tanning.

UNIT – III

3.1 Electrochemistry - Electrolytes – Definition and Examples – Classification - Specific and Equivalent Conductance - their determination – Variation of Specific and Equivalent conductance with Dilution – Ostwald's Dilution Law and its Limitations.

3.2 Kohlrausch's Law - Determination of Dissociation Constant of weak Electrolytes using Conductance measurement - Conductometric titrations.

3.3 pH – Definition and pH determination by indicator method - Buffer solutions - Buffer action - Importance of buffers in the living systems.

UNIT – IV

4.1Paints - Components of Paint – Requisites of a Good Paint - Pigments – Classification of Pigments on the basis of Colour – Examples - Dyes – Definition – Chromophores and Auxochromes – Examples - Colour and Dyes - Classification based on Constitution and Application – Examples.

4.2 Vitamins – Definition – Classification – Water Soluble and Fat Soluble –

Occurrence - Biological Activities and Deficiency Diseases caused by Vitamin A, B, C, D, E and K - Hormones – Definition and Examples – Biological Functions of Insulin and Adrenaline.

4.3 Chromatography - Principles and Applications of Column and Paper chromatography- R_f value.

UNIT – V

5.1 Drugs - Sulpha Drugs – Preparation and Uses of Sulphapyridine and Sulphadiazine - Mode of Action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicol and Streptomycin - Drug Abuse and Their Implication - Alcohol – LSD.

5.2 Anaesthetics - General and Local Anaesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS.

5.3 Electrochemical Corrosion and its Prevention – Electroplating – Applications.

ALLIED PRACTICAL

CHEMISTRY

VOLUMETRIC ANALYSIS

1. Estimation of HCl – Standard sulphuric acid.
2. Estimation of Borax - Standard Sodium Carbonate.
3. Estimation of NaOH – Standard Oxalic Acid.
4. Estimation of $FeSO_4$ – Standard FAS.
5. Estimation of Oxalic acid – Standard $FeSO_4$.
6. Estimation of FAS – Standard Oxalic Acid.
7. Estimation of Oxalic acid – Standard Oxalic Acid.
8. Estimation of Fe^{2+} using Diphenylamine / N- Phenyl Anthranilic acid as indicator.

ORGANIC ANALYSIS

Systematic Analysis of Organic Compounds containing One Functional Group and Characterisation by Confirmatory Tests.

Reactions of Aromatic Aldehyde, Carbohydrates, Mono and Dicarboxylic acids,

Phenol, Aromatic Primary Amine, Amide and Diamide.

REFERENCE BOOKS

- Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).
- Inorganic Chemistry - B. R.. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications (2013).
- Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
- Text Book of Inorganic Chemistry – R. Gopalan, Universities Press – 2012.
- Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
- Advanced Organic Chemistry - Bahl and Arun Bahl - Sultan Chand and Co. Ltd – 2012.

- Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
- A Text Book of Organic Chemistry K. S. Tewari, N. K. Vishol, S. N. Mehrotra-Vikas Publishing House – 2011.
- Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishal Publishing Company – 2013.
- Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha andU. N. Dash - Sultan Chand & Co – 2006.
- Understanding Chemistry – C. N. R. Rao, Universities Press – 2011.

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THIRUVALLUVAR UNIVERSITY

PART-IV

ENVIRONMENTAL STUDIES

SYLLABUS

(For all UG Degree Courses)

(with effect from 2020-2021)

SEMESTER I

UNIT-I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES :

Environmental Sciences - Relevance - Significance - Public awareness - Forest resources - Water resources - Mineral resources - Food resources - conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies.

UNIT-II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION:

Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem.

Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) and local levels - Hotspots, threats to biodiversity - conservation of biodiversity - Insitu & Exsitu.

UNIT-III: ENVIRONMENTAL POLLUTION AND MANAGEMENT

Environmental Pollution - Causes - Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management - Floods, Earth quake, Cyclone and Land slides. Role of individuals in prevention of pollution - pollution case studies.

UNIT-IV: SOCIAL ISSUES - HUMAN POPULATION

Urban issues - Energy - water conservation - Environmental Ethics - Global warming - Resettlement and Rehabilitation issues - Environmental legislations - Environmental production Act. 1986 - Air, Water, Wildlife and forest conservation Act - Population growth and Explosion - Human rights and Value Education - Environmental Health - HIV/AIDS - Role of IT in Environment and Human Health - Women and child welfare - Public awareness - Case studies.

UNIT-V: FIELD WORK

Visit to a local area / local polluted site / local simple ecosystem - Report submission

REFERENCES

1. KUMARASAMY, K., A.ALAGAPPA MOSES AND M.VASANTHY, 2004. ENVIRONMENTAL STUDIES, BHARATHIDSAN UNIVERSITY PUB, 1, TRICHY

2. RAJAMANNAR, 2004, ENVIRONEMNTAL STUDIES, EVR COLLEGE PUB, TRICHY

3. KALAVATHY,S. (ED.) 2004, ENVIRONMENTAL STUDIES, BISHOP HEBER COLLEGE PUB., TRICHY

திருவள்ளுவர் பல்கலைக்கழகம், வேலூர்
இளநிலைப் பட்டப்படிப்பு

அடித்தளப் படிப்பு – பகுதி -1 தமிழ்
முதலாமாண்டு – முதற்பருவம்
2020 - 2021

அலகு – 1 கவிதை

1. பாரதியார்	-	நெஞ்சுபொறுக்கு திலையே... (7 பாடல்கள்)
2. பாரதிதாசன்	-	1. தமிழின் இனிமை 2. சங்கநாதம்
3. கவிமணிதேசிய விநாயகம்பிள்ளை	-	மலரும் மாலையும் - 'கோவில் வழிபாடு'
4. கவிஞர் சுரதா	-	தேன்மழை – 'தலைமை தாங்கும் தமிழ்'
5. அப்துல் ரகுமான்	-	ஆலாபனை – 'ஆறாவது அறிவு'
6. மு.மேத்தா	-	தேசப் பிதாவுக்கு ஒரு தெருப்பாடகனின் அஞ்சலி
7. நா.தனராசன்	-	அந்தகிராமத்து மனிதன் - 'தூய்மை மலரட்டும்'
8. சுகிர்தராணி	-	சிறப்பு மண்டலம் - எங்கள் வளநாடு
9. மாலதி மைத்ரி	-	அகதி

அலகு -2 உரைநடை

1. ரா.பி.சேதுப்பிள்ளை	-	வாழ்க்கையும் வைராக்கியமும்
2. மயிலை சீனி வேங்கடசாமி	-	பழங்காலத்து அணிகலன்கள்

அலகு -3 நாடகம்

1. அறிஞர் அண்ணா	-	பாரதம்
2. ஆறு. அழகப்பன்	-	கொல்லிப்பாவை

அலகு -4 சிறுகதை

1. நாற்காலி	-	கி. ராஜநாராயணன்
2. வளவ.துரையன்	-	சேலத்தார் வண்டி

அலகு -5 மொழித்திறன்

1. அடிப்படை இலக்கணம் - பெயர்ச்சொல், வினைச்சொல் அறிதல்
2. ண-ன-ந, ல-ள-ழ, ர-ற வேறுபாடு அறிதல்
3. கலைச் சொல்லாக்கம்
4. பிறமொழிச் சொல் நீக்கித் தமிழ்ச்சொல் அறிதல்

இலக்கிய வரலாறு

பாடப்பகுதியை ஒட்டிய இலக்கிய வரலாறு : 20-ஆம் நூற்றாண்டுக் கவிஞர்கள் கவிதை, உரைநடை, நாடகம், சிறுகதை ஆகிய இலக்கியங்களின் வளர்ச்சி நிலை.

இளநிலைப் பட்டப்படிப்பு

அடித்தளப் படிப்பு – பகுதி -1 தமிழ்
முதலாமாண்டு – இரண்டாம் பருவம்
2020 – 2021

அலகு – 1 கவிதை

1.	திருநாவுக்கரசர்	-	திருவதிகை பதிகம் (கூற்றாயினவாறு விளக்களீர் - முதல் 5 பாடல்கள்)
2.	மாணிக்கவாசகர்	-	அச்சோபதிகம் (முக்தி நெறியே அறியாத – முதல் 5 பாடல்கள்)
3.	திருமூலர்	-	கல்வி (முதல் 5 பாடல்கள்)

அலகு -2

1.	ஆண்டாள்	-	நாச்சியார் திருமொழி (கற்பூரம் நாறுமோ – எனத் தொடங்கும் 5 பாடல்கள் மட்டும்)
2.	குலசேகராழ்வார்	-	பெருமாள் திருமொழி (4-ஆம் திருமொழி)
3.	நம்மாழ்வார்	-	உயர்வர உயர்நலம் உடையவன் (எனத் தொடங்கும் 5 பாடல்கள்)

அலகு -3

1.	பலபட்டடை சொக்கநாதப்புலவர்	-	அழகர் கிள்ளை விடு தூது
2.	ஜெயங்கொண்டார்	-	கலிங்கத்துப்பரணி (கடைத்திறப்பு)
3.	முக்கூடற்பள்ளு	-	ஏசல்

அலகு -4

1.	கண்ணதாசன்	-	ஏசுகாவியம் (ஊதாரிப்பிள்ளை)
2.	குணங்குடி மஸ்தான் சாகிபு	-	மஸ்தான் சாகிபு பாடல்கள் பரா பரக்கண்ணி (1-40 கண்ணிகள்)
3.	பட்டினத்தார் பாடல்கள்	-	திருவிடை மருதூர் (காடே திரிந்து – எனத் தொடங்கும் பாடல்

பா.எண்.279, 280)

அலகு -5

1. நேர்காணல்
2. நாளிதழுக்கு அறிக்கைத் தயாரித்தல்
3. பாடப்பகுதியைஒட்டிய இலக்கிய வரலாறு

சைவ, வைணவ சமய இலக்கியங்கள், கிறிஸ்துவமும் தமிழும், இஸ்லாமியமும் தமிழும்.

இளநிலைப் பட்டப்படிப்பு

அடித்தளப் படிப்பு – பகுதி -1 தமிழ்
இரண்டாமாண்டு – மூன்றாம் பருவம்
2020 - 2021

அலகு – 1 திருக்குறள்

1. வான்சிறப்பு
2. வாழ்க்கைத் துணை நலம்
3. நட்பு
4. ஒழுக்கமுடைமை
5. பொழுது கண்டு இரங்கல்

அலகு -2

சிலப்பதிகாரம்
மதுரைக் காண்டம் - அடைக்கல காதை

மணிமேகலை
ஆபுத்திரன் திறம் அறிவித்த காதை
பதிமூன்றாவது காதை

அலகு -3

சீவகசிந்தாமணி
நாமகள் இலம்பகம்
ஏமாங்கத நாடு வர்ணனை

கம்பராமாயணம்
மந்தரை சூழ்ச்சி படலம்
அயோத்திய காண்டம்

அலகு -4

பெரியபுராணம் - மெய்ப்பொருள் நாயனார் புராணம்

சீறாப்புராணம் - விடம் மீட்ட படலம்

இரட்சண்ய யாத்திரிகம் - சிலுவைப் பாடுகள்

அலகு -5

மொழித்திறன்

1. விண்ணப்பம் எழுதுதல்
2. தன் விவரக் குறிப்பு எழுதுதல்

இலக்கிய வரலாறு

புதினெண்கீழ்க்கணக்கு நூல்களில் அற இலக்கியங்கள்
காப்பிய இலக்கியங்கள்.

இளநிலைப் பட்டப்படிப்பு

அடித்தளப் படிப்பு – பகுதி -1 தமிழ்
இரண்டாமாண்டு – நான்காம் பருவம்
2020 - 2021

அலகு – 1

1. குறுந்தொகை - திணைக்கு 1 பாடல் வீதம் 5 பாடல்கள் - (3, 7, 145, 275, 364)
2. நற்றிணை - திணைக்கு 1 பாடல் வீதம் 5 பாடல்கள் - (72, 110, 216, 238, 310)
3. ஐங்குறுநூறு - வேட்கைப் பத்து

அலகு -2

1. புறநானூறு - (பாடல்கள் - 114, 138, 163, 204, 205)
2. பதிற்றுப்பத்து - (ஐந்தாம் பத்து பாடல்கள் - 42, 45)

அலகு -3

1. கலித்தொகை - முல்லைக்கலி (பாடல் எண்.111)
   நெய்தற்கலி (பாடல் - 136)
2. பரிபாடல் - திருமால் - 1 : 36 – 73
   வையை – 6 : 1 – 24

அலகு -4

பத்துப்பாட்டு - குறிஞ்சிப்பாட்டு (முழுவதும்)

அலகு -5

சங்க இலக்கிய வரலாறு

1. எட்டுத்தொகை நூல்கள்
2. பத்துப்பாட்டு நூல்கள்.

THIRUVALLUVAR UNIVERSITY

HUMAN RIGHTS

COMPULSORY PAPER

(For all PG Degree Courses)

(with effect from 2020-2021)

Course Objectives

1.Human Rights are the rights of all Human Beings. They have universal application. Awareness about Human Rights and concern for its protection has become an important issue after the second world war and paved way for world Nations to come together for acceptance of Universal Declaration of Human Rights.

2. The role of UN in protecting and promoting awareness of Human Rights is highly significant. The binding nature of the International Conventions and Covenants are still a dilemma. The persuasive force in case of violation of human rights by International community is an area of concern. In the absence of National legislations enforcement of these rights remain as one farce.

3. To trace the development of regional instruments drafted aiming at protection of Human Rights and its enforceability.

4.The Indian perspective of protection of Human Rights vide its Legislations , the Constitution of India more read by its language, the Fundamental rights, Duties and Directive Principles of the State Policy has been elicited. The response shown by Indian judiciary and the expression of judicial activism is highlighted. The development of Human Rights jurisprudence in India is traced.

5.The Special legislations and the enforcement machineries remain as a watch dog in the due enforcement of Human Rights in India. The duty to protect human right of all individuals more particularly those are vulnerable remains more as a National obligation. The course intents to evaluate the Redressal mechanisms practiced in India.

COURSE CONTENTS

UNIT-1:

Human rights- Concepts & Nature

Human Rights: Meaning, Definition, Nature, Content- Legitimacy of Human Rights- Origin and Development of Human Rights- Theories – Principles of Magna Carta – Modern Movements of Human Rights – The Future of Human Rights.

UNIT-2:

Human Rights – The International Perspective

International human rights – Human Right concepts Prior and after World War II – UNO – Universal Declaration of Human Rights (UDHR) – International Covenant on Civil and Political Rights (ICCPR) – International Covenant on Economic, Social and Cultural Rights (ICESCR)- Optional Protocols- Human Right Declarations – Role of United Nation Commissions – Convention on the Elimination of All forms of Discrimination against women (CEDAW) – United Nations Convention against Torture (UNCAT) - United Nations Convention on the Rights of the Child (CRC or UNCRC) - Conventions on the Protection of the Rights of Migrant Workers and Disabled.

UNIT-3:

Regional Human Rights

European Human Rights System- African Human Rights System – International Human Rights – Enforceability before Domestic Courts.

UNIT-4:

Human Rights in India

The Constitution of India – Fundamental Rights – Right to Life and Liberty – Directive Principles of State Policy – Fundamental Duties – Individual and Group Rights – Other facets of Human Rights – Measures for Protection of Human Rights in India.

UNIT-5:

Human Right Violations and Redressal Mechanism

Human Rights – Infringement of Human Right by State Machinery and by Individual – Remedies for State action and inaction – Constitutional remedies – Public Interest Litigation (PIL) - Protection of Human Rights Act, 1993 – National Human Rights Commission – State Human Rights Commissions – Constitution of Human Right Courts

Text Books

Unit-1

- Human Rights Lalit Parmar, Anmol Publications Pvt. Limited, 1998
- Human Rights In International Relations, David P. Forsythe, Cambridge University Press

Unit-2

- Alston, Philip, And Frederic Megret, Eds. The United Nations And Human Rights: A Critical Appraisal. Second Edition. Oxford University Press, 2014.

- Bassiouni, M. Cherif, And William A. Schabas, Eds. New Challenges For The UN Human Rights Machinery: What Future For The UN Treaty Body System And The Human Rights Council Procedures? Intersentia, 2011.
- Kruckenberg, Lena J. The Unreal World Of Human Rights: An Ethnography Of The UN Committee On The Elimination Of Racial Discrimination. Nomos Publishers, 2012.

Unit-3

- Rebecce Wallace, International Human Rights, Text And Materials 1997
- European Convention On Human Rights: Texts And Documents (Herbert Miehsler & Herbert Petzold Eds., 1982)
- A.H. Robertson & J.G. Merrils, Human Rights In Europe: A Study Of The European Convention On Human Rights, 386-413 (3d Ed. 1993)
- International Human Rights Law And Practice ,Francisco Forrest Martin (1997)
- R.K S Inha, Human Rights Of The World (1997)
- African Commission On Human Rights And Peoples Rights Evelyn A Ankumah, (1996)
- The Constitution of India

Unit-4

- Human Rights Bharatiya Values, Mandagadde Rama Jois, Bharatiya Vidya Bhavan, 2015
- B P Singh Seghal , Human Rights in India 1996

Unit-5

- Paras Diwan and Piyush Diwan Women and Legal Protection
- Philip Alston Children Rights and the Law
- G S Bhargave and R M Pal Human Rights of Dalit Societal Violation 1999
- Geralden Van Bueren International Law and The Rights of the Child 1998
- P C Tirpathi Crime Against Working Women

Reference Items: books, Journal

- Protection Of Human Rights Act, 1993.
- Constitutional Law of India (3 Volumes) by Seervai H.M 2015
- The Human Rights Watch Global Report On Women's Human Rights 2000 Oxford Publication
- RS Sharma Perspectives In Human Rights Development
- Julies Stone Human Law And Human Justice 2000 Universal Publication
- Research Handbook On International Human Rights Law, Edited By Sarah Joseph & Edited By Sarah Joseph, Edward Elgar Publishing Limited USA

Course Out Comes

1. After studying unit-1, the student will be able to know the nature of human rights its origin , the theories, the movements in the march of human rights and the facets of future of human rights.

2. After studying unit-2, the student will be able to know the international dimension of human rights, the role of UN and the global effort in formulating conventions and declarations

3. After studying unit-3, the student will be able to Perceive the regional developments of human rights in Europe , Africa and Asia and the enforceable value of human rights in international arena.

4. After studying unit-4, the student will be able to have knowledge on the human rights perspectives in India, more developed by its constitution and special legislations

5. After studying unit-5, the student will be able to know the redressal mechanism made available in case of human rights violation confined to India.

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THIRUVALLUVAR UNIVERSITY

M.A. ENGLISH

SYLLABUS

UNDER CBCS

(With effect from 2020-2021)

PROGRAMME OBJECTIVES

The Programme aims to develop the ability of the student to critically examine and restate his/her understanding of literary texts, employing individual linguistic skills, engendering literary concepts and critical approaches to arrive at the core and essence of narratives. The learning process would also lead to a larger comprehension of global, national, social issues and thereby facilitate the students to address the issues proactivity and gain a reasonable command of the language.

PROGRAMME OUTCOME

- On completion of the programme the student will be able to:
- Interpret his/her understanding of form, structure, narrative technique, devices and style.
- Analyze and apply various literary concepts and critical approaches.
- Appreciate the importance of English as an international language, to benefit from the achievements of other cultures in accordance with various life situations.
- Organize and integrate the acquired knowledge towards individualistic compositions.
- Present, appraise and defend arguments with conviction and confidence.

M.A. ENGLISH EMPLOYMENT AREAS

1. Advertising Industry
2. Corporate Communication
3. Communications Industry
4. Indian Civil Services
5. Journalism
6. Online Tutoring
7. Politics
8. Publication Houses
9. Public Relations
10. Research
11. TV & Media
12. Translation Agencies

M.A ENGLISH JOB TYPES

1. IELTS trainer
2. English Translator
3. Junior Parliamentary Reporter (English)
4. English Editor
5. Translator/Interpreter
6. English Teacher
7. Content Writer/Trainer
8. English Tutor
9. Customer Support Executive
10. English Proof Reader
11. English Language Specialist
12. Media Analyst
13. Stenographer (English)

The Course of Study and the Scheme of Examination

Sl. No.	*Study Components* / *Course Title*		*ins. hrs / week*	*Credit*	*Title of the Paper*	*Maximum Marks*		
						CIA	*Uni. Exam*	*Total*
SEMESTER I								
1.	**Core**	**Paper- 1**	6	4	British Poetry (Chaucer to 20th century)	25	75	100
2.		**Paper- 2**	6	4	American Literature	25	75	100
3.		**Paper- 3**	6	4	Indian Literature in English	25	75	100
4.		**Paper- 4**	6	4	Advanced Linguistics	25	75	100
Internal Elective for same major students								
5.	**Core Elective**	**Paper-1**	3	3	**(To choose one out of 3)** A. Indian Writing in Translation B. Fourth World Literature C. Folk Tale and Myth	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
6.	**Open Elective**	**Paper-1**	3	3	**(To choose one out of 3)** A. Literature for Social Transformation B. Green Cultural Studies C. Public Speaking and Creative Writing	25	75	100
			30	**22**		**150**	**450**	**600**
SEMESTER II						*CIA*	*Uni. Exam*	*Total*
7.		**Paper- 5**	6	4	British Drama	25	75	100
8.		**Paper- 6**	6	4	Translation Theory & Practice	25	75	100
9.		**Paper- 7**	6	4	Contemporary Literary Theory - I	25	75	100
Internal Elective for same major students								
10.	**Core Elective**	**Paper-2**	5	3	**(To choose one out of 3)** A. Comparative Literature B. New Literature in English.	25	75	100

					C. Subaltern Literary Studies			
External Elective for other major students (Inter/multi disciplinary papers)								
11.	**Open Elective**	**Paper-2**	5	3	**(To choose one out of 3)** A. Technical Writing. B. Indian Diaspora Literature C. Journalism and Mass Communication.	25	75	100
12.	***Field Study**		-	2		100	-	100
13.	**Compulsory Paper**		2	2	**Human Rights**	25	75	100
			30	**22**		**250**	**450**	**700**
SEMESTER III								
14.	Core	Paper-8	5	4	Non- Fiction & Prose	25	75	100
15.		Paper-9	5	4	Research Methodology	25	75	100
16.		Paper-10	5	4	Contemporary Literary Theory - II	25	75	100
17.		Paper-11	5	4	African and Canadian Writings	25	75	100
Internal Elective for same major students								
18.	Core Elective	Paper - 3	5	3	**(To choose one out of 3)** A. Popular Literature B. Children's Literature C. Preparatory Exam for NET/SET/TRB – Paper II	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
19.	Open Elective	Paper - 3	5	3	**(To choose one out of 3)** A. Soft Skills B Theorising Sexualities C. Preparatory Exam for NET/SET – Paper I	25	75	100
20.	****MOOC courses**		-	-		-	-	100
			30	22		**150**	**450**	**700**
SEMESTER IV								
21.	Core	Paper-12	6	5	World Literature in Translation	25	75	100
22.		Paper-13	6	4	Shakespeare Studies	25	75	100
23.		Paper-14	6	4	Single Author Study	25	75	100
24.	Core	Project	5	5	Project with Viva voce	100 (75 Project +25 viva)		100
Internal Elective for same major students								
25.	Core Elective	Paper - 4	4	3	**(To choose one out of 3)** A. Post-Colonial Studies B. Gender Studies C. English Language Teaching - Theory and Practice	25	75	100

External Elective for other major students (Inter/multi disciplinary papers)								
26.	Open Elective	Paper - 4	3	3	**(To choose one out of 3)** A. Film Studies B. English for Media C. Fantasy Fiction	25	75	100
			30	**24**		**150**	**450**	**600**
			120	**90**				**2600**

*** Field Study**

There will be field study which is compulsory in the first semester of all PG courses with 2 credits. This field study should be related to the subject concerned with social impact. Field and Topic should be registered by the students in the first semester of their study along with the name of a mentor before the end of the month of August. The report with problem identification and proposed solution should be written in not less than 25 pages in a standard format and it should be submitted at the end of second semester. The period for undergoing the field study is 30 hours beyond the instructional hours of the respective programme. Students shall consult their mentors within campus and experts outside the campus for selecting the field and topic of the field study. The following members may be nominated for confirming the topic and evaluating the field study report.

(i). Head of the respective department

(ii). Mentor

(iii). One faculty from other department

****Mooc Courses**

Inclusion of the Massive Open Online Courses (MOOCs) with zero credits available on SWAYAM, NPTEL and other such portals approved by the University Authorities.

SEMESTER III
PAPER - 8
NON-FICTION AND PROSE

COURSE OBJECTIVES

- To familiarize the student with the essays of Francis Bacon, his-epigrammatic style and aphorisms.
- To acquaint the student with the Holy Bible, its language and the Utopia as an ideal state.
- To enjoy autobiographical elements of Charles Lamb's essays, his unique style, pathos and humor, the personal essay of the Romantic age.
- To probe the philosophical thought of Russell, the Post Colonial aspects as highlighted in George Orwell.
- To acquaint the students with the critical views of T.S. Eliot on the metaphysical poets like Donne and assimilate their literary content
- To impart the role of humor in everyday life - how an ordinary incident acquires philosophical dimensions in G.K Chesterton.

UNIT PLAN

- ❖ To understand the enrichment of English vocabulary and religious connotation of the period.
- ❖ To learn More's positive views on an Ideal State.
- ❖ To evaluate More as an essayist of the Middle English Period.
- ❖ To enjoy the Auto-biographical style of Lamb and Huxley.
- ❖ To understand the pathos in Lamb.
- ❖ To critically appreciate the humor in Lamb and Hazlitt.

COURSE OUTCOME

- ➢ To learn the writing style from Russell's model.
- ➢ To learn the value of lateral thinking.
- ➢ To enjoy the humor of Orwell.
- ➢ To critically evaluate the Post Colonial issues presented in Orwell's essay.
- ➢ To estimate T.S. Eliot as a scholarly critic.
- ➢ To learn about the greatness of the Metaphysical poets like Donne.

UNIT 1 - BRITISH LITERATURE-NON – FICTION

Great Contemporaries	-	Winstn Churchill (**Detailed)**
Seven Pillars of Wisdom	-	T.E. Lawrence (**Detail)**
Life of Mr. Richard Savage	-	Samuel Johnson (**Non- Detail)**

UNIT 2- AMERICAN LITERATURE- NON – FICTION

In Cold Blood	-	Thumam capote **(Detail)**
Two Kinds of Truth	-	Michael Connelly (**Detail)**
White trash	-	Nancy IsenBery **(Non-Detail)**

(The 400 – Year untold History of class in America)

UNIT 3- INDIAN WRITING IN ENGLISH-NON- FICTION

India After Gandhi	-	Ramachandra Guha (**Detail)**
An ordinary person's Guide to Empire	-	Arundhadhi Roy **(Detail)**
Freedom at Midnight	-	Larry Collins and Dominique Lappierre **(Non-Detail)**

UNIT 4- COMMONWEALTH LITERATURE -NON- FICTION

Descent into Chaos	-	Ahmed Rashid (**Detail)**
Reading Lolita in Tehran	:	A Memoir Books - AzarNatisi **(Detail)**
The Home that was Our country	:	A Memoir of Syria-Alia Malek(**Non Detail**)

UNIT 5- CHINESE NON-FICTION

The Soong Dynasty - Sterling Seagrame (**Detail)**
Factory Girls; From village to city in a changing China - Leslie T. Chang **(Detail)**
Haunted by Chaos: China's Grand Strategy from Mao Zedong to Xi – SulmaanWasif Khan **(Non Detail**)

PAPER -9
RESEARCH METHODOLOGY

OBJECTIVES

- To help students prepare a Dissertation of their own
- To prepare students for quality research in future
- To train students in using parenthetical documentation as recommended in MLA Hand Book

UNIT PLAN

- ❖ To learn regarding the concept, definition and variable**.**
- ❖ Experimental Design of Independent and Dependence of Variables
- ❖ Giving an idea of Validity and Reality.
- ❖ To collect the Data and how to represent them.
- ❖ Giving the vivid Software and Paper format.

COURE OBJECTIVES

- ➢ The learners are introduced to the Definitions, Variables and Research questions, etc.
- ➢ The learner can explore the Research Design, the difference between Quantative and Qualitative Research.
- ➢ The Concept of Measurement is introduced to the Learners.
- ➢ The learners are taught to interpret the data and Layout.
- ➢ The usage of the sources is taught to the Learners.

Unit– I

Research and Writing

Plagiarism and Academic Integrity

Unit– II

The Mechanics of Writing

Unit– III

The Format of the Research Paper Abbreviations

Unit– IV

Documentation: Preparing the list of Works Cited

Unit– V

Documentation: Citing Sources in the text

REFERENCE

1. Modern Language Assn. Of America, *"M.L.A Hand Book",* Macmillan. 8th edition.
2. Anderson, Durston & Poole, *"Thesis & Assignment Writing"*, Easter Limited, New Delhi. 1970 rpt. 1985.
3. Parsons C J, *"Thesis &Project Work",* Unwin Brothers Ltd., Gresham Press. 1973.
4. Rajanna, Busangi, *"Fundamentals of Research*", American Studies Research Centre, 1983.
5. *Research Methodology* – C.R. Kothari

PAPER - 10
CONTEMPORARY LITERARY THEORY - II

OBJECTIVES

- The aim of this course in to familiarize students with major trends in twentieth century literary Theory in order to explore ongoing debates in literary criticism and their application in critical practice.
- Students would be expected to acquaint themselves with the principal hypotheses and reading strategies of the following schools to see how each critical practice includes and excludes issues relevant to other practices.

UNIT PLAN

- ❖ Enhances the students to develop critical skills, analysis and many other communication skills, oral and written.
- ❖ The students are firmly equipped with various tools, techniques and strategies of interpretation.

COURSE OUTCOME:

- ➢ It reinforces the student's literary competence.
- ➢ The students will develop an independent critical persona.
- ➢ The students can understand the various types of theories
- ➢ Theories after the 20^{th} century are learned

UNIT I

Structuralism, Post structuralism and Deconstruction
(Barthes, Lacan, Derrida, Foucault)

UNIT II

Marxism and Ideological Criticism

UNIT III

New Historicism and Cultural Materialism

UNIT IV

Post – colonialism

UNIT V

Feminism
LGBTQ studies.

TEXT BOOKS

- Barry, Peter. *Beginning Theory* (Routledge, London, 2010)
- Selden, Raman. *A Reader's Guide to Contemporary Literary Theory*. (Pearson, Singapore, 2009)

REFERENCE

1. Lodge, David and Nigel Wood (ed.). *Modern Criticism and Theory* (Pearson, Essex, 2008)
2. Waugh, Patricia. *Literary Criticism and Theory*. (Oxford University Press, Oxford, 2008)

PAPER -11
AFRICAN AND CANADIAN WRITINGS

OBJECTIVES

- To make the students acquainted with the emerging literatures of the particular countries.
- To know more about the exploited people.
- Open up new avenues for their future research work.

UNIT PLAN

- ❖ Pictorial representation of the pain of the people.
- ❖ Exposure to thoughts of the oppressed.
- ❖ Reaction of the Colonized people.
- ❖ Seeking for recognition.

COURSE OUTCOME

- ➢ The pain of the exploited is taught via Poetry.
- ➢ The Situation of Woman in the Colonies is taught.
- ➢ The reaction of the Colonizers against the capture is sketched.
- ➢ Abuse of Colonial people for the trade of the Capitalist is highlighted.

UNIT – I: POETRY (DETAILED STUDY)

Okot Bitek	–	My Husband's Tongue is Bitter (selection from Song of Lawino)
J.P.Clark	–	Casualties – Part – II
Gabriel Okara	–	You Laughed and laughed and laughed
Daniel David Moses	–	Inukshuk
Margaret Atwood	–	Journey to the Interior
Sir Charles G.D. Roberts	–	The Solitary Woodsman

UNIT – II: PROSE (DETAILED STUDY)

Brian Chikwava	–	*Seventh Street Alchemy*
Mary Watson	–	*Jungfrau*
Uma Parameswaran	–	*16th July*
Renee Hulan	–	*Everybody Likes the Inuit*

UNIT – III: DRAMA

Chinua Achebe	–	*Things Fall Apart*
Joan Macleod	–	*Toronto, Mississipp*i

UNIT – IV: FICTION

Margaret Laurence	–	*The Stone Angel*
L.M. Montgomery	–	*Anne of Green Gables*

UNIT – V: CRITICISM

John Povey	–	The Novels of Chinua Achebe
Northrop Frye	–	*"Conclusion to A Literary History of Canada"* The Bush Garden: Essays on the Canadian Imagination. Pp. 213-252.
Richard Wright	–	Blue Print for Negro Writing

CORE ELECTIVE
PAPER –3
(to choose one out of 3)
A. POPULAR LITERATURE

COURSE OBJECTIVE

- To make learners aware of the popular works in literature and what made those works popular.
- To expose the learners to the salient features of literature.
- To enable readers to appreciate the popular works in literature
- To expose the changing trends in English literature.

UNIT PLAN

- ❖ To understand modern literature
- ❖ To emphasize the reading skill
- ❖ Struggles and the progress of Malala
- ❖ The conflict of rootless souls.

COURSE OUTCOME

- ➢ The learners will be aware of the new features of literature.
- ➢ To students can understand the changing trends in English literature.
- ➢ The readers will be able to appreciate the works in literature from the point of view of the refugees.
- ➢ The learners can be aware of the popular works in literature and what made those works popular.

UNIT 1

Tuesdays with Morie – Mitch Albom
Roadless Travel – M. Scott Peck
The Monk Who Sold His Ferrari – Robin Sharma

UNIT 2

An Unexpected Gift – Ajay K. Pandey
I Too Had A Love Story – Ravinder Singh
You are Trending In My Dreams – Sudeep Nagarkar

UNIT 3

Something I Never Told You – Shravya Bhinder
Jonathan Livingston Seagull – Richard Bach
Count Your Chickens Before They Hatch – Arindam Chaudhuri

UNIT 4

I Am Malala – Malala Yousafzai
The *Last Girl: My Story of Captivity, and My Fight Against The Islamic State* – Nadia Murad
Long Walk to Freedom – Nelson Mandela

UNIT 5

Controversially Yours – Shoaib Akhtat
Always Another Country: A Memoir of Exile and Home – Sisonke Msimang
This Divided Island: Stories from the Srilankan War - Samanth Subramanian

REFERENCE

CORE ELECTIVE
PAPER -3
B. CHILDRENS LITERATURE

OBJECTIVES

- To expose students to apparently simplistic narratives that have become important area of literary/cultural scholarship in recent times.
- To let the students acquire knowledge about children's poetry.

UNIT PLAN

- ❖ To enable students to get a glimpse of worldwide trends in children's prose
- ❖ To let the students aware of the variety of children's fiction
- ❖ To enable the students to understand and appreciate world drama meant for children
- ❖ To enlighten students about the richness of folk tales and wonder of comic strips

COURSE OUTCOME

- ➢ The student will be inspired to pay more attention to nature
- ➢ The student will be motivated to visualise a world devoid of fears
- ➢ The student will understand the contrast between worlds of childhood and reality
- ➢ The student will learn to appreciate how the poet deals with a simple idea in an extraordinary way.
- ➢ The students will be inspired by the thought and words of true genius
- ➢ The student will appreciate the importance of honest work and responsibility

UNIT I – POETRY

Lewis Carroll	–	A Strange Wild Song
Robert Louis Stevenson	–	1. The Flowers
		2. Night and Day
Sylvia Plath		1. Balloons
Edward Lear		2. The Owl and the Pussy cat

UNIT II – PROSE

Anne Frank	–	*The Diary of a Young girl*
TetsukoKuroyanagi	–	Totto Chan*: The Little Girl at the Window* (Translated by Dorothy Britton)
Abdul Kalam	–	*Inspiring Thoughts*

UNIT III – DRAMA

Vijay Tendulker	–	"The King and the Queen want Sweat"
Mark Twain	–	*The Prince and the Pauper*

UNIT IV – FICTION

Laura Ingalls Wilder	–	*Little House on the Prairie*
C.S Lewis	–	*Chronicles of Narnia- The Lion, Witch and the Wardrobe*
Harriet Beecher Stowe	–	*Uncle Tom's Cabin*
Markus Zusak	–	*The Book Thief*
J.R.R Tolkein	–	*The Hobbit*

UNIT V – FOLK LITERATURE, FAIRY TALES AND COMIC STRIPS

Perrault's Fairy Tales	–	1. *Cinderella*
		2. Little Red Riding Hood
		3. Hansel and Gretel
L.Frank Baum	–	*The Wonderful Wizard of OZ*
Jataka Tales	–	*1. The Monkey's Heart*
		2. The Talkative Tortoise
		3. The Mosquito and the Carpenter
		[Translated by Ellen C.Babbit]
Herge	–	*Tintin ; The Secret of the Unicorn*
Lee Falk	–	*The Story of the Phantom*

REFERENCE ITEM: BOOKS

1. *A Child's Garden of Verses:* Selected Poems- Robert Louis Stevenson, Simon &Schuster Books for young readers
2. *The Diary of a Young Girl*-Anne Frank, Bantam Publishers,1993
3. *The Little Girl At the Window*- Tetsuko Kuroyanagi (Translated by Dorothy Britton), Kodansha Publishers, USA, 2011
4. *Inspiring Thoughts* –Abdul Kalam, Penguin Books, 2017
5. *Little House on the Prairie*- Laura Ingalls Wilder, Penguin Publishers,
6. *Chronicles of Narnia- The Lion, the Witch and the Wardrobe* , U.K Chidlren's Publishers,2010
7. *Uncle Tom's Cabin*- Beecher Stowe- Fingerprint Publishing, 2019
8. *The Book Thief* – Markus Zusak, Random House, UK,
9. *The Hobbit*- J.R,R,Tolkein, Harper Collins, 2011
10. *The Complete Jataka Tales*, Translated by Edward Byles Cowell, Jazzybee Verlag Publishers, 2016
11. *Tintin: The Secret of the Unicorn*- Herge, Egmont Publishers, 2011
12. *Phantom Series*- Lee Falk, Harper Collins, 1973

E-MATERIALS:

1. https://www.poemhunter.com
2. https://www.lieder.net
3. https://wwwgenius.com
4. https://www.poetryfoundation.org

CORE ELECTIVE
PAPER -3
C. PREPARATORY EXAM FOR NET/ SET/TRB – PAPER-II

OBJECTIVE

- To enable students to face NET/SET and PG-TRB examinations.
- To help the students gain knowledge and assist them in gaining knowledge of the major and minor writers of every age.
- To teach the various literary terms that are employed in various genres of literary works.
- To inform the students of the various schools of poetry and literary movements.

UNIT PLAN

- ❖ Concentration on Periodical writings.
- ❖ American literature and New literature writings will be given an outlook
- ❖ Criticism to Contemporary theory will be focused

COURSE OUTCOME

- ➢ The students learn about the importance of the Chaucer to the Shakespearean age
- ➢ The learner can experience the important features of the Romantic and the Victorian period.
- ➢ The students can acquaint the knowledge over the Modern and Contemporary Period.
- ➢ The students are taught about the American Literature and the learner also can develop his knowledge in the field of translation studies too.
- ➢ The learner explores the various forms of Criticism and the contemporary Theories.

UNIT I

Chaucer to Shakespeare
Jacobean to Restoration

UNIT II

Romantic Period
Victorian Period

UNIT III

Modern Period
Contemporary Period

UNIT IV

American Literature
New Literature in English (Indian, Canadian, African, Australian)
English Language Teaching
Translation Studies

UNIT V

Classicism to New Criticism
Contemporary Theory

REFERENCE

- D. Benet E., and Samuel Rufus. *NET. SET..GO....English*. N.p.,2014.
- Masih, K. Ivan. Et.al. An *Objective Approach to English Literature: For NET. SET.JRF.SLET AND Pre-Ph.D*
- *Registration Test*. New Delhi . Atlantic Publishers, 2007.

OPEN ELECTIVE
PAPER -3
(to choose one out of 3)
A. SOFT SKILLS

OBJECTIVE

- To enhance the language skill of the learner
- To provide LSRW skills.
- To build the Fluency of the learner.

UNIT PLAN

- ❖ The capability of fluency in students is analyzed.
- ❖ Emphasis on LSRW skills.
- ❖ Role of Public speaking and telephonic conversation.
- ❖ Highlighting Business presentation.

COURSE OUTCOME

- ➢ The students can recap the language skills, Grammar, Vocabulary, Phrase, Clause and sentences.
- ➢ The learner can build his fluency gradually.
- ➢ The students can acquaint with LSRW skills and can also develop his Non- Verbal Communication.
- ➢ The students are taught about the Learning etiquettes
- ➢ The student can also learn about the importance of Business Etiquette.

UNIT – I

Recap of language skills – Speech, Grammar, Vocabulary, Phrase, Clause, Sentence.

UNIT – II

Fluency building
What is fluency- Why is fluency important – Types of Fluency – Oral fluency – Reading fluency – Writing fluency – Barriers of Fluency – How to develop Fluency.

UNIT- III

Principles of Communication: LSRW in communication.
What is meant by LSRW skills – Why it is important – How is it useful – How to develop the skills?
Oral – Speaking words, articulation, speaking clearly.
Written communication – Generating ideas/ gathering data organising ideas, Setting goals, Note taking, Outlining, Drafting, Revising, Editing and Proof reading.
Non-Verbal Communication – Body Language, Signs and symbols, Territory/ Zone, Object language

UNIT – IV

Etiquettes for Public Speaking (extempore and lectures), Interviews and Group Discussions, Telephone conversations and Business Meetings.

UNIT – V

Etiquettes for Business presentations – Team presentations and Individual presentation.

REFERENCE

1. Powell. *In Company.*
2. MacMillan. Cotton, et al. *Market Leader.*
3. Longman. Pease, Allan. 1998. *Body Language*:
4. *How to Read Others Thoughts by their Gestures*. Suda Publications. New Delhi.
5. Gardner, Howard. 1993. *Multiple Intelligences: The Theory in Practice*: A Reader Basic Book. New York.
6. De Bono, Edward. 2000. *Six Thinking Hats*. 2nd Edition. Penguin Books.
7. De Bono, Edward. 1993. *Serious Creativity*. Re print. Harper Business.

OPEN ELECTIVE
PAPER -3

B. THEORISING SEXUALITIES

OBJECTIVES

- To demonstrate an awareness of biological, social, and grammatical gender as being three different categories.
- To give a basic awareness of struggles and attainment of people with alternative sexualities in civil rights in various parts of the world
- To help the students view with skepticism the simplistic conflation of biological sex with socially and culturally conditioned gender

UNIT PLAN

- ❖ Defining the types of genders.
- ❖ The poetic mysticism of the female.
- ❖ The grace of feminism from the modern writers.
- ❖ Contribution of women writers on uplifting women.

COURSE OUTCOMES

- ➢ Appreciate, if not accept the viewing of gender as a continuum
- ➢ Critically analyze different gender self-identification preferences such as transgender and inter-genders rather than seeing the polar genders male and female as the only 'natural' ones
- ➢ To show sensitivity to the legal and social persecution faced by persons belonging to the LGBTQ or simply, Queer, community in societies across the world and view their rights as human rights
- ➢ To Exercise an enhanced openness and honesty when encountering/ generating discourse on matters of sexuality and gender roles

UNIT I: INTRODUCING SEXUALITY

Sexological types: Sexual classifications, sexual development, sexual orientation, gender identity, sexual relationship, sexual activities, paraphilias, atypical sexual interests
Psychoanalytic drives: Freud and Lacan.

Bristow, Joseph, Introduction, *Sexuality: The New Critical Idiom Series*. 1997. 2nd ed. London: Routledge, 2011.1-11, Print.

Butler, Judith. *Introduction, Bodies That Matter: On the discursive Limits of "Sex."* London: Routledge, 1993.xi –xx

UNIT II – POETRY

The songs of songs – the sufi and Bhakthi Tradition – the concepts of adhavbhaav

Shakespeare	:	Sonnet 73 That time of the year
Emily Dickinson	:	Her breast is fit for pearls

Adrienne Rich	:	Diving into the deck
Walt Whitman	:	The wounded Dresser
Siegfried Sassoon	:	The Last Meeting

UNIT III – PROSE

Manoj Nair	:	Rite of Passage
Chimamanda N. Adichie	:	On Monday of Last Week
Mukul Kesavan	:	Nowhere to Call Home
Shyam Selvadurai	:	Cinnamon Gardens
Ismat Chugtai	:	The Quilt

UNIT IV DRAMA

Edward Albee	:	*Who is Afraid of Virginia Woolf*
Amiri Baraka	:	*Most Dangerous man in America*

UNIT V FICTION

Moses Tulasi	:	*Walking the Walk*

REFERENCE

1. De lauretis, Teresa, *Technologies of gender: esaay on theory, Film and Fiction*, Bloomington: Indiana Up, 1987. Print
2. Dollinmore, Jonathan, *Sexual Dissidence:Augustine to Wilde, Frued to Foucalt*, Oxford Clarendon, 1991. Print.
3. Foucault, *Micheal. A History of Sexuality, 3vol*s. Trans. Robert Hurley. New York: Vintage, 1978. Print.
4. Kapoor, Shekar, dir. *Bandit Queen*. Perf. Seema Biswas, Nirmal Pandey, Rakesh Vivek.
5. 1004. DVD. Film.
6. Mehta, Deepa, dir. *Fire*. Perf. Shabana Azmi, Nandita Das, Karishma Jhalani. 1996.DVD. Film.
7. Meht, Hansal, dir.Aligarh.Script. *Apurva* Asrani. Pref.Manoj Bajpayee and Rajkummar Rao.2016. DVD.
8. Nair, Manoj. "*Rite of Passage." Yaraana: Gay Writing from India*. Ed. Hoshang Merchant. New Delhi: Penguin, 1999.171-79. Print.

OPEN ELECTIVE
PAPER -3

C. PREPARATORY EXAM FOR NET/ SET/TRB – PAPER-I

OBJECTIVE

- To enable students to face NET/SET and PG-TRB examinations.
- To help the students gain knowledge and assist them in gaining knowledge of the Logic and Reasoning Ability.
- To teach the students about Data interpretation.
- To inform the students of the various aspects of Information and Communication Technology.

UNIT PLAN

- ❖ Identification of reasoning
- ❖ Deduction of logical Coherence
- ❖ Mathematical reasonings are developed.
- ❖ Error analysis are concentrated.

COURSE OUTCOME

- ➢ The students are taught about the Teaching and Research Aptitude.
- ➢ The learners can attempt the Comprehension passages and understand the Communication patterns.
- ➢ The students are introduced to Mathematical Reasoning, Logical Reasoning and General aptitude.
- ➢ The students can interpret the data and learn the various aspects of Information and Communication Technology.
- ➢ The students are taught about the higher education system and the people

UNIT- I

Teaching Aptitude
Research Aptitude

UNIT- II

Comprehension
Communication

UNIT- III

Mathematical Reasoning and Aptitude
Logical Reasoning

UNIT- IV

Data Interpretation

Information and Communication Technology.

UNIT- V

People, Development, and Environment
Higher Education System.

REFERENCE

1. Kaur, Harpeet- *NTA UGC NET/SET/JRF – Paper 1 Teaching and Research Aptitude*, Oxford Publishers. 2019.

SEMESTER IV
PAPER - 12
WORLD LITERATURE IN TRANSLATION.

OBJECTIVES

- Translation theory helps the students to learn it as an interdisciplinary study and to borrow from the various fields of study that supports translation
- It helps the students to learn the theory of description and application of translation to interpret and localize.
- It disseminates literatures around the world

UNIT PLAN

- ❖ Making the students to enjoying Classical Litearture.
- ❖ Inducing the habit of reading Khalil Gibran.
- ❖ An Introduction to the concept of Oedipus complex
- ❖ The outlook of short stories in translated works

OUTCOME

- ➢ Helps the students to works in various fields of translation studies, comparative literature and world literature.
- ➢ To know the importance of Classical literature.
- ➢ To give a world outlook to the learners.
- ➢ Challenges the hegemony of English in world literature
- ➢ Make the students to learn the political values and emphasie on global processes over national traditions.

UNIT I – POETRY

Virgil : *The Aeneid,* Book IV (438-563)

UNIT II – PROSE

Khalil Gibran : *The Prophet* (prose – poetry essays)
Viktor Schklovsky : Art as a Technique
Goethe : *Shakuntala*

UNIT III – DRAMA

Sophocles : *Oedipus Rex*
Goethe *: Faust – Part I*

UNIT IV – SHORT STORIES

Charles Perrault	:	Blue Beard
Juan Manuel	:	The Man who Tamed a Shrew
Giovanni Baccaccio	:	The Stone of Invisibility
Eliza Oreszkowa	:	Do You Remember?
Emile Verhaeren	:	The Horse Fair at Opdrop
Louis Couperus	:	About Myself and Others
Hans Christian Anderson	:	What the Old Man does I always Right
Jonas Lie	:	The Story of a Chicken

UNIT V – FICTION

Fyodor Dostoevsky	:	*Crime and Punishment*
Albert Camus	:	*The Outsider*

REFERENCE

1. Virgil, *The Aeneid*, [Net source} The Internet Classics Archive: Classic. Merit.edu./Virgil/Aeneid.html, 2015.
2. Kahlil Gibran, *The Prophet*, Rupa, 2002.
3. Viktor Schklovsky, *Art as Technique*, [Net source]: paradise. caltech. edu / ist4lectures / Viktor_Sklovsky. "Art_as_Technique":.pdf, 2015.
4. Sophocles, *Oedipus Rex*, Dover Publications; Unabridged edition, 2012.
5. Goethe, I *Faust – part*, RHUS Publications, 1988.
6. Gealdine McCaughrean, *Classic Stories Around the World*, Leopard Books, 1996.
7. Fyodor Dostoevsky, *Crime and Punishment*, Penguin, 2003.

PAPER – 13
SHAKESPEARE STUDIES

COURSE OBJECTIVES

- To know about the English folklore and Shakespeare's use of illusions in the form of fairies.
- To know about the use of catharsis in tragedy through the character of Hamlet.
- To enable students to learn about the history of Henry IV presented in the art form of drama.
- To enable students learn about political intrigue, power struggles, war and the plight of impassioned lovers.
- To make students learn about the varieties of interpretations on the works of Shakespeare and encourage them to critically appreciate his work.

UNIT PLAN

- ❖ Marriage, themes, Hippolyta, Egeus, Lysander, chastity, comic fantasy, four lovers, bewitched, fairies, love, jealousy.
- ❖ Tragedy, Oedipus complex, revenge, ghost, avenging father's death.
- ❖ Dramatic battle, father, son, strained relationship, rebellion.
- ❖ East West clash, honor, reason versus emotion, power struggle.
- ❖ Interpretation, critical analysis, critical theory applied on Shakespeare's work, structuralism, Marxism, feminism.

COURSE OUTCOME

- ➢ Learn as to how Shakespearean comedy is interwoven with obstacles, misunderstanding, jealousy, disguise which ultimately leads to fictional nature of the characters in the play
- ➢ Learn how Shakespeare has used revenge tragedy in extensively to make the audience learn and correct themselves through Aristotle's principle of catharsis.
- ➢ Learn the genre of Historical plays of Shakespeare. Shakespeare's inspiration from chronicles of Holinshed to draw plots for his Historical plays is vividly presented in such a way that it will make even commoners learn about their king's history.
- ➢ Learn the struggle between reason and emotion, the clash of east and west and the very definition of honor, while all the way they are exposed to political intrigue, power struggle and struggle between the lovers.

UNIT I

Sonnets	Sonnets – 12,65,86,130 (**Detail)**
Comedies	*Much Ado About Nothing Winter's Tale*

UNIT II

Tragedy	*Othello* (**Detail)**

UNIT III

Roman	*Coriolanus* (**Detail**)

UNIT IV

History *Henry IV Part I* (**Detail)**

UNIT V

SHAKESPEARE CRITICISM

Modern approaches – mythical, archetypal, feminist, post – colonial, New Historicist;

A.C. Bradley (extract)	Chapter V&VI and the New Introduction by John Russell Brown in **Shakespearean Tragedy** by A.C. Bradley, London, Macmillian, Third Edition, 1992
Wilson Knight	Macbeth and the Metaphysic of Evil (1976, V.S. Seturaman & S. Ramaswamy **English Critical Traditon Vol. I**. Chennai, Macmilla).
Stephen Greenblatt	Invisible Bullets: Rennaissance Authority and its Subversion, Henry IV & Henry V, in **Shakespearean Negotiations**. New York: Oxford University Press, 1988 Also in **Political Shakespeare: New Essays in Cultural Materialism**. Eds. Jonathan Dollimore and Alan Sinfield Manchester University Press, 1994
Ania Loomba	Sexuality and Racial Difference in **Gender, Race**, **And Renaissance Drama**, Manchester UP, 1989.

REFERENCE

1. Stephen Greenblatt, ed., 1997. **The Norton Shakespeare**, (Romance & Poems, Tragedies, Comedies), W.W. Norton & Co., London.
2. Bradley, A.C., 1904, **Shakespearean Tragedy**, Macmillan, London.

PAPER – 14
SINGLE AUTHOR STUDY

OBJECTIVE

- To make the students learn the various forms of genre of a single author
- To make the students explore the works of Rabindranath Tagore.

UNIT PLAN

- ❖ The poetic outburst of Tagore
- ❖ Tagore's foreseeing in his works.
- ❖ Global views of Tagore's Modernity in his writings.
- ❖ The sound exposure and experience of the Tagore's dramatic views.
- ❖ The style of Tagore's writings in his novels

COURSE OUTCOME

- ➢ The learners are exposed to the poetry of Tagore
- ➢ The essays of Tagore are introduced to the learners.
- ➢ The students can experience the rich themes and characterization in the plays of Tagore.
- ➢ The writing style of Tagore can be explored in the Short stories.
- ➢ The learners can also understand the style of Tagore in his Novels.

UNIT I - POETRY

Gitanjali – Song Offerings1996
The Broken Heart

UNIT II ESSAY (NON-DETAIL)

Literature
Five Elements
Ancient Literature
Modern Literature
Literature of the People
Tribute to Great Lives

UNIT III DRAMA (DETAILED)

Sacrifice
The Untouchable Woman (Non-Detail)
Raja O Rani
Malini
Muktadhara (1992)

UNIT IV - SHORT STORY (NON DEATILED)

My Lord, the Baby
Kahini
The Post Master
Kabuliwallah
Subha
The Babus of Nayanjore

UNIT V NOVEL (NON-DETAIL)

The Wreck
The Bachelor's Club
Gora

REFERENCE

1. Chatterji, David. *World literature and Tagore*: Visva Bharati, Ravindra- Bharati. Santiniketan: Visva Bharati, 1971.
2. Kripalani, Krishna. *Rabindranath Tagore: A Biography* London: Oxford University Press, 1962.
3. Tagore, Rabindranath. *Selected writings on literature and Language*. Ed. Sisir Kumar Das and Sukanta Chaudhuri. (2001). New Delhi: Oxford University Press. 2010.
4. Chaudhiri, Sutapa. Reading Rabindranath: *The Myriad Shades of Genius*.
5. Dalta, Rama: Seely, Clinton (2009). *Celebrating Tagore: A collection of Essays.* Allied Publishers. ISBN 9788184244243.
6. Dutta, Krishna: Robinson, Andrew (1997). *Rabindranath Tagore: An Anthology of his learning* contribution to South Asian studies.
7. The Roy, Kshitis, *Rabindranath Tagore: A life story Publications Divison Ministry of Information & Broadcasting*, 2017.
8. *The Complete works of Rabindranath Tagore* (All short stories, poetry, Novels, Plays & Essays) Edit. General Press- 18 Oct 2019

CORE ELECTIVE
PAPER - 4
(to choose one out of 3)
A. POST COLONIAL STUDIES

OBJECTIVES OF THE COURSE

- To introduce the students to some key theoretical formulations in the field
- To help develop an awareness of issues – social, political, cultural and economic – relating to the experience of colonial and after
- To encourage dialogue on conditions of marginality and plurality and to question metanarratives

UNIT PLAN

- General Introduction and Critical terms
- Deduction of opposition to the Colonizer's approach
- Poetical anecdote post colonial thoughts.
- To give the vast experiences of the marginalized through drama.

COURSE OUTCOMES

- Analyze texts using key concepts and theories in the field
- Interrogate dominate discourse in texts influenced by colonial ideologies
- Appreciate texts emerging from postcolonial nations
- Engage with the interplay of issues of race, colour, caste and gender in a neo – colonial world
- Challenge social inequalities existing in colonized regions and communities in the age of post colonialist.

UNIT 1 – ESSAYS

Edward Said Introduction (from *Orientalism)*
Robert J.C. Young Post – colonialism (from *Post - colonialism: An Historical Introduction)*
Ania Loomba Defining the Terms: Colonialism, Imperialism, Neo-Colonialism, Post – colonialism (from Chapter 1 *"Colonialism/Post – colonialism*")

UNIT 2 –PROSE

Nadine Gordimer *The Train from Rhodesia* (from The Harper Anthology of Fiction)
John Kelly *We are All in the Ojibway Circle (The Faber Book of Contemporary Canadian Short Stories)*
Witi Ihimaera *The Whale (from The Harper Anthology of Fiction)*

UNIT 3 – POETRY

Lisa Bellear	:	Women's Liberation
Judith Wright	:	At Cooloola
Derek Walcott	:	Ruins of a Great House
Garbriel Okara	:	Piano and Drums

UNIT 4 – DRAMA

Wole Soyinka	:	*Death and the King's Horseman*
Louis Nowra	:	Radiance

UNIT 5 – FICTION

Jhumpa Lahiri	: Unaccustomed Earth (from Unaccustomed Earth)
Chimamanda N. Adichie	:*Americannah*

BOOKS FOR REFERENCE

1. Ashcroft, Bill. *On Post-Colonial Futures: Transformations of Colonial Culture.* Continuum, 2001.
2. Ashcroft, Bill, et al. *Post-colonial Studies: The Key Concepts*. 2nd ed., Routledge, 2007.
3. Barker, Francis. Et al. editor. *Colonial Discourse/Postcolonial Theory*. Manchester UP, 1994.
4. Bayard, Caroline. *The New Poetics in Canadian and Quebec: From Concretism to Post-Modernism.* University of Toronto Press, 1989.
5. Bennett, Bruce, editor. *A Sense of Exile*. Centre for Studies in Australian Literature, 1988.
6. Chew, Shirley, and David Richards, editors. *A Concise Companion to Postcolonial Literature*. Wiley Blackwell, 2010.
7. Irvine, Lorna L. Sub/version: *Canadian Fiction by Women*. ECW Press, 1986.
8. Jahabegloo, Raman. Indian Revised: *Conversations on Continuity and Change*. Oxford UP, 2008.
9. Juneja, Om Prakash. *Post Colonial Novel: Narratives OF Colonial Consciousness, Creation*, 1995.
10. King, Bruce. *New National and Post-Colonial Literatures: An Introduction. Clarendon Press*, 1996.
11. Kudchedkar, Shirin and JameelaBegam, editors. *Canadian Voices*, Pencraft, 1996.
12. Lazarus, Neil, editor. *The Cambridge Companion to Postcolonial Literary Studies*.Cambridge UP, 2004.
13. Nkosi, Lewis. *Tasks and Masks: Themes and Styles of African Literature***.** Longman, 1981.
14. Pandey, Sudhakar. *Perspectives on Canadian Fiction*. Prestige Books, 1994.
15. Schwarz, Henry and Sangeeta Ray. *A Companion to Postcolonial Studies*. Blackwell, 2000.
16. Soyinka, Wole. *Art, Dialogue and Outrage: Essays on Literature and Culture*. Methuen, 1993.
17. Tanti, Melissa et al., editors. *Beyond "Understanding Canada": Transnational Perspectiveson Canadian Literature.* U of Alberta Press, 2017.
18. Walder, Dennis. *Post-Colonial Literatures in English: History, Language and Theory*.
19. Blackwell, 1998.
20. young, Robert J.C. *Post - colonialism: An Historical Introduction*. Blackwell, 2001.

JOURNALS

1. *ARIEL: A Review of International English Literature*
2. *Journal of Commonwealth Literature*
3. *Postcolonial Studies*
4. *Wasafiri*

WEB RESOURCES

1. http://www.mohamedrabeea.com/books/book1_3985.pdf
2. http://www.udel.edu/ArtHistory/ARTH435/Ashcroft.pdf
3. http://faculty.ksu.edu.sa/Nugali/English%20461/Post - colonialism.pdf

CORE ELECTIVE
PAPER - 4
B. GENDER STUDIES

OBJECTIVES

- To make students familiarize themselves with different waves of feminism, demonstrate logical reasoning regarding the perception of the female sex by the male. Beginning of the second wave of feminism.
- A lecture which emphasizes the need for a woman to own a room and money to be able to write. Brings an understanding of women's plight in the male dominated society.
- Women's struggle to succeed amidst the stereotypes, especially that of Virginia Woolf whilst suffering from man's dominance.
- A rewriting of mythological stories. Revisiting myth and presenting them through the feminist eyes.
- A symbolic representation of women trapped in a male body to portray the real.
- Oppression of women at the hands of men through a transgender

UNIT PLAN

- ❖ Second wave feminism, treatment of women through history.
- ❖ Money and room as initial needs for women's success
- ❖ Revisit myth, *Draupadi* standing against men.
- ❖ Rewriting myth, *Mahabharata*, Divakaruni's voice of *Panchali*.
- ❖ Struggle of transgender, representing women in the grasp of men.

COURSE OUTCOME

- ➢ To learn as to how the second wave of feminism kick- started its course with the publication of *The Second sex*. Women's struggle throughout history is brought out.
- ➢ The difference between feminism and womenism. Womenism as a separate entity to bring out the double suppression of black women in the hands of white and black men.
- ➢ Learn the plight of women who are physically harassed to keep them under the control of men. However they are revisited in recorded history to stand against men, despite their physical indifference,
- ➢ Learn the importance and the role of myth in the control of women throughout history while also learning a need to rewrite the changes in the myth via Panchali from The Mahabharatam
- ➢ Learn the struggles of transgender so as to face problems from within and also from the society to find their own identity, an identity crisis marred constantly due to the bias in society towards the classification of sex.

UNIT 1

Simone de Beauvoir *Introduction: The Second Sex*
Virginia Woolf *A Room of One's Own (*Chapter I &VI)
Elaine Showalter extract from *Woolf and the Flight into Androgyny*

UNIT 2

David S Gutterman "Postmodernism and the Interrogation of Masculinity" (From *Theorizing Masculinities* ed. Michael Kaufman, Harry Brod)
Bell hooks *Black Women: Shaping Feminist Theory*
Judith Butler *Interiority to Gender Performatives* (from Gender Trouble)

UNIT 3

Mahasweta Devi	:	*Draupadi* (Short Story)
Maya Angelou	:	Still I Rise Our Grandmothers
Adrienne Rich	:	When We Dead Awaken: Writing as Revision

UNIT 4

Chitra Bannerjee Divakaruni	:	*The Palace of Illusions*
Laura Esquivel	:	*Malinche*

UNIT 5

Manobi Bandyopadhyay	:	*A Gift of Goddess Lakshmi* (trans. JhimliMukerjee Pandey & Manobi Bandhopadhyay)
Alice Walker	:	*In Search of Mother's Garden*

BOOKS FOR REFERENCE

1. Gilbert, Sandra & Susan Gubar. *Madwoman in the Attic: The Woman Writer and the Nineteenth-Century Literary Imagination*. Yale Nota Bene, 2000.
2. James, Joy and T Denean Sharpley-Whiting. Eds. *The Black Feminist Reader*. Blackwell, 2000.
3. Rahman, Momin and Stevi Jackson. *Gender and Sexuality: Sociological Approaches*. Polity Press. 2010.
4. Rooney, Ellen. Ed. *The Cambridge Companion to Feminist Literary Theory*. Cambridge U P, 2008.
5. Schneir, Miriam. Ed. *The Vintage Book of Feminism: The Essential Writings of the Contemporary Women's Movement*. Vintage, 1995.
6. Tharu, Susie & K Lalitha. *Women Writing in India*. Oxford UP, 1991

CORE ELECTIVE
PAPER - 4

C. ENGLISH LANGUAGE TEACHING – THEORY AND PRACTICE

OBJECTIVES

- To acquaint students with the history of the English Language
- To help students learn the essential aspects of ELT and the different types of language testing and evaluation

UNIT PLAN

- ❖ The role of Translation method and Audio-lingual methods
- ❖ Importance of teaching methods.
- ❖ To exercise Language learning theories.
- ❖ To inculcate testing and evaluation.
- ❖ Role of education in technology.

COURSE OUTCOME

- ➢ The students were taught how the English Language Teaching takes place in India.
- ➢ The learners are introduced to several teaching Methods.
- ➢ The learners are exposed to different language teaching theories.
- ➢ The language testing and Evaluation is taught to the students.
- ➢ Teaching aids are introduced to the learners.

UNIT I ENGLISH LANGUAGE TEACHING IN INDIA

Grammar Translation Method
Reform Movement
Direct Method
20^{th} Century Trends (Situational methods)
Audio-Lingual Method
Communicative Approach

UNIT II OTHER TEACHING METHODS:

Total Physical Response
The Silent Way
Suggestopedia
Community Language Learning
Community Language Teaching
Natural Approach

UNIT III LANGUAGE LEARNING THEORIES

Behaviorism
Cognitive Approach
Natural Approach and their Educational Implications

Principles of Syllabus Construction
Structural Syllabus, Situational Syllabus, Notional Syllabus

UNIT IV LANGUAGE TESTING AND EVALUATION

Kinds of Tests, Aptitude, Proficiency, Achievement
Different Types of Multiple Choice – Questions
Evaluation

a) Formative
b) Summative
c) Norm-based
d) Criterion- based

UNIT V USE OF TEACHING AIDS INCLUDING EDUCATIONAL TECHNOLOGY

Language Laboratory
Audio-Visual
Aids
OHP-Black Board
Map and Charts
Computer etc.

REFERENCE

1. Jack C.Richards & Theodre S. Rodgers. *Approaches and Methods in Language Teaching*
2. Harria David. P *Testing English as Second Language*
3. Howatt. A. P. R. *A History of English Language Teaching*
4. Nunan. D. *Syllabus Design*
5. Wilkins, D. A. *Notional Syllabus*
6. Little word, W.T. *Communicative Language Teaching*

OPEN ELECTIVE
PAPER - 4
(to choose one out of 3)
A. FILM STUDIES

OBJECTIVES

- To introduce students to the evolution of films and to significant movements in cinema.
- To help students analyze films as an art form, using film language, editing, camera angles and movements as well as the sound in cinema.

UNIT PLAN

- ❖ To enable students to study various forms of representation in films.
- ❖ To enable students to analyze the relationship between literature and films through adaptations
- ❖ To enhance the students understanding of representation in cinema through the prescribed texts

COURSE LEARNING OUTCOMES

- ➢ On successful completion of the course, students will be able to trace the evolution of cinema and major film movements critically.
- ➢ Analyze cinema from various perspectives.
- ➢ To identify various technical aspects of cinema.
- ➢ Appreciate and develop an academic discourse on cinema.
- ➢ Analyze the relationship between films and literature through adaptations

UNIT 1 EVOLUTION OF FILMS

Evolution of films from still to moving pictures
Evolution of films from black and white to colour
Evolution of films from silent movies to talkies Texts to be discussed: Lumière Brothers *The Arrival of a Train* George Melies *A Trip to the Moon* Edwin Porter *The Great Train Robbery* (1903) Dadasaheb Phalke *Growth of a Pea Plant*

UNIT 2 HOW TO READ A FILM

Film Language – aspect ratio, mis-en-scène, montage, etc.
Editing – montage, jump cut, cross cut, fade, dissolve, iris in/out, etc.
Cinematography-camera movements and angles
Sound-diegetic and non-diegetic sound

UNIT 3 GLOBAL CINEMATIC MOVEMENTS

Italian Neo-realism -Vittorio De Sica Ladri di Biciclette
French New Wave -François Truffaut Les Quatre Cents Coups
Iranian New Wave- Jafar Panahi Offside
Indian Parallel Cinema- Satyajit Ray PatherPanchali

UNIT 4 REPRESENTATION IN INDIAN CINEMA

Tom Emmatty *Our Mexican Aparatha*
Mari Selvaraj *Pariyerum Perumal*
Karan Johar *AjeebDastaan Hai Ye* from Bombay Talkies Zoya Akhtar *Sheila Ki Jawaani* from Bombay Talkies
Alankrita Shrivastava *Lipstick Under My Burkha*

UNIT 5 ADAPTATIONS

Vishal Bharadwaj *Maqbool*
Danny DeVito *Matilda*

REFERENCE

1. Abrahams, Nathan, et al. *Studying Film*. Arnold: Hodder Headline Group, 2001.
2. Aitken, Ian. *European Film Theory and Cinema: A Critical Introduction*. Edinburgh
3. University Press, 2001.
4. Andrew, Dudley. Concepts in Film Theory. Oxford University Press, 1984.
5. Bazin, Andre. What is Cinema? Vol. I. University of California Press, 2005.Bhaskar, Ira. 09 Apr 2013,
6. *The Indian New Wave*. Routledge Handbook of Indian Cinemas. edited by K. Moti Gokulsing and Wimal Dissanayake. Routledge, 2019. pp.19-34
7. Buckland, Warren, editor. *Film Theory and Contemporary Hollywood Movies.* Routledge, 2009.
8. Butler, Andrew. *Film Studies*. Pocket Essentials, 2005.Dixon.
9. Wheeler Winston and Foster, Gwendolyn. *A Short History of Film*. Rutgers University Press, 2018.
10. Elsaesser, Thomas, and Malte Hagener. *Film Theory: An Introduction Through the Senses*. Routledge, 2010.
11. Hutcheon, Linda. *In Defence of Literary Adaptation as Cultural Production. Media Culture Journal, Vol. 10, no. 2, May 2007.*
12. http://journal.media-culture.org.au/0705/01-hutcheon.phpKuhn.
13. Annette, Guy Westwell. *A Dictionary of Film Studies*. OUP, 2012.
14. Monaco, James. *How to Read a Film: The World of Movies, Media, and Multimedia*: *and Language, History, Theory*. Oxford University Press, 2000.
15. Nichols, Bill. *Movies and Methods.* University of California Press, 1976.
16. Nichols, Bill. *Engaging Cinema: An Introduction to Film Studies.* W. W. Norton and Company, 2010

OPEN ELECTIVE
PAPER - 4

B. ENGLISH FOR MEDIA

OBJECTIVES

- Introduction to Mass Media
- Mass media is a form of communication that reaches a large people in a short time. For e.g.: TV, Newspaper, Radio and so on to communicate to the people. It very easy to reach all the people.
- Types of news analysis: News analysis may be for sentiment or business motive. It may be spoke or in the written form.
- Reviews: To design articles, advertisement, business, column, letters and novels.
- Report in the media English about the crime, election, sports and news. It can be in different font and style.
- Writing and learning – writing the news in English and editing it, it can be easily communicated to the public.

UNIT PLAN

- ❖ Introduction to media in English, definition of media, function
- ❖ Types of news in English, speaking in English and writing in English
- ❖ Reviews of media in English, editing, articles, novels and letters.
- ❖ Crime, public election, public matters, font, caption and style.
- ❖ Writing the news in English editing with grammar, to communicate easily to public.

COURSE OUTCOME

- ➢ The student is introduced to the essence of the Mass media and its definitions and its function.
- ➢ The learner learns the News Analysis and its types.
- ➢ In this the learner knows about the review, editorial columns etc.
- ➢ Different kinds of reports are taught like election, crime report etc.
- ➢ Writing and editing of T.V, Radio etc. is taught the learners.

UNIT I INTRODUCTION TO MASS MEDIA

Definition of Mass Media - Functions - Public Opinion

UNIT II TYPES OF NEWS ANALYSIS

Hard and soft news - Expected and Unexpected News - Box News -
Follow up news - Scoop - Filters - News Analysis and Evaluation.

UNIT III REVIEWS

Editorial - Columns - Articles - Reviews - Features – Letters

UNIT IV REPORTS

Reporting - Crime, Court, Election, Legislative, Sports, Investigative - Font, Caption, Style - Emphasis of News and Reports - Principles of Editing.

UNIT V

Writing and Editing - TV/Radio-News and News Headlines, Documentaries, TV/Radio Features

REFERENCE

1. Keval J.Kumar – *Mass Communications in India* (Bombay: Jacco 1981)
2. MacBride –*Many Voices, One world* (London: Kagan Press, 1980)
3. D.S.Metha – *Mass Communication and Journalism*
4. James M.Neel – *News Writing and Reporting*

OPEN ELECTIVE
PAPER - 4

C. FANTASY FICTION

COURSE OBJECTIVES

- To introduce students to various definitions of fantasy fiction
- To improve the imagination of students.
- To introduce students to the history of fantasy fiction

UNIT PLAN

- To Sketch the growth of fantasy Fiction through ages**.**
- To Build their imagination through the story.
- To realize the importance of creativity.
- To built socialization

COURSE OUTCOMES

- On successful completion of the course, students will be able to
- Demonstrate a basic understanding of the sub-genre of fantasy fiction
- Identify the genre and features of fantasy fiction
- Discuss the evolution of fantasy fiction
- Evaluate and discuss a work of fantasy fiction using prescribed texts
- Discuss the socio-cultural contexts and their impact on works of fantasy fiction.

UNIT 1

Introduction to Fantasy Fiction
Evolution of Fantasy Fiction

UNIT 2

Ursula K Le Guin Dragonfly

UNIT 3

Nnedi Okarofor - *Akata Witch*

UNIT 4

Terry Pratchett - The Colour of Magic

UNIT 5

Robin Hobb - Assassin's Apprentice

REFERENCE

1. Card, Orson Scott. *The Infinite Boundary*.
2. *How to Write Science Fiction and Fantasy*. Writers' Digest Books. 1990.
3. Dalton, A. J. *Sub Genres of British Fantasy Literature*. Luna Press Publishing, 2017.
4. Hume, Kathryn. *Fantasy and Mimesis*. Methuen, 1984.
5. Mendelsohn, Farah, Edward James. *A Short History of Fantasy*. Middlesex University Press, 2009.
6. Reid, Robin Anne. *Women in Science Fiction and Fantasy (Vol. 1 & 2)*. Greenwood Press, 2009.
7. Sinclair, Frances. *Fantasy Fiction*. School Library Association, 2008.
8. Tableford, Brian. *The A to Z of Fantasy Literature*. The Scarecrow Press, Inc., 2009.
9. Swinfen, Ann. *In Defense of Fantasy: A Study of the Genre in English and American Literature Since 1945*. Routledge & Kegan Paul, 1984

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THIRUVALLUVAR UNIVERSITY

MASTER OF COMMERCE

SYLLABUS

UNDER CBCS

(With effect from 2020-2021)

The Course of Study and the Scheme of Examination

Sl. No.	*Study Components*		*ins. hrs / week*	*Credit*	*Title of the Paper*	*Maximum Marks*		
	Course Title					*CIA*	*Uni. Exam*	*Total*
SEMESTER I								
1.	Core	Paper- 1	6	4	Advanced Financial Management	25	75	100
2.		Paper- 2	6	4	Accounting for Managerial Decision	25	75	100
3.		Paper- 3	6	4	Marketing Management	25	75	100
4.		Paper- 4	6	4	Advanced Business Statistics	25	75	100
Internal Elective for same major students								
5.	Core Elective	Paper-1	3	3	(To choose one out of 3) A. Business Environment B. Computer Application in Business C. Managerial Economics	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
6.	Open Elective	Paper-1	3	3	(To choose one out of 3) A. Principles of Marketing B. Elements of Insurance C. Corporate Social Responsibility	25	75	100
			30	**22**		**150**	**450**	**600**
SEMESTER II						*CIA*	*Uni. Exam*	*Total*
7.	Core	Paper- 5	6	4	Corporate Laws	25	75	100
8.		Paper- 6	6	4	Human Resource Management	25	75	100
9.		Paper- 7	6	4	Advanced Corporate Accounting	25	75	100
Internal Elective for same major students								
10.	Core Elective	Paper-2	5	3	(To choose one out of 3) A. Export and Import Management B. Global Marketing C. E-Commerce	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
11.	Open Elective	Paper-2	5	3	(To choose one out of 3) A. Principles of Management B. Elements of Accounting C. Elements of Business Law	25	75	100
12.	*Field Study		-	2		100	-	100

13.	Compulsory Paper		2	2	Human Rights	25	75	100
			30	**22**		**250**	**450**	**700**
SEMESTER III						*CIA*	*Uni. Exam*	*Total*
14.	Core	Paper- 8	5	4	Goods & Services Tax (GST)	25	75	100
15.		Paper- 9	5	4	Organisational Behaviour	25	75	100
16.		Paper- 10	6	4	Advanced Cost Accounting	25	75	100
17.		Paper-11	6	4	Research Methodology	25	75	100
Internal Elective for same major students								
18.	Core Elective	Paper -3	4	3	(To choose one out of 3) A. Agri Business Management B. Services Marketing C. Business Analytics	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
19.	Open Elective	Paper -3	4	3	(To choose one out of 3) A. Small Business Management B. Banking Theory C. Stress Management	25	75	100
20.	**MOOC Course		-	-		-	-	100
			30	**22**		**150**	**450**	**700**
SEMESTER IV						*CIA*	*Uni. Exam*	*Total*
21.	Core	Paper- 12	6	4	Direct Taxes	25	75	100
22.		Paper- 13	6	4	Investment & Portfolio Management	25	75	100
23.		Paper- 14	5	5	Project Development	25	75	100
24.	Core	Project	5	5	Project With Viva voce	100 (75 Project +25 viva)		100
Internal Elective for same major students								
25.	Core Elective	Paper 4	5	3	(To choose one out of 3) A. Financial Services B. Information Technology in Business C. Entrepreneurial Development	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
26.	Open Elective	Paper 4	3	3	(To choose one out of 3) A. Office Management B. Business Organisation C. Principles of Auditing	25	75	100
			30	**24**		**150**	**450**	**600**
								2600

*** Field Study**

There will be field study which is compulsory in the first semester of all PG courses with 2 credits. This field study should be related to the subject concerned with social impact. Field and Topic should be registred by the students in the first semester of their study along with the name of a mentor before the end of the month of August. The report with problem identification and proposed solution should be written in not less than 25 pages in a standard format and it should be submitted at the end of second semester. The period for undergoing the field study is 30 hours beyond the instructional hours of the respective programme. Students shall consult their mentors within campus and experts outside the campus for selecting the field and topic of the field study. The following members may be nominated for confirming the topic and evaluating the field study report.

(i). Head of the respective department
(ii). Mentor
(iii). One faculty from other department

****Mooc Courses**

Inclusion of the Massive Open Online Courses (MOOCs) with zero credits available on SWAYAM, NPTEL and other such portals approved by the University Authorities.

SEMESTER III

PAPER - 8

GOODS AND SERVICES TAX (GST)

Course Objectives

1. To gain expert knowledge on the principles and law relating to Indirect Taxation and GST in India.
2. To expose the students with the latest development in GST.
3. To impart skill in applying and analysing the provisions of Goods and Service Tax Act.
4. To know about the basic Administration of GST.
5. To Familiarize the Provisions to appeal in the court.

Unit 1: Introduction:

Meaning and Definition of Indirect Taxes-Nature-Scope Constitutional provisions-Advantages-Disadvantages-Difference between Direct and Indirect Taxes- Types-Milestones in the history of Indirect Taxation in India - **Goods & Services Tax (GST)** Act 2016- Introduction - Meaning-Definition-Major Indirect Taxes merged in to Goods and Service Tax.

Unit 2: Basic Provisions of GST:

Introduction--Historical backdrop of Goods and Service Tax-objectives & features - Strengths, Weaknesses, Opportunities and Challenges (SWOC) Analysis of GST in India.– Advantages & Limitations of GST-Economy, Industry and trade, tax payers-Types of GST - CGST-IGST-SGST- UTGST Schedules-Rate of GST- Tamil Nadu GST Provisions.

Unit 3: Main Provisions of GST:

Provisions Compensation (GST) Law-Definitions of important terms-Levy of Tax-Collection-relating to Place, Time and Value of Supply-Different meaning of supply- Composite Supply Mixed supply- Scope of Supply- Taxable Supply- E-Commerce-Supply Chain.

GST Exemption limit-Tax Invoice-Credit and Debit Notes-Valuation Rules-Computation Tax Input tax Credit (ITC)-Registration-procedures-Deemed Registration-Cancellation of Registration.

Accounts and Records- Period of Retention of Records- Presumption as to Documents-Returns-Annual-Final-Payment of Tax-Information Technology in GST Audit- Special Audit-Assessment-Refund-Consumer welfare Fund-GST Practioners - TDS/TCS.

Unit 4: Administration of GST:

GST Council-Authorities-Inspection-search seizure-Arrest-Demand-Recovery-Liability to pay tax in certain cases-Advance Ruling- Authority and Appellate Authority - GSTN-Information infrastructure for GST.

Unit 5: Appeals & Revisions under GST:

Appeals-Appeal to High Court Appeal to Supreme Court- Revisions-Offences- Compounding of Offences-Penalty Transitional provisions-IGST Provisions- Inter-state Supply- Intra-state supply- Zero rated Supply- Imported Supply- Transfer of ITC-Compensation Rules- Base year Revenue-Projected Revenue-Miscellaneous provisions-Interest-Job Work Procedure Deemed Export.

Text Books:

1. Goods and Services Tax, Dr. H.C. Mehrotra and V.P. Agarwal, Sahitya Bhawan Publications, Agra.
2. GST- A Brief Introduction, L.V.R. Prasad and G.J. Kiran Kumar, PK Publishers.
3. Indirect Taxes- Dr.H.CMehrotra & Prof. Agarwal, SahityaBhavanPublishers,Agra.

Reference Book

1. GST Law & Procedure, Anandaday Misra, Taxman
2. Hand Book of GST in India Concepts and Procedures(2017Edition) RakeshGarg&SandeepGarg - Bloomsbury India Publications
3. GST in India-RakeshGarg&SandeepGarg, Bloomsbury IndiaPublications
4. All about GST-V.S Datey-Taxman Publications.
5. GST Law, Concept & Impact Analysis-Dr.SanjivAgarwal
6. GST Law & Analysis with Conceptual Procedure-Bimal Jain &IshaBensalYoungGlobal.
7. GST Bare Acts, Rules, Notifications &Circulars
8. An Insight of GST in India-ICWAI, Vol:1&2

Course Outcome

1. The students will able to know and familiarize with the fundamentals of Taxation.

2. The students will able to know GST and its history of GST and their types.

3. The students will able to know the exempted goods and Services under GST Act.

4. The students will able to know the Administration of GST and Autority.

5. The students will able to know how to avail the Appeal and Revision under GST Act.

PAPER - 9

ORGANISATIONAL BEHAVIOUR

Course Objectives

1. To understand the basic concepts of organistional behaviour .
2. To bring an understanding on different types of motivational theories
3. To facilitate the students to know the stress management
5. To let to know students to organistional structure and Organisational Effectiveness

Unit I: Introduction

Organisational Behaviour – Concepts - Nature & Scope – Organisational Behaviour Models - Foundations of Individual Behaviour – Personality – Stages of Personality - Perception – Learning – Attitudes – Values – Emotions.

Unit II: Motivation

Motivation – Theories by Maslow, Herzberg, McGregor, McClelland & Vroom – Motivational Tools in Organisation – Effects on Work Behaviour - Motivation and Morale - Organisational Citizenship Behaviour.

Unit III: Group Dynamics and Stress Management

Group Dynamics – Formal and Informal Group - Group Norms - Group Cohesiveness - Group Behaviour - Group Decision Making – Work Stress - Stress Management – Coping Strategies of Stress.

Unit IV: Leadership and Organisational Conflicts

Leadership – Traits - Styles – Theories of Leadership - Power and Politics - Organisational Conflicts - Stages - Sources - Types - Conflict Management.

Unit V: Organisational Structure and Organisational Effectiveness

Organisational Structure – Foundation and Types - Organisational Culture and Climate – Organisational Development – Organisational Effectiveness & Performance – Organisational Ethics.

Text Books

1. S.S. Khanka, Organisational Behaviour, S.Chand & Co. Ltd., New Delhi.
2. K. Aswathapa, Organisational Behaviour, Himalaya Publishing House.

Reference Books:.

1. Stephen P. Robbins, Organizational Behavior, Pearson Education, New Delhi.
2. L.M. Prasad, Organisational Behaviour, Sultan Chand and Sons, New Delhi.
3. Margie Parikh and Rajen Gupta, Organisational Behaviour, Tata McGraw Hill Education, New Delhi

Course Outcome

1. After studied Unit-1, the student will be able to understand the basic concept of organisational behaviour and foundations of individual behaviour
2. After studied Unit-2, the student will be able to develop an idea about different motivational theories and evaluate motivational strategies used in a variety of organizational settings.
3. After studied Unit-3, the student will be able to understand the foundation of group dynamics and the nature of stress and its management.
4. After studied Unit-4, the student will be able to evaluate the appropriateness of various leadership styles and how to deal with organistional conflict.
5. After studied Unit-5, the student will be able to understand different types of organizational structures and importance of organizational effectiveness.

PAPER - 10

ADVANCED COST ACCOUNTING

Course Objectives

1. To enhance the understanding of the basic concepts in Cost Accounting.
2. To extend the knowledge of Methods of Costing Process costing.
3. To facilitate the students to have the deep understanding of Standard Costing and Variance analysis
4. To bring about the awareness of Methods of cost reduction.
5. To let the students to know about Benefits from adoption of ABC-Just in Time Costing (JIT).

UNIT-I

Nature and significance of cost accounts-Definition of Costing, Scope, Objectives, Functions and limitations of cost accounting-Installation of costing system-Elements of Cost- Cost centre and profit centre-Preparation of Cost sheet, tender of quotations.

UNIT-II

Methods of Costing-Process costing, Treatment of equivalent production- Inter process profit-Joint and by product Costing-Preparation of contract account, Cost plus contract and escalation clause.

UNIT-III

Standard Costing and Variance analysis-Material, Labor and Overheads -reporting of variances

UNIT-IV

Cost control and Cost Reduction-Control over wastages, Scrap, Spoilage and defectives– Methods of cost reduction

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UNIT-V

Activity based costing–Meaning and concept-Characteristics of ABC-Benefits from adoption of ABC-Just in Time Costing (JIT)

Note: The proportion between theory oriented and problem oriented questions in the university examination shall be 20:80

Text Book

1. T.S.Reddy and Y.H. Reddy- Cost and Management Accounting-Margam Publications, Chennai.
2. S.P. Jain and K.L. Narang-Cost accounting-Kalyani Publishers-New Delhi.

Reference books

1. Ravi M Kishore Advanced Management Accounting - Taxman's-New Delhi. 4. Management Accounting - J.Batty.
2. B.K. Bhar- Cost Accounting-Academic publishers, Calcutta.
3. C.T.Horangren-Cost Accounting - A Managerial Emphasis- Pearson education-New Delhi.
4. Jawaharlal - Cost Accounting-Tata Mc. Graw Hill

5. Robert S. Kaplan-Anthony A. Atkinson- Advanced Management Accounting - Prentice Hall of India-New Delhi 8.
6. Weldon's Cost Accounting and Cost Methods - Mc. Donald and Evens Limited.

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the basic concepts in Cost Accounting and also familiarizing with the preparation of Cost Sheets, Tenders and Quotations.
2. After studied Unit-2, the student will be able to understand Preparation of Process Costing.
3. After studied Unit-3, the student will be able to Know the Standard Costing and Variance Analysis
4. After studied Unit-4, the student will be aware of the Cost control and Cost Reduction.
5. After studied Unit-5, the student will be able to develop the knowledge about Activity based costing.

PAPER - 11

RESEARCH METHODOLOGY

Course Objectives

1. To enhance the understanding of the basics of Research Methodology
2. To extend the knowledge of Data Collection and Sampling.
3. To facilitate the students to have the deep understanding of Processing of Data
4. To bring about the awareness of data Analysis through Statistical Tools.
5. To let students to know about Research Report.

UNIT-I : INTRODUCTION

Research - definition, characteristics, nature and scope. Various types of research - Formulation of research problem - Major steps in Research – Hypothesis – Research Design - Uses of social research.

UNIT-II : SAMPLING AND DATA COLLECTION

Sampling: Meaning, definition, need and types - Merits and demerits of sampling. Data collection: Sources of data; Primary and Secondary data. Procedure for data collection, Tool of data collection - Questionnaire – Interview-Schedule.

UNIT-III : DATA PROCESSING AND ANALYSIS

Processing of data: editing, coding and Tabulation - Problems - use of computer in social research. Analysis of data: Statistical analysis; diagrammatic and graphic representation. Interpretation of results.

UNIT-IV : STATISTICAL APPLICATIONS

Statistical Tools used in Research – F test – t- Test, Analysis of Variance (ANOVA) – Chi-Square Analysis.

UNIT-V : RESEARCH REPORTS

Structure and components - Types of Research Report, Good Research Report. Pictures and Graphs. Introduction to SPSS Package

Text Books

1. Kothari.C.R. Research Methodology - Methods & Technology, New Age International Publisher, New Delhi.
2. Panneerselvam. R. Research Methodology, Prentice Hall of India, New Delhi, 2004.New Delhi, 1994.
3. Gupta, C.B., An introduction to Statistics Methods, Vikas Publishing House, 1998,New Delhi

Reference Items: books.

1. Wilkinson. T.S. & Bhandarkar. P.L. Methodology and Techniques of Social Research, Himalaya Publishing House, 2000, Mumbai.
2. Young, P.V., Scientific Social Survey and Research, Prentice Hall, 1949. New York.
3. Gupta, S.P. Statistical Methods, Sultan Chand and sons, 1999, New Delhi

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the basics of Research Methodology.
2. After studied Unit-2, the student will be able to know the Data Collection and Sampling
3. After studied Unit-3, the student will have understanding of Processing Data.
4. After studied Unit-4, the student will be able to have the awareness of Data Analysis through opt Statistical Tools
5. After studied Unit-5, the student will be able to know about Research Report and SSPS pacakage

CORE ELECTIVE
PAPER -1

(to choose one out of 3)

A. AGRIBUSINESS MANAGEMENT

Course Objectives

1. To enhance the understanding of the Management Concept and Agripreneurs
2. To extend the knowledge of Agribusiness and Commodities Market.
3. To facilitate the students to have the deep understanding of Agricultural Market and Products.
4. To bring about the awareness of Small Scale Industry and MSME.
5. To let students to know about financial schemes for Agribusiness.

Unit-1: Management Concepts and Agripreneurs.

Management Concepts & Principle - Basic Concepts of Management - Managerial Environment - Management Functions - Leading and Leadership - Forms of Business organization - Entrepreneurial Competencies - Agripreneurs.

Unit-2: Agribusiness and Commodities Markets.

Management principles to Agribusiness -Nature and Characteristics of Agribusiness -Agro-based Industries in India -Agricultural Supply Chain Management - Strategic Management in Agribusiness - Risk Management in Agribusiness - Contract Farming - Commodity Markets - Recent Innovations in Commodities Markets - Warehousing

Unit-3: Production, Consumption, Processing and Marketing of Agricultural Products.

Production, Consumption, Processing and Marketing of Agricultural Products – Agricultural Production Scenario in India – Consumption of Agricultural Products – Agricultural Marketing – Agricultural Marketing Functions – Classification of Markets- Cooperative Agricultural Marketing – Pricing – Marketing cost-margins-price spreads – Food Processing –Rural Marketing

Unit-4: Small Scale Industry – MSME.

Small Scale Industrial Undertaking -Ancillary Industrial Undertaking - Tiny Enterprises - Export Oriented Units -Small Scale (Industrial related) Service and Business Enterprises (SSSBE) - Women Enterprises - Village and Small Scale Industries –MSME- Khadi Village Cottage Industries

Unit-5: Financing Agribusiness.

Financing Agribusiness – NABARD - Financial Assistance from Banks - Micro Credit Firms – Cooperative Banks - Types of Agricultural loans - Risk Management – Export Opportunities – Quality Management - TQM.

Text Books

Unit-1: Girdhari Lal Meena, Fundamentals of Agribusiness Management, Agrotech Publishing Academy, 2017, Udaipur

Unit-2: Vedamurthy K.B, Agribusiness Management and Trade, Anand Agricultural University, Anand.

Unit-3: TNAU, Tamil Nadu, AECO 341 - Fundamentals of Agri Business Management.

Unit-4: Girdhari Lal Meena, Fundamentals of Agribusiness Management, Agrotech Publishing Academy, 2017, Udaipur.
Unit-5: Subba Reddy S, Raghu Ram P, Agricultural Finance & Management, Oxford & Ibh Publishing Co. Pvt. Ltd. New Delhi.

Reference Items: books.

1. Freddie L. Barnard, Jay T. Akridge, Agribusiness Management, Routledge Publishers. 2012, Canada.
2. Acharya S.S, Agricultural Marketing In India, Oxford & Ibh Publishing Co. Pvt. Ltd. 2019 New Delhi.
3. Sharma, Entrepreneurship in Livestock & Agriculture, CBS Publication, 2010 New Delhi,
4. Dr. Smita Diwase, Indian Agriculture and Agribusiness Management, Krish Management Network, 2017,New Delhi
5. Ramesh Chand, Agriculture Marketing, KSK Publishers & Distributors, 2011, Delhi
6. Katnalli Gauradevi S, Agro-Based Industries in India, ABD Publishers, Jaipur.
7. Srinivas Puri, Agro-Based Industries and Their Prospects, Random Publications, 2016, New Delhi,

Journals

8. The Madras Agricultural Journal, NABARD, Tamil Nadu Regional Office, Chennai.
9. Yojana, Rural Development, New Delhi
10. Agricutural Update, Muzaffar Nagar, UP
11. Agri Business and Food Industry, New Delhi
12. Kurukshetra, Ministry of Rural Development, New Delhi.
13. Kisan World, Chennai.

E-Materials

1. Vedamurthy K.B. Agribusiness Management and Trade. www.agrimoon.com.
2. Adnan Adeel, Principles of Agribusiness Management, www.academia.edu
3. Agribusiness Management. www. senecahs.org
4. Principles of Agribusiness Management, epdf – free download.
5. James G. Berlein, *Principles of Agribusiness Management*. www.wattpad.com

Course Outcomes:

1. After studied Unit-1, the student will be able to understanding of the Management Concept and Agripreneurs.
2. After studied Unit-2, the student will be able to know the Agribusiness and Commodities Market.
3. After studied Unit-3, the student will be able to have the deep understanding of Agricultural Market and Products.
4. After studied Unit-4, the student will be able to have the awareness of Small Scale Industry and MSME.
5. After studied Unit-5, the student will be able to know about financial scheme for Agribusiness.

CORE ELECTIVE
PAPER -1

B. SERVICES MARKETING

Course Objectives

1. To be aware of the Essential Elements of marketing mix in Service marketing.
2. To expand the understanding of marketing strategies for various services marketing-mix
3. To help the students in understanding of Product support services and problems of Service quality management
4. To enhance knowledge on Marketing of financial services.
5. To let the students to know CRM, and identify the Customer needs.

UNIT-I

Growth of the Service Sector - Nature and Concept of Service - classification of services - Characteristics of Services and their marketing implications - Essential Elements of marketing mix in Service marketing.

UNIT-II

Marketing strategies for service firms with special reference to information, communication, consultancy, advertising, professional services, after sales service, recruitment training and tourism.

UNIT-III Product support services - pricing of services - problems of Service quality management - Customer Expectations - innovation in services.

UNIT-IV Marketing of financial services - nature - types - marketing of insurance - mutual fund - marketing for non - profit firms - Growth of financial services in India.

UNIT-V CRM - identifying and Satisfying Customer needs - Relationship marketing - Customer Satisfaction - Managing Service Brands.

Text Books:

1. Christopher lovelock, Services Marketing, Pearson Education.
2. E.G. - Bateson, Managing Service marketing - Text and Readings, Dryden press, Hidsdale
3. Philip Kotler and Paul N.Bloom, Marketing professional Services, Prentice hall, New Jersey.

Reference Books:

1. Payne, the essence of Service Marketing, New Delhi, prentice Hall.
2. Helen Wood Ruffe, Services Marketing, Macmillan India, New Delhi.
3. Mary Ann pezzallo, Marketing Financial Services, Macmillan.
4. Dr.S.Gurusamy, Financial and Markets Vijay Nicole imprints private limited, Chennai.
5. Dr.B.Balaji, Services, Services Marketing and Management, S.Chand & Company Ltd., New Delhi.

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the Essential Elements of marketing mix in Service marketing
2. After studied Unit-2, the student will be able to develop an idea about marketing strategies for various services marketing-mix.
3. After studied Unit-3, the student will be able to know and learn about Product support services and Identify the problems of Service quality management
4. After studied Unit-4, the student will be able to learn the of Marketing of financial services.
5. After studied Unit-5, the student will be able to acquire the knowledge about CRM.

CORE ELECTIVE
PAPER -1

C. **BUSINESS ANALYTICS**

Course Objectives

1. To have the basic knowledge about Business Analytics.
2. To make the understanding about levels of Business Analytics.
3. To enable to students to know about types of Business Analytics
4. To bring knowledge about the Decision Making.
5. To enable the students to know about the approaches in Decision Making.

UNIT - I Business Analytics – Introduction

Definition of Business Analytics – Characteristics of Business Analytics and Business Intelligence. The basic rule of Business and Business Analysis - Evolving role of the Business Analyst.

UNIT - II levels of Business Analytics

Different levels of Business Analytics - Categories of Business Analytical methods and models. Business Analytic Process -. Classical Requirements and Tasks performed by Business Analysts

UNIT - III Decision Making

Decision Making - Objectives - Role and Significance of Decision Making- Decision Making Process - Rationality in Decision Making - Programmed and Non Programmed Decision Making- Decision Making under Uncertainty and Risk

UNIT - IV Approaches in Decision Making

Modern Approaches in Decision Making – Decision Support Systems - Heuristic Techniques- Participative Decision Making - Simulation – Brainstorming – Delphi Technique – Common Problems in Decision Making

UNIT - V Value of Analytics

Value of Analytics in Decision Making - Types of analytics – Descriptive, Predictive and Prescriptive analytics

Text book

1. C.B.Gupta, Business Management, Sultan Chand and Sons, New Delhi
2. Harold Koontz, Heinz Weihrich, ‘Essential of Management’, Tata Mcgraw Hill

Reference book

1. RN.Prasad, Seema, Achrya –Fundamentals of Business Analysis, Willy Publishers
2. Camm, Cochran, Fry, Ohlmann, Anderson, Sweeney, Williams- Essentials of Business Analytics, Cengage Learning.
3. Albright Winston, Business Analytics- Data Analysis-Data Analysis and Decision Making, Cengage Learning, Reprint 2016.

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the concept of Business Analytic
2. After studied Unit-2, the student will be able to understand the Categories of Business Analytical methods and models
3. After studied Unit-3, the student will be able to understand the Role and Significance of Decision Making.
4. After studied Unit-4, the student will be aware of the Modern Approaches in Decision Making and Common Problems in Decision Making
5. After studied Unit-5, the student will be able to know Value of Analytics in Decision Making.

OPEN ELECTIVE
PAPER - 1

(to choose one out of 3)

A. SMALL BUSINESS MANAGEMENT

Course Objectives

1. To enhance the understanding of the concept of Small Business and MSME.
2. To extend the knowledge of Starting a Small Industry.
3. To facilitate the students to have the deep understanding of the Type of the Organizations
4. To bring about the awareness of Sources of Finance for Small Business.
5. To let students to know about the Incentives and Subsidies given the Government.

UNIT-I: SMALL BUSINESS INTRODUCTION

Meaning of Small Scale Enterprises – Objectives of Micro, Small and Medium Enterprises Act of 2006 (MSME) – Importance of MSMEs – Advantages – Problems – Measures of the Government to Develop Small Industries.

UNIT-II: STEPS FOR STARTING A SMALL INDUSTRY

Steps for Starting a Small Industry – Search for Business Idea, Sources of Ideas – Project Formulation and Design, Introduction to Total Quality Management (TQM)

UNIT-III: TYPE OF THE ORGANIZATIONS

Selection of the Type of Organization – Sole Proprietorship - Partnership – Joint Stock Company – Factors Influencing the Choice of Organization.

UNIT-IV: SOURCES OF FINANCE

Sources of Project Finance – Short Term, Medium Term and Long Term Finance – Role of Banks – Institutions Assisting Small Enterprises – District Industries Centres (DICs), Industrial Estates, SIDO, NSIC, SIDCO, SISI, TIIC and SIPCOT.

UNIT-V: - INCENTIVES AND SUBSIDIES

Incentives and Subsidies – Meaning – Need and Problems – Schemes of Incentives for MSME & SSI Units –Export Opportunities

Text books

1. Dr. Vijayshree P.T& Dr. Alagammal. M. Entrepreneurship and Small Business Management, Margham Publications, Chennai
2. Gupta C.B & Srinivasan N.P. Entrepreneurship Development in India, Sultan Chand & Sons, 1999, New Delhi
3. Saravanavel P. Entrepreneurship Development, ESS PEE KAY Publishers, Chennai.

4. Gupta C.B. & Srinivasan N.P. Entrepreneurship Development in India, Sultan Chand & Sons, 1999, New Delhi
5. Satish Taneja & Gupta S.L, Entrepreneur Development, Galgotia Publishing Company 2002, New Delhi.

Reference Books:

1. Jayshree Suresh, Entrepreneurial Development, Margham Publications, 2015 Chennai
2. Gordon.E & Natarajan, Entrepreneurship Development, Himalaya Publishing House, 2009 Mumbai.
3. Poornima M. Charantimath, Entrepreneurship Development and Small Business Enterprises, Pearson Publishers, 2013, Chennai.
4. Anil Kumar. S, Small Business and Entrepreneurship, I. K. International Pvt Ltd, 2008, New Delhi
5. Besterfield Dale H. Total Quality Management (TQM) Pearson Publishers, 2018, Chennai.

Journals:

6. The_Journal_of_Entrepreneurship. www.ediindia.org
7. Journal of Small Business and Entrepreneurship Development. www. jsbednet.com
8. International Journal of Small Business and Entrepreneurship Development. www. researchgate.net
9. Journal of Small Business and Enterprise Development. www. emerald.com
10. International Journal of Entrepreneurship and Innovation. www. sagepub.com

E-Materials:

1. Poornima M Charantimath, Entrepreneurship Development And Small Business Enterprise, www.goodreads.com
2 .Kevin McQueen , Small Business Development Strategies. www.bwbsolutions.com
3. Darren Dahl, How to Develop a Business Growth Strategy, www.inc.com
4. Tamil Nadu Manufacturing Business Incubation Infrastructure Development Project, Entrepreneurship Development and Innovation Institute, www.startup-tn.in
5. Dr.Jayakumar. V, Total Quality Management. www. easyengineering.net

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the concept of Small Business and MSME.
2. After studied Unit-2, the student will be able to know how to start a Small Industry step by step.
3. After studied Unit-3, the student will be able to understand the Type of the Organizations.
4. After studied Unit-4, the student will be aware of the Sources of Finance for Small Business.
5. After studied Unit-5, the student will be able to know Incentives and Subsidies given the Government.

OPEN ELECTIVE
PAPER - 1

B. BANKING THEORY

Course Objectives

1. To enhance the understanding of Developments in Banking Sector
2. To extend the knowledge of Functions of Commercial Banks.
3. To facilitate the students to have the knowledge on the Factors influencing Bank lending
4. To bring about students to familiar with the Functions of Central Banks
5. To let students to know about Recent Trends in Banking Sector

UNIT – I: An Introduction to Banking

Introduction – Definition of Banking – Classification of Banks – Components of Indian Banking System – Banking Structure in India.

UNIT – II: Commercial Banks

Introduction – Definition – Features of a Commercial Banks – Origin of Commercial Banking in India – Function of Commercial Bank – Credit Creation.

UNIT – III: Function of Banking

Introduction – Opening of Accounts – Types of Accounts – Relationship with customers – KYC – Norms – Banking lending – Types of lending – Factors influencing Bank lending CIBIL.

UNIT – IV: Central Banks

Introduction – Definition – Characteristics – Role and objectives – Functions – Difference between Central bank and Commercial banks – Credit control.

UNIT – V: Recent Trends in Banking

Electronic Fund Transfer – Benefits of Electronic Banking – RTGS – NEFT – ATM – Credit and Debit Card – Core Banking Solutions (CBS).

Text Books:

1. P.N. Varshney., - Banking Law and Practice – Sultan Chand & Sons New Delhi-24th Edition
2. B. Santhanam, Banking and Financial System, Margham Publication, Chennai.
3. S.N. Mahaeswari, Banking Law and Practice, Kalyani Pubications, Chennai.

Reference Books:

1. Natarajan S. and Parameswaran R. – Indian Banking – S. Chand and Co. Ltd., New Delhi (Latest Ed).
2. Vasudevan S.V. – Theory of Banking – S. Chand and Co. Ltd., New Delhi (Latest Ed).
3. S.N. Maheswari, Banking Law and Practice, Kalyani Publications, Chennai

Course Outcomes

1. After Studied Unit-1, The Student will be able to know classification of banks, ownership, function and banking structure in India.
2. After Studied Unit-2, The student will be able to familiar with the Types and Functions of Commercial Banks.
3. After Studied Unit-3, The Students will able to analyse the Relationship between Banker and Customer.
4. After Studied Unit-4, The Student will be able to know the Functions of Central Banks
5. After Studied Unit-5, The Student will be able to Analyse Recent Trends in Banking Sector.

OPEN ELECTIVE
PAPER - 1

C. STRESS MANAGEMENT

Course Objectives

1. To enhance the understanding of the meaning of Stress, Types and Causes of Stress.
2. To extend the knowledge of Personality its Types and Perception.
3. To facilitate the students to have the deep understanding of Emotional Intelligence - EQ
4. To bring about the awareness of Stress at Work Place.
5. To let students to know about Stress Management and Counselling.

UNIT- I: STRESS, TYPES - CAUSES

Stress - Meaning of Stress- Types - Causes of Stress - Personal Factors - Environmental Factors Organisational Factors - Consequences of Stress - Psychological Symptoms - Behavioural Symptoms.

UNIT- II: PERSONALITY AND PERCEPTION

Personality -Types Personality - Determinants of Personality - Personality Theories - Trait Theories - Similarities of Individuals - Individuals Difference - Dimensions of Personality - Perception - Attention and Selection

UNIT- III: EMOTIONAL INTELLIGENT

Emotion - Types of Emotions - Positive and Negative emotions - Feelings – Sensations - Moods - Emotional Intelligence - EQ- Behaviour Theory - Cognitive Theory – Emotions and well-being

UNIT- IV: STRESS AT WORK PLACE

Stress and Job Performance – Role conflict – Organisational culture – Work Stress – effects of works on individual and organization - Stress of the working women - Time Management

UNIT- V: STRESS MANAGEMENT AND COUNSELLING

Stress Management and Counselling - Prevention of Stress - Escaping Stress - Coping with Stress -Counselling - Characteristics of Counselling - Importance of Counselling- Functions of Counselling - Types of Counselling.

Text book

1. Stress Management an Integrated Approach, Dr. Viswanathan Gopalan, GenNext Publication, 2016, New Delhi.
2. Introduction to Psychology, Clifford Morgan and Richard King , McGraw Hill Education, 2017 Chennai
3. Emotional Intelligence, Dainel Goleman, Penguin Random House, 2006, Noida

4.Human Resource Management, Jayasankar. J, Margham Publications, 2002, Chennai.

5.Richard Nelson Jones, Basic Counselling Skills: A Helper's Manual, Sage Publications, 2012, New Delhi

Reference - Books:

1. Stress Management, Chakravarty Ajanta, Rupa Publications, 2012, Chennai.
2. Organizational Behaviour, University of Minnesota Libraries Publishing, 2017. USA
3. John Romas, Practical Stress Management, Academic Press, 2017, Cambridge.
4. Dale Carnegie, How to Stop Worrying and Start Living, Rupa Publication, 2016, Kolkata
5. Dr. Bimal Chhajer A complete guide to Managing Stress, New Ages Books, 2006, Chennai
6. Shashi Jain, Introduction to Psychology, Kalyani Publishers, 2006, Bengaluru,
7. Mangal S. K. Emotional Intelligence, PHI Learning Pvt. Ltd. 2015, New Delhi

Journal:

8. International Journal of Stress Management.*www.aapb.org*
9. The American Journal of Psychology on JSTOR. www.jstor.org
10. International Journal of Stress Management. www.apa.org
11. International Journal of Psychology.www.onlinelibrary.wiley.com

E-Materials

1. International Journal of Stress Management. www.springer.com
2. Stress Management.www.helpguide.org
3. A Study of Learning Stress and Stress Management Strategies. www.sciencedirect.com
4. Management of Stress at Workplace. www.globaljournals.org

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the concept of Stress, Types and Causes of Stress
2. After studied Unit-2, the student will be able to understand the Personality its Types and Perception.
3. After studied Unit-3, the student will be able to understand the Emotional Intelligence - EQ
4. After studied Unit-4, the student will be aware of the Stress at Work Place.
5. After studied Unit-5, the student will be able to know Stress Management and Counselling skills.

SEMESTER IV

PAPER - 12

DIRECT TAXES

Course Objective

1. To Learn the Students about History of Income Tax in India.
2. To Facilitate the Practical Knowledge on Calculation of Income from House Property.
3. To Impart Practical knowledge on Income from Business &Professional and Capital Gain.
4. To Make understand the Computation of Total Income of Individuals.
5. To know about the Assessment Procedure, e-filing of Return and Tax Planning.

UNIT – I: Introduction

History of Income Tax in India - Basic Concepts – Income – Persons – Previous Year – Assessment Year – Assessee – Gross Total Income – Total Income – Determination of Residential Status – Scope of Total Income and Incidence of Tax – Incomes Exempt from Tax u/s 10.

UNIT – II: Income from Salary & House Property

Computation of Income from Salary – Allowances – Perquisites – Deductions including Standard Deduction – Income from House Property – Annual Value – Self-Occupied House - Let-Out House – Deemed to be Let-Out House – Partly Self-Occupied and Partly Let Out – Deductions.

UNIT – III: Income from Business & Profession and Capital Gains

Profits and Gains of Business and Profession – Admissible Deductions – Expenses Expressly Disallowed – Deemed Incomes – Depreciation – Block of Assets – Normal Depreciation – Additional Depreciation – Capital Gains – Short-term and Long-term Capital Gains – Exemptions.

UNIT IV: Income from Other Sources and Computation of Total Income

Income from Other Sources – Aggregation of Income – Set-Off and Carry Forward of Losses – Deductions available from Gross Total Income – Computation of Total Income of Individuals.

UNIT V: Assessment Procedure, e-filing of Return and Tax Planning

Assessment Procedure – Methods – Assessment of Individuals – e-filing of Tax Return – Tax Planning – Meaning, Need and Limitations – Tax Evasion and Tax Avoidance.

Note: Weightage of marks: Theory 40% Problems 60%

Text Books:

1. Gaur and Narang, Income Tax Law & Practice, Kalyani Publishers, New Delhi.
2. T.S. Reddy and Y. Hari Prasad Reddy, Income Tax Law & Practice, Margham Publications, Chennai.

3. Girish Ahuja & Ravi Gupta, Practical Approach to Income Tax, Wolters Kluwer India Pvt. Ltd., Mohali, Chandigarh.
4. Anita Raman, Income Tax Theory, Law & Practice, Mc Graw Hill, New Delhi.

Reference Books:

1. Vinod K Singhania and Monica Singhania, Students' Guide to Income Tax including GST, Taxmann, New Delhi.
2. H.C. Mehrothra, Income Tax including Tax Planning & Management, Sahithya Bhavan, Agra.
3. R N Lakhotia and Subhash Lakhotia, How to Save Income Tax through Tax Planning, Vision Books, New Delhi.
4. Master Guide to Income Tax Rules, Taxmann, New Delhi.
5. Income Computation & Disclosure Standards, Taxmann, New Delhi.

Course Outcomes:

1.The Students we able to Contrast The Different Basic Concepts In Income Tax
2. The Students we able to understand and Compute Salary Income And Income From House Property
3. The Students we able to understand and Construct The Statements For Business. Income, Professional Income And Capital Gains
4. The Students we able to understand and Compute Income From Other Sources And Total Income Of Individuals
5. The Students we able to understand and Trace Assessment Procedure and Familiarizing Tax Planning

PAPER - 13

INVESTMENT & PORTFOLIO MANAGEMENT

Course Objectives

1. To infuse basic knowledge in proposed investors as to select the better investment proposal.
2. To create awareness among the investors about unscrupulous trade practices happening in the security market thereby protecting their interests.
3. To Impart the students about basic Fundamental Analysis, Economic Analysis and Technical Analysis.
4. To facilitate the students about Valuation of Securities, ABM,YBM,FVM.
5. To Let students to know about Efficient Market Hypothesis, Random Walk Theory, Markowitz Theory.

Unit - 1

Properties of financial assets - Financial Markets - Investments - Types - Characteristics - Objectives - Types of Investors - Investment Vs. Gambling, Speculation, Speculation Vs. Gambling.

Unit - 2

Nature and Scope of Security Analysis - Concept of Risk and Return - Sources of Risk - Types of Risk - Risk Aversion and Risk Premium - Measurement of Risk: Standard Deviation as a measure of Risk, β as a measure of Risk) - Measurement of Return from Historical data.

Unit - 3

Fundamental Analysis - Economic Analysis, Industry Analysis and Company Analysis - Technical Analysis - Trend Indications - Indices and Moving applied in Technical Analysis.

Unit - 4

Valuation of Securities - Equity Shares: Assets Backing Method, Yield Basis Method, Fair Value Method, Return on Capital Employed and Price Earning Method. Preference Shares: Dividend Discount Model, Yield on Preference Shares. Debentures and Bonds: Market Discount Rate, Spot and Forward rate, Binominal Interest Rate Free, Maturity Pricing.

Unit - 5

Efficient Market Hypothesis - Random Walk Theory - Markowitz Theory - Sharpe's Optimisation Solution - Down Theory - CAPM model - SML, CML.

Note: Only theory Questions

Text Book

1. Dr. Bhalla V.K. Investment Managemet, S. Chand and Company, New Delhi.
2. Rustagi R.P. Investment Analysis and Portfolio Management, Sultan Chand & Sons, New Delhi.

References

1. Dr. Ranganatham m & Madhumathi R. Investment Analysis 7 Portfolio Management. Pearson Education, New Delhi.
2. Fisher & Jordan, Security Analysis and Portfolio Management, Prentice Hall of India, New Delhi.
3. Sharpe, William and Gordon, Investment - Prentice hall of India, New Delhi.

Course Outcomes

1. Making the students being well aware of types of financial markets
2. Testing the knowledge of students about measurement of risk and return.
3. Asses the performance of students in relation to Fundamental Analysis, Economic Analysis, Industry Analysis and Company Analysis.
4. Evaluate student's knowledge on valuation of equity shares, preference shares, debentures and bonds
5. Getting the students to familiarize Efficient Market Hypothesis

PAPER - 14

PROJECT DEVELOPMENT

Course Objective:

1. To study Project development cycle, Project Appraisal, Project Financing and Selection and Risk Management.

2. To Enhance the knowledge about the types of Appraisals.

3. To facilitate the students to the understanding Project cost and Social cost.

4. To enable the students Learn Selection of Project and Programming.

5. To Impart Knowledge on Project control and budgetary control.

UNIT-I: PROJECT

Meaning and overview – Project Development Cycle – Capital Expenditure Decisions – Importance and Difficulties.

UNIT-II: PROJECT APPRAISAL

Aspects of Appraisal – Market Appraisal – Technical Appraisal – Financial Appraisal – Economic Appraisal, Project formulation, and Feasibility Report.

UNIT-III: PROJECT COST AND MEANS OF FINANCE

Project cost – Social Cost and Social Benefit. Terms Loans – Loans from Development banks – Assistance from Indian Finance Corporations and International Finance Corporations. External commercial borrowing.

UNIT-IV: PROJECT SELECTION

Selection of a suitable project – Programming – Scheduling and Controlling Mechanism.

UNIT-V: PROJECT CONTROL

Time and cost control – Budgetary control – corrective and preventive actions. Risk Management function.

TEXT BOOKS:

1. Prasanna Chandra, Projects – Preparation Appraisal, Budgeting and Implementation, 3rd ed. Tata McGraw- Hill Publishing Company Limited, New Delhi.
2. Dr. Gupta, C.B. & Dr. Srinivasan, N.P. Entrepreneurial Development, Sultan Chand & sons, New Delhi.

REFERENCE BOOKS

1. Bryce, M.D. Industrial Development: A Guide for Accelerating Economic Growth, McGraw- Hill, 1960 New York.
2. Varma, M.L. Foreign Trade Management in India, Vikas Publishing House, 1993, New Delhi.
3. Jeevanandam, C. Foreign Exchange, Sultan Chand & sons, 1994, New Delhi.

Course Out Comes

1. The students will be able to understand the Project and its development:

2. The students will be able to understand the Capital expenditure decisions of projects.

3. The students will be able to understand the Economic Viability of the project.

4. The students will be able to understand the Sources of Project Finance.

5. The students will be able to understand the Project schedule and control mechanism.

CORE ELECTIVE

PAPER - 4

(to choose one out of 3)

A. FINANCIAL SERVICES

Course Objectives

1. To enhance the understanding of the Financial Institutions and Financial Services Sector.
2. To extend the knowledge of Legal aspects of Factoring and Venture Capital.
3. To facilitate the students to have the deep understanding of Capital Market and stock market in India
4. To bring about the awareness of SEBI Guidelines.
5. To let students to know about Credit rating agencies

Unit – I

Financial Services – meaning – Financial Services and economic environment - Legal and Regulatory Framework – Financial Institutions and other participants in the Financial Services Sector.

Unit – II

Factoring – Types and Features of Factoring agreement - Legal aspects of Factoring – Factoring in India – Steps involved in Future – Venture Capital – meaning and characteristics – Criteria for assistance – Schemes and guidelines.

Unit – III

Financial market - meaning – Features – Capital Market – primary market – secondary market – present position of stock market in India – money market – characteristics of Development money market – Importance – Problems faced by Indian money market – Difference between capital market and money market.

Unit – IV

Mutual Funds – SEBI Guidelines – Features and types – management – structure and performance evaluation – Growth and recent trends.

Unit – V

Investor Services – Credit rating agencies – CRISIL, CARE, ICRA – Services – Criteria for rating – symbols

Text Books:

1. M.Y.Khan, Indian Financial System, Tata McGraw Hill, 2001.
2. H.R.Machiraju, Indian Financial System, Vikas Publishing House, 1999
3. B.S. Bhatia &G.S.Bhatre, Management of Capital Markets, Financial Services and Insititutions, Deep and Deep Publishers, 2000.

Reference Books:

1. Dr. V. Balu, Merchant Banking & Finance Services, Sri Venkateswara Publication, Chennai
2. Dr. N. Permavathy, Financial Services and Stock Exchange, Sri Vishnu Publications, Chennai.
3. Dr.S.Gurusamy, Financial Services and Systems, Vijay Nicholes Imprint Pvt. Ltd., 2004 Chennai.

Course Outcomes

1. After studied Unit-1, achieve the target of students having better understanding of Financial Services in India.
2. After studied Unit-2, the student will be able to know the Collect the data from the students pertaining to venture capital
3. After studied Unit-3, Let the students know about Capital Market, Money Market Strategies and present position of stock market in India,.
4. After studied Unit-4, the student will be able to have the awareness of SEBI Guidelines and Structure and performance evaluation
5. After studied Unit-5, the student will be able to know about Investor Services & Credit rating agencies.

CORE ELECTIVE

PAPER - 4

B. INFORMATION TECHNOLOGY IN BUSINESS

Course Objectives

1. To Develop skills to practice information systems in Business.
2. To bring understanding about the Accounting and Financial Information Systems
3. To facilitate the students to know about – preparing to online business
4. To provide the students information about Security Issues in E-Commerce
5. To extend the knowledge of Growth of internet

UNIT-I : INFORMATION TECHNOLOGY

Meaning - Definition - Types of Information System - Changing decision making scenario; Quality of information - Role of Information Technology in information generation and value addition**.**

UNIT-II APPLICATION OF IT IN BUSINESS:

Accounting and Financial Information Systems- Manual System Vs Computer based Accounting System. Marketing Information Systems - Components. Operational and Production Systems – Material Resource Planning. Human Resource Information Systems – Advantages**.**

UNIT-III: ELECTRONIC BUSINESS

Computers - Internet business - Definition - Online Business - E.Business Categories – preparing to online business - Ethics of information technology. E. Business Applications - Business to Business (B2B) - Business to Customers (B2C) - Electronic Shopping.

UNIT-IV - SECURIY ISSUES IN E-COMMERC

Security Issues in E-Commerce: Risks of e-commerce –Types and sources of threats, Protecting electronic commerce assets and intellectual property; Risk management approach to e-commerce security.

UNIT-V: INTERNET

Meaning of Internet; Growth of internet, Owner of Internet, Anatomy of Internet, Net Etiquette ; World Wide Web; Internet Protocols, Usage of Internet to society, Search Engines . Features of Industry 4.O.

Text Books:

1. Deepak Bharihoka, Fundaments of Information Technology, Excel Book, New Delhi
2. Leon a. and Leon M., (2002) Fundamental of Information Technology, Vikas Software Manuals.

Reference Books:

1. Comer, Douglas E. (2007), the Internet Book, New Delhi : PHI Learning Private Limited).
2. Morley, Deborah and Charles S. parker (2007) Fundamentals of Computers (New Delhi: Learning India Pvt. Ltd.)
3. Laudon, Kenneth C. and Jane P. Laudon, (2003), Management Information Systems(New Delhi: Prentice Hall of India

Course Outcomes

1. After Studied Unit-1, Students will be able to develop skills to practice information systems in Business.
2. After Studied Unit-2, Students will be able understand the Accounting and Financial Information Systems.
3. After studied unit-3, Students will be able to develop to skill by preparing to online business
4. After Studied Unit-4, Students will be able to know the Security Issues in E-Commerce and Risk management approach to e-commerce security.
5. After Studied Unit-5, the student will be able to understand the relevant information technology, growth of internet and Usage of Internet to society

CORE ELECTIVE

PAPER - 4

C. ENTREPRENEURIAL DEVELOPMENT

Course Objectives

1. To enhance the deep understanding of the Entrepreneur and Entrepreneurship Qualities.
2. To extend the knowledge of devaluations of Joint Rights, liabilities and Discharge of contract.
3. To facilitate the students to have the understanding about Indemnity and Guarantee
4. To enable the students to know about Bailment and pledge
5. . To let students to know about Contract of Agency and Termination agency.

UNIT I

Concept of Entrepreneur and Entrepreneurship – Major Entrepreneurial Competencies – Qualities of Successful Entrepreneur – Types of Entrepreneur – Knowledge and Skills Required for an Entrepreneur.

UNIT II:

Entrepreneurial Environment – Economic and Non-Economic Factors – Entrepreneurial Motivation – Need for EDPS.

UNIT III

Sources of Business / Product ideas – Market Research – Pre-feasibility study - Criteria for Selection of a project – Project Report Preparation and Evaluation Criteria.

UNIT IV

Institutional Finance – Term Lending Institutions – Commercial Banks – State Finance Corporations – Small Industries Development Bank of India (SIDBI) – Small Industries Service Institute (SISI) – District Industries Centre (DIC) – SIDCO – SIPCOT and ITCOT – Microfinance and Self Help Groups.

UNIT V

Launching and Development of Small Business – Institutional Support to Small Business – Growth Strategies – Product Launching – Monitoring and Evaluation of Small Business – Industrial Sickness – Causes and Consequences – Prevent in Sickness.

Text Book:

1. Dr. Jayshree Suresh, Entrepreneurial Development, MArgham Publications, Chennai.
2. Dr. S.S. Khanka, Entrepreneurial Development S. Chand & Co., New Delhi

Reference books.

1. N.D. Kapoor, Business Laws, Sultan Chand & Sons, New Delhi.
2. R.S.N. Pillai &Bagavathi, Business Laws, S. Chand & Co., New Delhi.

Course Outcomes:

1. After studied Unit-1, the student will be able to acquire the basic knowledge and understand the types of contract and Agreement
2. After studied Unit-2, the student will be able to know the Identify the essential elements of contract and rules as to offer.
3. After studied Unit-3, the student will be able to have to understanding of law relating to indemnity and guarantee
4. After studied Unit-4, the student will be able to know the duties and rights of the Bailor and Bailee and Agent and Principal.
5. After studied Unit-5, the student will be able to know about law of Agency.

OPEN ELECTIVE

PAPER - 4

(to choose one out of 3)

A. OFFICE MANAGEMENT

Course Objectives

1. To impart knowledge in office management and its functions and make them to apply in the practical manner in the company
2. To understand how to organize their office and maintain filing system
3. To inspire the students to apply the knowledge gained in Office forms
4. To provide the students the avenues of studies in Office Machines and equipments
5. To teach the recent developments in the various areas of Measurement of Office Work.

Unit I - Office Management Introduction

Office and office Management –meaning of office, function of office, primary and administrative functions, importance of office. Relation of office with other departments of business Organization. Concept of paperless office, virtual office, back and front office, open and private office. Definition and elements of office management, duties of an Office Manager.

Unit II - Filing System

Filing and Indexing –Meaning and importance of filing, essential of good filing system. Centralized and decentralized filing system. Meaning, need and types of indexing used in the business organization.

Unit III - Office Forms

Office forms–Meaning and types of forms used in business organization, advantages, forms controls, objectives, form designing, principles of forms designing and specimens of forms used in office. Office Record Management –Meaning, importance of record keeping management, principles of record management and types of records kept in a business organization.

Unit IV - Office Machines and Equipments

Office Machines and equipments –Importance, objectives of office machines. Office Safety and Security –Meaning, importance of office Safety, safety hazards and steps to improve office safety. Security hazards and steps to improve office security.

Unit V - Measurement of Office Work:

Measurement of Office Work –Importance, purpose, difficulty in measuring office work. Different ways of measurement, setting of work standards, benefits of work standards. Techniques of setting standards. Office Manuals –Meaning, need, types of office manuals and steps in preparing of office manuals

Text Books:

1. S.P.Arrora -Office organization and management- Vikas publishing housenov,2009
2. Chopra-Office management-Vikas publishing house 2nd revised edition,2015

Reference Books:

1. M.E. Thukaram Rao-Office management and organization-atlantic publishers and distributers,2000
2. Ranjan Nangia -Office management- - Neha Publisherscrescent publishing corporation,2012

Course Outcomes

1. After Studied Unit-1, Students will be able to support management in office administration.
2. After Studied Unit-2, Students will be able to prepare business documents
3. After studied unit-3, Students will be able to manage records and files. Students will also able to demonstrate business communication skills
4. After Studied Unit-4, Students will be able to utilize appropriate office technology. Students will also able to execute the duties of an office administrator.
5. After Studied Unit-5, the student will be able to know about to role of management in the workplace, levels and functions of management

OPEN ELECTIVE

PAPER - 4

B. BUSINESS ORGANISATION

Course Objectives

1. To make students to understand the concept of business and Business ethics
2. To expand the awareness of forms of business organization
3. To facilitate the students to the understanding on size of industry
4. To bring the subject knowledge about functions of Stock Exchanges
5. To let students to be acquainted with on the subject of Trade Association & Chamber of commerce.

Unit –I

Business- meaning and types – profession – importance of business Organization- Social Responsibilities of Business- Business Ethics.

Unit –II

Forms of Business organization- sole trader- partnership- joint Hindu family- joint stock companies – co-operative societies – public utilities and public enterprises.

Unit –III

Location of industry – factors influencing location – size of industry- optimum firm- advantages of large- scale operation – limitation of small scale operation.

Unit- IV

Stock Exchange – Function – Types- working- Regulation of Stock Exchanges in India.

Unit – V

Trade association- Chamber of commerce- Functions- objectives – Working in India.

Text Books:

1. Y.K. Bhushan, Business organization, Sultan Chand, New Delhi.
2. Business organization & Management, R.N. Gupta, S. Chand & Co. New Delhi.
3. Dr. K. Sundar, Business Organization, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books:

1. Prakash & jagedesh, Business organization & Management.
2. Reddy & Gulshar, Principles of Business Organization & Management.
3. Vasudevan & Radhasivam, Business Organization.

Course Outcomes:

1. After studied Unit-1, the student will be able to know about Basics of Business Organization
2. After studied Unit-2, the student will be able to aware about different forms of business organization
3. After studied Unit-3, the student will be able to gain knowledge on Industry location & operations
4. After studied Unit-4, the student will be able to Facilitate to get exposure on Functioning of Stock Exchange.
5. After studied Unit-5, the student will be able to get full information on Trade Association & Chamber of commerce.

OPEN ELECTIVE

PAPER - 4

C. PRINCIPLES OF AUDITING

Course Objective:

1. To Facilitates the Students to know about Auditing and their nature.
2. To Impart the knowledge on Auditing programme Audit file and Audit note book.
3. To Enable the Students to know about Internal Check and Internal Audit.
4. To Make Aware the Students about Verification and Valuation of assets and liabilities.
5. To Learn Students about Qualification and Disqualification of Auditors, Rights, Powers,Liabilties.

UNIT-I

Meaning and Definition of Auditing – Nature and Scope of Auditing –Auditing and Investigation – Objectives of Auditing – Limitations of Audit – Advantages of Audit – Classification of Audit.

UNIT-II

Meaning and Definition of Audit Programme – Advantages and Disadvantages – Audit File, Audit Note Book, Audit Working Papers – Purposes and Importance of Working Papers –

UNIT-III

Internal Check – Meaning, object of Internal Check – Features of Good Internal Check System – Auditors duty with regards to Internal Check System – Internal Check and Internal Audit.

UNIT-IV

Verification and Valuation of assets and liabilities – Meaning and objects of verification – Vouching and verification – Verification and Valuation of different kinds of Assets and Liabilities.

UNIT-V

Qualification and Disqualification of Auditors – Status of Auditors – Rights – Powers – Duties and Liability of Auditors.

Text Books:

1. B.N. Tandon, Sultan Chand – A handbook of practical auditing
2. B.N. Tandon, Sudharsanam, Sundharabahu – S Chand – Practical auditing.
3. Sundar. K and Pari. K, Vijay Nicole Imprints Private Ltd., Chennai.

Reference Books:

1. Sharma, SahityaBhavan, Agra – Auditing
2. Dr.N.Premavathy, Practical Auditing, Sri Vishnu Publications, Chennai.
3. Dr.N.Premavathy, Practical Auditing (in Tamil), Sri Vishnu Publications, Chennai.

Course Outcomes

1. The Students will able to understand the concept of Auditing and Classification.

2. The Students will able to Gain the knowledge about Audit Programme and importance.

3. The Students will able to Get awareness the Students about Internal check and Audit.

4. The Students will able to understand the Valuation of assets and liabilities.

5. The Students will know about the qualification and disqualification of Auditors

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