

**ISLAMIAH COLLEGE  
(AUTONOMOUS)  
VANIYAMBADI – 635 752**



**Syllabi Book- III**

**4<sup>th</sup> Academic Council**

**31<sup>st</sup> March 2013**

## **UG - FOUNDATION COURSE**

### **URDU PAPER -I (SEMESTER I) SYLLABUS FOR ALL UG I YEAR FROM 2013 - 2014 ONWARDS**

#### **PROSE PAPER I .. PROSE, GRAMMER & LETTER WRITING**

##### **UNIT - I PROSE**

BOOK PRESCRIBED: FAIZAN-E-ADAB , APPLIED BOOKS, NEW DELHI

1. SAIR PAHLAY DARWESH KI - Meer Amman Dehlavi
2. GHALIB KE AKHLAQ -O- AADAT - Moulana Althaf Hussain Hali
3. UMMEED KI KHUSHI - Sir Syed Ahmed Khan
4. KHAWAJA MOINUDDEEN CHISTI - Shebaz Hussain
5. SAWERAY JO KAL MERI AANKH KHULI - Putars Bukhari

##### **UNIT II – GRAMMER**

1. Ism aur Uski Qismein
2. Fe'l aur Uski Qismein
3. Sifat aur Uski Qismein
4. Zameer aur Uski Qismein
5. Jins aur Uske Aqsaam

Book for reference:

Hafeezul Qawaid by P. Hussain Khan

published by National Fine Printing Press, Char Kaman, Hyderabad

##### **UNIT III- LETTER WRITING**

1. Letter to the Principal Seeking leave
2. Letter to the father/guardian asking money for payment of college fees
3. Letter to a friend inviting him to your sister's marriage
4. Letter to the manager of a firm seeking employment
5. Letter to a publisher of a book seller placing order for books.

Book for reference:

Urdu Khutoot aur Mazameen by Yacoob Aslam Oomeri

published by Javed Book Centre, Vaniyambadi

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## UG - FOUNDATION COURSE

### URDU PAPER - II (SEMESTER II) SYLLABUS FOR ALL UG I YEAR FROM 2013 - 2014 ONWARDS

#### POETRY PAPER I .. GHAZALIAT, MANZOOMAT ,

#### RUBAIYAT & TRANSLATION

#### UNIT - I GHAZALIAT

BOOK PRESCRIBED: FAIZAN-E-ADAB , APPLIED BOOKS, NEW DELHI

1. MEER TAQI MEER – Ulti hogayeen Sab tadbeerein kuch na dawa nay kam kiya
2. GHALIB – Dil hi to hai na sang wo khishth dard se bhar na aaye kyon
3. NIYAZ VANIYAMBADI – Hum O hain jo k waqt ki chalon me aagaye
4. SHAKIR VANIYAMBADI – Jan dena kiya hai niyyat chahiye
5. JIGAR MURADABADI – Duniya k sitam yaad na apni hi wafa yaad

#### UNIT II – MANZOOMAT

1. KHUSH AAMAD – NAZEER AKBAR ABADI
2. SHIKWA – ALLAMA IQBAL
3. JAWAB-E-SHIWA—ALLAMA IQBAL
4. TAJ MAHAL—SAHIR LUDHIANAWI
5. SUBH-E-AZADI—FAIZ AHMED FAIZ

BOOK PRESCRIBED: FAIZAN-E-ADAB , APPLIED BOOKS, NEW DELHI

#### UNIT III- RUBAIYAT

1. MEER ANEES – Gulshan me phirun k sair sehra dekhun
2. AMJAD – Is naam ki zindagi me kuch jan to ho
3. AKBAR – Gaflat ki hansi se aah bharna achcha
4. JOSH – Pa mal-e-Gham insane huwa jata hai
5. ASGAR VELLORI – Dhoondha to kitabon me sadaqat na mili

#### UNIT IV- TRANSLATION:

An unseen passage of about 150 words from English to Urdu only.

Book for reference:

English Translation , Composition & Grammer by M.A. Shaheed,  
Published by Educational Book House, Aligarh

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**FOUNDATION COURSE IN ARABIC**  
**SYLLABUS FROM THE ACADEMIC YEAR 2013-14**

(For the Candidates admitted from 2013-14)

**Semester-I**

**Arabic Paper-I**

**Prose, Grammar and Translation**

*Books prescribed:-*

1. **DURUS-AL-LUGHAT-AL-ARABIYYAH** by *Dr.V.Abdur Rahim* (Director, King Fahad Printing Complex, Al Madina al Munawwarrah, KSA)

Part-I (Lesson from 01 to 11)

2. **BASIC ARABIC GRAMMAR** by *Dr.Syed Rahmathullah* (Former HOD, Dept. of Arabic, The New College, Chennai-600 014)

(Lesson from 01 to 10)

3. **AHAADITH SAHLA** by *Dr.V.Abdur Rahim* (Director, King Fahad Printing Complex, Al Madina al Munawwarrah, KSA)

(Ahaadith from 01 to 10)

**FOUNDATION COURSE IN ARABIC**  
**SYLLABUS FROM THE ACADEMIC YEAR 2013-14**

(For the Candidates admitted from 2013-14)

**Semester-II**

**Arabic Paper-II**

**Prose, Grammar and Translation**

*Books prescribed:-*

1. **DURUS-AL-LUGHAT-AL-ARABIYYAH** by *Dr.V.Abdur Rahim* (Director, King Fahad Printing Complex, Al Madina al Munawwarrah, KSA)

Part-I (Lesson from 11 to 23)

2. **BASIC ARABIC GRAMMAR** by *Dr.Syed Rahmathullah* (Former HOD, Dept. of Arabic, The New College, Chennai-600 014)

(Lesson from 11 to 20)

3. **AHAADITH SAHLA** by *Dr.V.Abdur Rahim* (Director, King Fahad Printing Complex, Al Madina al Munawwarrah, KSA)

(Ahaadith from 11 to 20)

**SYLLABUS AND BOOKS PRESCRIBED:**

**I.PROSE:** GADYA MUKUR –Ed.Dr.ShaikAbdul Wahab

Raka Book Shop

25 A Mahatma Gandhi Marg

Civil Lines

ALLAHABAD -2

**Lessons prescribed:** 1. AATMA NIRBHARTHA by Pt.Balkrishna Bhatt

2. MITRATA by Ramchandra Shukla

3. MADHUR BHASHAN by Gulab Roy

4. HEENGVALA-by Subhadrakumari Chouhan

5. AJATSHATRU by Jayshankar Prasad

**II. APPLIED GRAMMAR-**

**Prescribed Points:** 1.Gender

2.Number

3.Causal Verbs

4.Voice

5.Spell Check

**III. LETTER WRITING :**

**Prescribed Letters:** ( Personal & Commercial ):

1. Ordering for books

2. Letter for Employment

3. Letter Of Complaint

4. Opening an Account in Banks

5. Letter to Parents

6. Letter to a Friend

#### **IV.FUNCTIONAL HINDI: Administrative & Business Terminology:**

**TERMS from English to Hindi**

**And**

**Terms from Hindi to English**

**[Prescribed Terminology A) Enclosed]**

#### **V. FUNCTIONAL HINDI : Administrative & Business Terminology:**

**PHRASES from Hindi to English**

**[Prescribed Terminology Aa) Enclosed]**

#### **Books for Reference:**

- 1.Hindi Vyakaran by Shastri & Apte, D.B.H. Prachar Sabha,Chennai.
2. Pramanik Alekhan Aur Tippan , Prof. Viraj, Rajpal & Sons,  
Kashmere Gate, Delhi - 6
3. Vyavasayik Hindi, Prof. Rahamathullah, Vani Prakashan, Darya Ganj,New Delhi.

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#### **PREScribed TERMINOLOGY :**

##### **ADMINISTRATIVE AND BUSINESS TERMINOLOGY**

##### **A) ENGLISH TO HINDI and VICE VERSA**

ASSISTANT = सहायक ; ACCOUNTANT = लेखपाल; AUDITOR = लेखा परीक्षक;  
AMBASSADOR = राजदूत; ADMINISTRATION = प्रशासन ; ALLOWANCE = भत्ता;  
ADVISOR = सलाहकार; BANK MANAGER = बैंक प्रबंधक BEARER = धारक ;CABINET =  
मंत्रिमंडल; CIRCULAR = परिपत्र CLERK = लिपिक CONTROLLER = नियंत्रक  
CONTRACTOR = ठेकेदार; COMMISSIONER = आयुक्त; CHIEF JUSTICE = मुख्य न्यायाधीश  
; CASHIER = रोकडिया; CUSTOMER = ग्राहक CHANCELLOR = कुलाधिपति ;  
CORRESPONDENT = संवाददाता ; CASH = रोकड / नकद; DIRECTOR = निदेशक, ;  
DOCUMENT = प्रलेख / दस्तावेज; EDITOR = संपादक; ENGINEER = अभियंता ;  
ELECTION COMMISSIONER = निर्वाचन आयुक्त ;EMPLOYMENT = रोजगार; FUND =  
निधि; GENERAL MANAGER= महाप्रबंधक; GOVERNOR = राज्यपाल ; GRANT= अनुदान  
;GAZETTED OFFICER = राजपत्रित अधिकारी ; HEADQUARTERS= मुख्यालय ; INCOME  
TAX= आयकर; INSPECTOR= निरीक्षक; LOAN = ऋण ; MINISTRY = मंत्रालय ; PRIME  
MINISTER= प्रधान मंत्री ; MINISTRY OF DEFENCE = रक्षा मंत्रालय; MINISTRY OF  
FINANCE = वित्त मंत्रालय; MINISTRY OF HRD = मानव संसाधन विकास मंत्रालय ; MINISTRY  
OF HOME AFFAIRS = गृह मंत्रालय ; MINISTRY OF HEALTH = स्वास्थ्य मंत्रालय;  
MINISTRY OF LAW = विधि मंत्रालय; MINISTRY OF RAILWAYS = रेल मंत्रालय;  
MINISTRY OF TOURISM = पर्यटन मंत्रालय; MINISTRY OF EXTERNAL AFFAIRS =

विदेश मंत्रालय ; MINISTRY OF COMMERCE = वाणिज्य मंत्रालय ; ORDER = आदेश  
;PROGRAMME = कार्यक्रम; PARLIAMENT = संसद; QUALIFICATION= योग्यता / अर्हता;  
REGISTRAR = कुलसचिव ; REVENUE = राजस्व ; REPAYMENT = पुनर्भुगतान;  
SECRETARY = सचिव; DEPUTY SECRETARY = उप सचिव ; ADDITIONAL  
SECRETARY = अपर सचिव; JOINT SECRETARY = संयुक्त सचिव; GENERAL  
SECRETARY= महा सचिव ;TYPIST = टंकक ; TRANSFER = स्थानांतरण / तबादला  
;TRANSPORT = परिवहन ;VICE CHANCELLOR = कुलपति; WORK SHOP = कार्यशाला ।

**आ) HINDI TO ENGLISH PHRASES:**

उपर्युक्त = Above mentioned; पावती भेजें= Acknowledge the receipt;  
निदेशानुसार= as directed; जैसी स्थिति हो= as the case may be; की ओर ध्यान आकषित किया  
जाता है = attention is invited to; निवेदन है कि = beg to state; के आदेश से = by order;  
के पक्ष में= in favour of; पद के नाते = by virtue of office; विलम्ब के लिए खेद है = delay is  
regretted; विमर्श कीजिए = please discuss; अनुमोदन के लिए = for approval; मार्गदर्शन के  
लिए = for guidance; हस्ताक्षर के लिए = for signature; विषय विचाराधीन है = matter is  
under consideration; विचार किया जाए = may be considered; मझे निदेश हुआ है = I am  
directed to; अकृत एवं शून्य = null and void; अस्वीकृत कीजिए = reject ; भवदीय = yours  
faithfully; आपका = yours sincerely; लम्बित किया जाए = keep pending; इस अवधि में =  
during this period; देख लिया फाइल कीजिए =seen , file; यथाशीघ्र = as early as  
possible; लागू होना =apply to; जैसा आवश्यक हो = as may be necessary; प्रतिलिपि  
संलग्न है= copy enclosed; संपूर्णतः / पूरी तरह से = in toto; देखलिया धन्यवाद=seen,  
thanks.



## **UNITIZED SYLLABUS SEMESTER I**

### **UNIT I**

ATMA NIRBHARTA - PROSE

APPLIED GRAMMAR – 1

LETTER WRITING - 1

### **UNIT II**

MITRATA- PROSE

APPLIED GRAMMAR - 2

LETTER WRITING –2

### **UNIT III**

MADHUR BHASHAN- PROSE

APPLIED GRAMMAR –3

LETTER WRITING – 3

TECHNICAL TERMINOLOGY

### **UNIT IV**

HEENGWALA- PROSE

APPLIED GRAMMAR –4

LETTER WRITING – 4 & 5

TECHNICAL TERMINOLOGY

### **UNIT V**

AJAATSHATRU – PROSE

APPLIED GRAMMAR –5

LETTER WRITING – 6

TECHNICAL TERMINOLOGY.

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## **UNITIZED SYLLABUS SEMESTER II**

### **UNIT I**

DEEPDAN – ONE ACT PLAY

TRANSLATION - Ex. No.6

DIALOGUE WRITING - 1

APPLIED GRAMMAR

### **UNIT II**

NAMAK KA DAROGA - SHORT STORY

TRANSLATION - Ex. No. 7 & 8

DIALOGUE WRITING – 2 & 3

APPLIED GRAMMAR

### **UNIT III**

BEEMAR KA ILAAJ - ONE ACT PLAY

TRANSLATION - Ex. No. 9 & 10

DIALOGUE WRITING – 4 & 5

APPLIED GRAMMAR

### **UNIT IV**

USNE KAHA THA - SHORT STORY

TRANSLATION - Ex. No. 11 & 12

DIALOGUE WRITING – 6 & 7

APPLIED GRAMMAR

### **UNIT V**

GAON KA ESHWAR – ONE ACT PLAY

MAHUYE KA PED – SHORT STORY

TRANSLATION - Ex. No.13

DIALOGUE WRITING – 8

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## **COURSE OBJECTIVES**

TO APPRECIATE HINDI LANGUAGE AND LITERATURE.

- TO DEVELOP EFFECTIVE COMMUNICATION SKILLS.
- TO INCULCATE HUMAN VALUES THROUGH HINDI LITERATURE.
- TO CREATE AWARENESS OF DISTINCT FEATURES OF TRENDS OF HINDI LITERATURE.
- TO DEVELOP SKILLS OF TRANSLATION.
- TO CREATE AWARENESS OF NATIONAL INTEGRATION THROUGH LANGUAGE.

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**SEMESTER : II      TITLE : HINDI-PAPER- II**

**SYLLABUS AND BOOKS PRESCRIBED:**

**I ONE ACT PLAY : ‘GADYA MUKUR’ Ed. Dr. Shaik Abdul Wahab**

**Raka Prakashan, Allahabad**

**LESSONS PRESCRIBED : 1. DEEPDAN by RAMKUMAR VARMA**

**2. BEEMAR KA ILAAJ by UDAY**

**SHANKAR BHATT**

3. GAON KA ESHWAR by

LAXMINARAYAN LAL II

SHORT STORY : TEXT – ‘ GADYA MUKUR’

LESSONS PRESCRIBED : 1.NAMAK KA DAAROGA by

PREMCHAND

2. USNE KAHA THA by GULERI

3. MAHUYE KA PED by MARKANDEY

III TRANSLATION PRACTICE : HINDI TO ENGLISH .

ANUVAD ABHYAS – I

D.B.HINDI PRACHAR SABHA

CHENNAI-17

LESSONS PRESCRIBED : LESSON NO.6 to LESSON NO.13 ONLY.

IV DIALOGUE WRITING :

PRESCRIBED COMMUNICATIONS :

1. ADHYAPAK AUR VIDYARTHI

2. DOCTOR AUR ROGI

3. DUKANDAR AUR GRAHAK

4. DO YAATRI (YA) MUSAFIR

5. DUKANDAR AUR VIDYARTHI.

6. DAK GHAR MEIN

7. BANK MEIN

8. SAKSHATKAR or INTERVIEW MEIN

V APPLIED GRAMMAR : USAGE IN TWO DIFFERENT MEANINGS.

BOOKS FOR REFERENCE :

1. NAYEE HINDI RACHNA- PART – II

D.B.HINDI PRACHAR SABHA

CHENNAI-17

2. BOLCHAL KI HINDI, Dr.SUSHEELA

GUPTA

3. HINDI VYAKARAN : SASTRI & APTE,

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இசுலாமியாக் கல்லூரி(தன்னாட்சி),வாணியம்பாடி.  
தமிழ்த்துறை  
பாடத்திட்டம்:அடித்தளப்படிப்புத் தமிழ்  
முதலாண்டு முதற்பருவம்

அலகு 1: சங்க இலக்கியம்

குறுந்தொகை-5 பாடல்கள்  
புறநானூறு-5 பாடல்கள்

அலகு 2: நீதி இலக்கியம்

இனியவை நாற்பது-10 பாடல்கள்  
ஆசாரக்கோவை-10 பாடல்கள்  
நாண்மணிக்கடிகை-10 பாடல்கள்

அலகு 3: இலக்கிய வரலாறு

சங்க இலக்கிய வரலாறு  
நீதி இலக்கிய வரலாறு

அலகு 4: கட்டுரை

1.எண்ணங்கள்-எம்.எஸ்.உதயமூர்த்தி  
2.எம்.ஆர்.எம்.அப்துர் றஹீம்

அலகு 5: மொழித்திறன்

பிழை நீக்கம்  
நிறுத்தற் குறிகள்  
மரபுச்சொற்கள்  
மயங்கொலிச் சொற்கள்  
அகர வரிசைப்படுத்தல்  
கலைச்சொல்லாக்கம்

பார்வை நூல்கள்

- 1.தமிழ் இலக்கிய வரலாறு-மு.வரதராசனார்
- 2.தமிழ் இலக்கிய வரலாறு-மு.அருணாச்சலம்
- 3.மொழித்திறன்-க.பட்டாபிராமன்

இசுலாமியாக் கல்லூரி(தன்னாட்சி),வாணியம்பாடி.  
தமிழ்த்துறை  
பாடத்திட்டம்:அடித்தளப்படிப்புத் தமிழ்  
முதலாண்டு இரண்டாம் பருவம்

அலகு 1: பக்தி இலக்கியம்

சைவம்  
வைணவம்  
இசுலாம்  
கிறித்துவம்

அலகு 2: காப்பிய இலக்கியம்

சிலப்பதிகாரம்  
கம்பராமாயணம்

அலகு 3: இலக்கிய வரலாறு

பக்தி இலக்கிய வரலாறு  
காப்பிய இலக்கிய வரலாறு

அலகு 4: இணையமும் தமிழும்

கணினித் தமிழ்  
ஊடகத்தமிழ்  
கற்றலும் கற்பித்தலும்

அலகு 5: பேச்சு,எழுத்து,கற்றல்,கற்பித்தல்

பேச்சாளர் தகுதிகள்  
பேச்சுக்கலையின் பண்புகள்  
கவிதையாக்கம்  
கட்டுரையாக்கம்

பார்வை நூல்கள்

- 1.இணையம் கற்போம்-முனைவர் மு.இளங்கோவன்
- 2.பேச்சுக்கலை-அ.கி.பரந்தாமனார்

## **DEPARTMENT OF ENGLISH**

### **SEMESTER – I**

#### **FOUNDATION ENGLISH**

#### **PART II ENGLISH**

#### **OBJECTIVE:**

The prime objective of this paper is to promote the linguistics competence into the minds of the young learners through teaching the basics of English and acquainting them with situational dialogues and expose the learners to the production and receptive skills.

#### **Unit I Grammar**

A. Parts of Speech

1. Noun
2. Pronoun
3. Adjective
4. Verb
5. Adverb
6. Preposition
7. Conjunction
8. Interjection

B. Articles

**Unit II**

A. Infinitives

Participles

Gerunds

Auxiliaries and Modals

Subject Verb Agreement

Tenses

B. Language Lab – *1 hour per week.*

**Unit III**

**Conversational Dialogues in Social Context**

1. To introduce yourself
2. Making request
3. Seeking permission
4. Seeking clarification
5. Invitation

**Unit IV**

**Conversational Dialogues at work place**

1. In a shop
2. At the airport
3. Telephone banking
4. At a restaurant
5. Getting a driving license

**Unit V**

**Writing**



1. Short messages
2. Spotting errors
3. Note – making
4. Jumbled sentences
5. Comprehension

**TEXT BOOK:**

Foundation English for Semester I – published by Islamiah College (Autonomous), Vaniyambadi, 2013.

**DEPARTMENT OF ENGLISH**

**SEMESTER – II**

**FOUNDATION ENGLISH**

**PART – II ENGLISH**

**Unit I Prose**

1. Stephen Leacock : My Lost Dollar
2. Anita Desai : A Devoted Son
3. R.K. Narayan : Sweet for Angels

## **Unit II Poetry**

1. Nissim Ezeikel : Night of the Scorpion
2. Robert Frost : The Road Not Taken
3. William Wordsworth: Daffodils

## **Unit III Grammar**

1. Active and passive voice
2. Direct and indirect speech
3. Degrees of comparison

## **Unit IV Soft Skills**

1. Time management
  - Importance of time
  - Characteristics of management tasks
  - Determining time elements
  - Time management techniques
2. Entrepreneurship
  - Entrepreneur and its role
  - Essentials steps to become an entrepreneur
  - EDP training

## **Unit V Writing**

1. Report writing
2. Cover letter
3. Curriculum vitae

### **TEXT BOOK:**

Foundation English for Semester II – published by Islamiah College (Autonomous), Vaniyambadi, 2013.

## **INDIAN LITERATURE IN ENGLISH**

### **CORE COURSE-I**

**B.A. ENGLISH**

**SEMESTER-I**

#### **UNIT-I : POETRY**

1. Rabindranath Tagore: Selections from Gitanjali (Lyrics 35, 36 and 50)
2. Toru Dutt: "The Lotus"

#### **UNIT-II : POETRY**

1. A.K.Ramanujan : "A River"

## 2. Gowri Deshpande : “The Female of the Species”

### **Prescribed Text**

Selections in units 1 and 2 are from The Lotus and Rose – An Anthology of Indian Writing in English (Vol.III Poetry) – Edited by Anand Kumar Raju, Blackie & Sons.

### **UNIT-III : PROSE**

Jawaharlal Nehru: Selections from the Discovery of India – Macmillan

G.K. Gokhale : “ The Elevation of the Depressed Classes”

The Lotus and the Rose – Vol.I Edited by A.K.Raju, Blackie & Sons.

### **UNIT-IV : DRAMA**

Rabindranath Tagore: The Post Office – Macmillan

Girish Karnad: Hayavadana – Oxford University Press

### **UNIT-V : FICTION**

R.K. Narayan : The Guide

### **Text Prescribed**

For Units 1 and 2

A.K. Raju.ed. The Lotus and Rose – An Anthology of Indian Writing In English Vol.3. Blackie and sons, 1992.

For Unit 3

A.K.Raju.ed. The Lotus and Rose – An Anthology of Indian Writing In English.

Vol.4.Blackie and sons, 1992.

Rabindranath Tagore. The Post Office. Macmillan

Girish Karnad. Hayavadana. Oxford : OUP.1997

## **Reference Books**

1. K.R.Srinivasa Iyenger : Indian Writing in English, Sterling Publishers, New Delhi.
2. M.K.Naik – A History of Indian English Literature, Satitya Akademi, New Delhi.
3. H.M.Williams – Indo-Anglian Literature 1800-1970 : A Survey, Orient Longman, Chennai.

## **FICTION**

### **CORE COURSE-II**

#### **SEMESTER-I**

#### **UNIT-I**

Jane Austen – Pride and Prejudice

#### **UNIT-II**

Joseph Conrad – Heart of Darkness

### **UNIT-III**

George Orwell - Animal Farm

### **UNIT-IV**

Thomas Hardy - The Mayor of Casterbridge

### **UNIT-V**

Graham Greene - The Power and the Glory

## **LIERARY FORMS**

### **ALLIED-I**

### **SEMESTER-I**

### **UNIT-I**

The Essay, The Short Story, Biography, Autobiography

### **UNIT-II**

The Lyric, The Sonnet, The Elegy, The Epic

### **UNIT-III**

The Miracle and Mystery Plays, Comedy, Tragedy, Tragic-Comedy

### **UNIT-IV**

The Dramatic Monologue, Soliloquy and Aside, The Absurd Drama, The One Act Play.

### **UNIT-V**

The Detective Novel, The Stream of Consciousness Novel, The Realistic Novel.

### **Reference Books**

1. William Henry Hudson: An Introduction to the Study of Literature, Kalayani Publishers, Ludhiana
2. Birjadesh Prasad: A Background to the Study of English Literature (Revised Edition); Macmillan Company, Chennai.
3. R.J.Rees: English Literature – An Introduction for foreign Readers, Macmillan, London.  
K.R.Srinivasa Iyengar and Prema Nandakumar: Introduction to the Study of English Literature; Asia Publishing House, Bombay.

## **ENGLISH PROSE**

### **CORE COURSE-III**

#### **SEMESTER-II**

#### **Unit-1**

Francis Bacon : 'Of Studies'

Francis Bacon : 'Of Revenge'

#### **Unit-2**

Joseph Addison : Sir Roger and Will Wimble

Richard Steele : The Trumpet Club

### **Unit-3**

Oliver Goldsmith : Man in Black

Charles Lamb : Poor Relations

### **Unit-4**

Stephen Leacock : My Lost Dollar

George Orwell : Sporting Spirit

### **Unit-5**

Robert Lynd : Pocket Money

C.E.M.Joad : A Dialogue on Civilization

### **Content as in:**

A collection of prose - (Compiled by) Department of English,  
Islamiah College, Vaniyambadi.



**ENGLISH DRAMA**

**CORE COURSE-IV**

**SEMESTER-II**

**Detailed**

**Unit-1**

Christopher Marlowe : Doctor Faustus

**Unit-2**

Bernard Shaw : Pygmalion

**Non-Detailed**

**Unit-3**

Oliver Goldsmith : She Stoops to Conquer

**Unit-4**

Synge : The Playboy of the Western World

**Unit-5**

Samuel Beckett : Waiting for Godot

# **THE HISTORY OF ENGLISH LITERATURE – I (1350-1850)**

## **ALLIED – II**

### **(SEMESTER – II)**

#### **PROSE**

##### **Unit-1**

Thomas More, Bacon, Philip Sidney, Steele, Addison, Dr. Johnson, G. K. Chesterton, George Orwell, A. G. Gardiner.

#### **POETRY**

##### **Unit-2**

Chaucer, Spencer, Shakespeare, Donne, Dryden and Pope

##### **Unit-3**

Blake, Wordsworth, Shelley, Keats, Tennyson, Arnold, W.B. Yeats and T.S. Eliot

#### **DRAMA**

##### **Unit-4**

Mystery play, Shakespeare, Ben Jonson, Goldsmith, Sheridan, G.B. Shaw

#### **FICTION**

##### **Unit-5**

Defoe, Jane Austen, Walter Scott, Dickens, George Eliot, Thomas Hardy, E.M. Forster

#### **Book for Reference;**

An Outline History of English Literature - Hudson.

# **CHAUCER AND ELIZABETHAN AGES**

## **CORE COURSE I**

**M.A. English**

**SEMESTER I**

### **UNIT I (POETRY)**

Geoffery Chaucer                      -Prologue to the Canterbury Tales (The Knight,  
The Wife of Bath & The Monk)

Edmund Spenser                      -Epithalamion

### **UNIT II (POETRY)**

John Donne                              -Extasie  
-Death, Be Not Proud

William Shakespeare                -Let me not to the marriage of true minds  
(Sonnet: 116)

### **UNIT III (PROSE)**

Francis Bacon                      -Of Truth, Of Studies

### **UNIT IV (DRAMA)**

Webster                                -The Duchess of Malfi

### **UNIT V (DRAMA)**

Ben Jonson                            -Volpone

# **THE NEO CLASSICAL AGE**

## **CORE COURSE II**

### **SEMESTER I**

#### **UNIT I (POETRY)**

John Milton (1608-1674) -Paradise Lost Book IX (Temptation & Fall)

#### **UNIT II (POETRY)**

Andrew Marvell (1621-1678)-To His Coy Mistress

Alexander Pope (1688-1744) -An Epistle to Dr. Arbuthnot

#### **UNIT III (PROSE)**

Addison & Steele -The Coverley Papers “The First Five  
Essays” (Macmillan)

Samuel Johnson -Life of Milton

#### **UNIT IV (DRAMA)**

John Dryden -All for Love

William Congreve -The Way of the World

#### **UNIT V (NOVEL)**

Daniel Defoe (1660-1731) -Robinson Crusoe

Jonathan Swift (1667-1745) -Gulliver's Travels

# **THE ROMANTIC AND THE VICTORIAN AGES**

## **CORE COURSE III**

### **SEMESTER I**

#### **UNIT I (POETRY)**

William Wordsworth	-Ode: Intimations of Immortality from -Recollections of Early Childhood
Samuel Taylor Coleridge	-Christabel
John Keats	-Ode on a Grecian Urn

#### **UNIT II (POETRY)**

P.B. Shelley	-Ode to the West Wind
Robert Browning	-My Last Duchess
William Blake	-The Lamb/Tiger/London

#### **UNIT III (PROSE)**

Addison and Steele	-The Spectator Club
Oliver Goldsmith	-The Man in Black
Charles Lamb	-Old China
William Hazlitt	-On going a Journey
Mathew Arnold	-The Study of Poetry

#### **UNIT IV (DRAMA)**

Oscar Wilde	-The Importance of Being Ernest
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#### **UNIT V (NOVEL)**

Charles Dickens	-A Tale of Two Cities
Thomas Hardy	-Far from the Madding Crowd

**TWENTIETH CENTURY LITERATURE**

## CORE COURSE IV

## SEMESTER I

## UNIT I (POETRY)

# T.S. Eliot

## -The Waste Land

## UNIT II (POETRY)

W.B. Yeats

## -Sailing to Byzantium

## Among School Children

G.M. Hopkins

## -Wreck of Deutschland

W.H. Auden

### -The Shield of Achilles

### UNIT III (PROSE)

D.H. Lawrence

## -Why the Novel Matters

## T.S. Eliot

### -Tradition and Individual Talent

## UNIT IV (DRAMA)

# Samuel Beckett

## -Waiting for Godot

T.S. Eliot

## -Murder in the Cathedral

## UNIT V (NOVEL)

# Virginia Woolf

-Mrs.Dalloway

D.H. Lawrence

## -Sons and Lovers

# **CREATIVE WRITING**

## **ELECTIVE I**

### **SEMESTER I**

#### **UNIT I Creative Writing**

Imagination and Writing – Measuring creative writing –  
The Importance of Reading

#### **UNIT II The Art of Writing**

Tropes and figures – Style and Register – Playing with words

#### **UNIT III Writing Poetry**

Definition of Poetry – Dominant modes of poetry – Lyrical, Narrative and Dramatic.

#### **UNIT IV Writing Fiction and Short Stories**

Fiction and Non fiction – Literary and popular fiction – Character, Plot, Point of View and Setting in Short Story

#### **UNIT V Writing Drama**

Concepts and Characteristics of Drama – Plot, Structure and Characterization

#### **Recommended Text**

Elements of Literature. (Eds.) Scholes et al. (Oxford)

Creative writing. Anjana Neira Dev, Anuradha Marwah, Swathi Pal. Pearson Longman Publication.

# ENGLISH LANGUAGE AND LINGUISTICS

## CORE COURSE V

### SEMESTER II

#### Unit I

What is Language? Processing & Theory

1. A Brief outline of language Philosophy(Nativism vs. Behaviorism)
2. What is Language, Why is it Special: The Biological Basis of Language (Language and Brain)?
3. Child Language Development:(Lexical Vs. Functional Grammar)
4. Standard English

#### UNIT II

Phonology

1. Cardinal vowels, English vowels, diphthongs and consonants
2. Transcription
3. The syllable, Received Pronunciation and the need for a model
4. Accent, rhythm and intonation
5. Assimilation, elision and liaison or juncture

#### UNIT III

Linguistics

1. Morphology, phrases and sentences
2. Syntax, semantics

#### UNIT IV

Socio-linguistics

1. Language Varieties, Language society and culture

#### UNIT V

Approaches to Grammar

1. Structural grammar
2. Transformative Generative Grammar
3. Communicative Grammar

#### Recommended Texts:

1. F.T.Wood -“*An Outline History of English Language*”
2. Frank Palmer -“*Grammar*”
3. A C Gimson -“*An Introduction to the Pronunciation of English*”
4. George Yule -“*The Study of Language*”
5. Crystal David -“*Linguistics*”
6. A C Bough -“*A History of English Language*”



# **INDIAN LITERATURE IN ENGLISH**

## **CORE COURSE VI**

### **SEMESTER II**

#### **UNIT I (POETRY)**

Nissim Ezekiel                      -The Night of the Scorpion/Bird Watcher

A.K. Ramanujan                    -The River/Anxiety

#### **UNIT II (POETRY)**

Rabindranath Tagore -Gitanjali

#### **UNIT III (PROSE)**

Jawaharlal Nehru                    -Discovery of India

Sri Aurobindo                    -The Renaissance in India

#### **UNIT IV (DRAMA)**

Girish Karnad                    -Hayavadhana

Manjula Padmanabhan            -Harvest

#### **UNIT V (NOVEL)**

Mulk Raj Anand                    -The Untouchable

Kamala Markandaya -A Handful of Rice

**SHAKESPEARE**  
**CORE COURSE VII**  
**SEMESTER II**

**UNIT I**

A Midsummer Night's Dream

**UNIT II**

Hamlet

**UNIT III**

Othello

**UNIT IV**

The Tempest

**UNIT V**

The Elizabethan Theatre and Audience

Trends in Shakespeare Studies

# **AMERICAN LITERATURE**

## **CORE COURSE VIII**

### **SEMESTER II**

#### **UNIT I (POETRY)**

Walt Whitman	-Crossing Brooklyn Ferry
Emily Dickinson	-Success is Counted Sweetest
Robert Frost	-Mending Wall

#### **UNIT II (POETRY)**

E.E.Cummings	-Any one lived in a pretty how town.
Langston Hughes	-I too Sing America
Sylvia Plath	-Daddy

#### **UNIT III (PROSE)**

Ralph Waldo Emerson	-The American Scholar
Edgar Allan Poe	-The Philosophy of Composition

#### **UNIT IV (DRAMA)**

Eugene O'Neill	-The Hairy Ape
Marsha Norman	-Night, Mother

#### **UNIT V (NOVEL)**

Toni Morrison	-The Bluest Eye
Hawthorne	-The Scarlet letter

# **NEW LITERATURE IN ENGLISH**

## **ELECTIVE II**

### **SEMESTER II**

#### **UNIT I (POETRY)**

Mahmoud Darwish -Identity Card

Yasmin Farooq -Is Biology My Destiny?

Czeslaw Milosz -Incantation

#### **UNIT II (POETRY)**

Moniza Alivi -Thoughts of Pakistani Woman in English Jail

Wislaw Szymborska -A Contribution to Statistics

Sathyendra Srivastava -At an Indian Girl's Third Wedding

#### **UNIT III (PROSE)**

Allan Sinefield -Literature and Cultural Production

Tariq Ali -Torture Civilizations: Islam and the West

#### **UNIT IV (DRAMA)**

Tanika Gupta -Gladiator Games

Dario Fo -Accidental Death of an Anarchist

#### **UNIT V (NOVEL)**

J.M. Coetzee -Disgrace

Abdul Razak Gurnah -Paradise

**CORE PAPER I**

**HISTORY OF INDIA UPTO A.D. 1206**

**UNIT I**

Meaning, Nature and Scope of History – Ancient Indian Historiography – Sources of Indian History – Geographical Features and Its Influence on Indian History

**UNIT II**

Indus Valley Civilization: Indus Script, Great Bath and Granery, Town Planning, Economy and Trade, Religious Life

Early Vedic Period: Political, Social and Economic Life – Status of Women - Religion

Later Vedic Period: Political, Social and Economic Life – Status of Women – Education - Religion

**UNIT III**

Jainism: Mahavira and His Teachings, Jain Literature

Buddhism: Gautama Buddha and His Teachings, Buddhist Literature Alexander's Invasion

**UNIT IV**

Mauryan Empire: Chandragupta, Ashoka, Decline of Mauryas

Gupta Empire: Chandra Gupta I, Samudra Gupta, Chandra Gupta II – Decline of Guptas – Harsha Vardhana and His Times

**UNIT V**

Chalukyas – Rashtrakutas – Kakatiyas

Arab Invasion of Sindh – Turko-Afghan Invasion: Mahmud Ghazni, Muhammad Ghori

**Maps:**

1. Sites of Indus Valley Civilization
2. Route of Alexander's Invasion
3. Samudra Gupta's Empire
4. Ashoka's Empire
5. Harsha's Empire

**Books for Reference:**

1. R.C. Majumdar, H.C. Raychaudhuri & K. Dutta: An Advance History of India, Macmillan India Limited., 2004, New Delhi
2. Romila Thapar: Ancient India, Penguin India Ltd., New Delhi, 1998
3. D.N. Jha: Ancient India, Manohar Publishers, New Delhi, 2004
4. J.C. Agarwal: Ancient Indian History, S.Chand & Co., New Delhi
5. A.L. Basham: The Wonder That Was India, OUP, New Delhi
6. L. Mukerjee: Ancient India, New Delhi

## **CORE PAPER II**

### **HISTORY OF TAMIL NADU**

#### **FROM SANGAM AGE TO THE IMPERIAL CHOLAS**

##### **UNIT I**

Influence of Geography and Topography on the history of Tamil Nadu - Sources – Races and Tribes – Dravidians – Pre History of the Tamils – Aryanization.

##### **UNIT II**

Physical features of Tamil Nadu in the Sangam Age – Sangam Age: Early Chera, Chola and Pandyas – Sangam Literature – The Chieftains – Socio and economic condition of Sangam people.

##### **UNIT III**

The period of the Kalaprahs –Religious Practices and Culture –The Rise Pallavas..

##### **UNIT IV**

Later Pallavas – Pandyas of Madurai \_ The Pallava- Chalukya conflicts – The Pallava Rashtrakuta conflicts- Decline of the Pallavas – Administration and Social life – Literature– The Pallavas Art and Architecture – Bakthi Movement.

##### **UNIT V**

The Rise of the Imperial Cholas –The Chola Pandya conflicts – The Chalukya Cholas – The Chola Overseas Empire – Decline of the Cholas - Administration and Social life –Art and Architecture.

#### **Books for Reference**

1. Dikshidar V.R.R. : Studies in Tamil literature and History
2. Gopalan. A. : Pallavas of Kanchi
3. Gilbert stater : Dravidian elements in Indian culture
4. Kanagasabai.V : The Tamils in 1800 years ago
  1. Krishnasamy Aiyangar.S : Beginnings of South Indian History
2. Dr. Meenakshi.C : Administration and social life under the pallavas, university of Madras, Madras 1977.
3. sadasivapandarathar : Previous history of cholas.
4. Sadasivapandarathar : History of Pandyas.
5. Rajamanickam Pillai : Pallava History
6. Rajamanickam Pillai : History of Cholas.

## **ALLIED PAPER I**

### **TOURISM PRINCIPLES AND POLICIES**

#### **UNIT I**

History of Tourism – Definition, Nature, Scope and Importance of Tourism – National Tourism Action Plan 1992

#### **UNIT II**

Kinds of Tourism: Historical Tourism – Cultural Tourism – Religious Tourism –

Medical Tourism – Adventure Tourism

#### **UNIT III**

Components of Tourism: Travel Agents – Tour Operators – Tourist Information and Guiding Service – Transportation – Accommodation and Catering – Attractions

#### **UNIT IV**

Tourism Organizations: World Tourism Organization, International Air Travelers

Association, Pacific Asia Travel Association, Indian Association of Tour Operators

#### **UNIT V**

Tourism as an Industry: Government Policies – Tourism and Economy – Social, Cultural and Environmental Impact of Tourism

#### **Books for Reference:**

1. Bhatia, A.K.: Tourism Development: Principles and Practices, Sterling Publishers Pvt., Ltd., New Delhi, 1989
2. Bhatia, A.K.: International Tourism Management, Sterling Publishers Pvt., Ltd., New Delhi, 1992
3. Burkart A.J. and Madlik: Tourism, Past, Present and Future, Heinemann, London, 1994
4. Sinha P.C.: Tourism Evolution, Scope, Nature and Organization, Anmol Publications Pvt., Ltd., New Delhi
5. Panda Tapan, K, Srikantha Mishra and Birsaj Bhusan Parida (Eds.): Tourism Development: The Socio-Economic and Ecological Perspective, Universities Press, Hyderabad, 2004
6. Karthik C. Roy, Clement A. Tisdell: Tourism in India and India's Economic Development, Nova Science Publishers, USA, 1998
7. Arun Kumar Sarkar: Action of Plan and Priorities in Tourism Development, Kanishka Publishers, New Delhi
8. Kaul R.H.: Dynamics of Tourism: A Trilogy, Sterling Publishers Pvt., Ltd., New Delhi



**HISTORY OF INDIA FROM A.D. 1206 TO A.D. 1707****UNIT I**

The Slave Dynasty: Qutbuddin Aibak – Iltutmish – Razia Sultan – Balban The Khilji Dynasty: Alauddin Khilji – His Southern Expedition – His Market Reforms The Tughluq Dynasty: Muhammad bin Tughluq – His Schemes – Firoz Shah Tughluq – His Reforms - Timur's Invasion -The Sayyids & The Lodis

**UNIT II**

Delhi Sultanate: Administration – Art & Architecture – Downfall of the Delhi Sultanate

**UNIT III**

The Great Mughals: Babar – First Battle of Panipat – Humayun – Second Battle of Panipat – Sher Shah – His Administration – Emperor Akbar – Din-e-Ilahi – Jahangir and Noor Jahan

**UNIT IV**

Shah Jahan – Golden Age of the Mughals – Aurangzeb – His Deccan Policy

**UNIT V**

Mughal Administration – Art & Architecture – Rise of Shivaji – His Administration – Birth of Sikhism – Guru Nanak

**Maps:**

Alauddin Khilji's Empire

Malik Kafur's Southern Expedition

Muhammad bin Tughluq's Empire

Mughal Empire Under Akbar

Mughal Empire Under Aurangzeb

**Books for Reference:**

1. Majumdar, H.C. Raychaudhuri & K. Dutta: An Advance History of India, Macmillan India Limited., 2004, New Delhi
2. Charusis: Medieval History of India, Kings Books, Delhi
3. Sharam: The Crescent in India, Lakshmi Narain Agarwal, 1983
4. L.P. Sharma: History of Medieval India, Konark Publishers Pvt., Ltd., 1997, Delhi

**CORE PAPER IV**  
**HISTORY OF TAMIL NADU**  
**FROM SECOND PANDYAN EMPIRE TO A.D. 1806**

**UNIT I**

Pandyas of the Second Empire –The Chola Pandya conflict – Hoysala and Rashtrakuta interference in Tamil Nadu – Invasions of Malik Kafur and Ulug Khan- Fall of The Pandyan Empire – Account of Marcopolo and Abdullah Wasaf – Administration and Social life – Art and Architecture.

**UNIT II**

The founding of the Sultanate of Madurai – Jalaluddin Hasan Sha – The Rise of Vijaya Nagar Empire – Kumarakampana – Decline of the Madurai Sultanate – Impact of Islam - Administration – Art and Architecture – Social life and Cultural expansion.

**UNIT III**

The Fall of Vijayanagar Empire – The Rise of Nayaks of Madurai – Gingee – Tanjore – Vellore – Administration – Art and Architecture – Social life and Cultural expansion.

**UNIT IV**

The Mughal Invasion – Zulfikar khan – Nawabs of Arcot – Poligar System - The Marathas of Gingee and Tanjore – The Rise of Sultanat-e-khudadat – Hyder Ali and Tipu Sultan – Society - Literature – Art and Architecture.

**UNIT V**

The Coming of the Europeans – European Settlements in Tamil Nadu – British East India Company – Carnatic Wars – Mysore Wars - Virapandia Katta Bomman – Marudhu Brothers – Poligar Rebellion – South Indian Confederacy and the Rebellion – Vellore Mutiny of 1806.

**Books for Reference**

1. Majumder. R.C: The History and culture of Indian People. Vols.VI to X  
B.V.Bhavan – Bombay – 1976.
2. Rajayyan K.: History of Madurai 1736 – 1801.
3. Rajayyan K. : South Indian Rebellion, The First war of Independence
4. Rajayyan K. : Administration and Society in the Carnatic
5. Rajayyan K. : Rise and fall of the Poligars of Tamil Nadu
6. Sathiyanaithaier.R. : Tamilaham in the 17<sup>th</sup> Century Madras – 1956
7. Sathiyanaithaier.R. : A History of the Nayakas of Madurai – Ananda Book Deopt.
8. Srinivasachari.C : A History of Gingee and its Rulers – Annamalai Nagar.

**ALLIED PAPER II**  
**TOURISM RESOURCES OF INDIA**

**UNIT I**

**Historical Resources:** Qutub Minar, Red Fort, India Gate, Jantar Mantar, Teen Murti Bhavan, Taj Mahal, Fatehpur Sikri. Hawa Mahal,

**Religious Resources:** Char Dham Yatra, Vaishnavadevi Temple, Haridwar, Bodhgaya, Mount Abu, Jamia Masjid Delhi, Ajmer Shareef, Golden Temple.

**UNIT II**

**National Parks and Wildlife Sanctuaries:** Corbett National Park, Kanha National Park, Sanjay Gandhi National Park, Kaziranga National Park, Gir Wildlife Sanctuary, Mudumalai Wildlife Sanctuary,

**UNIT III**

**Bird Sanctuaries:** Salim Ali Bird Sanctuary, Porbandar Bird Sanctuary, Nawabganj Bird Sanctuary, Nalsarovar Bird Sanctuary, Vedanthangal Bird Sanctuary

**Waterfalls:** Kunchikal Waterfalls, Jog Falls, Meenmutti Waterfalls, Hogenakkal Waterfalls, Kutralam Waterfalls

**UNIT IV**

**Hill Stations :** Shimla, Darjeeling, Nainital, Srinagar, Mussoorie, Ooty.

**Seaside Resorts:** Goa Beaches, Havelock Beach, Paradise Beach, Marina Beach, Kovalam Beach

**UNIT V**

**Luxury Trains and Spas:** Palace on Wheels, Golden Chariot, Deccan Odyssey, Fairy Queen.

**Fairs and Festivals:** Id-ul-Fitr, Id-ul-Azha, Pongal, Dussehra, Holi, Durga Puja, Diwali, Christmas, Kumbh Mela, Pushkar, Baishakhi

**Books for Reference:**

1. Michael George: Monuments of India, Vol.1 and 2, London, 1988
2. Percy Brown: Indian Architecture: Buddhist and Hindu, Bombay, 1972
3. Percy Brown: Indian Architecture: Islamic Architecture, Bombay, 1972
4. Oki Morihiko: Fairs and Festivals, World Friendship Association, Tokyo, 1988
5. Vikram Bhat: Hill Stations of India, Grantha, U.K.
6. Bikram Grewal(Ed.): Indian Wildlife
7. Michael Coltman: Tourism Marketing, Van Nostrand Reinhold, New York, 1989
8. Sinha, P.C.: Tourism Marketing, Anmol Publishers, New Delhi, 2002

**SOCIAL AND CULTURAL HISTORY OF INDIA UPTO A.D. 1206****UNIT – I**

Sources of Ancient Indian History – Pre-Historic Culture – The Indus Valley Civilization – Vedic and Later Vedic Culture – Position of Women – Caste System – Religious ferment in the 6<sup>th</sup> Century B.C. Rise of Jainism and Buddhism – Persian and Greek influences on Indian Society.

**UNIT - II**

Age of Mauryas – Social Conditions – Literature – Art and Architecture – Indian between 2<sup>nd</sup> Century B.C to 3<sup>rd</sup> Century A.D. Brahmanical cultural and synthesis – Social and Economic condition – Mahayana and Hinayana Buddhism – Gandhara and Mathura school of Arts – Vaishnavism and Saivism.

**UNIT – III**

The Classical Age: Guptas Cultural Florescence – Art and Architecture (Nagara, Vesara and Dravida Style) – Paintings (Ajantha and Ellora Style) – Foreign accounts – The Age of Harsha – Socio, Economic and religious condition – Hiuen Tsang.

**UNIT – IV**

Advent of the Arabs: Condition of India on the eve of Arab Conquest – Effects of Arab Conquest – Invasions of Mahmud Ghazni and Muhammad Ghori and its effect.

**UNIT - V**

India between 8<sup>th</sup> and 12<sup>th</sup> Century. A.D.: Social and Cultural Conditions – Art and Architecture.

**Books for Reference:-**

1. Basham, A.L.(ed) : A Cultural History of India, Oxford University Press, New Delhi, 2006.
2. Jha, D.N. : Ancient India, Manohar Publishers, New Delhi, 2004.
3. Romila Thapar : Ancient Indian Social History, Orient Longman (P) Ltd, New Delhi, 2004.
4. Chandra, Satish : Essays on Medieval Indian History, Oxford University Press, New Delhi, 2004.
5. Chandra, Satish : Medieval India from Sultanate to Mughal – Part – 1, 1206 – 1526, Haranand Publications, New Delhi, 1975.
6. Mahajan, V.D : History of Delhi Sultanate, Sultan Chand, New Delhi, 2000.

## **CORE PAPER II**

### **SOCIAL AND CULTURAL HISTORY OF TAMIL NADU UP TO A.D.1565**

#### **UNIT I**

Sangam Age and Post Sangam Age – Social Institutions - Customs and practices – Economic life – Trade – Religion – Literature – Arts

#### **UNIT II**

Age of the Pallavas – Society Economic life – Religion – Role of the Temples – Literature and Education – Art and Architecture

#### **UNIT III**

Age of the Cholas: Society - Economic – Religion – Role of the Temples – Literature and Education – Art and Architecture

#### **UNIT IV**

Age of the Pandyas – Society – Economic life – Religion – Foreign Accounts – Literature – Art and Architecture

#### **UNIT V**

Tamil Nadu under Sultanate of Madurai and Vijayanagar Empire: Society – Economic life – Religion – Literature – Art and Architecture

#### **Books for Reference**

1. Chellam, V.T : Thamizhaga Varalarum Panpadum (in Tamil), Manivasagar Pathipagam, Chennai.
2. Hardgrave, R., : The Dravidian Movement, Popular Prakashan, Bombay, 1965.
3. Hardgrave (Jr) R.L.,: The Nadars of Tamilnadu, University of California Press (Berkley and Los Angeles), 1969.
4. Irschick, E.F., : Politics and social Conflict in South India. Oxford University Press, Bombay, 1969.
5. Nambiarooran, K., : Tamil Renaissance and the Dravidian Nationalism, Madurai, 1980.

6. Pillay. K.K., : A Social History of the Tamils, University of Madras, Madras, 1969,  
Tamilnadu History, Its People and Culture ( in Tamil). International Institute of  
Tamil studies, Chennai, 2004.
7. Rajaraman, P. : The Justice Party, 1916 – 1937, Poompozhi Publishers, Madras,  
1988.
8. Sathianadhan, S: History of Education in the Madras Presidency, Madras, 1894.
9. Subramanian, N. : Social and Cultural History of Tamilnadu ( A. D. 1336 – A.D. 1984) Ennes  
Publications, Udumalpet, 1999.

**HISTORY OF ANCIENT CIVILIZATIONS****UNIT I**

Introduction – Definition – Origin and Growth – Pre-Historic Culture – Paleolithic, Mesolithic and Neolithic Period

**UNIT II**

Egyptian Civilization – Mesopotamian Civilization – Assyrian, Sumerian, Babylonian and Chaldean Civilization

**UNIT III**

Persian Civilization – Hebrew Civilization

**UNIT IV**

Ancient Greece – Legacy of Greece – Hellenistic Civilization – Ancient Rome – Roman Civilization

**UNIT V**

Chinese Civilization – Japanese Civilization – Maya, Aztec and Inca Civilizations

**Books for Reference:**

1. Brinton, Christopher and Wolf: A History of Civilization, Vol.1 & 2, Prentice Hall Inc., U.S.A. 1984
2. Edward D'Cruz, S.J.: A Survey of World Civilization, Lalvani Publishing House, Bombay, 1970
3. Gokhale, B.K.: Introduction to Western Civilization, S. Chand & Co., New Delhi, 1970
4. Swain, J.E.: A History of World Civilization, Eurasia Publishing House Pvt., Ltd., New Delhi, 1994
5. Toynbee, A.J.: A Study of History, 12 Volumes
6. Will Durant: The Story of Civilization, Vol. 1 & 2, Simon and Shuster, U.S.A., 2000
7. Will Durant: Lessons of History, Simon and Shuster, U.S.A., 1975

## **CORE PAPER IV**

### **ISLAMIC HISTORY FROM A.D. 500 TO A.D.750**

#### **UNIT I**

Geography of Arabia - Jahiliya Period – Political, Social, Cultural and Religious Life of the Arabs

#### **UNIT II**

Prophet Muhammad – Early Life – Prophethood - Teaching of Islam – Five Pillars of Islam – Quran and Hadith

#### **UNIT III**

The Pious Caliphate – Hazrat Abu Bakr, Hazrat Umar, Hazrat Uthman and Hazrat Ali - Their Administration

#### **UNIT IV**

The Umayyad Dynasty - Muawiyah I – Yazid I - Abdul Malik – Al Walid I –Umar bin Abdul Aziz – Fall of the Umayyads.

#### **UNIT V**

Cultural Progress under the Umayyad – Literature - Art and Architecture — Fall of the Umayyads

#### **Books for Reference**

1. Abbas : Civilization in Islam, Reference Press, New Delhi, 2005.
2. Ali, Syed Ameer : The Spirit of Islam, Idarahi-i-Adabiyat-i-Delhi, New Delhi, 1997.
3. Ali Syad Ameer: History of the Saracens, Kitab Bhavan, New Delhi, 1995.
4. Arnoid, Thomas: The Legacy of Islam, Oxford University Press, 1980.
5. Hitti, Philip.K : History of Arabs, Macmillan India, New Delhi, 1974.
6. Zaydan, Juriji, : History of Islamic Civilization, Kitab Bhawan, New Delhi, 1978



## **ELECTIVE I**

### **TRAVEL AGENCY MANAGEMENT**

#### **UNIT – I**

Travel Formalities: Passport, Visa, Health Requirements, Taxes, Customs, Currency, Travel Insurance, Baggage and Airport Information

Travel Agency and Tour Operation Business: History, Growth and Present Status of Travel Agency

#### **UNIT – II**

Approval of Travel Agents and Tour Operators by Department of Tourism, Government of India – IATA Rules and Regulations for Approval of a Travel Agency, Approval by Airlines and Railways

#### **UNIT – III**

Understanding the Functions of a Travel Agency: Travel Information and Counseling to the Tourists, Itinerary Preparation, Reservation, Ticketing, Preparation and Marketing of Tour Packages, Handling Corporate Clients, Conferences and Conventions

Sources of Income: Commission, Service Charges

#### **UNIT – IV**

Functions of a Tour Operator: Market Research and Tour Package Formulations, Assembling, Processing and Disseminating Information on Destinations, Tour Operation and Post-Tour Management

#### **UNIT – V**

Public and Private Sector in Travel Agency Business and Tour Operation Business: ITDC, Travel Corporation of India, TTDC, Cox & Kings, Thomas Cook

#### **Books for Reference:**

Mohinder Chand, Travel Agency Management: An Introductory Text, Anmol Publications Pvt. Ltd., New Delhi, 2009

L.K. Singh, Management of Travel Agency, Isha Books, Delhi, 2008

**SOCIAL AND CULTURAL HISTORY OF INDIA FROM A.D.1206 TO A.D.1857**

**UNIT I**

Delhi Sultanate: Social Condition – Status of Women – Religion – Cultural Condition – Literature, Learning, Art and Architecture.

**UNIT II**

Bhakti Movement: Introduction – Bhakti Cult – Sufi Movement: Introduction – Sufi Orders: Chistiya, Suharwardiya, Qadiriya and Naqshbandiya.

**UNIT III**

Social and Cultural life under Vijayanagar rule – Art and Architecture – Social and Cultural life under Bahmani Sultans – Art and Architecture

**UNIT IV**

Sources – India Under Mughals – Social and Cultural Conditions – The Ruling Class – Mansabdars, Jagirdars, Zaminadars – Peasants – Status of Women – Religion – Cultural Condition under the Mughals – Literature – Education – Painting – Music – Arts and Architecture.

**UNIT V**

European Penetration – Growth of Indology – Social and Cultural Policy of the East India Company – Activities of Christian Missionaries – Growth of Humanitarianism – Education in British and Independent India : Traditional Hindu and Muslim Educational System – Patshalas and Madrasas – Introduction of Western Education – Wood's Despatch – Universities of 1857.

**Books for Reference:-**

1. Chandra, Satish : Essays on Medieval Indian History, Oxford University Press, New Delhi, 2004.
2. Chandra, Satish : Medieval India from Sultanate to Mughal – Part – 1, 1206 – 1526, Haranand Publications, New Delhi, 1975.
3. Mahajan, V.D : History of Delhi Sultanate, Sultan Chand, New Delhi, 2000.
4. Bose, M.L. : Social and Cultural History of India, Concept Publication, New Delhi, 1989.
5. Basham, A.L(ed.) : A Cultural History of India, Oxford University Press, New Delhi – 2006.

## **CORE PAPER VI**

### **SOCIAL AND CULTURAL HISTORY OF TAMIL NADU**

#### **FROM A.D1565 TO A.D. 2000**

#### **UNIT I**

Nayaks of Madurai, Chengi, Tanjore: Society Economic life – Religion – Literature – Art and Architecture.

#### **UNIT II**

Tamil Nadu under Carnatic Nawabs and Marathas of Tanjore: Social Condition - Religion – Education - Literature – Art and Architecture – Fine Arts.

#### **UNIT III**

Religious developments: Hinduism – Revivalist Movements – Brahmo Samaj – Ramakrishna Mission – Theosophical Movement – Saiva Siddhantam – Mutts – Islam : Wahabi Movement – Sufism – Fakirs – Christianity and its Impact.

#### **UNIT IV**

Social Reform Movements: Dalit Movement- Pandit C. Iyothee Thasar - Rettamalai Srinivasan – N. Sivaraji Vaikunda Swamy Movement – Indian National Congress and Social Reforms – Self Respect Movement – Women Movements and Social Reforms (1800- 2000).

#### **UNIT V**

Growth of Tamil Literature (1800 – 2000) – Prose – Poetry – Novels – Dramas – Journals its Impact on Society – Vethanayagam Pillai – Mu .Varatharajan – Kalki – Jayakanthan – Sujatha – Ka . Na. Subramaniyan – Manavai Mustafa.

#### **Books for Reference**

1. Balasubramanian C. The Status of women in Tamilnadu during the Sangam Age,  
1976
2. Devanesan A. History of Tamilnadu, Renu Publications, Marthandam, 1997.
3. Mahalingam T.V – Administration and Social Life under Vijayanagar, Madras, 1940.
4. Dr. Minakshi C. – Administration and Social life under the Pallavas, University of  
Madras, Madras, 1977.

5. Ngaswamy R. – Studies in South Indian History and Culture.
6. Nilakanta Sastri K.A. – The Colas, Vol I, University of Madras, Madras, 1984.
7. Nilakanta Sastri K.A. – The Pandyan Kingdom, London, 1929.
8. Pillay K.K. – Thamizhaga Varalaru Makkalum Panpadum, (in Tamil) international institute of Tamil Studies, Chennai, 2004
9. Pillay K.K. – A Social History of the Tamils, University of Madras, Madras, 1975.

## **CORE PAPER VII**

### **HISTORY OF MEDIEVAL CIVILIZATIONS**

#### **UNIT I**

Rise and Spread of Christianity – The Papacy – Contribution of the Byzantines to World Civilization

#### **UNIT II**

Rise and Spread of Islam – Administration under the Pious Caliphate – Contribution of the Saracens to World Civilization

#### **UNIT III**

Feudalism – Origin – Feudal Hierarchy – Lord and the Vassal – Knighthood – Merits and Demerits of Feudalism – Crusade – Early Crusades – Later Crusades – Children's Crusade – Causes and Results of Crusades

#### **UNIT IV**

Monastic Orders of Medieval Europe – Byzantine Monasticism – Benedictine Monasticism – Franciscans and Dominicans – Monastic Reforms – Medieval Cities – Life, Markets, Guilds, Municipal Services and Crimes

#### **UNIT V**

Rise of Medieval Universities – Subjects of Study – Teachers and Students – Life in the Medieval Universities

#### **Books for Reference**

1. Burns, Ralph et al: Western Civilizations.
2. Brinton, Christopher and Wolf: A History of Civilization, Vol.1 & 2, Prentice Hall Inc., U.S.A. 1984
3. Edward MacNall: Western Civilizations – The History and their Culture, W.W.Norton & Company, Inc New York, 1963
4. Gokhale, B.K: Introduction to Western Civilization, S.Chand & Co, Pvt. Ltd, New Delhi, 1973.
5. Judd, G.P: History of Civilization.
6. Swain, J.E : A History of World Civilization, Euraisa Publishing House. Pvt.Ltd, New Delhi, 1994
7. Toynbee, A.J : A study of History (12 Volumes)
8. Wall Blank, T.W,: Civilization – Past and Present Balley, N.M

## **CORE PAPER VIII**

### **ISLAMIC HISTORY FROM A.D. 750 TO A.D.1258**

#### **UNIT-I**

Abbasid Revolution – Abul Abbas Saffah – Abu Jafer Al-Mansur – Harun Al-Rasheed – Mamun Al-Rasheed

#### **UNIT-II**

Al-Mutawakkil – Causes for the downfall of the Abbasids – The Crusades – Imaduddin Zengi – Sultan Salahuddin Ayyubi

#### **UNIT-III**

The Fatimids of Egypt – Obaidullah Al-Mahdi – Al-Muiz – Al-Aziz – Cultural Contribution of the Fatimids – Downfall of the Fatimids

#### **UNIT-IV**

Moors of Spain – Abdul Rahman I – Abdul Rahman II – Abdul Rahman III – Development of Literature, Art and Architecture under the Moors

#### **UNIT-V**

Contribution of the Arabs to Science: Medicine, Astronomy, Mathematics, Chemistry and Ophthalmology – Famous Muslim Scientists – Famous Muslim Historians

#### **Books for Reference**

1. Abbas : Civilization of Islam, Reference Press, New Delhi, 2005.
2. Ali, Syed Ameer: The Spirit of Islam, Idarah – I Adabiyat – I - Delli , New Delhi, 1997.
3. Ali, Syed Amir: A Short History of the Saracens, Kitab Bhavan, New Delhi, 1995.
4. Arnold, Thomas: The Legacy of Islam, Oxford University Press, 1980.
5. Hitti, Philip. K: History of Arabs, Macmillan India, New Delhi, 1974
6. Zaydan, Jurji, : History of Islamic Civilization, Kitab Bhavan, New Delhi, 1978

## **ELECTIVE II**

### **HOTEL MANAGEMENT**

#### **UNIT – I**

Classification of Hotels: Different Types of Star Hotels – International Hotel Chains – Indian Hotel Chains – Public and Private Sector Hotels in India – Rules and Regulations Governing Hotel Business in India

#### **UNIT – II**

Front Office: Reservation, Concierge, Phone Service, Accounting

#### **UNIT – III**

House Keeping: Making Beds, Tidying Rooms, Cleaning and Polishing, Washing and Removing Stains, Vacuuming

#### **UNIT – IV**

Food and Beverage Service: Quick Service, Table Service, Specialty Restaurants, Coffee Shops, Buffets and Banquets, Wedding and Birthday Services

#### **UNIT – V**

Other Departments of a Hotel: Sales & Marketing Division, Accounting Division, Engineering and Maintenance Division, Security Division, Human Resources Division

#### **Books for Reference:**

1. V Prakash Kainthola, Principles of Hotel Management, Gyan Books Pvt. Ltd. New Delhi, 2006
2. Jatashanker R. Tewari, Hotel Front Office: Operations and Management, Oxford University Press, India, June, 2009
3. G. Raghubalan, Smritee Raghubalan, Hotel Housekeeping, Oxford University Press, India, July 2009
4. Dennis Llicrap and John Cousins, Food and Beverage Service, Book Power, New Delhi, 2008

# **BACHELOR OF BUSINESS ADMINISTRATION**

I-SEMESTER

**PRINCIPLES OF MANAGEMENT**

CORE PAPER 1

## **UNIT-1**

Management-Importance-Definition-Nature and Scope of Management-Management process-Role and Function of a manager-Levels of management-Management vs. Administration-Management as an art or science-Management as a Profession-Management Approaches (Henry Fayol,F.W.Taylor,Elton Mayo's Contribution).

## **UNIT-2**

Planning-Nature-Importance-Steps in planning-Types of plans-Objectives-Policies-Procedures-And methods-Nature and types of policies-Decision making-Process of Decision Making-Types of Decision-Problem involved in Decision Making.

## **UNIT-3**

Organisation-Types of organization structure-Span of control-Departmentation-Informal Organisation.

## **UNIT-4**

Authority-Delegation-Difference between Authority and Power- Decentralization- Responsibility- Staffing-Sources of Recruitment-Selection process-Training.

## **UNIT-5**

Coordination-Need of coordination-Types-Techniques-Distinction between coordination and cooperation-Requisites for Excellent coordination-Controlling-Meaning and Importance of Controls-Control process.

## **TEXT BOOKS:**

P.C Tripathi & P.N.Reddy -Principles of Management-Tata Mc.Graw Hill

Prasad L.M- Principles and Practice of Management

R.N. Gupta- Principles of Management- S.Chand Pub.

## **REFERENCE BOOKS:**

Guptha CB- Business Management

Peter-F,Drucker- Principles of Management

Harold Koontz-aryasri & heniz weirich- Principles of Management- Tata Mc.Graw Hill



# **BACHELOR OF BUSINESS ADMINISTRATION**

**I-SEMESTER**

**BUSINESS ORGANISATION**

**CORE PAPER**

## **UNIT-1**

Business-Meaning-Types of Business-Industry-Types of Industry-Commerce and Trade-Profession-Differences between Business and Profession- Difference between Profession and Employment- Organisation-Meaning and Importance of Business Organisation.

## **UNIT-2**

Forms of Business Organisation-Sole Trader-Partnership-Differences between Sole Trader and Partnership firm-Partnership deed-Registration of partnership firm -Joint Stock Companies-Differences between Partnership firm and Joint stock company-Cooperatives Societies-MNC's.

## **UNIT-3**

Location of Industry-Factors Influencing Location and Size-Industrial Estate-District Industries Center.

## **UNIT-4**

Corporate Social responsibility-Business Ethics-Unethical practices in business-Social Audit.

## **UNIT-5**

Business combination-Causes-Types-Simple combination-Compound combination-Features of Pool, Cartel, Merger, Amalgamation and Acquisition-Trade Association and Chamber of Commerce-Differences between Trade Association and Chamber of Commerce.

## **TEXT BOOKS:**

1. Bhusan Y.K- Business Organisation
2. Prakesh Jagadesh- Business Organisation and Management
3. Reddy P.N and Gulshan S.S.- Principles of Business Organisation and Management.
4. Vasudevan and Radhaswami- Business Organisation
5. M.C.Shukla- Business Organisation and Management.

# **BACHELOR OF BUSINESS ADMINISTRATION**

**I-SEMESTER BUSINESS MATHEMATICS AND STATISTICS-1 ALLIED PAPER**

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## **OBJECTIVES:**

To apply the concepts of statistics and Mathematics in Business

### **UNIT-1**

Statistics-Definition-Scope and Limitation-Presentation of Data-Diagrammatic and Graphical Representation of Data.

### **UNIT-2**

Measures of Central Tendency-Mean-Median and Mode-GM and HM-Advantages and Limitations.

### **UNIT-3**

Measures of Dispersion-Range-Mean Deviation-Quartile Deviation-Standard Deviation-Coefficient Variation-Measures of Skewness-Karl Pearson and Bowleys methods.

### **UNIT-4**

Mathematics for Finance-Simple and Compound Interest-Annuities-Sinking Funds-Discount and Present-Values.

### **UNIT-5**

Basic Calculus-Rules for Differentiation-Maxima and Minima and their Application to Business.

Note: The proportion between theory and problems shall be 20:80

## **BOOK REFERENCE:**

1. J.K. Sharma- Business Statistics- Pearson Publications
2. P. Naveentham- Business Statistics and Mathematics
3. P.R. Vital- Business Statistics and Mathematics

## **BACHELOR OF BUSINESS ADMINISTRATION**

**II-SEMESTER**

**BANKING & FINANCIAL SYSTEM**

**CORE PAPER**

### **UNIT-I**

Introduction - Origin of banks -Definition of bank -Types of bank - Unit bank- Merits and Demerits of unit bank- -Branch bank- Its merits and demerits - Mixed banking - Retail banking - Wholesale banking-Universal banking.

### **UNIT-II**

Function of modern commercial banks-Savings accounts-Current account-Difference between savings account and current accounts- Fixed Deposit - Recurring Deposit - Granting of loan -Clean loan- Secured loan- Over draft- Cash credit.

### **UNIT-III**

Role of Reserve Bank of India -Co-operative banks - Urban Co-operative Bank-Land Development banks-NABARD (National Bank For Agriculture And Rural Development ) - EXIM Bank. Economic and Monetary implications of modern banking operations - Concepts of social responsibility of banks .

### **UNIT-IV**

Financial System-Components –Financial Institutions – Financial Market-Services of stock exchange – Financial Instruments (Promissory Note, Bill of Exchange and Cheque only).

### **UNIT-V**

Financial Services (Factoring, Leasing, Hire Purchase, Housing Finance, Credit Card, Credit Rating only) . E-Commerce, E-Business, E-Banking.

### **TEXT AND REFERENCE BOOKS:**

- 1.B.Santhanam,Sundaram & Varshney-Banking and financial system.
- 2.B.Santhanam-Banking theory law and practice
- 3.Kandasami.K.P.-Banking law and practice.

# **BACHELOR OF BUSINESS ADMINISTRATION**

**II-SEMESTER**

**MANAGERIAL COMMUNICATION**

**CORE PAPER**

## **UNIT-1**

Business Communication -Meaning- Importance- Objectives- Communication process- Types of communication- Methods of communication- Barriers to communication.

## **UNIT-II**

Business letters -Structure of a Business letter- Qualities of a good Business letter- Letter of enquiry-Letter of Order- Execution of order letter- Cancellation of Order -Letter of Complaints- Collection letter.

## **UNIT-III**

Circular letters -Banking Correspondence -Insurance Correspondence.

## **UNIT-IV**

Application for Situation- Secretarial Correspondence-Preparation of Agenda and Minutes-Annual Report.

## **UNIT-V**

Communication Media- Telegrams –Telephone –Telex –Fax - Cell phones- Internet.

## **TEXT AND REFERENCE BOOKS:**

1. Rajendra pal and Korlehalli-Essentials of Business Communication
2. Pillai and Bagawathi-Modern Commercial Correspondence
3. A.N.Kapoot- Business Communication
4. Sandhanam.R- Business Communication
5. Ramesh and Patten shetty- Business English and Correspondence
6. L.Gartside- Modern Business and Correspondence

## **BACHELOR OF BUSINESS ADMINISTRATION**

**II-SEMESTER      BUSINESS MATHEMATICS AND STATISTICS-II      ALLIED PAPER**

### **OBJECTIVES**

To apply the concepts of Mathematics and Statistics in Business.

#### **UNIT-1**

Matrix Theory-operations of Determinants-Inverse of a Square Matrix(not more than 3rd order)

#### **UNIT-2**

Solving Simultaneous Equations using Matrix Method-Integration and thier application to business.

#### **UNIT-3**

Correlation-Karl Pearson`s Correlation-Concurrent Deviation Methiod-Rank Correlation-Regression lines-Regression Coeffients-Properties of Regression Coefficient.

#### **UNIT-4**

Time Series-Components of Time Series-Measurements of Trend-Semi Average Method-Moving Average Method-Methods of Least Squares.

#### **UNIT-5**

Index Numbers-Weighted and UnWeighted Index Numbers-Cost of Living Index Numbers.

Note:The proportion between theory and problems shall be 20:80

### **BOOKS FOR REFERENCE:**

- 1.J.K.Sharma-Business Statistics-Pearsons Publications
- 2.P.Navaneetham-Business Statistics & Mathematics
- 3.P.R.Vittal-Business Statistics & Mathematics
- 4.S.P.Gupta-Elementary Statistical Method.

**SYLLABUS FOR B.COM. (FINANCE & ACCOUNTS)**  
**SEMESTER – I**  
**Part - III**  
**FINANCIAL ACCOUNTING – I**  
**CORE PAPER – I**  
**(SUBJECT CODE : U0FA1001 )**

**Objective:** To equip the students to understand basic financial accounting concepts

**UNIT-I:**

Need, concepts and conventions – Accounting Equation – Journal – Ledger - Trial Balance – Rectification of Errors - Subsidiary Books

**UNIT-II:**

Final Accounts – Introduction – Manufacturing Account – Trading Account - Distinction between Capital and Revenue expenditure – Profit and Loss Account Balance Sheet – Various adjustments – Classification of Assets and Liabilities Adjustments.

**UNIT-III:**

Depreciation, Reserves and Provisions – Depreciation, Depletion and Amortization Objectives of Providing Depreciation – causes of depreciation – methods of record depreciation – straight line method – Diminishing Balance Method – Annuity method.

**UNIT-IV:**

Account current – Average Due Date – Insurance claim – Loss of stock – Average clause.

**UNIT-V:**

Single Entry – Objectives – Definition – Salient features – Limitations of Single Entry – Ascertainment of Profit – Statement of Affairs Method – Conversion Method – Difference between Statement of Affairs and Balance Sheet.

**Problem - 80% Theory- 20%**

**Reference Books**

1. M.C. Shukla, T.S. Grewal. Advanced Accounts [volume I] S.Chand & Co., Ltd. New Delhi.
2. T.S. Reddy & A. Murthy – Financial Accounting – Margham Publications, Chennai.
3. R.S.M. Pillai, Bagawathi & S.Uma – Advanced Accounting (Financial Accounting) Volume-I S.Chand & Co. Ltd., New Delhi
4. R. L. Gupta & V. K. Gupta, Financial Accounting, Sultan Chand & Sons, New Delhi.
5. S.P.Jain & K.L.Naranj, Advanced Accountancy, Kalyani Publications, New Delhi, Ludhiana.

**SEMESTER – I**  
**Part - III**  
**BUSINESS COMMUNICATION**  
**CORE PAPER – II**  
**(SUBJECT CODE: U0FA1002)**

**Objective:**

To enable the students to know about the principles, objectives and importance of business communication.

**UNIT – I**

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 - RTI

**UNIT IV:**

Corporate correspondence – Correspondence with share holder, Debenture and Fixed deposits holder.

**UNIT V:**

Bank and Insurance correspondence, Correspondence with Government departments – Modern methods of correspondence – email, internet, Fax, Video conference and their importance.

**Reference Books:**

1. Rajendra Pal & J.S.Korlahalli, Essentials of Business Communication – Sultan Chand & Sons, New Delhi
2. Bovee, Thill, Schatzman 7<sup>th</sup> Edition Pearson publication, New Delhi
3. Shirley Taylor Communication for business Pearson publication, New Delhi

**SEMESTER – I**  
**Part - III**  
**Allied – I**  
**(SUBJECT CODE: UOFAAL01)**  
**ELEMENTS OF INSURANCE**

**Objective:** Among the non – banking financial companies insurance plays a crucial role. To make the students to understand about the importance of insurance and its role played in the development of the society and its constituents.

**UNIT-I:**

Definition of Insurance-Features-Nature of Contract of Insurance -Function of Insurance-Primary and Secondary-Types of Insurance-Importance of Insurance-To Individual -To Business-To Society

**UNIT-II:**

Principles of Insurance- utmost good faith-Insurable interest - Indemnity-Subrogation-Contribution-Mitigation of losses-causa proxima-Insurance terms-Reinsurance - Double Insurance

**UNIT-III:**

Life Insurance - Meaning-Principles-Policy conditions-Difference between Assignment and Nomination-Classification of life policy- Claims intimation -Documents-Settlement Procedure-Maturity claims - Survival benefit - Death claims- Annuities.

**UNIT-IV:**

General Insurance-Fire Insurance-Principles-Types of fire policies -Marine Insurance-Principles - Types of marine policies – Miscellaneous insurance policies-Motor insurance-Third party insurance-Fidelity insurance-Burglary insurance-Credit insurance

**UNIT-V:**

Insurance industry in India-Paradigm Shift - Insurance sector reforms-Private players in the market-Entry of banks in to insurance - Challenges for insurance sector- Insurance Regulatory and Development Authority - Objectives-Duties and Powers-Functions- Insurance Ombudsman

**Reference Books**

1. Insurance Theory & Practice - Nalini Prave, Tripathy & Praber Pal - PHI, New Delhi.
2. Principles & Practice of Insurance- A. Murthy, Margam Publication, Chennai.
3. Principles & Practice of Insurance- Dr N.Patmavathy ,ShriKrishana Publication , Chennai.
4. Risk Management Insurance – S.Arunajaikrishan and T.R.Visvanathan, Macmillan,Chennai
5. Business Law – D. Chandra Bose,PHI, New Delhi.



**SEMESTER – II**  
**Part - III**  
**CORE PAPER – III**  
**(SUBJECT CODE: U0FA2001)**  
**FINANCIAL ACCOUNTING – II**

**Objective:**

To gain knowledge of accounting in General, to understand the system of Financial Account.

**UNIT – I:**

Branch Accounts – Objects of Branch Accounts – Types of Branches – Dependent Branch – Stock and Debtor system - Independent Branch (Foreign Branch excluded) – Incorporation of branch trial balance.

**UNIT – II:**

Departmental Accounts – distinction between Department and Branches – Allocation of expenses – Interdepartmental department transfer at cost or selling price.

**UNIT – III:**

Hire Purchase System – Accounting treatment – Calculation of Interest – Books of hire purchases and hire vendor – Default and Repossession – Installment System Distinction between Hire purchase system and Installment system – Accounting treatment – Books of buyers and sellers.

**UNIT – IV:**

Partnership Accounts – Fundamentals – Different types – Admission – Profit loss appropriation account - Adjustment in profit sharing ratio

**UNIT – V:**

Partnership Accounts – Treatment of good will – Adjustment for goodwill – Retirement and Death of partners.

**Problem - 80% Theory- 20%**

**Reference Books**

1. M.C. Shukla, T.S. Grewal, Advanced Accounts {volume I}, S. Chand & Co. Ltd., New Delhi.
2. T.S. Reddy, & A. Murthy – Financial Accounting – Marghan Publications, Chennai.
3. R.S.N. Pillai, Bagavathi & S. Uma – Advanced Accounting {Financial Accounting} Volume – I, S. Chand & Co. Ltd., New Delhi.
4. R.L. Gupta & V.K. Gupta, Financial Accounting, Sultan Chand & Sons, New Delhi.
5. S.P. Jain & K. L. Narang, Advanced Accountancy, Kalyani Publications, New Delhi, Ludhiana.
6. Dr. S. Ganesan, S.R. Kalavathy, Thirumalai Publications, Nagarkoil.

**SEMESTER – II**  
**Part - III**  
**CORE PAPER IV**  
**(SUBJECT CODE: U0FA2002)**  
**BUSINESS LAW**

**Objective**

To gain a comprehensive knowledge on all aspects of legal rules as to contracts - sale of goods.

**UNIT – I**

Formation of Essential Elements of Contracts – Types of Contract and Agreement, Rules as to offer, Acceptance and Consideration – Capacity to Contract.

**UNIT – II**

Performance of Contract – Discharge of Contract – Breach of Contract and Remedies – Quasi Contracts.

**UNIT – III**

Indemnity and Guarantee – Features and Distinctions – Extent of Surety's Liability, Rights and Discharge of Surety – Bailment and Pledge – Features – Difference – Right and Duties of Bailor and Bailee -Right and Duties of Pawnor and Pawnee.

**UNIT – IV**

Contract of Agency – Definition and Meaning \_ Creation \_ Ratification and Requisite – Rights of Principal and Agent – 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.

**Reference Books:**

1. Business Laws – N.D.Kapoor, Sultan Chand & Sons, New Delhi
2. Business Laws – M.C.Dhandapani, Sultan Chand & Sons, New Delhi
3. Mercantile Law – M.C. Shukla, S.Chand & Co, New Delhi
4. Business Laws – R.S.N.Pillai & Bagavathi, S.Chand & Co, New Delhi.
5. Business Laws – P.C.Tulsian, Tata McGraw Hill, New Delhi

**SEMESTER – II**  
**Part - III**  
**Allied Paper – II**  
**(SUBJECT CODE: UOFAAL02)**  
**ENTREPRENEURIAL DEVELOPMENT**

**Objective:**

To gain knowledge about setting –up and managing a business

**UNIT – I**

Meaning of Entrepreneur – Entrepreneur and Enterprise – Entrepreneur and Manager Entrepreneur and Intrapreneur – Qualities [Traits] of a True Entrepreneur – Concepts of Entrepreneur – Characteristics of Entrepreneurship – Schumpeter theory of Innovation – Mch .Allen's Achievement Theory - Roles of Entrepreneurs in Economic Development

**UNIT – II**

Establishing an Enterprise – Project Identification – Selection of Product – Project Formulation – A 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 – Source 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 Area – Taxation Benefits to SSI Units Subsidies and Incentives in Tamil Nadu for SMES- National Entrepreneurial Development Network

**UNIT – V**

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

**Reference Books**

1. C.B. Gupta – Entrepreneurship Development in India, Sulthan Chand
2. Jayashree Suresh – Entrepreneurial Development, Margham Publications
3. P.Saravanavel - Entrepreneurial Development, Ess Pee Kay Pub. House
4. [www.pace.edu](http://www.pace.edu).
5. [www.harvard.edu](http://www.harvard.edu)
6. [www.niecbud.nic.in](http://www.niecbud.nic.in)

## DEPARTMENT OF COMMERCE (FINANCE & ACCOUNTS)

### Agenda for Board of studies Meeting (02.03.2013)

1. Approval of syllabus for I & II semester.
2. Changes in the syllabus and its contents, suggestions of the Board for simplifying and modernizing the subject, taking in to note about the quality of the students, and changes occurring in the international financial services markets at present at B.Com. I & II semester level.
3. Modifications in the contents of the syllabus not over burdening with excessive problematic subjects.
4. Allotment of Project work among the faculties.
- 5.
6. Requesting the Principal to permit 10 days off -Campus for III B.Com(F&A) VI Semester Students.
7. Conducting the Viva-voce External / Internal.
8. Pattern of Question Paper

Part A	10 Questions	Each carries 2 marks	=	20
Part B	Either/Or	5 Questions	Each carries 5 marks	= 25
Part C	Answer any Three out of Five	Each carries 10 marks	=	30
				-----
				75
9. Components of internal marks 25 marks (enclosed)

**B.Com ( Computer Application)  
I SEMESTER**

**FINANCIAL ACCOUNTING - I**

**Object:**

- \* To provide knowledge on the fundamental of financial accounting.
- \* To expose the students to various financial and its current applications.

**UNIT-I:**

Need, concepts and conventions - Accounting Equation –Journal, Ledger and Preparation of Trail Balance - Rectification of errors - Self balancing ledgers.

**UNIT-II:**

Depreciation, Reserves and Provisions - Depreciation, Depletion and Amortization - Objectives of providing depreciation - causes of depreciation - methods of recording depreciation - straight line method - Diminishing Balance Method - Changes in method of depreciation - Annuity method - Sinking Fund Method - Insurance Policy Method - Machine Hour Rate Method - Depletion Method - Revaluation Method.

**UNIT-III:**

Account current - Average Due Date - Insurance claim - Loss of stock - Average clause.

**UNIT-IV:**

Final Accounts - Introduction - Manufacturing Account -Trading Account - Distinction between Capital and Revenue expenditure - Profit and Loss Account - Balance Sheet - Various adjustments - Classification of Assets and Liabilities.

**UNIT-V:**

Single Entry - Objectives - Definition - Salient features - Limitations of Single Entry - Ascertainment of Profit - Statement of Affairs Method - Conversion Method - Difference between Statement and Affairs and Balance Sheet.

**REFERENCE BOOKS:**

1. M.C.Shukla, T.S.Grewal. Advanced Accounts (volume I) S.Chand & Co., Ltd., New Delhi.
2. T.S.Reddy & A.Murthy - Financial Accounting - Marghan Publications, Chennai.
3. R.S.N. Pillai, Bagawathi & S.Uma - Advanced Accounting (Financial Accounting) volume I, S.Chand & Co. Ltd., New Delhi.
4. R.L. Gupta & V.K. Gupta, Financial Accounting, Sultan Chand & Sons, New Delhi.
5. S.P. Jain & K.L. Naranj, Advanced Accountancy, Kalyani Publications, New Delhi, Ludhiana.

## **PRINCIPLES OF MANAGEMENT**

### **Object:**

- To introduce the students to the various management concepts
- To explain the various function of management.

### **UNIT-I**

Concept of Management - Meaning and Definitions - Nature and Characteristics of Management - Management Vs Administration - Levels of Management - Importance of Management and Scope of Management - Principles.

### **UNIT-II**

Process of Management - Planning - Its Nature, Need Characteristics, Objectives and Importance of Planning - Types of Planning - Principles of Planning - Steps in Planning Process - Planning Premises - Forecasting - Decision Making.

### **UNIT-III**

Organizing - Principles of Organization - Staffing Functions and Importance of Staffing - Departmentation - Authority and Responsibility - Organization Charts and Manual - Job Analysis and Job Evaluation.

### **UNIT-IV**

Directing: Principles of Delegation - Delegation Vs Decentralization - Principles and Techniques of Directing - Span of Supervision - Fundamentals of Effective Supervision - Role of Communication.

### **UNIT-V**

Leadership - Qualities of Good Leader - Types of Leadership - Co-ordination and Control - Problems in Co-ordination - Steps Involved in Control Process.

### **REFERENCE BOOKS:**

1. Business Management - Dr.C.B.Gupta - Sultan Chand & Sons
2. Management principles and Practices - Lallan Prasad & S.S.Gulshan & S.Chand & Co.
3. Principles of management - Koontz, Weihrich and Aryasri & Tata McGraw hill
4. Principles & Practice of Management - Dr.H.C. Das Gupta & Sahitya Bhawan Agra

## **INTRODUCTION TO INFORMATION TECHNOLOGY**

### **Objective:**

- To provide basic knowledge about computer & to the students.

### **UNIT-I:**

Introduction: History of Computer parts of Computer System, Hardware devices - Software operating system - Examples of operating system - Computer Networking - Visual Editor.

### **UNIT-II:**

Word processing with Ms Word - starting Ms Word - Ms Environment - working with word documents - working with text - working with tables - checking spelling and grammar - printing document - spreadsheets and Ms Excel - starting Ms Excel - Ms Excel Environment - working with Excel - workbook - working with work.

### **UNIT-III:**

Making presentation with Ms Power point - starting Ms Power point - Ms Power point Environment - working with power point - working with different views - designing presentations - printing in power point.

### **UNIT-IV:**

MS-Access: Creating a Data Base –Table –Creating forms using wizard –Generating Reports (Simple).

### **UNIT-V:**

Computer networking basics –Networking Topology –LAN –WAN –Net working Devices – Information System Management –Information Concepts –Planning issues and the MIS Organizing issues and the MIS –Control issues and the MIS –Decision Support System.

### **REFERENCE BOOKS:**

1. Edward Willeh, David Crower & Rohanda Crowder “MS Office 2000 Bible”, IDG Books & India -2000.
2. Sanjay Saxsena, “A First Course in Computer”, Vikas Publishing House, 2000.
3. Sanjay saxsena, “MS Office 2000”, Vikas Publishing House, 2000.
4. Linda Tway, Sapphiro Pacific Lajolla, “Multimedia in Action”, Academic Press, 1995.

## **MS OFFICE (PRACTICAL)**

### **Objective:**

- To give knowledge of MS-Office to the students so that the students can prepare test documents and Excel sheets and to prepare ppt's for presentation.

### **(A) MS-WORD**

1. Usage of Numbering, Bullets, Tools and Headers
2. Usage of Spell Check and Find and Replace
3. Text Formatting
4. Picture Insertion and Alignment
5. Mail Merge Concept
6. Creation of Tables, Formatting Tables
7. Splitting the Screen
8. Inserting Symbols in Documents

### **(B) MS-EXCEL**

1. Changing of Column Width and Row Height (Column and Range of Column)
2. Moving, copying, Inserting and Deleting Rows and Columns
3. Creating Chart.
4. Using Excel Function (Date, Time)
5. Using Excel Function (Statistical Mathematics)
6. Using Excel Function (Financial)

### **(C) MS-POWER POINT**

#### **Working With Slides**

1. Creating, saving, Running Slides
2. Adding Headers and footers
3. Changing slide layout
4. Working fonts and bullets
5. Inserting Clipart



## II SEMESTER FINANCIAL ACCOUNTING – II

### Objectives:

- To understand the preparation of accounting for branch and departments
- To understand the treatment of partnership accounting.

### UNIT-I

**Branch Accounting:** Meaning –Objectives –Types of Branch –Debtors System –Stock and Debtors System –Wholesale Branch –Independent Branch (Foreign Branches Excluded).

### UNIT-II

**Departmental Accounting:** Meaning –Need –Advantages –Difference between Branch and Department Account- Apportionment of Expense- Inter Department Transfer.

### UNIT-III

**Hire purchase and Installment system:** Definition-Feature –Distinction –Accounting Treatment – Calculation of Interest and Cash Price-Default and Repossession –Hire Purchase Trading Account – Installment Purchase System –Meaning -Accounting Treatment.

### UNIT-IV

**Partnership Account:** Definition –Partnership Deed –Past Adjustments and Guarantee –Admission of a Partner –Profit Sharing Ratio and Sacrificing Ratio –Preparation of New Balances Sheet. Retirement of a partner. Death of Partner.

### UNIT-V

**Dissolution of a Firm:** Meaning –Modes of Dissolution –Insolvency of a Partner –Garner Vs Murray's Principles –Insolvency of all partners –Piecemeal Distribution –Proportionate Capital Method –Maximum loss Method.

### Reference Books:

1. R.L. Gupta & V.K. Gupta- Advanced Accounting- Sultan Chand- New Delhi.
2. T.S. Reddy & A. Murthy- Financial Accounting- Margham Publication- Chennai
3. Shulka & Grewal- Advanced Accounting- S Chand – New Delhi
4. Jain & Narang- Financial Accounting, Kalyani Publications, New Delhi
5. Jawahar Lal, Seema, Financial accounting, S. Chand & Company, New Delhi

## **MANAGERIAL ECONOMICS**

### **Objective:**

To make the students understand the application of economic tools and logic to business decision making; demand forecasting and pricing methods.

### **UNIT-I**

Definition, Meaning, Nature and Scope of Managerial Economics - Economics and Managerial Economics - Role and Responsibilities of Managerial Economics. Demand Forecasting: Meaning - Purpose & methods - Criteria for good forecast - Forecasting.

### **UNIT-II**

Managerial Decision Making : Risk and Uncertainty - Elements of Decision Theory - Classification of Managerial Problem - Decision taking under certainty and uncertainty - Cost control & Cost Reduction.

### **UNIT-III**

Pricing Methods - Full cost Pricing, target pricing, Going rate pricing - customary pricing, differential pricing - Specific pricing methods - pricing a new product - pricing over the life cycle of a product - product line pricing - mark up and mark down pricing by retailers - Resale price maintenance - Dual pricing - Brand Value.

### **UNIT-IV**

Profit and Profit Management - Accounting profit and Economic profit - Theories of profit.

### **UNIT-V**

Capital Budgeting: Need for Capital Budgeting - forms of capital Budgeting - Nature of Capital budgeting problem - project profitability: Methods of Appraising project Profitability.

### **References Books**

1. Hague,D.C. : Managerial Economics
2. Joel Dean : Managerial Economics, Prentice Hall
3. Peterson & Lewis : Managerial Economics.
4. Sankaran .S : Managerial Economics, Margham Publication
5. Savage & Small : Introduction to Managerial Economics.

## **TALLY (THEORY)**

### **UNIT: I**

Introduction to Accountancy – Introduction to Tally fundamentals – Maintenance of company Data – Concept of Ledger – Configuration of chart of Accounts – Maintaining Stock Details - How to make entries in Cash book – Purchase book – Sales book – Invoice – Purchase return book – Sales return book – Petty cash book – Configuration in tally

### **UNIT: II**

Introduction to Bills – Details of bills – Description of: Accounting vouchers – Inventory vouchers – Cost centers and Cost categories – Entries in Trail balance – How to create new groups – master configuration – Accounts masters – readymade creation – List of groups – How to alter groups – creation of primary groups – Secondary group creation

### **UNIT: III**

Introduction to VAT – VAT activation and classification – Creating of ledger – Stationary ledger – Display the created ledger – concepts of voucher – Creation of receipt voucher – Payment voucher – Credit note – Remove the voucher – Print the voucher – Accounting input credit on opening stock – Accounting of interstate branch transfer – VAT computation – VAT Form – CST introduction – Ledger Creation – Creating vouchers – CST reports

### **UNIT: IV**

TDS Introduction – Configuration of Tally for TDS - Creation of balance sheets – concept of trial balance in tally – balance sheet – sales registers – Purchase registers – Sales vouchers – concept of ageing – receivable ageing – TDS Report – Configuring Tally for Service Tax – Master Creation – Service Tax Reports

### **UNIT: V**

Bank reconciliation – Concept of inventory – Inventory in tally – creation of stock category – stock groups – creation of multi stock item – inventory vouchers – Inventory reports – Printing Reports – Consolidation of Accounts and other reports – Security control

### **BOOKS RECOMMENDED:**

1. TALLY, Sridharan, Narmadha publications, May 2003.
2. E-Commerce, a guidance, Rajamalar, Narmadha publications, May 2003.

## **TALLY (LAB)**

1. Create a group in Tally
2. How to create a primary group? Explain with your own example
3. Create Ledger with your own entries from the books already available
4. Explain how to create Voucher entries
5. Explain how to remove voucher entries
6. Print the Voucher you have created with all necessary entries
7. Explain how to create stock category.
8. Explain how to create groups with your own entries.
9. Explain – Multi Stock Item
10. Creation of Delivery Note – Explain with your entries.

**Core Paper - I**  
**FINANCIAL ACCOUNTING – I**  
**(5 hours)**

**UNIT – I**

**Introduction:** Basic accounting concepts – Accounting conventions – Journal – Ledger – Preparation of trail balance – Errors – Types and rectification of errors – Bank reconciliation statement.

**UNIT – II**

**Depreciation Accounting:** Meaning of depreciation – Causes of depreciation - Methods of providing depreciation – Straight line method – Diminishing balance method (excluding change in the method of depreciation) – Annuity method – Sinking fund method.

**UNIT – III**

**Final Accounts:** Preparation of final accounts – Trading account – Profit and loss account – Balance sheet – Adjustment entries.

**UNIT IV**

**Average Due Date:** Determination of due date – Calculation of interest. Fire Insurance Claims - Need for fire insurance – Computation of claim to be lodged for loss of stock – Average clause

**UNIT V**

**Single Entry System:** Objectives – Definition – Salient features – Limitation of single entry system – Difference between single entry and double entry – Ascertainment of profit through network method (statement of affairs) and conversion method.

**Note: Weightage of marks: Theory 20% and Problems 80%**

**Reference Books:**

1. T.S. Reddy and Murthy, *Financial Accounting*, Margham Publications, Chennai.
2. S.P. Jain and K.L.Narang, *Financial Accounting*, Kalyani Publishers, Chennai.
3. M.C.Shukla and T.S.Grewal, *Advanced Accounts*, S.Chand & Co., - New Delhi.
4. R.L.Gupta and M. Radhaswamy, *Financial Accounting*, Sultan Chand & Sons., New Delhi.
5. A. Mukherji & M. Hanif, *Financial Accounting*, Tata Mc. Graw Hill Publishing Co. Ltd., New Delhi.

**Core Paper - II**  
**BUSINESS ORGANISATION**  
**(5 hours)**

**UNIT-I**

**Nature of Business:** Meaning – Characteristics – Objectives - Classification of business Activities - Industry - Commerce - Trade - Hindrances of trade - Distinguish between trade and commerce - Qualities of a successful businessman.

**UNIT-II**

**Profession:** Meaning – Characteristics - Difference between business and profession - Social responsibilities of business - Need and responsibility towards various stakeholders.

**UNIT-III**

**Form of Business Enterprises:** Meaning – Types - Selection of forms of organisation - Sole Trader – Partnership firm - Co-operative societies - Joint Stock Company - Public Private Partnership (PPP)

**UNIT-IV**

**International Business:** Meaning – Scope – Objectives – Advantages – Disadvantages -Difference between domestic trade and international trade - Concept of Liberalization, Privatization and Globalization (LPG) - MNCs.

**UNIT-V**

**Business Combination:** Meaning – Advantages – Limitation – Types - Forms of combination - Trade association – Chamber of commerce - FICCI - Difference between trade association and chamber of commerce.

**Reference Books:**

1. Y.K. Bhusan, *Business Organisation*, Sultan Chand & Sons, New Delhi.
2. C.D Balaji and G. Prasad, *Business Organization*, Magham Publications, Chennai.
3. Vasudevan & Radhasivam, *Business Organisation*, Tamil Nadu Book House, Chennai.
4. R.N. Gupta, *Business Organisation & Management*, S.Chand & Co., New Delhi.
5. R.L Varshney and B.Bhattacharya, *International Marketing Management*, Sultan Chand & Sons, New Delhi.

**Allied Paper - I**  
**BUSINESS ECONOMICS – I**  
**(6 hours)**

**UNIT – I**

**Business Economics:** Meaning – Definition – Characteristics –Importance – Scope – Difference between Business Economics and Economics – Micro economics – Macro economics – Role and responsibilities of business economist.

**UNIT – II**

**Utility Analysis:** Meaning – Characteristics – Cardinal – Ordinal – Total utility – Marginal utility – Law of diminishing marginal utility – Law of equi-marginal utility – Indifference curve analysis.

**UNIT – III**

**Demand:** Meaning – Definition – Characteristics – Factors determining demand – Demand curve - Elasticity of demand – Types – Demand forecasting techniques – Short and long term.

**UNIT – IV**

**Production and Costs:** Meaning – Functions – Production cost – Types of cost – Short and long run cost – ‘L’shape curve – Law of variable proportion.

**UNIT – V**

**Supply:** Meaning – Factors affecting supply – Supply schedule – Supply curve – Law of supply – Elasticity of supply – Determinants of elasticity of supply.

**Reference Books:**

1. Agarwal M.D., and Som Deo, *Business Economics*, Ramesh Book Depot, New Delhi.
2. Sankaran S, *Business Economics*, Margham Publications, Chennai.
3. Mithani. D.M., *Managerial Economics – Theory and Application*, Himalaya Publishing House Pvt. Ltd., Mumbai.
4. Ahuja H.L., *Business Economics*, S.Chand & Co. Ltd., New Delhi.
5. Mehta P.L., *Managerial Economics*, Sultan Chand & Sons., New Delhi.

**Core Paper – III**  
**FINANCIAL ACCOUNTING – II**  
**(5 hours)**

**UNIT - I**

**Branch Accounts:** Objectives of Branch Accounts – Types of Branches – Dependent Branch – Debtor system - Stock and debtors system – Independent branch (foreign branch excluded) – Incorporation of branch figures in the head office books.

**UNIT - II**

**Departmental Accounts:** Distinction between departments and branches – Allocation of common expenses – Expenses which cannot be allocated – Preparation of departmental accounts - Inter-departmental transfer at cost price and selling price.

**UNIT - III**

**Hire Purchase System & Instalment Purchase System:** Hire Purchase System – Accounting treatment – Calculation of interest – Books of hire purchaser and hire vendor – Default and repossession – Hire purchase trading account – Instalment system – Distinction between hire purchase and instalment purchase system – Accounting treatment – Books of buyer and seller.

**UNIT - IV**

**Partnership Accounts:** Admission of a partner – Calculation of ratios – Treatment of goodwill – Revaluation of assets and liabilities – Retirement and death of a partner.

**UNIT – V**

**Partnership Accounts:** Dissolution of partnership firm – Insolvency of a Partner and partnership firm – Garner vs. Murray – Gradual Realization and Piecemeal Distribution.

**Note: Weightage of marks: Theory 20% and Problems 80%**

**Reference Books:**

1. T.S. Reddy and Murthy, *Financial Accounting*, Margham Publications, Chennai.
2. S.P. Jain and K.L.Narang, *Financial Accounting*, Kalyani Publishers, Chennai.
3. M.C.Shukla and T.S.Grewal, *Advanced Accounts*, S.Chand & Co., - New Delhi.
4. R.L.Gupta and M. Radhaswamy, *Financial Accounting*, Sultan Chand & Sons., New Delhi.
5. A. Mukherji & M. Hanif, *Financial Accounting*, Tata Mc. Graw Hill Publishing Co.Ltd., New Delhi.



**Core Paper – IV**  
**BUSINESS MANAGEMENT**  
**(5 hours)**

**UNIT-I**

**Management:** Meaning and Definitions – Nature, Principles and Scope - Levels of Management - Management vs. Administration.

**UNIT –II**

**Planning:** Meaning, Objectives and Importance of Planning – Types of planning –Process of Planning – Decision-Making – Forecasting.

**UNIT – III**

**Organizing and Staffing:** Purpose, Principles and Importance of Organizing– Departmentation – Authority and Responsibility - Delegation and Decentralization – Staffing- Functions and Importance.

**UNIT – IV**

**Directing:** Meaning and Nature of Directing – Leadership –Importance-Qualities of a Leader – Functions –Leadership Styles.

**UNIT –V**

**Controlling and Coordination:** Meaning and Significance – The Control Process – Traditional and Modern Techniques of Control – Coordination, Meaning and Importance.

**Reference Books:**

1. Dr. C.B. Gupta, *Business Management* – Sultan Chand & Sons, New Delhi.
2. Lallan Prasad and S.S. Gulshan, *Management Principles and Practices* - S. Chand & Co., New Delhi.
3. Koontz, Welhrich and Aryasri, *Principles of Management* – Tata McGraw Hill, New Delhi.
4. Dr. H.C. Das Gupta, *Principles & Practice of Management* – Sahitya Bhawan, Agra.
5. Dr. Kathiresan and Dr. Radha, *Business Management*, Prasanna Publications, Chennai.

**Allied Paper - II**  
**BUSINESS ECONOMICS – II**  
(6 Hours)

**UNIT – I**

**Market Structure:** Classification– Perfect competition – Monopoly – Monopolistic competition – Oligopoly- Kinked demand curve.

**UNIT – II**

**Price and Profit:** Equilibrium price – Profit maximization – Sales maximization – Theories of profit – Rent, risk, uncertainty, innovations and dynamic.

**UNIT –III**

**National Income:** Definition – Circular flow – Measurement –Gross Domestic Product( GDP) – National Domestic Product (NDP) – Gross National Product (GNP) –Net National Product ( NNP) – Difficulties of measurement of national income – National income and welfare.

**UNIT –IV**

**Fiscal Economics & Monetary Policy:** Public revenue-Public expenditure-Canons of taxation-Fiscal policy. Monetary policy: Meaning- Importance -Objectives-Types-Instruments.

**UNIT –V**

**International Trade:** Meaning – Theories of international trade – Classical theory – Comparative cost advantage – Modern theory of international trade - Balance of trade and Balance of payment – Components.

**Reference Books:**

1. Agarwal M.D., and Som Deo, *Business Economics*, Ramesh Book Depot, New Delhi.
2. Sankaran S, *Business Economics*, Margham Publications, Chennai.
3. Mithani. D.M., *Managerial Economics – Theory and Application*, Himalaya Publishing House Pvt. Ltd., Mumbai.
4. Ahuja H.L., *Business Economics*, S. Chand & Co. Ltd., New Delhi.
5. Mehta P.L., *Managerial Economics*, Sultan Chand & Sons. New Delhi.

**Core Paper - I**  
**ADVANCED MANAGEMENT ACCOUNTING**  
**(6 hours)**

**UNIT – I**

**Management Accounting:** Scope and importance – Management Accounting Vs Financial Accounting – Management Accounting as a tool for decision making – Ratio Analysis.

**UNIT – II**

**Decision Making Techniques:** Pricing decisions – Cost Volume Profit Analysis – BEP – Margin of Safety – Pricing decisions – Make or buy – Key factor – Selection of suitable Product Mix.

**UNIT – III**

**Funds Flow Statement:** Utility and construction of Fund Flow Statement.

**UNIT – IV**

**Cash Flow Statement:** Statement as per AS 3 – Utility and construction of Cash Flow Statement – Distinction between fund flow statement and cash flow statement.

**UNIT – V**

**Budget and Budgetary Control:** Concept and objectives – Budget administration – Functional budgets – Fixed and flexible budgets – Zero base budget – Performance budget.

**Note: Weightage of Marks - Theory 20% Problem 80%**

**Reference Books:**

1. I M Pandey – *Management Accounting* – Vikas Publishing House
2. Khan and Jain – *Management Accounting* – Tata McGraw Hill, New Delhi
3. Ravi M Kishore – *Management Accounting* – Taxman Publication, New Delhi
4. S N Maheswari – *Management Accounting* – Sultan Chand & Sons, New Delhi
5. Robert S Kaplan and Anthony Atkinson – *Advance Management Accounting* – Prentice Hall, New Delhi.

**Core Paper - II**  
**MARKETING MANAGEMENT**  
**(6 hours)**

**UNIT – I**

**Marketing:** Definition – Scope – Function – New concepts of marketing – Mass marketing – Niche marketing – Strategic marketing – Demarketing – Remarketing – Social marketing – Green marketing – Areas of marketing management.

**UNIT – II**

**Product Planning & Product Life Cycle:** Developing a new product – Product line – Factors determining the scope of product line – Challenges in new product development – Product life cycle – Product mix – Classification of goods - Consumer goods - Industrial goods

**Branding:** Brand Management – Advantages and Disadvantages of branding – Brand management – Packaging and labeling.

**UNIT – III**

**Designing Pricing Strategies:** Objectives – Factors affecting pricing decisions – Procedure for price determination – Kinds of pricing – Pricing of a new product – Price differentials – Price leader.

**UNIT – IV**

**Channels of Distribution:** Objectives – Functions – Types – Channel management decisions – Evaluating the major channels – Vertical marketing system – Horizontal marketing system – Multi channel system.

**UNIT – V**

**Managing Direct and Online Marketing:** Growth of direct marketing – Electronic business – Benefits – Major channels for direct marketing – The online consumer – Online marketing – Advantages and disadvantages – Promises and challenges of online marketing – Ethical issues in direct marketing

**Reference Books:**

1. Philip Kotler, *Marketing Management*, Prentice Hall of India Pvt. Ltd., New Delhi.
2. Ramaswamy V S and Nandakumari S, *Marketing Management*, McMillan, Delhi.
3. Varshney R L and Gupta S L, *Marketing Management*, Sultan Chand & Sons., New Delhi.
4. Bagozzi R P, *Principles of Marketing Management*, Science Research Associates, Chicago.
5. Govindarajan M, *Marketing Management*, Prentice Hall of India Pvt. Ltd., New Delhi.

**Core Paper - III**  
**BUSINESS ENVIRONMENT**  
**( 6 hours)**

**UNIT - I: Introduction**

Concept of business environment – Nature and significance – Types of environment – Internal, External, Micro and Macro – Dimensions of business environment - Impact of environment on Business and strategic decisions – Challenges - Techniques of environmental analysis and Forecasting.

**UNIT - II: Social Environment**

Social environment – Objectives and importance- Business and society – Business ethics and Business culture – Social responsibility of business - Responsibilities to different sections – Factors affecting social orientation – Arguments for and against social involvement – Social audit.

**UNIT - III: Political and Legal Environment**

Political and Government Environment – Political stability – Regulations toward trade, taxation policies – Priorities in social sector.

New industrial policy resolution – Privatization & Disinvestment – Patents and trademarks – Monetary and fiscal policies – Health and safety regulations.

**UNIT - IV: Labour Environment**

Labour environment – Labour legislations – Labour welfare and social security – Trade unions – Workers Participation in Management – Quality circles.

**UNIT - V: Global Environment**

Globalization – Impact on Indian business environment – International economic integration – Country evaluation and selection – Foreign entry methods – International trade – Free Trade Vs Protection. GATT and WTO – Origin, objectives organization structure, functioning and its impact on India.

**Reference Books:**

1. Sheikh Saleem – *Business Environment*, Pearson Education, New Delhi.
2. Francis Cherunilam – *Business Environment*, Himalaya Publications, Mumbai.
3. Suresh Bedi – *Business Environment*, Exel, New Delhi
4. Shajahan – *International Business*, Mac MilanIndia, New Delhi
5. P.K.Gosh & G.K. Kapoor – *Business Policy and Environment*, Sultan Chand and Sons, New Delhi.

**Core Paper - IV**  
**ADVANCED BUSINESS STATISTICS - I**  
**(6 hours)**

**UNIT-I**

**Statistics:** Meaning - Definition – Characteristics – Functions and Scope of Statistics. Data: Meaning – Types of data – Primary vs. Secondary data – Sources of primary data and secondary data – Vital statistics.

**UNIT-II**

**Correlation Analysis:** Meaning – Uses – Correlation and causation – Types of Correlation – Methods of Correlation – Scatter diagram method – Graphic method – Karl Pearson's co-efficient of correlation – Rank correlation – Concurrent deviation method.

**UNIT-III**

**Regression Analysis:** Meaning – Uses – Distinction between Correlation and Regression – Direct method – Actual Mean Method – Assumed mean method – Grouped data.

**UNIT-IV**

**Partial & Multiple Correlation:** – Characteristics – Uses and Limitations – Multiple Regression Analysis.

**UNIT-V**

**Introduction to Quantitative Techniques:** Meaning of Quantitative Techniques – Classification of quantitative techniques – Important operations research techniques – Role of quantitative techniques in business and industry – Limitations of quantitative techniques.

**Note: Weightage of Marks - Theory 20% Problem 80%**

**Reference Books:**

1. Dr. S.P.Gupta, *Statistical Methods*, Sultan Chand & Sons, New Delhi.
2. C.R. Kothari, *Quantitative Techniques*, Vikas Publishing House Pvt. Ltd., Noida.
3. Dr. S.P.Gupta, and M.P.Gupta, *Business Statistics*, Sultan Chand & Sons, New Delhi.
4. R.S.N.Pillai and Bhagavathi, *Statistics-Theory & Practice*, S.Chand & Co., New Delhi.
5. P.R.Vittal, *Business Statistics & Operations Research*, Margham Publications, Chennai.

**Elective Paper - I**  
**BUSINESS AND PROFESSIONAL COMMUNICATION**  
**(6 hours)**

**UNIT - I: Introduction**

Communication – Features- Goals of Communication – Forms of Communication - Effective communication – Communication competence – Communication process – Types/Forms of Communication- Communication barriers.

**UNIT - II: Communication Technology**

Technical communication – Technical reports – Forms – Memos - Technical presentations – e-mails – Graphics – Managing techno life – Changing role of communication technology in workplace – Communication technology and virtual office – Modern communication tools.

**UNIT - III: Professional Communication**

Meaning – Importance – Oral communication techniques – Public speaking skills – Negotiating skills – Facilitator and participant skills in meetings – Written communication techniques and principles – Reading and comprehension skills – Interpersonal communication- Building interpersonal skills in workplace.

**UNIT - IV: Listening**

Meaning – Importance of listening – Benefits of effective listening – Hearing versus listening a model for listening – Gender differences and listening – Assessing listening skills – Techniques to make others listen.

**UNIT - V: Presentations**

Facets of professional presentations – Understanding audience – Speaking occasions - Presentation goals – Selection of best format for presentation Resumes and interviews – Introduction – Employment interview – Surviving the group interview.

**Reference Books:**

1. J. Penrose - *Advanced Business Communicator* –Thomson Asia Ltd.
2. Deborah Raorch & Elieen Perrigo , Allen & Becon - *Business and Professional Communications* for the 21<sup>st</sup> Century
3. Guffey, *Thomson Business Communication*.
4. Andrea Rutheford - *Business Communication Skills for Technology* – Pearson Educations.

**Core Paper – V**  
**ADVANCED FINANCIAL MANAGEMENT**  
**(6 hours)**

**UNIT – I**

**Financial Management:** Functions and Goals of Financial Management – Maximization vs. Optimization – Risk- return trade off.

**UNIT – II**

**Fund Management:** 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 and Leverage:** 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. Dividend Policy and Practices – Dividend policies – Factors affecting dividend decisions – Dividend theories – Gordon, Walter and MM theories

**UNIT – IV**

**Working Capital Management:** Working capital cycle – Factors influencing working capital - Forecasting of working capital requirements - Management of inventory, cash and accounts receivable – Payables management – Credit and collection policies.

**UNIT – V**

**Management of Fixed Asset** – Evaluation of capital investment decision – Payback Period – ARR – IRR – NPV.

**Note: Weightage of Marks - Theory 40% Problem 60%**

**Reference Books:**

- 1) I.M. Pandey, *Financial Management*, Vikas Publishing House, New Delhi.
- 2) S.N. Maheswari, *Fundamentals of Financial Management*, Sultan Chand & Sons, New Delhi.
- 3) Prasanna Chandra, *Financial Management*, Theory and Practice, Tata McGraw Hill Publishing Company, New Delhi.
- 4) M.Y. Khan and P.K. Jain, *Financial Management*, Tata McGraw Hill Publishing Company Limited. New Delhi.
- 5) P.V.Ratnam, *Financial Management Theory*, Problems and Solutions, Kitab Mahal, New Delhi.



**Core Paper - VI**  
**HUMAN RESOURCE MANAGEMENT**  
**(6 hours)**

**UNIT – I**

**Human Resource Management:** Nature and scope of HRM – Concepts of HRM – Characteristics – Objectives – Importance – Functions – Emerging trends in HRM

**UNIT – II**

**Human Resources Planning:** Need and importance of HR planning – HR forecasting – Job analysis – Job description – Job specification.

**UNIT – III**

**Recruitment and Selection:** Meaning - Recruitment – Sources of recruitment – Techniques of recruitment – Selection methods - Testing – Interviewing – Placement and Induction.

**UNIT – IV**

**Employees Training:** Concepts of training – Need and importance of training – Types of training – Methods and techniques of training – Evaluating effectiveness – Executive Development – Methods and techniques of ED.

**UNIT – V**

**Performance Appraisal:** Concepts – Objectives – Importance – Methods of performance appraisal – Traditional and modern methods

**Reference Books:**

1. David A. Decenzo & S.P. Robbins - *Personal / Human Resource Management*, Prentice Hall India, New Delhi.
2. C.B. Gupta - *Human Resource Management* – Sultan Chand and Sons, New Delhi.
3. L.M. Prasad - *Human Resource Management* – Sultan Chand and Sons, New Delhi.
4. P.G. Aquinas - *Human Resources Management Principles and Practices*, Vikas Publishers, New Delhi.
5. Dessler - *Human Resources Management*, Prentice Hall India, New Delhi.
6. Dr. K. Sundar & Dr. J. Srinivasan – *Human Resources Management*, Vijay Nicole Publishers, Chennai.

**Core Paper - VII**  
**FINANCIAL SERVICES**  
**(6 hours)**

**UNIT – I**

**Financial Services:** Introduction – Concept – Significance – An overview of financial services in India – Financial services types – Asset based – Fund based – Advisory financial services – Financial services institutions – NBFC and other players.

**UNIT – II**

**Leasing:** Introduction – Concept – Classification – Significance – Limitations – Lease documentations and agreements – Tax aspects of leasing. Hire purchase – Introduction – Concept – Significance – Leasing vs. Hire purchase – Legal frame work – Taxation aspects

**UNIT – III**

**Factoring:** Introduction – Concept – Significance – Mechanism – Functions of a Factor – Types – Legal aspect of factoring – Factoring vs. Bill discounting. Forfeiting – Meaning – Salient Features of forfeiting – Advantages – Forfeiting vs. Factoring.

**UNIT – IV**

**Venture Capital:** Introduction – Features – Selection of investment – Stages of financing – Evaluation methods – Conventional Method, First Chicago Method and Revenue Multiplier Method – Investment Nurturing – VCI debt instruments – Indian scenario.

**UNIT – V**

**Fee Based & Advisory Financial Services:** Introduction – Types – Merchant bankers – Underwriters – Portfolio management – Issue management - Bankers to issue – Book building – Stock broking – Credit rating – Depository Services.

**Reference Books:**

1. M.Y. Khan - *Financial Services* - McGraw Hill, New Delhi.
2. G Ramesh Babu – *Financial Services* – Concept Publishing House, New Delhi
3. B S Bhatia and G S Batra – *Management of Financial Services* – Deep & Deep Publications Pvt. Ltd., New Delhi
4. Rajesh Khothari – *Financial Service in India* – Sage Publications, New Delhi
5. Clifford Gomez – *Financial Market, Institution and Financial Services* – Prentice Hall, New Delhi

**Core Paper - VIII**  
**ADVANCED BUSINESS STATISTICS - II**  
**(6 hours)**

**UNIT-I**

**Probability:** Addition and multiplication theorem – Conditional probability – Baye's theorem.

**UNIT-II**

**Chi-square Test:** Uses – Properties of chi-square test – Procedure for testing the significance of the difference between the observed and expected frequencies – Cautions while applying chi-square test – Hypothesis framing – Hypothesis testing.

**UNIT-III**

**F-test:** Properties of F-test – Analysis of variance (ANOVA) – One-way classification – Two-way classification – Testing of hypotheses.

**UNIT-IV**

**Students't-Distribution:** Properties of t-distribution – Application of the t-distribution – Cautions while using t-test – Normal curve – Z test – Testing of hypotheses.

**UNIT-V**

**Assignment Problems:** Definition – Hungarian assignment method – Restricted or prohibited assignments. **Transportation problems:** Definition – North West corner rule – Row minima method – Column minima method – Least cost method – Vogel's approximation method – optimality test – Degeneracy in a transportation problem – Unbalanced transportation problem.

**References Books:**

1. Dr. S.P.Gupta, *Statistical Methods*, Sultan Chand & Sons, New Delhi.
2. C.R. Kothari, *Quantitative Techniques*, Vikas Publishing House Pvt. Ltd., Noida.
3. Dr. S.P.Gupta, and M.P.Gupta, *Business Statistics*, Sultan Chand & Sons, New Delhi.
4. R.S.N.Pillai and Bhagavathi, *Statistics-Theory & Practice*, S.Chand & Co., New Delhi.
5. P.R.Vittal, *Business Statistics & Operations Research*, Margham Publications, Chennai.

**Elective Paper - II**  
**CONSUMER BEHAVIOUR**  
(5 hours)

**UNIT – I**

**Introduction to Consumer Behaviour:** Nature and Importance of consumer behaviour – Application of consumer behaviour in marketing – Factors influencing consumer behaviour – Consumer research process

**UNIT – II**

**Individual Determinants of Consumer Behaviour:** Motivation – Needs – Motives and goals – Dynamic nature of motivation – Arousal of motives – Personality – Nature – Theories – Self concept – Psychographic and life style. Perception – Process – Consumer imagery – Perceived risk. Learning – Principles – Theories – Attitude – Structural model of attitude – Attitude formation and change

**UNIT – III**

**Group Determinants of Consumer Behaviour:** Reference group influence – Types of consumer relevant groups – Factors affecting group influence – Application of reference group – Concept of Family – Functions of family – Family decision making – Family life cycle – Opinion leadership and personal influence

**UNIT – IV**

**Environmental Influences on Consumer Behaviour:** Social class – Life style profile of social class application to consumer behaviour – Social class mobility. Culture – Meaning - Characteristics – Factors affecting culture – Role of customs – Values and beliefs in consumer behaviour. Sub-culture – Meaning – Sub-culture division and consumption pattern in India – Types of sub-culture – Cross cultural consumer analysis – Similarities and differences among people – Cross-cultural marketing problems in India – Strategies to overcome cross-cultural problems.

**UNIT – V**

**Organisation and Consumers:** Factors influencing organisational buying behaviour – Consumer and marketer – Marketing communication and persuasion – Developing persuasive communication – Market regulation – Consumer dissatisfaction.

**Reference Books:**

1. David L. Loudon and Albert J Della Bitta , *Consumer Behaviour*, Tata McGraw Hill, New Delhi
2. Leon G . Schiffman and Leslie Lasar Kanuk, *Consumer Behaviour*, Pearson Education, India.
3. S. Ramesh Kumar, *Consumer Behaviour and Branding*, Pearson Education, New Delhi.

**Paper - I****ALGEBRA**

Objectives: Students are exposed to topics like Theory of Equations, Summation of Series, Matrices, Continued Fraction and Elementary Number Theory. The stress is on the development of problem solving skills.

**UNIT- I SUMMATION OF SERIES**

Partial fractions - Summation of series using Binomial, Exponential and Logarithmic series (Theorem without proof) (15 hours)

**UNIT- II THEORY OF EQUATIONS**

Polynomial Equations - Imaginary and Irrational roots - Symmetric Function of roots in terms of Coefficient - Sum of  $r$ th powers of roots - Reciprocal Equations – Transformation of Equations (15 hours)

**UNIT- III THEORY OF EQUATIONS (contd . . .)**

Descartes Rule of Signs - Approximate Solutions of Polynomials by Horner's method - Newton's Raphson method of solution of a cubic polynomials. (15 hours)

**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. (15 hours)

**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. (15 hours)

**RECOMMENDED TEXTS**

1. ALGEBRA Vol. I & II, *T.K. Manickavachagom pillay, T.N. Natarajan and K. S. Ganapathy*, (2007), S. Viswanathan Printers & Publishes Pvt. Ltd, Chennai.
2. MATHEMATICS FOR B.SC. Vol. I,II,III & IV, *P.Kandasamy and K.Thilagavathy*, (2004), S.Chand & Company Ltd, New Delhi.

**REFERENCES**

ALGEBRA, Vol. I & II, *S. Narayanan*, S. Viswanathan Printers & Publishes Pvt. Ltd, Chennai.

## Paper-II

## GEOMETRY

Objectives: Students are exposed to fundamental aspects of two and three Dimensional Analytical Geometry and Polar coordinates and it develops logical and systematic computational skills.

### UNIT- I TWO DIMENSIONAL ANALYTICAL GEOMETRY

Conics: Chord in terms of middle points using  $r$  method (or) otherwise - Pole, Polar, Conjugate Hyperbola and Conjugate diameter for ellipse, hyperbola. (12 hours)

### UNIT-II TWO DIMENSIONAL ANALYTICAL GEOMETRY(Contd...)

Conics- Conjugate hyperbola, Conjugate diameters of an ellipse and a hyperbola (12 hours)

### UNIT-III THREE DIMENSIONAL ANALYTICAL GEOMETRY :

Plane and straight lines – symmetrical form of straight line, Coplanar lines, Skew lines intersection of plane and line (12 hours)

### UNIT - IV THREE DIMENSIONAL ANALYTICAL GEOMETRY(Contd.)

Sphere: Section of a sphere by a plane – tangent plane- Orthogonal Spheres. (12 hours)

### UNIT - V THREE DIMENSIONAL ANALYTICAL GEOMETRY (Contd...)

Cone- Equation of cone- cone whose vertex is at the origin – Quadratic Cone with the vertex at the origin- Right circular cone. (12 hours)

### RECOMMENDED TEXT

ANALYTICAL GEOMETRY (TWO AND THREE DIMENSIONS), *T.K.Manickavachagom Pillay & others*, (2007), S.Viswanathan Printers & Publishers, Chennai.

### REFERENCES

ANALYTICAL GEOMETRY (TWO AND THREE DIMENSIONS), *S.G. Venkatachalapathy*, (2010), Margham Publications, Chennai.

Objectives: This course will cover basic method for forming difference table, essence of interpolation techniques, solving algebraic equations and system of linear equations.

**UNIT - I FINITE DIFFERENCES AND OPERATORS**

First and Higher order differences - Forward and Backward difference - Properties of operators - Defference of a polynomial - Factorial polynomials - Operators E - Relation between  $\Delta$ ,  $\nabla$  and E.  
(15 hours)

**UNIT - II INTERPOLATION FOR EQUAL INTERVALS**

Newton Gregory Forward and Backward interpolation formulae. Guass forward and backward difference formulae - problems based on them.  
(15 hours)

**UNIT - III INTERPOLATION FOR EQUAL INTERVALS (Contd . . . )**

Stirlings formula - Bessels formula - Problems based on them.  
(15 hours)

**UNIT - IV INTERPOLATIONS FOR UNEQUAL INTERVALS**

Divided differences - Newton's divided differences formula and Lagrange's formula -Estimating them missing terms. (with one or more missing values)  
(15 hours)

**UNIT - V SOLUTIONS OF SMULTANIOUS LINEAR EQUATIONS**

Guass elimination method - matrix inversions method Guass Jordon method - Guass seidel method.  
(15 hours)

**RECOMMENDED TEXT**

NUMERICAL ANALYSIS, B.D. Gupta , (2001) Konark Pub. Ltd. , Delhi

**REFERENCES:**

FINITE DIFFERENCE AND NUMERICAL ANALYSIS, H.C. Saxena, (1991) S. Chand & Co. Delhi

## **ALLIED PRACTICAL – I**

### **PROBLEM SOLVING TECHNIQUES - PRACTICAL - I**

1. Forward Interpolation Techniques.
2. Backward Interpolation Techniques.
3. Newton's divided difference Techniques.
4. Guass elimination technique of solving simultaneous linear equations.
5. Guass seidel technique of solving simultaneous linear equations.



## SEMESTER II

### **Paper III    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 -  $n^{\text{th}}$  Derivative - Leibnitz's theorem (without Proof) and its application -  
Jacobians - Total Differentiation (15 hours)

#### UNIT - II

Maxima and Minima functions of two and three independent variable, Lag ranges method (without proof), problems on this concepts, Curvature, Radius of Curvature in Cartesian and Polar coordinates, p-r equation, Evolutes. (15 hours)

#### UNIT - III

Curvature, Radius of Curvature in Cartesian and Polar coordinates, p-r equation. (15 hours)

#### UNIT - IV

Evolutes and Envelopes (15 hours)

#### UNIT - V

Asymptotes: Methods (without proof) of finding Asymptotes of rational algebraic curves with special cases. (15 hours)

### RECOMMENDED TEXT

1. CALCULUS, *S. Narayanan and T.K.Manickavachagom Pillay*, (2004), S.Viswanathan printers & Publishers, Chennai.
2. MATHEMATICS FOR B.SC. Vol. I,II,III & IV, *P.Kandasamy and K.Thilagavathy*, (2004), S.Chand & Company Ltd, New Delhi.

### REFERENCE BOOKS

1. DIFFERENTIAL CALCULUS, *Shanti Narayan*, (2001), S. Chand & Co, New Delhi.
2. CALCULUS, *S. Sudha*, (1998), Emerald Publishes, Chennai.
3. CALCULUS AND ANALYTICAL GEOMETRY, *G.B. Thomas and R.L.Finney*, (1998) Addison Wesley [9 th ed.].

## PAPER IV - TRIGONOMETRY

### Objectives:

Students are exposed to fundamental Polar coordinates and it develops logical and systematic computational skills.

### UNIT- I

Expansions of  $\sin n\theta$  and  $\cos n\theta$  - Expansion of  $\tan n\theta$  in terms of  $\tan \theta$  - Powers of Sines and Cosines of  $\theta$  in terms of functions of multiples of  $\theta$  (12 hours)

### UNIT – II

Expansions of  $\sin^n \theta$ ,  $\cos^n \theta$ , in a series of ascending powers of  $\theta$  - Expansion of inverse circular functions – Expansion of  $\sin \theta$  and  $\cos \theta$  in a series of ascending powers of  $\theta$  .

12 hours)

### UNIT – III

Definition – Relations between Hyperbolic function and Circular function (12 hours)

### UNIT – IV

Inverse Hyperbolic functions (12 hours)

### UNIT – V SUMMATION OF SERIES

Logarithms of complex quantities – Summation of Trigonometric series (12 hours)

### RECOMMENDED TEXT

TRIGONOMETRY, S.Narayanan and T.K.Manickavachagom Pillay, (2004), S.Viswanathan Printers & Publishers Pvt. Ltd, Chennai.

### REFERENCES:

TRIGONOMETRY, *M. L. Khanna*,

## **Allied Paper II      NUMERICAL METHODS - II**

Objectives: This course will cover basic methods for numerical differentiation, numerical integration and numerical solution of ordinary differential equations.

### **UNIT- I    NUMERICAL DIFFERENTIATION**

Newton's forward and backward differences to compute the derivatives - derivative using divided difference formula - Maxima and Minima using the above formulae. (15 hours)

### **UNIT - II NUMERICAL INTEGRATIONS**

General Quadrature formula- Trapezoidal rule- Simpson's 1/3 rd rule - Simpson's 3/8 th rule - Weddle's rule. (15 hours)

### **UNIT - III DIFFERENCE EQUATIONS**

Linear difference equations - Linear homogeneous difference equation with constants coefficient - Particular integrals of the form  $a^x$ ,  $x^m \sin ax$ ,  $x^m \cos ax$  (15 hours)

### **UNIT - IV SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS**

Bisection method- Iteration method – Regula falsi method- Newton Raphson's method. (15 hours)

### **UNIT - V NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS**

Euler's method – Modified Euler method – Picard's method – Taylor's method – Runge Kutta method. (15 hours)

### **RECOMMENDED TEXT**

NUMERICAL ANALYSIS, B.D. Gupta , (2001) Konark Pub. Ltd. , Delhi

### **REFERENCES:**

FINITE DIFFERENCE AND NUMERICAL ANALYSIS, H.C. Saxena, (1991) S. Chand & Co. Delhi

## **ALLIED PRACTICAL – I I**

### **PROBLEM SOLVING TECHNIQUES - PRACTICAL - II**

1. Newton's Forward Difference Technique to compute derivatives.
2. Newton's Backward Difference Technique to compute derivatives.
3. Integration Techniques of Simpson.
4. Techniques of Solving Algebraic and Transcendental equations using Bisection and Regula-Falsi methods.
5. Techniques of solving Ordinary Differential Equations using Euler's Method.

## **ALLIED SUBJECTS FOR**

### **B.Sc (Computer Science) B.Sc.(Software Computer Science) & BCA**

#### **ALLIED PAPER – I : MATHEMATICAL FOUNDATION I**

Objectives: To Explore the Fundamental Concept of Mathematics

##### **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 argument. (12 hours)

##### **Unit II : SET THEORY**

Set, set operations, venndiagram, Properties of sets, number of elements in a set, Cartesian product, relation & functions,

Relation : Equivalence relation. Equivalence class, Partially and Totally ordered sets,

Functions : Types of Functions, Composition of Functions. (12 hours)

##### **Unit III : BINARY OPERATORS**

Types of Binary operations : Commutative, Associative, Distributive and identity, Boolean algebra : properties. Permutations and combinations. (12 hours)

##### **Unit IV : DIFFERENTIATION**

Simple problem using standard limits,  $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$ ,  $\lim_{x \rightarrow 0} \frac{\sin x}{x}$ ,  $\lim_{x \rightarrow 0} \frac{\tan x}{x}$ ,  $\lim_{x \rightarrow 0} e^x$ ,  $\lim_{n \rightarrow 0} (1 + 1/n)^n / n$ ,  $\lim_{n \rightarrow 0} (1 + n)^{1/n}$ , Differentiation, successive differentiation, Leibnitz theorem, partial differentiation. (12 hours)

##### **Unit V : APPLICATIONS OF DIFFERENTIATION**

Applications of differentiation, Tangent and normal, angle between two curves, Maximum and minimum values [second derivative test], curvature and radius of curvature [Cartesian coordinates], Envelops. (12 hours)

## RECOMMENDED TEXT

*Mathematical Foundations* by U.Rizwan, Nelliappar Publications, Chennai, 2012.

## Reference Books

1. P.R VITTAL , Mathematical Foundations – Margham Publication, Chennai.
2. U.Rizwan, Mathematical Foundation – Sci Tech, Chennai
3. V.Sundaram & others, Dircrte Mathematical Foundation – A.P.Publication, sirkali
4. P.Duraipandia & Others, Analytical Geometry 2 Dimension – Emerald Publication 1992 Reprint.
5. Manicavachagom pillay & Natarajan Analytical Geometry part I – Two Dimension – S. Viswanathan [printers & Publication] Pvt Ltd., 1991.

## ALLIED PAPER – I I: MATHEMATICAL FOUNDATION II

Objectives: To Explore the Fundamental Concept of Mathematics

### Unit I: MATRICES

Multiplication of matrices, singular and Non singular matrices, Adjoin of a Matrix, inverse of a matrix, symmetric and skew symmetric, Hermitian and skew Hermitian, orthogonal and unitary matrices, Rank of a matrix, solution of simultaneous linear equations by [i] Cramer's rule [ii] Matrix inversion Method. ( Upto Four equation Four unknowns) (12 hours)

### 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. (12 hours)

### Unit III : INTEGRATION

Integration simple problems, integration of rational function involving algebraic expressions of the form  $\frac{1}{ax^2+bx+c}$ ,  $\frac{1}{\sqrt{ax^2+bx+c}}$ ,  $\sqrt{ax^2+bx+c}$ ,  $\frac{px+q}{ax^2+bx+c}$ ,  $\frac{px+q}{\sqrt{ax^2+bx+c}}$  (12 hours)

### Unit IV : INTEGRATION (Contd . . . )

Integrations using simple substitutions integration 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. (12 hours)

### Unit V : ANALYTICAL GEOMETRY OF THREE DIMENSION

Spheres and cones (simple problems any) (12 hours)

### RECOMMENDED TEXT

*Mathematical Foundations*, Volume II by U.Rizwan, Nelliappar Publications, Chennai, 2013.

### Reference Books

1. P.R VITTAL , Mathematical Foundations – Margham Publication, Chennai.
2. U.Rizwan, Mathematical Foundation – Sci Tech, Chennai
3. V.Sundaram & others, Dircrete Mathematical Foundation – A.P.Publication, sirkali
4. P.Duraipandia & Others, Analytical Geometry 2 Dimension – Emerald Publication 1992 Reprint.
5. Manicavachagom pillay & Natarajan Analytical Geometry part I – Two Dimension – S. Viswanathan [printers & Publication] Pvt Ltd., 1991.

## **ALLIED PRACTICAL – I**

for B.Sc. (Computer Science),  
B.Sc. (Software Computer Science) and  
BCA Degree Courses

### **COMPUTATIONAL MATHEMATICS : PRACTICAL - I**

1. Solution of system of linear equations
2. Solution of quadratic equations
3. Calculation of interest tables
4. Finding HCF and LCM .
5. Calculation of Profit and Loss



## **ALLIED PRACTICAL – I I**

for

B.Sc. (Computer Science),

B.Sc. (Software Computer Science) and

BCA Degree Courses

### **COMPUTATIONAL MATHEMATICS : PRACTICAL - II**

1. Finding area of two dimensional figures
2. Finding volume of three dimensional figures
3. Finding number of days between two given dates
4. Calculation of continuous discounts
5. Drawing graphs

**PAPER I****ALGEBRA I**

Objectives: To introduce the concept and to develop working knowledge on class equation, solvability of groups, 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 (omit Lemma 2.12.5) (18 hours)

**UNIT- II**

Solvable groups - Direct products - Finite abelian groups - Modules  
Chapter 5 : Section 5.7 (Lemma 5.7.1, Lemma 5.7.2 theorem 5.7.1)  
Chapter 2 : Sections 2.13 and 2.14 (Theorem 2.14.1 only)  
Chapter 4 : Section 4.5 (18 hours)

**UNIT- III**

Linear Transformations: Canonical forms - Triangular form - Nilpotent transformations.  
Chapter 6: Sections 6.4, 6.5 (18 hours)

**UNIT- IV**

Jordan form - rational canonical form  
Chapter 6: Sections 6.6, 6.7 (18 hours)

**UNIT- V**

Trace and transpose - Hermitian, Unitary, Normal transformation, real Quadratic form.

Chapter 6: Sections 6.8, 6.10 and 6.11 (Omit 6.9) (18 hours)

CONTENT AND TREATMENT AS IN :

TOPICS IN ALGEBRA [Second Edition], I.N.Herstein, (1975) Wiley Eastern Limited, New Delhi.

## REFERENCES:

1. ALGEBRA, M.Artin, (1991), Prentice Hall of India.
  2. BASIC ABSTRACT ALGEBRA, (Second Edition), P.B.Bhattacharya, S.K.Jain and S.R.Nagpaul, (1997), Cambridge University Press.
  3. ALGEBRA, Vol I - Groups, Vol II - Rings, I.S. Luther and I.B.S.Passi, (1999), Narosa Publishing House, New Delhi.
  4. FUNDAMENTALS OF ABSTRACT ALGEBRA, D.S.Malik, J.N.Mordeson and M.K. Sen, (1997), McGraw Hill, New York.
- 2 Islamiah College(Autonomous), Vaniyambadi

## PAPER II 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. INFINITE SERIES: Absolute and conditional convergence - Dirichlet's test and Abel's test - Rearrangement of series - Riemann's theorem on conditionally - convergent series.

Chapter 6: Sections 6.1 to 6.8

Chapter 8: Sections 8.8, 8.15, 8.17, 8.18 (18 hours)

### 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 - Comparison theorems.

Chapter 7: Section 7.1 to 7.14 (18 hours)

### 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 – Lebesgue criterion for the existence of Riemann integrals Chapter 7: Sections 7.15 to 7.26 (18 hours)

## UNIT- IV

INFINITE SERIES AND INFINITE PRODUCTS : Double sequences – Double series - Rearrangement theorem for double series - A sufficient condition for equality of iterated series - Multiplication of series - Cesaro summability - Infinite products. POWER SERIES : Multiplication of power series - The Taylor's series generated by a function- Bernstein's theorem - Abel's limit theorem - Tauber's theorem

Chapter 8 Section 8.20, 8.21 to 8.26

Chapter 9 Section 9.14, 9.15, 9.19 9.20, 9.22, 9.23 (18 hours)

## UNIT- V

SEQUENCE OF FUNCTIONS : Point wise convergence of sequence 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 Reimann - Stieltjes integration - Non-uniform convergence and term - by -term 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, 9.9, 9.10, 9.11, 9.13 (18 hours)

CONTENT AND TREATMENT AS IN : PRINCIPLES OF MATHEMATICAL ANALYSIS, (Second Edition), Tom M. Apostol, (1974), Addison-Wesley Publishing Company Inc. New York.

## REFERENCES:

1. REAL ANALYSIS, Bartle, R.G., (1976), John Wiley and sons Inc.
  2. PRINCIPLES OF MATHEMATICAL ANALYSIS, (3rd Edition), Rudin, W., (1976), McGraw Hill Company, New York.
  3. MATHEMATICAL ANALYSIS, Malik, S.C. and Savita Arora, (1991), Wiley Eastern Limited. New Delhi.
  4. INTRODUCTION TO REAL ANALYSIS, Sanjay Arora and Bansi Lal, (1991), Satya Prakashan, New Delhi.
  5. PRINCIPLES OF REAL ANALYSIS, A.L. Gupta and N. R. Gupta, (2003), Pearson Education.
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## **PAPER III 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. (18 hours)

### **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. (18 hours)

### **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 homogenous equation - homogeneous equation with analytic coefficients - The Legendre equation.

Chapter- 3: Sections 1 to 8 (Omit Section 9) (18 hours)

### **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 (Omit sections 5 and 9) (18 hours)

## 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 (Omit sections 7 to 9) (18 hours)

CONTENT AND TREATMENT AS IN : AN INTRODUCTION TO ORDINARY DIFFERENTIAL EQUATIONS, E.A. Coddington, (2007), Prentice - Hall of India Ltd., New Delhi.

### REFERENCES:

1. ORDINARY DIFFERENTIAL EQUATIONS, W.T. Reid, (1971), John Wiley and Sons, New York.
2. ADVANCED DIFFERENTIAL EQUATIONS, M.D. Raisinghania, (2001), S.Chand & Company Ltd. New Delhi.

## **PAPER -IV MECHANICS**

Objectives: To study mechanical systems under generalized co-ordinate systems. Virtual work, energy and momentum. To study mechanics developed by Newton, Lagrange, Hamilton Jacobi and theory of relativity due to Einstein.

### **UNIT- I**

**MECHANICAL SYSTEMS** The mechanical systems - Generalized co-ordinates -Constraints - Virtual work - Energy and Momentum.

Chapter 1 : Section 1.1 to 1.5 (18 hours)

### **UNIT- II**

**LANGRANGE'S EQUATIONS** Derivation of Lagrange's equations -

Examples - Integrals of motion.

Chapter 2 : Sections 2.1 to 2.3 (18 hours)

### **UNIT- III**

**HAMILTON'S EQUATIONS** Hamilton's Principle - Hamilton's equations – Other Variational Principle.

Chapter 4 : Sections 4.1 to 4.3 (18 hours)

### **UNIT- IV**

**HAMILTON'S - JACOBI THEORY** Hamilton's Principle Function - Hamilton -Jacobi Equation - Separability.

Chapter 5 : Section 5.1 to 5.3 (18 hours)

### **UNIT- V**

**CANONICAL TRANSFORMATION** Differential forms and Generating functions -Special Transformations - Lagrange and Poisson brackets.

Chapter 6 : Section 6.1, 6.2 and 6.3 (18 hours)

**CONTENT AND TREATMENT AS IN :**

**CLASSICAL DYNAMICS**, D. T. GREENWOOD, (1985), Prentice Hall of India, New Delhi.



## REFERENCES:

1. CLASSICAL MECHANICS, H. Goldstein, (Second edition) Narosa Publishing House, New Delhi.
  2. CLASSICAL MECHANICS, N.C. Rane and P.S.C. Joag, , Tata McGraw Hill, (1991)
  3. PRINCIPLES OF MECHANICS, J.L. Synge and B.A. Griffith, McGraw Hill Book Co, New York, (1970).
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## **ELECTIVE - I : Paper I RESOURCE MANAGEMENT TECHNIQUES**

Objectives: This course introduces advanced topics in linear and non – linear programming.

### **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 - One Integer Programming.

Chapter : 7 . (18 hours)

### **UNIT- II**

**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.

Chapter : 22. (18 hours)

### **UNIT- III**

**THEORY OF SIMPLEX METHOD** : Canonical and Standard form of LP – Slack and Surplus Variables - Reduction of any Feasible solution to a Basic Feasible solution - Alternative optimal solution - Unbounded solution - Optimality conditions - Some complications and their resolutions - Degeneracy and its solutions.(Theorems with proof)

Chapter : 24. (18 hours)

### **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 : 25 and 27. (18 hours)

## UNIT- V

PARAMETRIC LINEAR PROGRAMMING Variation in the coefficients  $c_j$  , - Variations in the Right hand side  $b_i$ . GOAL PROGRAMMING: Difference between LP and GP. approach - Concept of Goal Programming -Goal Programming Model Formulation-Graphical Solution Method of Goal programming - Modified Simplex method of goal Programming.

Chapter: 28 and 29. (18 hours)

CONTENT AND TREATMENT AS IN :

OPERATIONS RESEARCH, J.K.Sharma, (2001), Macmillian (India ), New Delhi.

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### REFERENCES:

1. OPERATIONS RESEARCH, Hamdy A.Taha, (1997), Prentice Hall of India private Limited, New Delhi.
2. INTRODUCTION TO OPERATIONS RESEARCH F.S.Hiller & J.Lieberman, (2001), Tata -McGraw Hill, New Delhi.
3. FOUNDATIONS OF OPTIMIZATION, (Second edition), Beightler.C D.Philips , and B.Wilde, (1979), Prentice Hall, New York.
4. OPTIMIZATION THEORY AND APPLICATIONS, S.S.Rao, (1990), Wiley Eastern, New Delhi.

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## **ELECTIVE - I : PAPER II GRAPH THEORY**

Objectives: To study and develop the concepts of Graphs, sub graphs, Trees, connectivity, Euler's theorem, Hamilton Cycles, Matching, coloring of graphs, Independent sets, cliques, vertex coloring and planar graphs.

### **UNIT- I**

**GRAPHS, SUB GRAPHS AND TREES:** Graph and simple graphs – graph isomorphism - the Incidence and adjacency matrices - sub graph - vertex degrees - paths and connection - cycles - trees - cut edges and bonds - cut vertices.

Chapter 1 [section 1.1 to 1.7], Chapter 2 [section 2.1 to 2.3] (18 hours)

### **UNIT- II**

**CONNECTIVITY:** Euler's tours and Hamilton Cycles Connectivity - Blocks - Eulertours - Hamilton cycles.

Chapter 3 [section 3.1 to 3.2], Chapter 4 [section 4.1 to 4.2] (18 hours)

### **UNIT- III**

**MATCHINGS, EDGE COLORINGS:** Matching - Matching and coverings in Bi partite graphs - Edge chromatic number - Vizing's theorem.

Chapter 5 [section 5.1 - 5.2], Chapter 6 [section 6.1 - 6.2] (18 hours)

### **UNIT- IV**

**INDEPENDENT SETS AND CLIQUES, VERTEX COLORINGS:** 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] (18 hours)

### **UNIT- V**

**PLANAR GRAPHS:** Plane and planar graphs - dual graphs - Euler's formula – the five color theorem and four color conjecture.

Chapter 9 [ section 9.1 - 9.3, 9.6] (18 hours)

CONTENT AND TREATMENT AS IN :

GRAPH THEORY AND APPLICATIONS, J.A Bondey and USR Murthy, (1976),  
McMillan, London.

REFERENCES:

1. A FIRST LOOK AT GRAPH THEORY, J.Clark and D.A Holton, (1995),  
Allied publishers, New Delhi.
2. GRAPH THEORY, R. Gould Benjamin, Cummings, (1989), Menlo Park.
3. ALGORITHMIC GRAPH THEORY, A.Gibbons, (1989), Cambridge  
University Press, Cambridge.
4. GRAPHS : AN INTRODUCTORY APPROACH, R.J. Wilson and J.J.  
Watkins, (1989), John Wiley and Sons, New York.
5. INTRODUCTION TO GRAPH THEORY, (Fourth Edition), R.J. Wilson,  
(2004), Pearson Education.
6. A FIRST COURSE IN GRAPH THEORY, S.A. Choudum, (1987), MacMillan  
India Ltd.

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**II SEMESTER**  
**PAPER V ALGEBRA II**

Objectives: To study field extension, roots of Polynomial, Galois Theory, finite fields, division rings, solvability by radical and to develop computational skill in abstract algebra.

**UNIT- I**

Extension fields - Transcendence of  $e$ .

Chapter 5 : Section 5.1 and 5.2. (18 hours)

**UNIT- II**

Roots of polynomials - More about roots.

Chapter 5 : Section 5.3 and 5.5 (18 hours)

**UNIT- III**

Elements of Galois theory.

Chapter 5 : Section 5.6. (18 hours)

**UNIT- IV**

Finite fields - Wedderburn's theorem on finite division rings.

Chapter 7 : Sections 7.1 and 7.2 [Only theorem 7.2.1.] (18 hours)

**UNIT- V**

Solvability by radicals - A theorem of Frobenius - Integral Quaternions and the Four - Square theorem.

Chapter 5: Section 5.7 [Omit Lemmas 5.7.1, 5.7.2 and Theorem 5.7.1]

Chapter 7: Section 7.3 and 7.4. (18 hours)

CONTENT AND TREATMENT AS IN :

TOPICS IN ALGEBRA, (Second Edition), I.N.Herstein, (1975), Wiley Eastern Limited, New Delhi.

## REFERENCES:

1. ALGEBRA M. Artin, (1991), Prentice Hall of India.
  2. BASIC ABSTRACT ALGEBRA P.B.Bhattacharya, S.K.Jain, and S.R.Nagpaul, (1997), (First Edition) Cambridge University Press.
  3. ALGEBRA I.S. Luther and I.B.S.Passi, (1996), Vol. I: Groups; Vol. II: Rings, Narosa Publishing House, New Delhi.
  4. FUNDAMENTALS OF ABSTRACT ALGEBRA D.S.Malik, J.N.Mordeson and M.K. Sen, (1997), McGraw Hill, New York.
  5. BASIC ALGEBRA, N. Jacobson, (1980), Vol.I & II W.H.Freeman; also published by Hindustan publishing company, New Delhi.
- 10 Islamiah College(Autonomous), Vaniyambadi

## PAPER VI 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 function relative to an orthonormal system - Properties of Fourier Coefficients - The Riesz - Fischer Theorem - The convergence and representation problems in trigonometric series - The Reimann - Lebesgue Lemma - The Dirichlet Integrals – An Integral representation for the partial sums of Fourier series - Reimann'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 Weiestrass approximation theorem.

Chapter 11: Section 11.1 to 11.15 [Apostol] (18 hours)

### 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] (18 hours)

### UNIT- III

IMPLICIT FUNCTIONS AND EXTREMUM PROBLEMS 18hrs Functions with non - zero Jacobian determinants - The inverse function theorem - The Implicit function Theorem - Extrema of real valued functions of several variables – Extremum problems with side conditions.

Chapter 13 : Section 13.1 to 13.7 [Apostol] (18 hours)



## 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] (18 hours)

## UNIT- V

THE LEBESGUE INTEGRAL : Properties of the Lebesgue integral for bounded measurable functions - The Lebesgue integral for unbounded functions – Some fundamental theorems - The metric space  $L^2[a, b]$  - The integral on  $(-1,1)$  and int plane.

Chapter 11 : Section 11.6 to 11.10 [R.R.Goldberg] (18 hours)

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CONTENT AND TREATMENT AS IN :

1. MATHEMATICAL ANALYSIS, Tom M.Apostol, (1974), Second Edition, Addison - Wesley Publishing Company Inc. New York, (for units I,II & V).
2. METHOD OF REAL ANALYSIS, Richard R. Goldberg, (1975), Oxford & IBH Publishing, New Delhi,(for Unit IV & V)

## REFERENCES:

1. THE LEBESGUE INTEGRAL, Burkill, J.C, (1951), Cambridge University Press.
  2. MEASURE AND INTEGRATION, (1971), Munroe, M.E, Addison - Wiley.
  3. REAL ANALYSIS, (1988), Roydon, H.L, Macmillon Pub. Company, New York.
  4. PRINCIPLES OF MATHEMATICAL ANALYSIS, Rudin, W, (1979), McGraw Hill Company, New York.
  5. MATHEMATICAL ANALYSIS, (1991), Malik, S.C. and Savita Arora, Wiley Eastern Limited. New Delhi.
  6. INTRODUCTION TO REAL ANALYSIS, Sanjay Arora and Bansilal, Satya Prakashan, (1991), New Delhi.
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## **PAPER VII PARTIAL DIFFERENTIAL EQUATIONS**

**Objectives:** The aim of the course is to introduce the various types of partial differential equations and obtaining solution of 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 – Charpit 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 (18 hours)

### **UNIT- III**

**ELLIPTIC DIFFERENTIAL EQUATIONS** Derivation of Laplace and Poisson equation - BVP - Separation of Variables - Dirichlet's Problem and Neumann 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, 2.10 to 2.13 [omit 2.3 ,2.4, 2.8 and 2.9] (18 hours)

### **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 and 3.9 [omit 3.8] (18 hours)

### **UNIT- V**

**HYPERBOLIC DIFFERENTIAL EQUATIONS** Formation and solution of one -dimensional wave equation - canonical 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 :Section 4.1 to 4.12 [omit 4.5, 4.6 and 4.10] (18 hours)

CONTENT AND TREATMENT AS IN :

INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS K. Sankara Rao, (2007), Second Edition Prentice Hall of India, New Delhi.

#### REFERENCES:

1. PARTIAL DIFFERENTIAL EQUATIONS, (Second Edition), R.C. Mc Owen, (2005), Pearson Education, New Delhi.
2. ELEMENTS OF PARTIAL DIFFERENTIAL EQUATIONS, I.N. Snedden, (1983), McGraw Hill, New Delhi.
3. ADVANCED DIFFERENTIAL EQUATIONS, M.D.Raisinghania, (2001), S.Chand & Company LTD, New Delhi.

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## **PAPER VIII ADVANCED NUMERICAL ANALYSIS**

Objectives: To introduce the derivation of numerical methods with error analysis and give better understanding of the subject.

### **UNIT- I**

Transcendental and Polynomial equations Iteration methods based on second degree equation -Rate of convergence - Iteration methods - methods for complex roots - Polynomial equations.

Chapter 2 : 2.4 to 2.8 (18 hours)

### **UNIT- II**

System of linear algebraic equations and Eigen value problems Direct methods - Triangularisation, Cholesky and Partition methods - Error analysis - Iteration methods - Eigenvalues and Eigenvectors - Jacobi's method, Given's method, Rutishaugher method and Power method.

Chapter 3 : 3.2 to 3.5 (18 hours)

### **UNIT- III**

Interpolation and Approximation Hermite Interpolations - Piecewise and Spline Interpolation - Bivariate interpolation - Approximation - Least Square approximation - Uniform approximation.

Chapter 4 : 4.5 to 4.10 (18 hours)

### **UNIT- IV**

Differentiation and Integration Numerical Differentiation – Partial Differentiation - Numerical Integration methods based on undetermined coefficients - Double integration.

Chapter 5 : 5.2, 5.5, 5.6, 5.8, 5.11 (18 hours)

### **UNIT- V**

Ordinary differential equations Numerical methods - Single-step methods - Multistep methods - Predictor-Corrector methods. Chapter 6 : 6.2 to 6.5 (18 hours)

CONTENT AND TREATMENT AS IN :

Numerical Methods for Scientific and Engineering Computation, M.K. Jain,

S.R.K. Iyengar and R.K. Jain, New Age International, (1993) 3rd Edition.

#### REFERENCES:

1. ELEMENTARY NUMERICAL ANALYSIS - An Algorithmic approach, Cortes S.D. and de Boor, 3rd Edition., McGraw Hill International Book Company, 1980.
  2. NUMERICAL MATHEMATICAL ANALYSIS, James B. Scarborough, Oxford & IBH Publishing Company, New Delhi.
  3. INTRODUCTION TO NUMERICAL ANALYSIS, F.B. Hildebrand , McGraw Hill, New York, 1956.
- 14 Islamiah College(Autonomous), Vaniyambadi

## **ELECTIVE II : PAPER I OPERATIONS RESEARCH**

Objectives: This course aims to introduce decision theory, PERT, CPM, deterministic and probabilistic inventory systems, queues, replacement and maintenance problems.

### **UNIT- I**

**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 10: Section 10.1 to 10.8 (18 hours)

### **UNIT- II**

**PROJECT MANAGEMENT: PERT AND CPM** Basic Differences between PERT and CPM - Steps in PERT/ CPM Techniques - PERT / CPM Network Components and Precedence Relationships - Critical path Analysis - Probability in PERT Analysis - Project time - cost Trade off - Updating the Project - Resource Allocation.

Chapter 12: Sections 12.1 to 12.9 (18 hours)

### **UNIT- III**

**DETERMINISTIC INVENTORY CONTROL MODELS :** Meaning of Inventory control - Functional Classification - Advantage of Carrying Inventory - Features of Inventory System - Inventory Model building - Deterministic Inventory Models with no shortage - Deterministic Inventory with Shortages.

Chapter 13: Sections 13.1 to 13.8, (18 hours)

### **UNIT- IV**

**QUEUEING THEORY:** Essential Features of Queuing System – Operating Characteristic of Queuing System - Probabilistic Distribution in Queuing Systems Classification of Queuing Models - Solution of Queuing Models – Probability Distribution of Arrivals and Departures - Erlangian Service time Distribution with k-phases.

Chapter 15 : Section 15.1 to 15.8 (18 hours)

## UNIT- V

REPLACEMENT AND MAINTENANCE MODELS: Failure Mechanism of items - Replacement of Items Deteriorates with Time - Replacement of items that fail completely - other Replacement Problems

Chapter 16 : Section 16.1 to 16.5 (18 hours)

CONTENT AND TREATMENT AS IN :

OPERATIONS RESEARCH, J.K. Sharma, (2001), Mac Millan India, New Delhi.

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### REFERENCES:

1. INTRODUCTION TO OPERATIONS RESEARCH, (Eighth edition), F.S. Hillier and J.Lieberman, (2006), Tata McGraw Hill Publishing Company, New Delhi.
  2. FOUNDATIONS OF OPTIMIZATION, (Second edition), Beightler. C, D. Phillips, B. Wilde, (1979), Prentice Hall New York.
  3. LINEAR PROGRAMMING AND NETWORK FLOW, Bazaraa, M.S; J.J.Jarvis, and H.D.Sharall, (1990), John Wiley and sons, New York.
  4. FUNDAMENTALS OF QUEUING THEORY, Gross, D and C.M. Harris, [3rd Edition], (1998), Wiley and Sons, New York.
  5. OPERATIONS RESEARCH, (Sixth edition), Hamdy A.Taha, Prentice-Hall of India Private Limited, New Delhi.
- 16 Islamiah College(Autonomous), Vaniyambadi

## **ELECTIVE II : PAPER II ALGEBRAIC NUMBER THEORY**

Objectives: This course aims to provide a study on modules over rings, finite fields, algebraic extensions, number fields and cyclotomic fields, Noetherian rings modules and Dedekind rings.

### **UNIT- I**

ALGEBRAIC BACKGROUND, rings and Fields - Factorization of Polynomials - Field Extensions - Symmetric Polynomials - Modules - Free Abelian Groups.

Chapter 1 : Sections 1.1 to 1.6 . (18 hours)

### **UNIT- II**

ALGEBRAIC NUMBERS - Conjugates and Discriminants - Algebraic Integers - Integral Bases - Norms and Trace - Rings of Integers.

Chapter 2 : Sections 2.1 to 2.6. (18 hours)

### **UNIT- III**

QUADRATIC AND CYCLOTOMIC FIELDS - Quadratic fields and cyclotomic fields : Factorization into irreducibles : Trivial factorization - Factorization into irreducibles - Examples of non unique factorization into irreducibles.

Chapter 3 : Sections 3.1 to 3.2.

Chapter 4 : Sections 4.2 to 4.4. (18 hours)

### **UNIT- IV**

Prime Factorization - Euclidean Domains - Euclidean Quadratic fields - Consequences of unique factorization - The Ramanujan - Nagell Theorem. Chapter 4 : Section 4.5 to 4.9. (18 hours)

### **UNIT- V**

IDEALS - Prime Factorization of ideals - The norms of an ideal - Non unique Factorization in Cyclotomic Fields.

Chapter 5 : Section 5.2 to 5.4. (18 hours)

CONTENT AND TREATMENT AS IN :



ALGEBRAIC NUMBER THEORY AND FERMAT'S THEOREM, Third Edition),  
Steward and D. Tall, (2002), A.K Peters Ltd, Natick, Mass.

#### REFERENCES:

1. NUMBER THEORY, Z.I. Borevich and I.R. Shafarevich, (1966), Academic Press, New York.
2. ALGEBRAIC NUMBER THEORY, J.W.S. Cassels and A. Frohlich, (1967), Academic Press, New York.
3. ALGEBRAIC NUMBER, P. Ribenboim, (1972), Wiley, New York.
4. ALGEBRAIC THEORY OF NUMBERS, P. Samuel, (1970), Houghton Mifflin Company, Boston.
5. BASIC NUMBER THEORY, A. Weil, (1967), Springer, New York.

**PROPERTIES OF MATTER AND ACOUSTICS****Credits : 5**

**Objective:** It is aimed at exposing the undergraduate students to study the physical properties of materials and fundamentals of 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 –  $q$ ,  $\eta$  and  $\sigma$  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.

Viscosity: Viscosity – Rate flow of liquid in a capillary tube – Poiseuille's formula – Correction- Determination of coefficient of viscosity of a liquid – Comparison of viscosity of two liquids using Ostwald's Viscometer - Variations of viscosity of a liquid with temperature lubrication.

Physics of low pressure – production and measurement of low pressure – Rotary pump – Diffusion pump – Molecular pump – Knudsen absolute gauge – penning and pirani gauge – Detection of leakage.

**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 – Derivation- measurement of reverberation time – Acoustic aspects of halls and auditoria.

## **Unit V - Ultrasonics**

Ultrasonic waves – Different modes – Characteristic properties – Behaviour – Focusing – Stationary waves and resonance – Attenuation – Diffraction – Sources of ultrasound. Magnetostriction Oscillator- Piezoelectric Oscillator – Low frequency/ high Intensity applications – SONAR, NDT- high frequency – low intensity applications – clinical applications of different scans.

### **Books for study**

1. Properties of matter by Murugesan 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 Bladevraj, Narosa (2004)

### **Books for Reference**

1. Elements of Properties of Matter by Mathur D S, Shyamlal 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, New Delhi 1985
5. Mechanics and General Properties of Matter by P K Chakrabarthy – Books & allied (P) Ltd., 2001
6. Fundamentals of Physics, 6<sup>th</sup> Edition by D Halliday, R Resnick and J Walker, Wiley NY 2001.
7. Physics, 4<sup>th</sup> Edition vols. I, II & II Extended by D Halliday, R Resnick and K S Krane, Wiley NY 1994.
8. CRC Handbook of Physics & Chemistry, 80<sup>th</sup> ED., CR5 Press, NY, 1999
9. The Feynman Lectures on Physics, Vols. I, II and III, by R P Feynman, RB Leighton and M Sands, Narosa, New Delhi, 1998.

## SEMESTER II - PAPER II

### THERMAL AND STATISTICAL PHYSICS

Credits : 5

No. of hrs/wk : 5

**Objective:** This paper aims to impart the understanding of heat flow, its related Phenomenon and the distribution of particles in systems

#### Unit I -Thermometry and Calorimetry

Types of Thermometers - Platinum resistance thermometer - Callender & Griffith's bridge - Thermistor - Specific heat capacity - Specific heat capacity of solids - Dulong & Petit's law - Specific heat capacity of liquid - method of mixtures - Barton's correction - Specific heat of capacity of gases -  $C_p$  and  $C_v$  by Regnault's and Callender and Barne's methods

#### Unit II -Thermodynamics

Zeroth law of thermodynamics-First law of thermodynamics - Heat engines - petrol and diesel engines - reversible and irreversible processes - second law of thermodynamics - thermodynamic scale of temperature - entropy- change of entropy in reversible and irreversible processes - temperature - entropy diagram - third law of thermodynamics - Maxwell's thermo dynamical relations - derivation - Clausius - Clapeyron equation - Specific heat relation.

#### Unit III - Low temperature Physics

Joule Kelvin effect – Liquefaction of hydrogen- Liquefaction of helium – Kammerling and Onnes method – Helium I and II- Lambda point - Joule-Thomson effect - porous plug experiment: - liquefaction of gases –Production of low temperature by adiabatic demagnetisation - applications of low temperatures - refrigerating machines — Superconductors – Type I and Type II – Meissner effect – Super conducting magnets.

#### Unit IV -Conduction and radiation

Definition of thermal conductivity - Thermal conductivity of a good conductor - Forbes method - thermal conductivity of bad conductor - Lee's disc method- thermal conductivity of rubber – Wiedmann Franz Law - radiation - Black body radiation - Wien's law, Rayleigh-Jean's law and Planck's law - Stefan's law - Determination of Stefan's constant - laboratory method – Planck's quantum theory of radiations- solar constant - solar energy – applications.

#### Unit V- Statistical Physics

Classical Statistics - Maxwell-Boltzman Statistics – Phase Space - Quantum statistics of identical particles - Bose-Einstein and Fermi Dirac Statistics - applications Bose-Einstein and Fermi-Dirac gases as degenerate gases – Free electron gas - comparison of three statistics.

### **Books for Study**

1. Heat and Thermodynamics - D.S.Mathur
2. Heat and Thermodynamics - Brij Lal and Subramaniam, S. Chand & Co. 16<sup>th</sup> Edition.
3. Elementary statistics - Gupta and Kumar

### **Books for Reference**

1. Heat and Thermodynamics - J. B. Rajam & C. L. Arora
2. Thermodynamics and statistical Physics - Sharma & Sarkar
3. Statistical Mechanics - Sathya Prakash & C.Agarwalp
4. Fundamentals of Physics, 6<sup>th</sup> Edition, by D.Halliday, R.Resnick and J.Walker, Wiley, NY, 2001.
5. Thermal Physics, A.B. Gupta and H. Roy, Books and Allied (P) Ltd., (2002.)
6. Physics, 4<sup>th</sup> 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<sup>th</sup> Ed., CRS Press, NY, 1999.
8. The Feynman Lectures on Physics, Vols. I, II, and III, by R P. Feynman, R B Leighton and M Sands, Narosa, New Delhi, 1998.

## **I B.Sc- Core Practical- I**

**Objective:** It is aimed at exposing the under graduate students to the technique of handling simple measuring instruments and also make them measure certain mechanical and thermal properties of matter.

### **List of Experiments**

1. Young's modulus – non uniform bending – pin and microscope.
2. Young's modulus – non uniform bending – optic lever – Scale and Telescope.
3. Rigidity modulus – Torsional pendulum – without masses.
4. Rigidity modulus and moment of inertia – Torsional pendulum – with identical masses.
5. Surface tension and interfacial surface tension – by drop weight method.
6. Coefficient of viscosity of a liquid – graduated burette - Radius of capillary tube by mercury pellet method.
7. Sonometer – frequency of a tuning fork.
8. Sonometer – Determination of AC frequency Using steel wire
9. Specific heat capacity of a liquid – Newton's law of cooling.
10. Focal length – R and  $\mu$  of a convex lens.
11. Spectrometer – Solid prism -  $\mu$  of a liquid.
12. Post office box – temperature coefficient of resistance of the coil.
13. Potentiometer – Calibration of low range voltmeter.
14. Potentiometer – Calibration of ammeter
15. Unregulated and Zener regulated power supply.

### **TEXT BOOKS:-**

1. C.C Ouseph, G.Rangarajan- A Text Book of Practical Physics- S. Viswanathan Publisher-Part I (1990)
2. C.C Ouseph, C.Rangarajan, R.Balakrishnan- A Text Book of Practical Physics- S.Viswanathan Publisher-Part II ( 1996)

### **BOOKS FOR REFERENCE:-**

1. S.L Gupta and V.Kumar- Practical Physics- Pragati Prakashan – 25<sup>th</sup> Edition (2002)

## M.Sc Physics

### I SEMESTER

#### Paper 1: MATHEMATICAL PHYSICS I

Credits: 3

Semester: I

Hrs. /week: 5

**OBJECTIVE:** The foundations to various mathematical techniques and tools like numerical methods, transform techniques and special functions which forms the back bone of all higher physics is introduced.

#### UNIT 1: Linear vector spaces

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

#### UNIT-2: Complex Variables

Functions of a complex variable - Single and multivalued functions - Analytic functions - Cauchy - Riemann conditions - Singular points - Cauchy's theorem and integral formulae - Taylor and Laurent expansions - Zeros and poles - Residue theorem and its applications

#### UNIT -3: 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-4: Linear Differential Equations

Second order linear differential equations – Wronskian - Sturm- Liouville theory - Orthogonality of eigen functions - Illustration with Legendre, Laguerre, and Hermite differential equations – Expansion of polynomials - Dirac delta function.

#### UNIT-5: Green's Function

One-dimensional Green's function - Eigenfunction expansion of the Green's function - Reciprocity theorem - Sturm - Liouville type equations in one dimension and their Green's functions.

#### BOOKS FOR STUDY:

1. **P. K. Chattopadhyay**, 1990, *Mathematical Physics*, Wiley Eastern, Madras.
2. **G. Arfken and H. J. Weber**, 2001, *Mathematical Methods for Physicists*, 5<sup>th</sup> Edition, Harcourt (India), New Delhi.
3. **A. W. Joshi**, 1997, *Elements of Group Theory for Physicists*, 4<sup>th</sup> Edition, New Age International, New Delhi.
4. **A. W. Joshi**, 1995, *Matrices and Tensors in Physics*, 3<sup>rd</sup> Edition, Wiley Eastern, Madras.
5. **E. Kreyszig**, 1999, *Advanced Engineering Mathematics*, 8<sup>th</sup> Edition, Wiley, New York.
6. **M. D. Greenberg**, 1998, *Advanced Engineering Mathematics*, 2<sup>nd</sup> Edition, International Ed., Prentice - Hall International, New Jersey.

7. **F. A. Cotton**, *Chemical Application of Group Theory*. 3<sup>rd</sup> Edition, John Wiley and Sons, New York.
8. *Advanced Engineering Mathematics* by **Erwin Kreyszig**, 10<sup>th</sup> Edition, John Wiley & Sons (2011)(partly for unit 1)

#### BOOK FOR REFERENCE:

1. **Tulsi Dass** and **S. K. Sharma**, 1998, *Mathematical Methods in Classical and Quantum Physics*, Universities Press(INDIA), Hyderabad.
2. **S. Lipschutz**, 1987, *Linear Algebra*, Schaum's Series, McGraw - Hill, New York
3. **E. Butkov**, 1968, *Mathematical Physics* Addison - Wesley, Reading, Massachusetts.
4. **P. R. Halmos**, 1965, *Finite Dimensional Vector Spaces*, 2<sup>nd</sup> Edition, Affiliated East-West, New Delhi.
5. **M. Hamermesh**, 1962, *Group Theory and Its application to Physical Problems*, Addison Wesley, Reading.
6. **C. R. Wylie** and **L.C. Barrett**, 1995, *Advanced Engineering Mathematics*, 6<sup>th</sup> Edition, International Edition, McGraw-Hill, New York.
7. **W. W. Bell**, 1968, *Special Functions for Scientists and Engineers*, Van Nostrand, London.
8. **M. A. Abramowitz** and **I. Stegun (Editors)**, 1972, *Handbook of Mathematical Functions* Dover, New York.



## Paper 2: CLASSICAL MECHANICS

**Credits: 3**  
**Hrs./week : 4**

**Objectives:** To introduce the classical formulation approaches like Lagrangian and Hamiltonian dynamics in understanding mechanical systems and solving of problems.

### UNIT 1: Lagrangian Formulations

Mechanics of a system of particles – Constraints - Lagrange's equations of motion – velocity dependent potentials – variation principle – Hamilton's principle – Non- holonomic system – conservation theorems and symmetry properties - Principle of least action-Two-body central force problem –Kepler Problem and Kepler's laws

### UNIT 2: Mechanics of Rigid Bodies

Rigid body motion – Kinematics – Euler angles – Infinitesimal rotations – Rate of change of a vector – Coriolis force - Dynamics - Angular momentum and rotational kinetic energy - Moment of inertia tensor - Euler's equations of motion - Torque-free motion - Symmetrical top.

### UNIT 3: Hamiltonian Formulation

Legendre transformation and Hamiltonian equations – Cyclic coordinates and conservation theorems – Hamiltonian equations from Variational principle – Canonical transformations – Poisson brackets – equation of motion – conservation theorems in Poisson bracket formulation

### UNIT 4: Canonical Transformation

Canonical transformations – Simple examples - Poisson brackets – Equations of motion in Poisson bracket formalism - Symmetries and conservation laws - Hamilton-Jacobi theory - Application to harmonic oscillator problem.

### UNIT 5: Small Oscillations

Small Oscillations – Normal mode - Diatomic molecule - Formulation of the problem - Transformation to normal coordinates - Frequencies of normal modes - Linear triatomic molecule.

### BOOKS FOR STUDY:

1. **H. Goldstein**, 2002, *Classical Mechanics*. 3<sup>rd</sup> Edition, C. Poole and J. Safko, Pearson Education, Asia, New Delhi.
2. **S. N. Biswas**, 1998, *Classical Mechanics*, Books and Allied Ltd., Kolkata.
3. **Upadhyaya**, 1999, *Classical Mechanics*, Himalaya Publishing Co., New Delhi.
4. **P. V, Panat**, 2005 *Classical Mechanics* 5<sup>th</sup> Edition alpha Science International.
5. **R. Douglas Gregory**, 2006 *An Undergraduate Text of Classical Mechanics*, Cambridge University Press .

### BOOKS FOR REFERENCE:

1. **D. Landau and E. M. Lifshitz**, 1969, *Mechanics*, Pergomon Press, Oxford.
2. **K. R. Symon**, 1971, *Mechanics*, Addison Wesley, London.
3. **J. L. Synge and B. A. Griffith**, 1949, *Principles of Classical Mechanics*, Mc Graw-Hill, New York.
4. **C. R. Mondal**, *Classical Mechanics*, Prentice-Hall of India, New Delhi.
5. **R. Resnick**, 1968, *Introduction to Special Theory of Relativity*, Wiley Eastern, New Delhi.

6. **R. P. Feynman**, 1962, *Quantum Electrodynamics*, Benjamin, Reading, MA.
7. M.Glazer and J.Wark, 2001, *Statistical Mechanics*, Oxford University Press, Oxford.

## WEB SITES

1. <http://astro.physics.sc.edu/selfpacedunits/unit56.html>
2. <http://www.phy.auckland.nz/staff/smt/453310SC.html>
3. <http://www.damtp.cam.ac.uk/user/tong/dynamics.htm>
4. <http://farside.ph.utexas.edu/teaching/301/lectures/lectures.html>
5. <http://www.lancs.ac.uk/depts/physics/teaching/py332/phys332.htm>

**UNIT 1: Basic formalism**

Interpretation and conditions on the wave function - Postulates of quantum mechanics and the Schroedinger equation - Ehrenfest's theorem - Stationary states - Linear operators - Orthonormality - Hermitian operators for dynamical variables – Eigen values and Eigen functions

**UNIT 2: One and Three Dimensional Problems**

Particle in a box - Square-well potential - Barrier penetration - Simple harmonic oscillator - Ladder operators method – Rigid Rotator.

Orbital angular momentum and spherical harmonics - Central forces and reduction of two-body problem - Particle in a spherical well - Hydrogen atom.

**UNIT 3: General Formalism**

Hilbert space - Dirac notation - Representation theory - Co-ordinate and momentum representations - Time evolution - Schroedinger, Heisenberg and Interaction pictures- Symmetries and conservation laws - Unitary transformations associated with translations and rotations - Parity and time reversal.

**UNIT 4: Approximation methods**

Time-independent perturbation theory for non-degenerate and degenerate levels - Variation method, simple applications - WKB approximation - Connection formulae (no derivation) - WKB quantization rule - Application to simple harmonic oscillator

**UNIT 5: Angular Momentum**

Eigen value spectrum from angular momentum algebra - Matrix representation - Spin angular momentum - Non-relativistic Hamiltonian including spin - Addition of angular momenta - Clebsch - Gordan Coefficients.

**BOOKS FOR STUDY:**

1. **P. M. Mathews and K. Venkatesan**, 1976, *A Text book of Quantum Mechanics*, Tata McGraw-Hill, New Delhi.
2. **L. I. Schiff**, 1968, *Quantum Mechanics*, 3<sup>rd</sup> Edition, International Student Edition, MacGraw-Hill Kogakusha, Tokyo.
3. **V. Devanathan**, 2005, *Quantum Mechanics*, Narosa Publishing House, New Delhi.

**BOOKS FOR REFERENCE:**

1. **E. Merzbacher**, 1970, *Quantum Mechanics* 2<sup>nd</sup> edition, John Wiley and Sons, New York.
2. **V. K. Thankappan**, 1985, *Quantum Mechanics*, 2<sup>nd</sup> Edition, Wiley Eastern Ltd, New Delhi.
3. **P. A. M. Dirac**, 1973, *The Principles of Quantum Mechanics*, Oxford University Press, London.
4. **L. D. Landau and E. M. Lifshitz**, 1976, *Quantum Mechanics* Pergomon Press, Oxford.
5. **S. N. Biswas**, 1999, *Quantum Mechanics*, Books And Allied Ltd., Kolkata.
6. **G. Aruldas**, 2002, *Quantum Mechanics*, Prentice Hall of India, New Delhi.

7. **A. Ghatak and S. Lokanathan**, *Quantum Mechanics: Theory and Applications*, 4<sup>th</sup> Edition, Macmillan India.
8. **J. S. Bell, Gottfried and M. Veltman**, 2001, *The Foundations of Quantum Mechanics* World Scientific, Singapore.
9. **R. P. Feynman, R. B. Leighton, and M. Sands**, 1998, *The Feynman Lectures on Physics*, Vols. 3, Narosa, New Delhi.
10. **V. Devanathan**, 1999, *Angular Momentum Techniques in Quantum Mechanics*, Kluwer Academic Publishers, Dordrecht.

#### WEB SITES

1. <http://www.netsa.org.lk/OcwWeb/Physics/index.htm>
2. <http://www.theory.caltech.edu/people/preskill/ph229/>
3. <http://www.nsl.msui.edu/~pratt/phy851/lectures/lectures.html>
4. <http://walet.phy.umist.ac.uk/QM/LectureNotes/>
5. <http://www.ks.uiuc.edu/Services/Class/PHYS480/>
6. <http://www.mat.univie.ac.at/~gerald/ftp/book-schroe/index.html>
7. <http://people.deas.harvard.edu/~jones/ap216/lectures/lectures.html>
8. <http://www.netsa.org.lk/OcwWeb/Chemistry/5-73Introductory-Quantum-Mechanics-IFall2002/LectureNotes/index.htm>
9. <http://www.glue.umd.edu/~fivel/>
10. <http://www.phys.ualberta.ca/~gingrich/phys512/latex2html/phys512.html>
11. <http://www.eas.asu.edu/~vasilesk/EEE434.html>
12. <http://minty.caltech.edu/Ph125a/>
13. <http://walet.phy.umist.ac.uk/QM/LectureNotes/>

## PAPER 4 – ELECTROMAGNETIC THEORY

**Credits: 4**  
**Hrs. /week : 5**

**Objective:** To study the laws governing the distribution and propagation of electromagnetic fields created by static and dynamic charge distributions and their interaction with matter.

### UNIT 1: Electrostatics

Boundary value problems and Laplace equation – Boundary conditions and uniqueness theorem – Laplace equation in three dimension – 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 – Electrostatic energy in the presence of dielectric – Multipole expansion.

### UNIT 2: Magnetostatics

Biot-Savart Law - Ampere's law – Magnetic scalar and 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 3: Maxwell Equations

Faraday's laws of Induction - Maxwell's displacement current - Maxwell's equations - 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 4: Application of Maxwell's equations

Fields and radiation of localized sources – Oscillating electric dipole – Radiation from an Oscillating electric dipole – Poynting vector and radiated power – Radiation resistance – Radiation from a linear antenna – Antenna arrays – Radiation pressure and electromagnetic momentum – Electromagnetic Oscillators.

### UNIT 5: Guided waves

Essential conditions for guided waves - TEM waves in coaxial cables - TE waves - rectangular wave guide - electric and magnetic fields on the surface and inside rectangular wave guide - TE and TM waves in rectangular wave guide - cut - off frequency and wavelength - circular waveguides - energy flow and attenuation in wave guides - cavity resonators - phase and group velocity

### BOOKS FOR STUDY:

1. **D. J. Griffiths**, 2002, *Introduction to Electrodynamics*, 3<sup>rd</sup> Edition, Prentice-Hall of India, New Delhi.
2. **J. R. Reitz, F. J. Milford and R. W. Christy**, 1986, *Foundations of Electromagnetic Theory*, 3<sup>rd</sup> edition, Narosa Publication, New Delhi.
3. **J. D. Jackson**, 1975, *Classical Electrodynamics*, Wiley Eastern Ltd. New Delhi.
4. **J. A. Bittencourt**, 1988, *Fundamentals of Plasma Physics*, Pergamon Press, Oxford.

### BOOKS FOR REFERENCE:

1. **W. Panofsky** and **M. Phillips**, 1962, *Classical Electricity and Magnetism*, Addison Wesley, London.
2. **J. D. Kraus** and **D. A. Fleisch**, 1999, *Electromagnetics with Applications*, 5<sup>th</sup> Edition, WCB McGraw-Hill, New York.
3. **B. Chakraborty**, 2002, *Principles of Electrodynamics*, Books and Allied, Kolkata.
4. **R. P. Feynman**, **R. B. Leighton** and **M. Sands**, 1998, *The Feynman Lectures on Physics*, Vols. 2, Narosa, New Delhi.

**WEB SITES:**

1. <http://www.plasma.uu.se/CED/Book/index.html>
2. <http://www.thphys.nuim.ie/Notes/electromag/frame-notes.html>
3. <http://www.thphys.nuim.ie/Notes/em-topics/em-topics.html>
4. [http://dmoz.org/Science/Physics/Electromagnetism/Courses and Tutorials/](http://dmoz.org/Science/Physics/Electromagnetism/Courses_and_Tutorials/)

**Elective Paper 1:**  
**ELECTRONIC DEVICES AND APPLICATIONS**

**credits: 5**

**Hrs./week : 5**

**Objective:** The students are exposed to the wide applications of electronic devices such as IC 555 timer, LED, Operational amplifiers and focuses on in-depth understanding of communication system

**UNIT 1: Fabrication of IC and logic families**

Fabrication of IC – Monolithic integrated circuit fabrication - Voltage Measuring device – Monolithic voltage regulators – Integrated circuit multipliers – Integrated circuit logic – Schottky TTL – ECL – P and NMOS Logic – CMOS logic – Tristate logic circuits.

**UNIT 2: Opto Electronic Devices**

Basics of Photometry - Light sources and Displays - Light emitting Diodes – Surface emitting LED – Edge emitting LED – Seven segment display – LDR – Diode lasers – Photo detectors – Photo diodes – p-i-n - Photo diode – Photo transistors

**UNIT 3: 555 Timer and its 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 – PLL IC 565 – Description – Lock in range – Capture range – Application – Frequency multiplication.

**UNIT 4: Op-amp applications**

Instrumentation amplifier – Sample and hold circuits – Log and Antilog amplifiers – Multiplier and Divider – Electronic analog computation – Schmitt Trigger – Astable, Monostable Multivibrator – Triangular wave generators – Sine wave generators – RC Active filters.

**UNIT 5: Pulse and Digital Communication**

Pulse communications – Introduction – Types – Pulse – Amplitude Modulation [PAM] – Pulse Time modulation – 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

**Books for Study:**

1. S.M.Sze, 1985, Semiconductor Devices – Physics and Technology, Wiley, New York.
2. Milman and Halkias, Integrated Electronics, Mc-Graw – Hill, New Delhi.
3. R.A.Gaekwad, 1994, Op-Amps and integrated circuits EEE.
4. Taub and Shilling, 1983, Digital Integrated Electronics, McGraw Hill, New Delhi.
5. J.Millman, 1979, Digital and Analog Circuits and Systems, McGraw Hill, London.
6. George Kennedy, 1987, Electronic communication systems 3<sup>rd</sup> Edition, McGraw Hill, London.

**Books for Reference:**

1. R.F. Coughlin and F.F.Driscoll, 1996, Op-Amp and linear Integrated circuits, Prentice Hall of India, New Delhi.
2. M.S.Tyagi, Introduction to Semi conductor Devices, Wiley, New York.
3. P.Bhattacharya, 2002, Semiconductor Optoelectronic Devices, 2<sup>nd</sup> Edition, Prentice Hall of India, New Delhi.
4. D.Roy Choudhury, 1991, Linear Integrated circuits, Wiley Eastern, New Delhi.



**CORE PRACTICAL I**  
**GENERAL EXPERIMENTS**  
**(Any 10 out of the given 15)**

**Objective:** It is aimed at exposing the post graduate students to the technique of determination of physical properties and handling simple measuring instruments.

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 – Thermister.
5. Hydrogen spectrum – Rydberg's.
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 using spectrometer.
11. Iron /Copper are spectrum.
12. Brass /Alloy are 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 by four probe method.

## SEMESTER II

### PAPER-5 MATHEMATICAL PHYSICS II

**Credits: 3**  
**Hrs./week : 5**

**OBJECTIVE:** The foundations to various mathematical techniques and tools like numerical methods, transform techniques, special functions and group theory which forms the backbone of all higher physics is introduced

#### UNIT –I: Partial differential equations

Laplace's equations – solutions of Laplace's 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 II : Special Functions – II

Hermite polynomials - Generating function - Orthogonality properties - Recurrence relations - Laguerre polynomials - Generating function - Orthogonality properties - Recurrence relation - Associated Laguerre polynomial - Properties - The error function and related functions

#### 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

#### UNIT –V Probability

Definitions – Laws of probability – Mean, Standard deviation – Poisson distribution – Binomial distribution – Normal distribution – Moments of distribution – Recurrence relations – Sampling of variables – Variance – The t – distribution – The Chi – Square distribution

#### Books for Study:

1. P.K. Chattopadhyay, 1990, Mathematical Physics Wiley Eastern, Madras.
2. G. Arfken and H.J. Weber, 2001, Mathematical Methods for Physicists, 5th Edition, Harcourt (India), New Delhi.
3. M.D. Greenberg, 1998, Advanced Engineering Mathematics, 2nd Edition, International Ed., Prentice - Hall International, New Jersey.
4. E. Kreyszig., 1999, Advanced Engineering Mathematics, 8th Ed. Wiley, New York.

5. B.D. Gupta, 2006, Mathematical Physics, Vikas publishing house Third edition, New Delhi.
6. Satyaprakash, 2004, Mathematical Physics, Sultan Chand & sons, New Delhi.
7. F.A. Cotton, Chemical Application of Group Theory 3rd Edition, John Wiley and Sons, New York.
8. A.W. Joshi, 1997, Elements of group Theory for Physicists, 4th Edition, New Age International, New Delhi.
9. R. Resnick, Introduction to special theory of Relativity
10. D. Rindler, 1982, Special Theory of Relativity, Oxford University Press.

#### **Books for Reference:**

1. Schaum's outline series, McGraw Hill 1964, (i) Complex Variables, (ii) Laplace Transforms, (iii) Group Theory, (iv) Differential equations
2. P.R. Halmos, 1965, Finite dimensional Vector Spaces, 2nd Edition. Affiliated East - West, New Delhi.
3. M. Hamermesh, 1962, Group Theory and Its application to Physical Problems Addison Wesley, London.
4. C.R. Wylie and L.C. Barrett, 1995, Advanced Engineering Mathematics, 6th Edition., International Edition. McGraw Hill, New York.
5. P.K. Chakrabarti and S.N. Kundu, 1996, A Text Book of Mathematical Physics, New Central Book Agency, Kolkata.
6. A.K. Ghatak, I.C. Goyal and S.H. Chua, 2002, Mathematical Physics Macmillan India, New Delhi.

**UNIT 1: Microwave Spectroscopy**

Rotational spectra of diatomic molecules - Polyatomic molecules - Linear and symmetric top molecules - Hyperfine structure and quadrupole moment of linear molecules - Experimental techniques - Stark effect.

**UNIT 2: Infrared Spectroscopy**

Vibrations of diatomic and simple polyatomic molecules - Anharmonicity – Fermi Resonance – Hydrogen Bonding – Normal Modes of Vibration in a crystal – Solid State Effects – Interpretation of Vibrational Spectra – Instrumentation techniques – FTIR spectroscopy

**UNIT 3: Raman Spectroscopy**

Vibrational and Rotational Raman spectra – Mutual Exclusion principle – Raman spectrometer – Polarization of Raman Scattering light - Structure Determination through IR and Raman spectroscopy – Phase transitions – Resonance Raman Scattering

**UNIT 4: NMR and NQR Spectroscopy**

Quantum theory of NMR – Bloch equations – Design of CW NMR Spectrometer – Principle and block diagram of PT NMR – Chemical Shift – Application to molecular structure

Quadrupole Hamiltonian of NQR – Nuclear Quadrupole energy levels for axial and non axial symmetry – Experimental techniques and applications

**UNIT 5: ESR and Mossbauer Spectroscopy**

Quantum Theory of ESR – Design of ESR Spectrometer – Hyperfine Structure – Anisotropic systems – Triplet state study of ESR – Applications – Crystal defects -Biological studies

Mossbauer Effect – Recoilless emission and absorption – Mossbauer spectrum – Experimental methods – Mossbauer spectrometer- Hyperfine interactions –Chemical Isomer shift.

**Books for Study:**

1. **C. N. Banwell** and **E. M. McCash**, 1994, *Fundamentals of Molecular Spectroscopy*, 4<sup>th</sup> Edition TMH, New Delhi.
2. **G. Aruldas**, 2001, *Molecular Structure and Spectroscopy*, Prentice Hall of India Pvt. Ltd. New Delhi.
3. **D. N. Satyanarayana**, 2004, *Vibrational Spectroscopy and Applications*, New Age International Publication

**Books for Reference:**

1. **D. D. Jyaji** and **M. D Yadav** 1991, *Spectroscopy*, Amol Publications
2. **Atta ur Rahman**, 1986, *Nuclear Magnetic Resonance*, Spinger Verlag.
3. **D. A. Lang**, *Raman Spectroscopy*, Mc Graw-Hill International
4. **Raymond Chang**, 1980, *Basic Principles of Spectroscopy* Mc Graw-Hill Kogakusha, Tokyo.

## Paper-7 QUANTUM MECHANICS II

### UNIT 1: Scattering Theory

Scattering amplitude - Cross sections - Born approximation - Partial wave analysis -Effective range theory for S-wave - Transformation from centre of mass to laboratory frame – Phase shift – scattering length and effective range – Low energy scattering.

### UNIT 2: Perturbation Theory

Time dependent perturbation theory - Constant and harmonic perturbations - Transition probabilities - Adiabatic approximation - Sudden approximation - The density matrix - Spin density matrix and magnetic resonance - Semi-classical treatment of an atom with electromagnetic radiation - Selection rules for dipole radiation.

### UNIT 3: Relativistic Quantum Mechanics

Klein-Gordon equation - 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 4: Dirac Equation

Covariant form of Dirac equation - Properties of the gamma Matrices - Traces -Relativistic invariance of Dirac equation – Probability density-current four vector – Bilinear covariants - Feynman's theory of positron (Elementary ideas only without propagation formalism).

### UNIT 5: Second Quantization

Second quantization of Klein-Gordon field - Creation and annihilation operators - Commutation relations - Quantization of electromagnetic field - Quantization of Schrodinger's and Dirac field

### BOOKS FOR STUDY:

1. **P. M. Mathews** and **K. Venkatesan**, 1976, *A Text book of Quantum Mechanics*, Tata McGraw-Hill, New Delhi.
2. **L. I. Schiff**, 1968, *Quantum Mechanics*, 3<sup>rd</sup> Edition, International Student Edition, MacGraw-Hill Kogakusha, Tokyo.
3. **E. Merzbacher**, 1970, *Quantum Mechanics*, 2<sup>nd</sup> edition, John Wiley and Sons, New York.
4. **V. K. Thankappan**, 1985, *Quantum Mechanics*, 2<sup>nd</sup> Edition, Wiley Eastern Ltd, New Delhi.
5. **J.D. Bjorken** and **S.D. Drell**, 1964, *Relativistic Quantum Mechanics*, MacGraw-Hill New York.
6. **V. Devanathan**, 2005, *Quantum Mechanics*, Narosa Publishing House, New Delhi.
7. S.L. Gupta and I.D.Gupta - Quantum Mechanics.

### BOOKS FOR REFERENCE:

1. **P. A. M. Dirac**, 1973, *The Principles of Quantum Mechanics*, Oxford University Press, London.
2. **L. D. Landau** and **E. M. Lifshitz**, 1958 *Quantum Mechanics*, Pergomon Press, London.
3. **S. N. Biswas**, 1999, *Quantum Mechanics*, Books and Allied, Kolkata.
4. **G. Aruldhas**, 2002, *Quantum Mechanics*, Prentice-Hall of India, New Delhi.
5. **J. S. Bell**, **Gottfried** and **M.Veltman**, 2001, *The Foundations of Quantum Mechanics*, World Scientific.
6. **V. Devanathan**, 1999, *Angular Momentum Techniques in Quantum Mechanics*, Kluwer Academic Publishers, Dordrecht.

## **Paper-8 STATISTICAL MECHANICS**

### **UNIT-1: Ensemble Theory**

Foundation of statistical Mechanics – connection between statistical mechanics and thermodynamics – classical ideal gas – Gibb's paradox – phase space – Liouville's theorem, microcanonical ensemble - - Classical gas in microcanonical ensemble

### **UNIT-2: Canonical Ensembles**

Classical canonical ensembles – partition function – connection with thermodynamics – energy fluctuation – classical ideal gas in canonical ensembles – calculation of statistical quantities – equipartition theorem – classical harmonic oscillator – concept of negative temperature – partical in a box –linear harmonic oscillator

### **UNIT-3: Grand Canonical ensemble**

Particle reservoir – grand partition function – connection with thermodynamics – classical gas in grand canonical ensemble – photons – number fluctuation – parametric equation of states – virial expansion critical fluctuation – pair production – elements of quantum statistics

### **UNIT-4: Bose-Einstein Statistics**

Ideal Bose gas – its thermal properties – statistics of ensembles – black body radiation – phonons – Debye's theory of specific heat – BE condensation – Liquid helium – super fluidity

### **UNIT-5: Ideal Fermi gas**

Ideal Fermi gas – Fermi Dirac distribution – thermodynamic properties of Fermi gas – electron in metals – electronic heat capacity – paramagnetic susceptibility – white dwarf – Chandrasekhar limit – nuclear matter

### **Books for Study:**

1. Thermodynamics and Statistical Mechanics – Walter Greiner – Springer – 1995
2. Statistical Physics - Laundu and Lifshitz – Butterworth – Heinemann – 3<sup>rd</sup> Edition –1980
3. Introduction to statistical Mechanics, Principles and selected application – Terrell Hill – Courier Dover Publication 1987
4. H. Goldstein, 2002, Classical Mechanics. 3<sup>rd</sup> Edition. Pearson Education, Asia, New Delhi.
5. S.N. Biswas, 1998, Classical Mechanics, Books and Allied Ltd., Kolkata.
6. K. Huang, 1975, Statistical Mechanics, Wiley Eastern Ltd., New Delhi.
7. B.K. Agarwal and M. Eisner, 1998, Statistical Mechanics, 2<sup>nd</sup> Edition, New Age International, New Delhi.
8. Sathya Prakash and J.P Agarwal, 1994, Statistical Mechanics, 7<sup>th</sup> Edition, Kedar Nath and Ram Nath & Co, Meerut.
9. J.K.Bhattacharjee, 1996, Statistical Mechanics: An Introductory Text, Allied Publication, New Delhi.

**Books for Reference:**

1. L.D. Landau and E.M. Lifshitz, 1969, Mechanics, Pergomon Press, Oxford.
2. K.R. Symon, 1971, Mechanics, Addison Wesley, London.
3. J.L. Synge and B.A Griffith, 1949, Principles of Classical Mechanics, Mc.Graw-Hill, NewYork.
4. C.R.Mondal, Classical Mechanics, Prentice - Hall of India, New Delhi.
5. L.P. Kadanoff, 2001, Statistical Physics - Statics, Dynamics and Renormalization, World Scientific, Singapore.
6. M. Glazer and J. Wark, 2001, Statistical Mechanics, Oxford University Press, Oxford.

## ELECTIVE PAPER 2

### FUNDAMENTALS OF NANO SCIENCE

**Objectives:** The course will introduce the students to the rapidly developing field of nanoscience and technology with special focus on the methods of synthesis, characterization techniques and applications of nanomaterials with interdisciplinary approach involving Physics and Chemistry. The course is expected to provide the necessary understanding in nanotechnology and the students must be able to perform their project works related to the synthesis and characterization of nanomaterials by direct experience.

#### Unit I: Basics of Nanotechnology

History of Nanotechnology – Concept of nanotechnology and nanomachines – atomic structure molecules and phases – molecular and atomic size – surfaces and dimensional space- top down and bottom up approach in synthesis - Nanoscale formation

#### Unit II: Forces between atoms and molecules

Strong intermolecular forces – covalent and coulomb interactions – interactions involving polar molecules and polarization – weak intermolecular forces and total intermolecular pair potentials – Van der Waals forces – repulsive forces; special interactions such as hydrogen –bonding, hydrophobic and hydrophilic interactions

#### Unit III: Fabrication techniques

Vacuum Techniques: thermal evaporation – sputter deposition – chemical vapour deposition – chemical solution deposition - Nanolithography techniques: photo, electron beam, ion beam, x-ray lithography

#### Unit IV: Nanostructures and their properties

Definition of nano systems – dimensionality and size dependent phenomena in Quantum dots, and Quantum wires – size dependent variation in magnetic, electronic transport properties

#### Unit V: Applications of Nanomaterials

Nanophotonic and Devices: 1D, 2D photonic crystal – Couplers - Waveguides - Photonic crystal fibers - optical data storage systems - quantum computing – Imaging of cancer cells – Targeted nano drug delivery system

#### References:

1. Nanotechnology: basic science and emerging technologies – Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005)
2. Amorphous and Nanocrystalline Materials: Preparation, Properties, and Applications, A.Inoue, K.Hashimoto (Eds.,) (2000)
3. Understanding Nanotechnology, Scientific American, editors at Scientific American, Warner Books (2002)
4. Introduction to Nanotechnology, Charles P. Poole, Frank J. Owens, Wiley- Interscience (2003)

#### Books for Reference:

1. Nanotechnology: A Gentle introduction to the Next Big Idea, Mark A. Ratner, Daniel Ratner, Mark Ratne, Prentice Hall PTR; 1st edition (2002)
2. Optical properties and Spectroscopy of nanomaterials – Jin Zhong Zhang, World Scientific (2009).
3. Core concept of nanotechnology with application spectrum – Rakesh Rathi, SBS Publishers,(2007).



**CORE PRACTICAL 2**  
**ELECTRONICS EXPERIMENTS**  
**(Any 15 out of the given 25)**

**Credits: 4**  
**Hrs./week : 6**

**Objectives:** The course aims at exposing the students to the intricacies of handling sophisticated equipments , designing electronic circuits, trouble shooting and analysis of results

1. Characteristics of UJT and Relaxation Oscillator.
2. FET Characteristics and FET amplifier.
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-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, sawtooth 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 rejecter.
10. Op-Amp – D.A.converter - Binary weighted method - R/2R Ladder method.
11. IC7400 – Half adder, Half subtractor, Full adder, Full subtractor.
12. IC 7490 – modulus counters
13. IC 7447 – Seven segment display using Decade counter IC7490 and display 7447.
14. Up-down counters – Design of modulus counters.
15. 4 bit Shift Registers – Ring counter – Twisted Ring counter.
16. IC 7483 – Arithmetic Operations.
17. IC 555 – Astable multivibrator and Voltage Controlled Oscillator.
18. IC 555 – Monostable multivibrator, Frequency Divider.
19. IC 555 – Schmitt Trigger and Hysteresis.
20. IC 7400 & IC 7413 - Clock generators.
21. Temperature co-efficient using 555 timers.
22. Instrumentation Amplifier – using four IC 741.
23. Pulse width modulator using IC 741.
24. A/D converter using comparator LM 336.
25. Phase locked loop.

**B. Sc Chemistry**  
**I SEMESTER**  
**PAPER – I**  
*General Chemistry – I*

**OBJECTIVE:**

**90 Hours**

Basic concepts regarding atomic structure, periodic properties, bonding concepts, quantum chemistry, solids, liquids, gases, hydrocarbons, nomenclature, reactions, principles of volumetric analysis derivation of equations, related problems, and applications wherever necessary are to be taught for I-Semester.

**UNIT – 1**

**18 Hours**

- 1.1 Atomic structure – Quantum number n, l, m and s – Pauli exclusion principle – Energy distribution and orbitals – Hund's rule of maximum multiplicity – Aufbau's Principle – Electronic configurations of elements – Stability of half – filled and completely filled orbitals.
- 1.2 s, p, d and f block elements – Classification and characteristic properties – Periodicity of properties – Definition and periodicity of the following properties – Atomic radii – factors affecting atomic radii – Ionic radii – factors affecting ionic radii.
- 1.3 Ionization potential – factors affecting ionization potential – Electron affinity – factors affecting electron affinity – Electronegativity – factors affecting electronegativity – Pauling scale – Mulliken electro negativity scale.

**UNIT – II**

**18 Hours**

- 2.1 Classification of organic compounds – Nomenclature of organic compounds – Functional groups – Homologous series – IUPAC recommendations for naming simple aliphatic – Alicyclic and aromatic compounds – Polyfunctional compounds – Heterocyclic compounds.
- 2.2 Basic concepts of bonding in organic chemistry – Hybridisation – tetravalency of carbon – geometry of molecules – methane, ethane, ethylene, acetylene and benzene – Factors affecting covalent bond.
- 2.3 Electron displacement affects – inductive – inductomeric – electromeric – resonance – hyperconjugation and steric effects.

**UNIT – III**

**18 Hours**

- 3.1 Quantum chemistry – Quantum theory of radiation – Planck's theory – Photoelectric effect - Compton effect – Wave mechanical concept of the atom – de Broglie's relationship – wave nature of electron – Heisenberg's uncertainty principle.
- 3.2 Schrodinger wave equation [without derivation] – Significance of wave functions,  $\psi$  and  $\psi^2$  – probability distribution of electrons – radial probability distribution curves.
- 3.3 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]– transport properties- viscosity – thermal conductivity – diffusion.

#### **UNIT – IV**

**18 Hours**

- 4.1 Definitions of molarity – normality – molality and mole fraction – their calculations – definition and examples for primary and secondary standards. Calculation of equivalent weights.
- 4.2 Types of organic reactions – Cleavage of bonds - Homolytic and Heterolytic fission of carbon-carbon bond – Methods for determining reaction mechanism – Reaction intermediates – Structure and stability of Carbocations – Carbanions and Free radicals.
- 4.3 Liquid crystals – classification and molecular arrangements – 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 – effect of pressure.

#### **UNIT – V**

**18 Hours**

- 5.1 Theories of acid-base – red-ox – complexometric and iodometric titrations. Theories of indicators – acid-base – redox – metal ion and adsorption indicators and choice of indicators.
- 5.2 Alkanes – Methods of preparation of alkanes – Physical and chemical properties of alkanes – Mechanism of free radical substitution in alkanes - Alkenes Addition reactions of alkenes with hydrogen and Mechanism – halogens and Mechanism – hydrogen halide [Markownikoff's rule] and Mechanism – hydrogen bromide [peroxide effect] and Mechanism – sulphuric acid – water and Mechanism – hydroboration – ozonolysis – hydroxylation with  $\text{KMnO}_4$ .
- 5.3 Solid State – Crystal lattices – Laws of crystallography – Elements of symmetry – crystal systems – unit cell – space lattice – Bravais lattices – structure of NaCl - structure of CsCl– Wiles– Miller's indices.

#### **Text Books:**

- ❖ Text book of Organic Chemistry by Arun Bahl & B.S. Bahl - S.Chand.
- ❖ Text book of Inorganic Chemistry by P.L. Soni – S. Chand.
- ❖ Principles of Physical Chemistry by Puri, Sharma – Vishal Publication.
- ❖ Advanced Organic Chemistry by Morrison & Boyd.
- ❖ Text book of Inorganic Chemistry by R.D. Madan

#### **Reference Book**

- ❖ Advanced Organic Chemistry by I. L. Finar.
- ❖ Advanced Inorganic Chemistry by J.D. Lee.
- ❖ Physical Chemistry by Rajaram Kureakose.

**Core Practical - I**  
**SEMESTER – 1**

**VOLUMETRIC ESTIMATION**

Objective: To learn the practical techniques of Acidimetry, Iodimetry&Iodometry.

**ACIDIMETRY**

1. Estimation of Hcl.
2. Estimation of Sodium Hydroxide.

**IODIMETRY**

3. Estimation of Arsenious oxide. (Not to be given in the Examinations)

**IODOMETRY**

4. Estimation of Copper.
5. Estimation of Potassium dichromate.
- 6.

Reference Book:

1. Quantitative Estimation of Inorganic salt by Vogel.

Practical Book:

1. Practical Book by Thomas.

Marks 75

- |                    |          |
|--------------------|----------|
| 1. Short Procedure | 10 Marks |
| 2. Experiment      | 35 Marks |
| 3. Manipulation    | 20 Marks |
| 4. Record & Viva   | 10 Marks |

**II SEMESTER**  
**PAPER – II**  
**General Chemistry – II**

**OBJECTIVES:**

**90 Hours**

Basic concepts regarding ionic bond, covalent bond, M.O theory, cyclo alkanes, dienes, thermochemistry, thermodynamics, derivation of equations, related problems, s-block elements, group study, polymerisation, mechanism, applications are to be taught for II – Semester.

**UNIT – I**

**18 Hours**

- 1.1 Ionic bond – Electronic theory of valence – Conditions for the formation of ionic bond – General properties - Radius ratio rule and its limitations –Hydration energy and lattice energy and their applications – Born - Haber cycle. Fajan's rules – Characteristics of electrovalent compounds – Valence bond theory – Conditions for the formation of covalent bond – General properties – Polarity of bonds
- 1.2 VSEPR theory geometries of  $\text{BO}_3^{3-}$ ,  $\text{NH}_4^+$ ,  $\text{ClF}_3$ ,  $\text{PCl}_5$ ,  $\text{IF}_7$ , and  $\text{XeF}_6$  molecules – partial ionic character of covalent bond – percentage of ionic character.
- 1.3 Molecular Orbital theory – Bonding, anti-bonding orbitals – Relative order of energies of molecular orbitals – MO diagrams of  $\text{H}_2$ ,  $\text{He}_2$ ,  $\text{O}_2$ ,  $\text{O}_2^+$ ,  $\text{O}_2^-$  and  $\text{CO}$  – Bond order – stability and magnetic property of the molecules – Comparison of VB and MO theories.

**UNIT – II**

**18 Hours**

- 2.1 Alkynes – Acidity of alkynes – Addition of hydrogen – Hydorboration – Hydrohalogenation – Addition of hypohalous acid Hydration – addition of wate with  $\text{HgSO}_4$  catalyst – Addition of alcohols and carboxylic acids.
- 2.2 Formation of acetylides – alkylation of alkynes with mechanism – oxidation with  $\text{KMnO}_4$  – ozonolysis – Polymerisation to benzene.
- 2.3 Cycloalkanes – preparation using Wurtz's reaction – Dieckmann's ring closure and reduction of aromatic hydrocarbons – Substitution and ring opening reactions – Rearrangements.

**UNIT – III**

**18 Hours**

- 3.1 Thermodynamics – Definition and explanation of terms – System, boundary, surroundings – Homogeneous and heterogeneous system –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.
- 3.2 Thermodynamic processes – types of processes – cyclic – reversible – irreversible – isothermal – adiabatic. Exact and inexact differentials. - Zeroth law of thermodynamics.
- 3.3 First law of thermodynamics –Statementand equation – concept of heat and work –  $C_p$ ,  $C_v$  relationship – Calculation of  $W$ ,  $Q$ ,  $\Delta E$  and  $\Delta H$  for the expansion of ideal gases under reversible – isothermal and adiabatic conditions.

**UNIT – IV**

**18 Hours**

- 4.1 Alkali metals – Li, Na, K, Rb and Cs – Occurrence – Comparative study of elements – oxides, halides, hydroxides and carbonates – Exceptional property of Lithium – Diagonal relationship of Li with Mg.

- 4.2 Synthesis of dienes – 1:3 butadiene –1:2 and 1:4 additions with mechanism – Free radical addition – polymerization of dienes.
- 4.3 Joule's law – Joule-Thomson effect – Joule-Thomson coefficient and its derivation – inversion temperature, its significance.

## **UNIT – V**

**18 Hours**

- 5.1 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 resembles zinc.
- 5.2 Polymers – definition – classification – functionality – degree of polymerization – addition – condensation – co-ordination – polymerization reactions.
- 5.3 Thermochemistry – Heat of reaction – Exothermic and endothermic reaction – Calculation of  $\Delta H$  from  $\Delta E$  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.

### **Text Book:**

- ❖ Text book of Organic Chemistry by ArunBahl& B.S. Bahl- S.Chand.
- ❖ Text book of Inorganic Chemistry by P.L. Soni – S. Chand.
- ❖ Principles of Physical Chemistry by Puri, Sharma – Vishal Publication.
- ❖ Advanced Organic Chemistry by Morrison & Boyd.
- ❖ Text book of Inorganic Chemistry by R.D. Madan

### **Reference Book**

- ❖ Advanced Organic Chemistry by I. Lfinar.
- ❖ Advanced Inorganic Chemistry by J.D. Lee.
- ❖ Physical Chemistry by RajaramKureakose.

**Core Practical - 2**  
**SEMESTER – 2**

**COMPLEXOMETRIC TITRATION**

Objective: To learn the practical techniques of Complexometry, Dichrometry & Precipitation Titration.

**COMPLEXOMETRY**

1. Estimation of Magnesium using EDTA.
2. Estimation Zinc using EDTA.
3. Estimation of Nickel using EDTA.
4. Estimation of Calcium using EDTA.

**DICHROMETRY**

5. Estimation of ferrous iron using Diphenyl amine /N-Phenylanthranillic acid as indicator.

**PRECIPITATION TITRATION**

6. Estimation of Chloride in neutral medium. [Demonstration – Experiment].

Reference Book:

1. Quantitative Estimation of Inorganic salt by Vogel.

Practical Book:

2. Practical Book by Thomas.

Marks 75

- |                    |          |
|--------------------|----------|
| 1. Short Procedure | 10 Marks |
| 2. Experiment      | 35 Marks |
| 3. Manipulation    | 20 Marks |
| 4. Record & Viva   | 10 Marks |

## I SEMESTER

### ALLIED CHEMISTRY (for I year B.Sc. Physics & Bio-Chemistry)

#### *Paper – I*

#### *Ancillary Chemistry – I*      **60 Hours**

Objective: To learn organic inorganic and physical chemistry aspects

#### **UNIT – I** **12 Hours**

- 1.1 Extraction of Metals Mineral and Ore difference – Minerals of Iron, Aluminum and Copper – Concentration of Ore –Froth Floatation and Magnetic separation.
- 1.2 Refining of Metals – Types of Refining – Electrolytic, Van Arkel and Zone Refining.
- 1.3 Extraction of Uranium and Thorium.

#### **UNIT – II** **12 Hours**

- 2.1 Cyclo-alkanes – preparation properties of Cyclo-hexane – Bayers strain theory.
- 2.2 Polarization – Inductive effect, mesomeric effect and steric effect.
- 2.3 Stereo isomerism – Types, Causes of optical activity of Lactic acid and tartaric acid – Racemisation – Resolution – Geometrical isomerism – maleic and fumaric acid.

#### **UNIT – III** **12 Hours**

- 3.1 Chemical Kinetics – Distinction between Order and Molecularity – derivation of First order rate equation – half life period of first order reaction – determination of rate constant of hydrolysis of ester.
- 3.2 Catalysis – catalyst – auto catalyst – enzyme catalyst – Promoters – catalytic poisoning – Active center – Distinction between homogeneous and heterogeneous catalysis – Industrial application of catalysts.
- 3.3 Photochemistry – Grothus Drapers law, stark einsteines law – quantum yield – Photosynthesis, phosphorescence – fluorescence – chemiluminescence's – photosensitization.

#### **UNIT – IV** **12 Hours**

- 4.1 VSEPR Theory – Shapes of simple Molecules  $\text{BF}_3$ ,  $\text{PCl}_5$   $\text{SF}_6$  and  $\text{XeF}_6$ .
- 4.2 Fuels – Calorific value of fuels – Non-conventional fuels – need of Solar energy – Applications – Bio-fuels.
- 4.3 Osmosis - Osmotic pressure – reverse osmosis – desalination of sea water.

#### **UNIT – V** **12 Hours**

- 5.1 Nuclear Chemistry – Definition of Half life period – Nuclear Fission and Fusion – Application of nuclear Chemistry in Medicine, agriculture, industries – Carbon dating.



- 5.2 Crude Oil – Petroleum Refining Cracking –Naphthalene Structure – Preparations, Properties and uses.
- 5.3 Elements of symmetry – unit cell – crystal lattice – types of cubic lattice – one example for each.

Text Book:

- Allied Chemistry by Dr. S. Sundaram
- Allied Chemistry by Gopalan

Reference Book

- Advanced Organic Chemistry by I.L.Finar.
- Advanced Inorganic Chemistry by J.D. Lee.
- Physical Chemistry by RajaramKureakose.

SEMESTER – 1

**ALLIED CHEMISTRY**  
(for I year B.Sc. Physics & Bio-Chemistry)

***Ancillary Practical - I***

Objective: to learn the Volumetric Techniques practically

45 Hours

**VOLUMETRIC ANALYSIS 1**

1. Estimation of hydrochloric acid using std. Sulphuric acid.
2. Estimation of Borax using std. Sodium carbonate.
3. Estimation of  $\text{FeSO}_4$  using Std. Mohr Salt Solution.
4. Estimation of Oxalic acid using Std.  $\text{FeSO}_4$  Solution.
5. Estimation of  $\text{K}_2\text{Cr}_2\text{O}_7$  using Std.  $\text{K}_2\text{Cr}_2\text{O}_7$ .

Reference Book:

1. Quantitative Estimation of Inorganic salt by Vogel.

Practical Book:

2. Practical Book by Thomas.

Marks 75

- |                    |          |
|--------------------|----------|
| 1. Short Procedure | 10 Marks |
| 2. Experiment      | 35 Marks |
| 3. Manipulation    | 20 Marks |
| 4. Record & Viva   | 10 Marks |

## II SEMESTER

### ALLIED CHEMISTRY-II (for I year B.Sc. Physics & Bio-Chemistry) 60 Hour

Objective: To learn organic inorganic and physical chemistry aspects

#### UNIT – I 12 Hours

##### 1.1 CO-ORDINATION CHEMISTRY:

Nomenclature of co-ordination compounds – Werner Theory of Co-ordination Compound – Chelation – Functions and structure of Haemoglobin and Chlorophyll.

##### 1.2 INDUSTRIAL CHEMISTRY: 12 Hours

Fertilizers and manures –Organic Manures and their importance – Role of NPK in plants – preparation and uses of Urea, Ammonium nitrate, potassium nitrate 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, Gamhexane and Freon.

#### UNIT – II 12 Hours

##### 2.1 CARBOHYDRATES:

Classification – Structure of glucose – Properties and uses of starch – uses of Cellulose Nitrate – Cellulose acetate.

##### 2.2 AMINO ACID AND PROTEIN:

Classification of Amino Acids – preparation and properties of Glycine – Classification of Protein based on physical properties and biological functions.

2.3 Primary and Secondary structures of protein [Elementary Treatment only] composition of RNA and DNA and their biological role. Tanning of leather – alum [aluminum tanning – vegetable tanning].

#### UNIT – III 12 Hours

##### 3.1 ELECTRO CHEMISTRY:

Specific and equivalent conductance – their determination – effect of dilution on conductance.

3.2 Kohlraue's law – Determination of dissociation constant of weak Electrolyte using Conductance measurement – Conductometric Titrations  $\text{HCl}$  vs  $\text{NaOH}$  and  $\text{CH}_3\text{COOH}$  vs  $\text{NaOH}$ .

3.3 Concept of  $\text{p}^{\text{H}}$  – Buffer solutions – Buffer action – importance of buffer in the living system – Derivation of Henderson equation.

#### UNIT – IV 12 Hours

4.1 Paints – Pigments – Components of Paint – Requisites of a good paint. Colour and Dyes – Classification based on constitution and application.

4.2 VITAMINS:

Biological activities and deficiency diseases of Vitamin A, B, C, D, E and K – Hormones – Functions of insulin and adrenaline.

- 4.3 Chromatography – Principles and application of Column, paper and thin layer chromatography.

## UNIT – V

**12 Hours**

- 5.1 Drugs - Sulpha Drugs – Uses and Mode of action of Sulpha Drugs – Antibiotics – Uses of Penicillin, Chloramphenicol, Streptomycin. Drug abuse and their implication alcohol – LSD.
- 5.2 ANAESTHETICS:  
General and Local Anaesthetics – Antiseptics – Example and their application. Definition and one example each for analgesics antipyretics, tranquilizers, sedatives, causes for diabetes, cancer and AIDS.
- 5.3 Electrochemical corrosion and its prevention - fuel cells.

### Text Book:

- Allied Chemistry by Dr. S. Sundaram
- Allied Chemistry by Gopalan

### Reference Book

- ❖ Advanced Organic Chemistry by I. Lfinar.
- ❖ Advanced Inorganic Chemistry by J.D. Lee.
- ❖ Physical Chemistry by RajaramKureakose.

## II SEMESTER

### **ALLIED CHEMISTRY** **(for I year B.Sc. Physics & Bio-Chemistry)** *(Allied Chemistry Practical)*

45 Hours

Objective: To learn the techniques in Organic Analysis

#### **ORGANIC ANALYSIS:**

Systematic analysis of organic compounds containing one functional group and characterisation by confirmatory tests. Reactions of aldehyde [aromatic], carbohydrate, carboxylic acid [mono and dicarboxylic], phenol, aromatic primary amine, amide and diamide.

Reference Book:

1. Quantitative Estimation of Inorganic salt by Vogel.
2. Advance Practical Chemistry by R. Mukhopadhyay.

Practical Book:

1. Practical Book by Thomas.

Marks 75

- |                              |          |
|------------------------------|----------|
| 1. Procedure                 | 10 Marks |
| 2. Special Element           | 15 Marks |
| 3. Aliphatic & Aromatic      | 10 Marks |
| 4. Saturation & Unsaturation | 10 Marks |
| 5. Functional Group          | 20 Marks |
| 6. Record & Viva             | 10 Marks |

# DEGREE OF MASTER OF SCIENCE

## M.Sc., BRANCH IV – CHEMISTRY

### SYLLABUS

#### I SEMESTER

#### STEREO CHEMISTRY & SUBSTITUTION REACTION (CORE PAPER) (90 HOURS)

**OBJECTIVE :** To learn the concepts 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

**18 Hours**

Optical activity and chirality, Classification of chiral molecules as asymmetric and dissymmetric. A brief Study of dissymmetry of allenes, biphenyls, spiro compounds, trans cyclo octane and cyclononene, absolute configuration –R, S notation of biphenyls and allenes. Fischer projection. Inter conversion of Sawhorse, Newman and Fischer projections. Molecules with more than one asymmetric center (restricted to five carbons). e.g. Erythro and threo compounds. Asymmetric synthesis. Cram's rule.

Geometrical isomerism, E, Z - nomenclature of olefins, Geometrical and optical isomerism (if shown) of disubstituted cyclopropane, cyclobutane and cyclopentanes. Stereo specific and stereo selective reactions, Identification of enantiotopic, homotopic, diastereotopic hydrogens and Pro chiral in carbon compounds.

#### UNIT II – CONFORMATIONAL ANALYSIS

**18 Hours**

Conformation of some simple 1, 2 – disubstituted ethane derivatives. Conformational analysis of disubstituted cyclohexane. Conformation of substituted cyclohexanol, cyclohexanone and cyclohexane carboxylic acid derivatives. Conformation and stereochemistry of cis and trans decalin and 9 – methyldecalin.

#### UNIT III – ALIPHATIC NUCLEOPHILIC SUBSTITUTION REACTION 18 Hours

S<sub>N</sub>1, S<sub>N</sub>2 and S<sub>N</sub>i 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.

S<sub>E</sub>1, S<sub>E</sub>2 and S<sub>E</sub>i mechanism, double bond shift – Reactivity. Migration of double bond, ketoenol interconversion, HVZ reaction, Stark-Enamine reaction, halogenation of aldehydes and ketones and decarboxylation of aliphatic acids.

## UNIT IV – AROMATIC ELECTROPHILIC SUBSTITUTION REACTIONS 18 Hours

The arenium ion mechanism. Orientation and reactivity (ortho, meta and para directing groups). Typical reactions – nitration, halogenation, alkylation, acylation and diazonium coupling, Formylation, Reimer – Tieman reaction, Vilsmeier – Hack, Gattermann, Gattermann – Koch, Kolbe reaction, Synthesis of di and tri substituted benzene (symmetrical tribromo benzene, 2-amino 5-methylphenol, 3 nitro, 4-bromobenzoic acid, 3, 4-dibromonitrobenzene, 1,2,3 – trimethylbenzene) starting from benzene or any monosubstituted benzene. Electrophilic substitution of furan, pyrrole, thiophene and pyridine-N-oxide.

## UNIT V – AROMATIC NUCLEOPHILIC SUBSTITUTIONS & DETERMINATION OF REACTION MECHANISM 18 Hours

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. Chichibabin reaction.

Kinetic and non-kinetic methods of determining organic reaction mechanism.

Hammett and Taft equations – Simple Problems.

### RECOMMENDED BOOKS

1. Organic Synthesis by R.O.C. Norman, Chapman and Hall, NY, (1980)
2. Physical Organic Chemistry by Niel Isaacs, ELBS Publications (1987)
3. Organic Reaction Mechanism by S.M. Mukherji and S.P. Singh, MacMillan India Ltd., Chennai (1990)
4. Organic Chemistry IV Edition by Stanley Pines
5. Structures and Mechanism by E.S. Gould
6. Advanced Organic Chemistry, Part A and B, by Francis A. Carey and Richard J. Sundberg, 3<sup>rd</sup> Edition (1990), Plenum Press.
7. Aromatic Nucleophilic Substitution by J. Miller
8. Advanced Organic Chemistry III Edition by J. Miller
9. Reactive Molecules, C. Wentrup, John Wiley and Sons, New York (1984)
10. Advanced organic reaction mechanism and structure by J. March, Tata McGraw Hill.

### Reference Books:

1. Organic Chemistry, Marc London
2. Organic Chemistry, Mc Murray

3. Organic Chemistry, Graham Solomons
4. Carbenes, Nitrenes and Arynes by T.L. Gilchrist and C.W. Rees, Thomas Nelson and Sons Ltd., London.
5. Stereochemistry, Conformation analysis and Mechanism by P.S. Kalsi, 2<sup>nd</sup> Edition (1993), Wiley Eastern Limited, Chennai.
6. Stereochemistry of carbon compounds by Ernest Eliel
7. Stereochemistry and Mechanism through solved problems by P.S. Kalsi. Wiley Eastern Ltd., (1994)
8. Basic principles of Organic Stereochemistry by P. Ramesh – Madurai Kamaraj University.
9. Organic Reaction Mechanism by R.K. Bansal.
10. A Guide book to mechanism in organic chemistry by Longman.
11. Structure and mechanism in organic chemistry by C.K. Ingold, cornell University press.



## Semester I

### SOLID STATE, STRUCTURE & BONDING (CORE PAPER)

Hours 90

**OBJECTIVES:** To make students acquainted with basics of crystallography, structure and bonding involved in Inorganic Chemistry and their basics.

#### UNIT – I SOLID STATE

18 Hours

Structure of solids – Comparison of X-ray and neutron diffraction, structure of Cadmium Iodide and Nickel Arsenide, Perovskite; spinels; defects in solids (Frenkel, Schottky types); non-stoichiometric compounds. Electrical, magnetic and optical properties of solids- Band theory, semi-conductors, super conductors, Solid state lasers. Types of magnetic behaviour – dia, para, ferro, antiferro and ferri magnetism; hysteresis, Magnetic susceptibility and measurements – Guoy and Faraday methods.

#### UNIT – II STRUCTURE AND BONDING

18 Hours

Polyacids: Isopolyacids and heteropolyacids of Vanadium, Chromium, Molybdenum and Tungsten – properties and structure. Inorganic polymers: General properties, Phosphorous based polymers – polyphosphazenes ; Sulphur based polymers – Sulphur Nitrides – synthesis, structure and applications. Silicates: Types, structure, properties and applications; Molecular sieves. Inorganic phosphors, Ferrites, Garnets.

#### UNIT – III METAL CLUSTERS & BORON HYDRIDES

18 Hours

Metal clusters: Carbonyl clusters and halide clusters – upto Tri-nuclear metal clusters, quadruple bond; naked clusters. Boron hydrides: Polyhedral boranes, carboranes, metallocarboranes – preparation, properties and structure.

#### UNIT – IV COORDINATION CHEMISTRY

18 Hours

Stability of complexes – factors affecting the stability of complexes, thermodynamic aspects of complex formation, determination of stability constants – spectrophotometric, polarographic and potentiometric methods. SHAB approach – Pearson's principle, applications in metallurgy.

#### UNIT – V STEREOCHEMISTRY OF COORDINATION COMPOUNDS 18 Hours

Stereochemical aspects– Stereoisomerism in inorganic complexes, isomerism arising out of ligand conformation and absolute configuration of the complex, chirality and the nomenclature of the chiral complexes – Optical rotatory dispersion (ORD) and Circular Dichroism (CD). Macrocyclic ligands – Crown ethers, Porphyrins, Corrins, Cryptands and Schiff's bases.

### **Reference Book:**

1. J.E. Huheey, Inorganic Chemistry – Principles, Structure and Reactivity, Harper Collins, New York, IV Edition (1993)
2. F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry – A Comprehensive Text, John Wiley and Sons, V Edition (1988)
3. K.F. Purcell and J.C. Kotz, Inorganic Chemistry – WB Saunders Co., USA (1977)
4. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., New York (1974)
5. J.E. Huheey, Inorganic Chemistry, Harper Collins NY IV Edition, (1993)
6. G.S. Manku, Inorganic Chemistry (1984)
7. D.F. Shrivvers, Pw. Atkins and C.H. Langford, Inorganic Chemistry, OUP (1990)

### **Recommended Books**

1. N.N. Greenwood and Earnshaw, Chemistry of the Elements, Pergamon Press, New York (1984)
2. EL. Muttarties, Polyhedral Boranes, Academic Press, New York (1975)
3. NH Ray, Inorganic Polymers, Academic Press, (1978)
4. S.F.A. Kettle, Coordination Chemistry, EIBS (1973)
5. K. Burger, Coordination Chemistry, Burter Worthy (1973)
6. F. Basolo and R.G. Pearson, Mechanism of Inorganic Reaction, Wiley NY (1967)
7. R. Sarkar, General and Inorganic chemistry, (Parts I and II), New Book Agency, Calcutta.

## **I SEMESTER**

### **REACTION ASPECTS & GROUP THEORY (ELECTIVE)**

**90Hours**

**OBJECTIVE:** To study the chemical potential and its significance. To study the effect of temperature on reaction rate. To study the elements of group theory and the applications of group theory.

#### **UNIT I – THERMODYNAMICS**

**18 Hours**

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.

Thermodynamics of real gases – gas mixture – definition of fugacity - determination of fugacity - variation of fugacity with temperature and pressure – thermodynamics of ideal and non ideal binary solutions – dilute solutions.

#### **UNIT II –THEORIES OF CHEMICAL KINETICS**

**18 Hours**

Excess functions for non ideal solutions and their determination – the concept of activity and activity coefficients – determination of standard free energies – choice of standard states - determination of activity and activity coefficients for non electrolytes.

Effect of temperature on reaction rates – collision theory of reaction rate – molecular beams – collision cross sections – effectiveness of collisions – probability factor – absolute reaction rate theory (ARRT) to simple unimolecular and bimolecular processes.

#### **UNIT III –CHEMICAL KINETICS**

**18 Hours**

Potential energy surfaces – kinetic isotopic effects - 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 equations.

## UNIT IV– ELEMENTS OF GROUP THEORY

18 Hours

Symmetry elements and symmetry operations – Groups – rules for forming a group, finite group, infinite group, abelian group, sub group- group multiplication table – sub groups, similarity transformation and classes – identifications of symmetry operations and determination of point groups – reducible and irreducible representations – direct product representation.

## UNIT V – APPLICATIONS OF GROUP THEORY

18 Hours

Orthogonality theorem and its consequences – construction of character table for  $C_{2v}$  and  $C_{3v}$  – hybrid orbitals in nonlinear molecules ( $CH_4$ ,  $XeF_4$ ,  $BF_3$ ,  $SF_6$  and  $NH_3$ ). Determination of representations of vibrational modes in nonlinear molecules ( $H_2O$ ,  $CH_4$ ,  $BF_3$ , and  $NH_3$ ).

Symmetry selection rules of infra-red and Raman spectra – application of group theory for the electronic spectra of ethylene and formaldehyde.

### 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. G.K.Vemulapalli, Physical Chemistry, Prentice-Hall, 2000.
4. Thomas Engel and Philip Reid, Physical Chemistry, Pearson Education, 2006.
5. J.Rajaram and J.C.Kuriacose, Kinetics And Mechanism Of Chemical Transformations, Macmillan India Ltd, 1993.
6. K.J.Laidler, Chemical Kinetics, Harper And Row, New York, 1987.
7. K.L.Kapoor, A text Book Of Physical Chemistry Macmillan India Ltd, 2001.
8. V.Ramakrishnan and M.S.Gopinathan, Group Theory In Chemistry, Vishal Publications, 1998.
9. K.V.Raman, Group Theory and It's Applications To Chemistry, Tata Mcgraw Hill Publishing, Co, 1990.
10. Bhattacharya: Group Theory And It's Applications.

### SUGGESTED REFERENCE BOOKS

1. W.J.Moore Chemistry, Orient Longman, London, 1972.
2. K.G.Denbigh, Thermodynamics Of Steady State, Methuen And Co.Ltd, London, 1951.
3. L.K. Nash, Elements Of Chemical Thermodynamics, Addison Wesley, 1962.
4. G.M.Barrow, Physical Chemistry, McGraw Hill, 1988.
5. R.G.Frost and Pearson, Kinetics And Mechanism, Wiley, New York, 1961.
6. C.Capellos and B.H.J.Bielski, Kinetics Systems, Wiley Interscience, New York, 1972.
7. Amdur and G.G.Hammes, Chemical Kinetics, Principles And Selected Topics, McGraw Hill, New York, 1968.
8. G.M.Harris, Chemical Kinetics, D.C.Health And Co., 1966.
9. F.A.Cotton, Chemical applications of Group Theory, John Wiley And Sons Inc., New York, 1971.
10. N.Thinkham, Group Theory and Quantum Mechanics, McGraw Hill Book Company, New York, 1964.
11. Strietweiser, Molecular Orbital Theory For Organic Chemists John Wiley And Sons, New York, 1961.
12. D.S.Schonland, Molecular Symmetry, Vannorstrand, London, 1965.
13. Alan Vincent, Molecular Symmetry and Symmetry And Group Theory-Programme Introduction To Chemical Application, Wiley, New York, 1977.
14. Sandony, Electronic Spectra And Quantum Chemistry, Prentice Hall, 1964.

## I SEMESTER

### ORGANIC PREPARATION & EXTRACTION – PRACTICAL –I (60 HOURS)

Objective: To learn the preparation techniques and Extraction methods

A) Any Six preparation form the following

- (i) Preparation of o-benzyl benzoic acid
- (ii) p-Nitrobenzoic acid from p-nitrotoluene
- (iii) Anthroquinone from anthracene
- (iv) Benzhydrol from Benzophenone
- (v) m-Nitroaniline from m-dinitrobenzene
- (vi) 1,2,3,4 – Tetrahydrocarbazole from cyclohexanone
- (vii) p-chlorotoluene form p-toluidine
- (viii) 2,3 – Dimethylindole from phenyl hydrazine and 2 – butanone (boiling acetic acid)
- (ix) Methyl orange form sulphanilic acid
- (x) Diphenyl methane from benzyl chloride

B) Extraction.

- (i) Caffine from Tea Dustt,
- (ii) Lactic Acid from Milk
- (iii) Citric Acid from Lemon
- (iv) Jasmine from Rose

Total	75Marks
Preparation	25 Marks
Recrystalisation	10 Marks
Extraction	20 Marks
Practical Viva	10 Marks
Record	10 Marks

#### REFERENCE:

1. Practical Organic Chemistry by Vogel.

#### RECOMMENDED BOOKS

1. Practical Organic Chemistry by Gnanaprakasam.

## I SEMESTER

### INORGANIC PREPARATION & ESTIMATION – PRACTICAL – I (60 HOURS)

Objective: To learn preparation and estimation techniques

A) Preparation of the following:

- (i) Potassium tris (oxalate) aluminate (III) trihydrate
- (ii) Tris (thiourea) copper (I) chloride
- (iii) Potassium tris (oxalaato) chromate (III) trihydrate
- (iv) Sodium bi (thiosphato) cuprate (I)
- (v) Tris (thiourea) copper (I) sulphate
- (vi) Sodium hexanitrocobaltate (iII)
- (vii) Chloropentammine cobalt (III) chloride
- (viii) Bis (acetylacetonato) copper (II)
- (ix) Hexamminnickel (II) chloride
- (x) Bis (thiocyanato) pyridine manganese (II)

Analysis of Metal colorimetrically of Iron, Nickel, Manganese and copper

Total	75 Marks
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- |                      |          |
|----------------------|----------|
| 1. a) Preparation    | 25 Marks |
| b) Recrystallisation | 5 Marks  |
| 2. Estimation        | 25 Marks |
| 3. Viva-Voce         | 10 Marks |
| 4. Record            | 10 Marks |

#### RECOMMENDED BOOK:

1. Qualitative Inorganic Analysis by V.V. Ramanujam

#### REFERENCE BOOK:

1. Practical Inorganic Chemistry by Vogel.

## I SEMESTER

### PHYSICAL CHEMISTRY PRACTICAL - I

60 Hours

**OBJECTIVE:** To Study the experiments in chemical equilibrium and chemical kinetics.

1. Determine the relative acidity ratio for the hydrolysis of ester in presence of two different acids.
2. Determine the temperature coefficient and energy activation of hydrolysis of ethyl acetate.
3. Study the inversion of cane sugar in the presence of acid using Polarimeter.
4. Study the simultaneous distribution of benzoic acid in benzene – water system.
5. Study the absorption of acetic acid by charcoal (Fruendlich isotherm)

1. Procedure	10 Marks
2. Experiment	10 Marks
3. Manipulation	10 Marks
4. Graph	10 Marks
5. Result	15 Marks
6. Viva-Voce	10 Marks
7. Record	10 Marks

#### Recommended Books:

1. Physical Practical Experiments by Palit.
2. Advance Practical Chemistry by R. Mukhopadhyay & P. Chatterjee.

#### Reference Books:

1. Practical Physical Chemistry by Findler Findler.
2. Practical Physical Chemistry by B. Viswanathan & P.S. Raghavan.

## II SEMESTER

### ORGANIC REACTIONS & MECHANISM (CORE PAPER)

**90 Hours**

**OBJECTIVE:** To learn the various types of reactions, rearrangements and their synthetic utility.

#### UNIT I – ADDITION TO CARBON – CARBON AND CARBON – HETERO MULTIPLE BONDS

**18 Hours**

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, Carbenes and their additions to double bonds – Simmons – Smith reaction. Mannich, Stobbe, Darzen, Wittig, Wittig – Horner and Benzoin reactions. Stereochemical aspects to be studied wherever applicable.

#### UNIT II – ELIMINATION REACTIONS

**18 Hours**

E<sub>1</sub>, E<sub>2</sub> and E<sub>1</sub>cB mechanism – E<sub>1</sub>, E<sub>2</sub> and E<sub>1</sub>cB spectrum – Orientation of the double bond – Hoffman and Saytzeff rules – Competition between elimination and substitution. Typical elimination reactions – dehydration, dehydrohalogenation and dehalogenation. Stereochemistry of E<sub>2</sub> eliminations in cyclohexane systems. Mechanism of pyrolytic eliminations. Chugaev and Cope eliminations.

#### UNIT III – MOLECULAR REARRANGEMENTS

**18 Hours**

A detailed study with suitable examples of the mechanism of the following rearrangements: Pinacol – Pinacolone (examples other than tetramethylethylene glycol) – Wagner – Meerwein, Demjanov, dienone – phenol, Favorski, Baeyer – Villiger, Wolf, Stevens (in cyclic systems) and Von Richter rearrangements.

#### UNIT IV – OXIDATION

**18 Hours**

Mechanism – study of the following oxidation reactions – oxidation of alcohols – use of DMSO in combination with DCC or acetic anhydride in oxidising alcohols – oxidation of methylene to carbonyl, oxidation of aryl methenes – allylic oxidation of olefins. Formation of C=C, C-C bonds by dehydrogenation, dehydrogenation by quinones, SeO<sub>2</sub>, Hg(OAc)<sub>2</sub> and Pb(OAc)<sub>4</sub>. Formation of C-C bond in phenol coupling – acetylene coupling – allylic oxidation – oxidation of alcohol, glycols, halides and amines to aldehydes and ketones – Ozonolysis – oxidation of Olefinic double bonds and unsaturated carbonyl compounds – oxidative cleavage of C-C bond.



Reduction : Selectivity in reduction 4-t-butylcyclohexanone using selected hydride reductions – Synthetic importance of Clemmenson and Wolf-Kishner reductions – Modification of Wolff-Kishner reduction – Birch reduction, MPV reduction. Catalytic hydrogenation, Sommelet reaction and selection in reduction . Clemmensen reduction. Reduction with  $\text{LiAlH}_4$ ,  $\text{NaBH}_4$ , tritertiarybutoxyaluminium hydride, sodium Cyanoborohydride, trialkyltin hydride, hydrazines.

Carbenes and nitrenes : Methods of generation , structure, addition reactions with alkenes –insertion reactions.

**RECOMMENDED BOOKS**

1. Principles of organic synthesis R.O.C. Norman, Chapman and Hall, London. 1980.
2. Structure and Mechanism by E.S. Gould
3. Advanced Organic Chemistry – Part B by Francis A. Carey and Richard J, Sundberg, 3<sup>rd</sup> Edition 1990.
4. Organic Reaction Mechanism by S.M. Mukherji and S.P. Singh, MacMillan India Ltd., Chennai – 1990.
5. Organic synthesis by Michael Smith.
6. Carbenes, Nitrenes and Arynes by T.L. Gilchrist and C.W. Rees, Thomas Nelson and Sons Ltd., London.
7. Molecular Rearrangements Vol-I and Vol-II by Paul de Mayo.
8. Advanced Organic Chemistry III Edition by J. March.

**REFERENCE BOOKS**

1. Stereochemistry and Mechanism through solved problems by P.S. Kalsi, Wiley Eastern Ltd., 1994.
2. Some Modern Methods of Organic Synthesis by W Carruthers, III Edition, Cambridge University Press, 1993.
3. Modern Synthetic Reactions by H.O. House, The Benjamin Cummings Publishing Company, London, 1972
4. Advanced organic chemistry, Mc Murray, Thomas Pvt. Ltd.,
5. Organic reaction mechanisms: Parmer and Chawla, S. Chand and Co.,

## Semester II

### COORDINATION AND NUCLEAR CHEMISTRY (ELECTIVE)

Total 90 hours

**OBJECTIVES:** To make the students acquaint themselves with Nuclear Chemistry Know-how, Stellar and cosmic phenomenon and also about coordination and bonding in transition metals and other compounds

#### UNIT I: THEORIES OF COORDINATION CHEMISTRY

18 Hours

Crystal field theory (CFT) – d orbital splitting in octahedral, tetrahedral and square planar complexes, Ligand field stabilization energy (LFSE), Spectrochemical series, Spectral and magnetic characteristics of transition metal complexes, Jahn – Teller distortion, Limitations of CFT.

#### UNIT II: COORDINATION CHEMISTRY M.O. THEORY

18 Hours

Molecular orbital theory – evidence for metal- ligand orbital overlap, energy level diagrams; nephelauxetic effect. Term states of d ions – term symbols, spin orbit coupling (LS coupling or RS coupling), d-d transition, selection rules for transition, Orgel and Tanabe-Sugano diagrams. Charge transfer spectra – features and comparison with d-d spectra.

#### UNIT III: COORDINATION CHEMISTRY REACTION MECHANISM

18 Hours

Electron transfer reactions – outer and inner sphere mechanisms, atom transfer reactions, precursor and successor complexes, Marcus theory, bridging ligands, complementary and non-complementary electron transfer reactions. Substitution reactions in square planar complexes – mechanism of substitution, trans effect, cis effect, effect of entering and leaving ligands and the effect of metal ions on the rate of substitution, applications and theory of trans effect.

#### UNIT IV: NUCLEAR CHEMISTRY – I

18 Hours

Nuclear properties – Nuclear spin and moments, origin of nuclear forces, salient features of the liquid drop and shell models of the nucleus. Models of radioactive decay: Orbital electron capture; nuclear isomerism, internal conversion, detection and determination of activity by cloud chamber nuclear emulsion, bubble chamber, G.M scintillation and Cherenkov counters. Compound nucleus theory, high energy nuclear reactions, nuclear fission and fusion reactions as energy sources: direct reactions: photonuclear and thermo nuclear reactions.

#### UNIT V: NUCLEAR CHEMISTRY – II

18 Hours

Nuclear Reaction types, reactions, cross section, Q-value, threshold energy, Stellar energy: synthesis of elements, hydrogen burning, carbon burning. The e, s, r, p and x processes. Nuclear reactors: fast breeder reactors, particle accelerators, cyclotron and synchrotron. Radio analytical methods: Isotope dilution analysis, radiometric titrations, radio immuno assay, neutron activation analysis.

## **REFERENCE BOOKS:**

1. J.E. Huheey, Inorganic Chemistry – Principles, Structure and Reactivity, Harper Collins, New York, IV Edition (1993)
2. F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry – A Comprehensive Text, John Wiley and Sons, V Edition (1988)
3. K.F. Purcell and J.C. Kotz, Inorganic Chemistry – WB Saunders Co., USA (1977)
4. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., New York (1974)
5. J.E. Huheey, Inorganic Chemistry, Harper Collins NY IV Edition, (1993)
6. G.S. Manku, Inorganic Chemistry (1984)
7. D.F. Shriver, Pw. Atkins and C.H. Langford, Inorganic Chemistry, OUP (1990)
8. N.N. Greenwood and Earnshaw, Chemistry of the Elements, Pergamon Press, New York (1984)
9. E.L. Muetterties, Polyhedral Boranes, Academic Press, New York (1975)
10. N.H. Ray, Inorganic Polymers, Academic Press, (1978)
11. S.F.A. Kettle, Coordination Chemistry, EIBS (1973)

## **RECOMMEND BOOKS:**

1. K. Burger, Coordination Chemistry, Butterworth (1973)
2. F. Basolo and R.G. Pearson, Mechanism of Inorganic Reaction, Wiley NY (1967)
3. R. Sarkar, General and Inorganic chemistry, (Parts I and II), New Book Agency, Calcutta.
4. H.J. Arnikar, Nuclear Chemistry, Wiley Eastern Co., II Edition, 1987.
5. S. Glasstone, Source Book on Atomic Energy, Van Nostrand Co., 1969
6. G. Frieslander, J.w. Kennedy and J.M. Miller, Nuclear and Radiochemistry, John Wiley and Sons, 1964.

## II SEMESTER

### ADVANCE PHYSICAL CHEMISTRY (CORE PAPER)

90 HOURS

**OBJECTIVE:** To study the different types of molecular spectroscopy, and kinetics of complex reactions. To study the fundamental principles of Quantum Chemistry, Schrodinger wave equation and its applications.

#### UNIT I – SPECTROSCOPY

18 Hours

Interaction of matter with radiation – Einstein's theory of transition probability – rotational spectroscopy of a rigid rotator – non rigid rotator – diatomic and polyatomic molecules. Vibrational spectroscopy – harmonic oscillator - anharmonicity – vibrational spectra of poly atomic molecules – vibrational frequencies – group frequencies – vibrational coupling overtones – Fermi resonance. Raman Spectra- elastic and inelastic scattering – pure rotational raman spectra – mutual exclusion principle.

#### UNIT II – SURFACE PHENOMENON

18 Hours

Adsorption and free energy reaction at interfaces – physisorption and chemisorptions – study of surfaces adsorption isotherms - Langmuir and BET adsorption isotherms- surface area determinations – Heat of adsorption , determination of adsorption from solutions – Gibbs adsorption isotherm- study of kinetics of surface reactions-catalysis by metals, semiconductor oxides- mechanism of heterogeneous catalytic reactions-the absorption coefficient and its significance.

#### UNIT III – CHEMICAL KINETICS

18 Hours

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 method and magnetic resonance methods

#### UNIT IV – INTRODUCTION TO QUANTUM CHEMISTRY

18 Hours

Inadequacy of classical theory – Bohr's quantum theory and subsequent developments - the Compton effect-wave particle duality-uncertainty principle –waves-wave equation for electrons-quantum mechanical postulates-the operators – Hermitian property

Schrodinger equation-elementary application of Schrodinger's equation-the particle in a box (one,two and three dimensional cases),

#### UNIT V – APPLICATIONS OF QUANTUM CHEMISTRY

18 Hours

The harmonic oscillator-the rigid rotor-particle in a ring, Schrodinger equation for hydrogen atom (no derivation is required) and the solution - the origin of quantum numbers (angular momentum and spin) - their physical significance.

## **TEXT BOOKS:**

1. C.N.Banwell and E.M.McCash, Fundamentals of Molecular spectroscopy IV Edition, Tata McGraw Hill, 2005.
2. D.N.Sathyanarayana, Vibrational Spectroscopy, New Age International publishers,2004.
3. J.Rajaram and J.C.Kuriacose,Kinetics and Mechanism Of Chemical Transformations.Macmillan India Ltd,1993.
4. R.J.Laidler,Chemical Kinetics,Harpet And Row,New York,1987.
5. D.A. Mcquarrie,Quantum Chemistry,University Science Books,Mil Valley,California,1983.
6. Quantum Chemistry,Allyn And Bacon,Boston,1983.
7. R.Anantharaman,Fundamentals Of Quantum Chemistry,Mamillan India Limited,2001.

## **SUGGESTED REFERENCE BOOKS**

1. Raymond Chang,Basic Priciples Of Spectroscopy,Mcgraw Hill Ltd.,New York,1971.
2. P.W.Atkins,Advanced Physical Chemistry,Oxford Press,1990.
3. G.Arul Doss,Molecular Structure and Spectroscopy,Prentice Hall,2002.
4. R.G.Frost and Pearson,Kinetics And Mechanism,Wiley,New York,1961.
5. W.J.Moore and R.G.Pearson,Kinetics And Mechanism,1981.
6. C.Capellos and B.J.J.Bielski,Kinetics Systems,Wisely Inter Science,New York,1972.
7. Ambur and G.G.Hammes,Chemical Kinetics,Principles And Selected Topics,Mcgraw Hill,New York,1968.
8. G.M.Harris,Chemical Kinetics,D.C.Heat And Co.,1966.
9. R.K.Prasad,Quantum Chemistry,University Science Books,Mil Valley,California,1983.
10. J.Goodisman,Contemporary Quantum Chemistry,An Introduction,Plenum Press,New York,1997.
11. R.Mcweeny,Coulon's Valence,Elbs Oxford University Press,1979.
12. F.J.Bockhoff, Elements Of Quantum Theory, Addision Wesley,Reading Mass,1976.
13. P.W.Atkins,Physical Chemistry,Oxford University Press,1990.
14. H.Eyring,J.Walter and G.Gimball Quantum Chemistry,John Wiley And Sons,New York,1944.
15. Linus Pauling and Wilson Introduction To Quantum Mechanics,Mcgraw Hill Book Company,New York,1935.
16. P.W.Atkins,Molecular Quantum Mechanics,Oxford University Press,Oxford,1983.

## II SEMESTER

### ORGANIC SYSTEMATIC ANALYSIS – PRACTICAL –II (60 HOURS)

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.

Total	75Marks
Pilot Separation	15 Marks
Component 1	20 Marks
Component 2	20 Marks
Practical Viva	10 Marks
Record	10 Marks

#### REFERENCE:

1. Practical Organic Chemistry by Vogel.

#### RECOMMENDED BOOKS

1. Practical Organic Chemistry by Gnanaprakasam.

## II SEMESTER

### SEMI MICRO QUALITATIVE ANALYSIS – PRACTICAL – II (60 HOURS)

Objective: To learn how to separate inorganic radicals & identify them.

1. Semimicro qualitative analysis of mixture containing two common and two rare cations.
2. The following are the rare cations to be included. W, Ti, Te, Se, Ce, Th, Zr, V, U, Li, Mo.
3. Water Analysis using EDTA methods.

(a) Common Cations	20 Marks
(b) Common Anions	20 Marks
(c) Water Analysis	15 Marks
(d) Viva Voce	10 Marks
(e) Record	10 Marks

#### RECOMMENDED BOOK:

1. Qualitative Inorganic Analysis by V.V. Ramanujam

#### REFERENCE BOOK:

1. Practical Inorganic Chemistry by Vogel.

## II SEMESTER

### PHYSICAL CHEMISTRY PRACTICAL – II

60 Hours

**Aim: To study the experiments in chemical equilibrium and molecular weight determination of substances using thermometry and viscometry.**

1. Construct the phase diagram for a simple binary system naphthalene – phenanthrene and benzophenone-diphenyl amine.
2. Determine the molecular weight of a polymer by viscosity method.
3. Determine the equilibrium constant of the reaction between iodine and potassium iodide by partition method and determine the concentration of the given unknown KI solution
4. Study the kinetics of Kinetics of Iodination of Acetone
5. Determination of molecular weight of the substance by Rast method.

1. Procedure	10 Marks
2. Experiment	10 Marks
3. Manipulation	10 Marks
4. Graph	10 Marks
5. Result	15 Marks
6. Viva-Voce	10 Marks
7. Record	10 Marks

#### Recommended Books:

1. Physical Practical Experiments by Palit

#### Reference Books;

1. Practical Physical Chemistry by Findler Findler



**B. Sc Biotechnology**  
**Core 1 – Cell and Molecular Biology**

**Semester : 1**

**Unit 1:** Cell – General Organization of Eukaryotic cell – Types of cell : Prokaryotes, Eukaryotes, sub-cellular organelles. Structure of DNA and RNA– Cell membrane, cell architecture.

**Unit 2:** Cell Division – Cell cycle – Mitosis, Meiosis – Cancer cell – type, Benign, Malignant, Apoptosis / Necrosis.

**Unit 3:** Cell chemical nature and macromolecular protein structure and function; membrane architecture. DNA replication, Genetic code – Operon concept – LAC – Protein synthesis.

**Unit 4:** Genetic – structure of chromosome and types multiple alleles – Blood types, HLA-Chromosome aberrations (Addition, Deletion, Duplication, Substitution).

**Unit 5:** Microbial Genetics – Conjugation – Hfr, Transformation – Griffith effect, Transduction – Gene specialized.

**Reference:**

1. Molecular cell biology - Harvey Lodish, David Baltimore, 2000.
2. Molecular Biotechnology – Principles and Application of recombinant DNA – Glick, Pasternak, 2002, Panima Pub.
3. Microbial Genetics (2<sup>nd</sup> Edition) – Maloy, Cronan, Frieifelder, Jones. Bartlett Pub.
4. Concept of Genetics (4<sup>th</sup> Edition) – William S.Klug & Micheal R. Cummings.
5. Cytology. 2005 by Verma and Agarwal
6. Molecular Biology 2002 – David P.Clark.

## **CORE PRACTICAL 1: CELL AND MOLECULAR BIOLOGY**

### **Semester 1**

1. Observation of Mitosis in Onion root tip
2. Observation of Giant chromosome in Chironomid larva
3. Types of cells – Columnar, Ciliated, Squash, ...
4. Cell measurement – micrometry
5. Blood grouping – Differential count of WBC
6. Observation of chromosomes
7. Bacterial Transformation – Demo.

**Objective:**

**Unit 1:** Structure and Biological importance of Biomolecules – Carbohydrate, Protein, Lipid and Vitamin.

**Unit 2:** Enzymes – classification – physico-chemical properties – Mechanism of enzyme action – factors affecting enzyme activity. Enzyme kinetics, immobilized enzymes.

**Unit 3:** Clinical biochemistry – Hypo and Hyper glycemia, Diabetes – Type I and II, GTT, GTT-curve, obesity, CHD, LDL, HDL, Inborn errors of Metabolism – Alkaptonuria, Phenylketonuria, albinism.

**Unit 4:** Bioenergetics – Energy and its forms – Energy rich compounds – laws of thermodynamics (First, Second) – enthalpy and entropy – redox potential – redox coupling and Redox reaction.

**Unit 5:** Radio isotope technologies – Units of radio activity. Trace technique, Geiger Muller counter, Scintillation counter, Autoradiography. Introduction to Nanobiotechnology.

**Reference:**

1. Biochemistry (4<sup>th</sup> Edition) – L. Stryer Freeman Co. NY
2. Biochemistry (Revised Edition) – N. Arumugam et. al. 2010. Saras Pub.
3. Elements of Biochemistry – H.S. Srivastava, Rastogi Pub.
4. Biochemistry – Satyanarayana, J.L. Jain. 2006
5. Biophysics (Rev. Edition) – N. Arumugam et. al. 2010. Saras Pub.
6. Biochemistry and Biophysics -
7. Enzymes by Ashok.

## **ALLIED PRACTICAL - 1 : BIOCHEMISTRY AND BIOPHYSICS**

### **Semester 1**

1. Estimation of pH using pH meter in various biological samples
2. Qualitative analysis of Glucose, Protein, Lipid
3. Estimation of Blood glucose level
4. Estimation of Blood Hemoglobin
5. Estimation of Blood Cholesterol
6. Biosynthesis of  $\text{AgNO}_3$  – Demo only
7. Observation of cellular components using differential Centrifugation.  
(Centrifugation: Tissue homogenization – sub cellular organelle preparations)
8. Enzyme activity – amylase / catalase.

## **CORE 2: MICROBIOLOGY**

### **Semester II**

**Unit 1:** Scope of Microbiology – classification of microbes. Five kingdom concept, Eight Kingdom concept. Major features of Bacteria – Structure of Bacteria– Bacterial Cell wall, Ultra structure of E.Coli – Capsule.

**Unit 2:** Distinctive features of Prokaryotic and Eukaryotic micro organism. Morphology, Ultra structure, Reproduction, life cycle of Algae (Diatom) - Morphology, Ultra structure, Reproduction, life cycle of Fungi (Penicillium) - Morphology, Ultra structure, Reproduction, life cycle of Virus (TMV).

**Unit 3:** Bacterial Growth- Growth Rate – Growth curve – Measurement of Bacterial Growth – Factors affecting Bacterial growth – culture medium –Culture Techniques - culture of Bacteria – Batch culture – Plate culture – Differential culture – Maintenance of Bacterial Culture.

**Unit 4:** Observation of Microorganisms – Simple microscope – Compound microscope – Oil immersion objective – Phase contrast microscope – Fluorescence microscope - Electron microscopes( TEM, SEM). Staining Technique – Microbiological stains – Types of staining – simple staining – Negative staining – Gram staining – Acid Fast staining.

**Unit 5:** Microorganisms involved in food products –some characteristics of Fermented milks – Micro organisms used as food sources (Algae, Single cell protein, Bacteria, Actinomycetes, Fungi). Role of microbes in food spoilage.

### **Reference :**

1. Microbiology –concept and applications, Pelzer, Chang and Krieg 1993, McGraw Hill NY.
2. Microbiology fundamentals and applications REnald, M.Atlas 1987. Prentice Hill
3. Microbiology – U.Satyanarayana 2008. Uppala Author Pub.
4. General Microbiology, Stainer, 1995, Mc. Millan Pub. Co
5. Microbiology : General and Applied – A.Mani and N. Arumugam 2011. Saras Pub.
6. Microbiology – Dubey.

## **CORE PRACTICAL 2: MICROBIOLOGY**

### **Semester II**

1. Sterilization techniques- Glassware, etc..
2. Media Preparation methods
3. Simple staining techniques
4. Gram staining
5. Culture techniques
6. Preservation of microbes.
7. Bacterial Growth curve.

## **Allied 2: Biodiversity**

### **Semester II**

Unit 1: General aspects of Biodiversity, types of Biodiversity, Global Biodiversity, Biodiversity in India and World. Species Biodiversity, Hotspots in India.

Unit 2: General Characters of Algae, General Characters of Fungi, General Characters of Bryophytes, General Characters of Pteridophytes, General Characters of Gymnosperms and General Characters of Angiosperms.

Unit 3: General Characters of Protozoa, General Characters of Porifera, General Characters of Coelenterata, General Characters of Helminthes, General Characters of Annalids, General Characters of Arthropods, General Characters of Molluscs and General Characters of Echinoderms.

Unit 4: General Characters of Prochordates, General Characters of Chordates, General Characters of Pisces, General Characters of Amphibia, General Characters of Reptilia, General Characters of Aves and General Characters of Mammalia.

Unit 5: Biodiversity – value of Biodiversity and conservations. Endangered species. Importance of Ecosystem. Economic importance of Algae, Fungi, Earthworm and Prawn.

#### **Reference:**

1. Plant Diversity vol.1 – Annie and V. Kumaresan 2012. Saras Pub.
2. Environmental Biodiversity – P.R. Dadav 1995.
3. Invertebrata – Phylum – R.L.Kotpal Series, Rastragi Pub. Meerut 2000.
4. Manual of Zoology – E. Ayyar. Madras Pub.1995.
5. Comparative vertebrate Zoology. Waterman et. Al. Mac Millan and Co. 1971.

## **Allied Practical 2: Biodiversity**

### **Semester II**

1. Plant diversity in campus
2. Animal diversity in campus
3. Microbial diversity in campus
4. Herbarium
5. Insect Box
6. Economically importance of plants and Animals
7. Field visit to Hotspot.



**M. Sc Biotechnology**  
**CORE I – ADVANCED BIOCHEMISTRY**

**Semester : I**

**UNIT-1**

Classification Structure, Chemistry and properties of Proteins, Amino acids, Lipids and Nucleic acids Carbohydrates- Mucopolysaccharides.

**UNIT-2**

.Glycolysis and gluconeogenesis – pathway , keyenzymes and co-ordinate regulation. The citric acid cycle and regulation. Metabolism of glycogen and regulation.

**UNIT-3**

. Overview of biosynthesis of non essential aminoacids.Catabolism of aminoacid nitrogen-Transamination, Deamination, ammonia formation and the urea cycle.

Metabolism of purine – Denovo and salvage pathways for biosynthesis. Purine catabolism. Biosynthesis and catabolism of pyrimidines

**UNIT- 4**

Biosynthesis of fattyacids. Metabolism of triacylglycerides, phospholipids and sphingophospholipids. Cholesterol biosynthesis and its regulation . oxidation of fattyacids- alpha, beta and omega

**UNIT- 5**

Oxidative phosphorylation- Electron transfer reactions in mitochondria. F1F0 ATPase – structure and mechanism of action. Chemiosmotic theory . Inhibitors of respiratory chain and oxidative phosphorylation- uncouplers and ionophores. Regulation of oxidative phosphorylation.

Reference:

1. Biochemistry, 4<sup>th</sup> edition, L. Stryer., 1999. W.H,Freeman & company, New York.
2. Principles of Biochemistry, AL. Leninger, D.L. Nelson and M.M. Cox., 1993.Worth Publishers, New York.
3. Biochemistry, 4<sup>th</sup> edition, G. Zubay, 1998. Mc Millan Publishing Co, New York.
4. Murray et al 2003 Harper's Biochemistry 26<sup>th</sup> edition McGraw Hills.
5. Donald Voet , J.G and Jsssohn Wiley, 1995 Biochemistry

## **CORE 2 – MOLECULAR BIOLOGY**

### **Semester : I**

#### **UNIT-I**

Introduction to Molecular Biology, Cell Cycle – Meiosis and Mitosis, DNA – Denaturation and Renaturation, C value paradox, cell membrane architecture, Cell signaling – Communication between the cell and their environment, second messenger (plant and animal) and G – protein coupled receptors, receptors of tyrosine kinase.

#### **UNIT-II**

Replication, Modes of Replication - Conservative, Semi conservative, dispersive methods and its experimental evidences. Prokaryotic and Eukaryotic replication - Polymerase, Primers and mechanism. Polymerase Chain Reaction and its types, Taq polymerase, Topoisomerase. Thermo cycler.

#### **UNIT-III**

Transcription - Prokaryotic and Eukaryotic transcription, mechanism of transcription, RNA polymerase and its types, transcription factors, Post transcriptional modifications – capping, polyadenylation, introns, exons, splicing, Alternate splicing.

#### **UNIT-IV**

Translation – Genetic code, Deciphering of genetic code, Prokaryotic and Eukaryotic translation, Ribosomes, aminoacyl synthetase, post translational modification.

#### **UNIT-V**

DNA repair and Protein localization – DNA repair and recombination. Chaperons and protein folding, nuclear localization signals for nucleus, mitochondria, chloroplast, Golgi, endoplasmic reticulum, membrane and secretory proteins and targeting.

#### **Reference:**

1. Molecular Cell Biology, Media connected W.H. Freeman and company.
2. Molecular Biology of Gene by Watson JD, Hopkins NH, Roberts JW, Steitz JA, Weiner AM. (2004). The Benjamin / Cummings Publishing Company.
3. Cell and molecular biology – concept and experiment. 2<sup>nd</sup> edn, Harris, D[ed], Karp, G.1999. John wiley & sons, sons, New York.
4. Microbial Genetics by S.R. Maloy, J.E. Cronan and D. Friefelder (1994) Jones and Bartlett publishers.
5. Genes VII by Levin. (2004) Oxford University press.
6. An introduction to genetic Analysis by A.J Griffiths, J.H Miller, D.T. Suzuki, R.C Lewontin and W.M Gelbart (2000) W.H Freeman Company.
7. Principles of Genetics by D.P Snustad, M.J. Simmons and J.B. Jenkins. (1997) John wiley and sons.
8. Principle of cell and molecular biology. 2<sup>nd</sup> edn., Mclaughlin,S., Trost, K., Mac Elree, E.[eds]., Kleinsmith, L.j.& Kish, V.M., 1995. Harper Collins Publisher, New York.
9. Molecular biology of the cell. 3<sup>rd</sup> edn., Alberts, B., Bray, D., Lawis, J., Raff, M., Roberta, K., Watson, J.d[eds], 1994. Garland Publication, Inc., New York.
10. Cell and Molecular Biology, Peter Paoella, m 1998. Mc Graw- Hill.

**UNIT-I**

Classification of microorganism – kingdom – protista, prokaryotic and eukaryotic microorganisms, the five-kingdom concept of classification, archaeobacteria, eubacteria and eukaryotes; History of Microbiology;

Microscopy – light, Fluorescence, electron and laser optic system micrometry.

**UNIT-II**

Prokaryotic and Eukaryotic cell structure pure culture techniques – isolation cultivation, enumeration and preservation of microbes; staining techniques- simple and differential staining.

Nutritional requirements and nutritional grouping of microorganisms; Different media [simple, complex and defined] – Growth curve; Axenic culture, Synchronous culture Continuous culture; Different; Effects of physical and chemical factors on microbial growth.

Microbial genetics-recombination – transformation, transduction, conjugation regulation of gene expression.

**UNIT-III**

Microbial diversity – Methods to assess microbial diversity, Merits and demerits culture dependent and culture independent methods. Molecular analysis of bacteria community: Denaturing gradient Gel Electrophoresis [DGGE], Terminal Restrict Fragment Length Polymorphism [T-RFLP], Amplified Ribosomal DNA and Restrict Analysis [ARDRA].

**UNIT-IV**

Microbes in natural habitats – air, water & soil. Industrial application of microbes Wine, Beer, Cheese, Yogurt. Primary and secondary metabolites and their application preservation of food; biogas; bio-fertilizers and bio-pesticides; leaching of ores microorganism; microorganism and pollution control-bioremediation; biosensors.

**UNIT-V**

Microbial Pathogenicity – toxins, mode of action. Bacterial pathogens – Staphylococcus, Streptococcus, Escherichia, Salmonella & Mycobacterium. Viral pathogens – Influenza, Rabies, Enterovirus, Oncogenic viruses and retroviruses.

Control of microorganism – physical and chemical methods – antibiotics and chemotherapeutic agents – anti microbial susceptibility test.

**Reference:**

1. Microbiology, L.M. Prescott, J.P. Harley and D.A Klein, 7/e, 2007. McGraw Hill, Boston.
2. Microbiology, L.M. Prescott, J.P. Harley and D.A Klein, 6/e, 2005. McGraw Hill, Boston.
3. Fundamental Principle of Bacteriology, A.J. Salle, 1999. Tata McGraw – Hill Publishing Company Limited, New Delhi.
4. Medical Microbiology, D.Greenwood, R.Slack and J.Peutherer, 1997. Elsevier with Churchill Livingstone, Hong Kong.
5. Microbial Ecology. Fundamentals and Applications, R.M. Atlas and R.Bartha, 2000.
6. Microbiology, M.J. Pelzer Jr., E.C.S. Chan and N.R Kreig, 1993. McGraw Hill Inc., New York.

## CORE PRACTICAL 1

### Advanced Biochemistry and Molecular Biology

**Semester : I**

**Sub. Code :**

#### Advanced Biochemistry

1. Isolation and estimation of glycogen from liver.
2. Estimation of DNA using diphenylamine method.
3. Estimation of total soluble sugars.
4. Estimation of protein by Lowry's method.
5. Estimation of RNA using orcinol.
6. Separation and identification of sugars and amino acids by chromatography.
7. Separation of plant pigments column chromatography.
8. Separation of serum proteins by SDS-PAGE.
9. Qualitative analysis of urine.
10. Qualitative analysis of aminoacids

#### Molecular Biology

1. Observation of prokaryotic and eukaryotic cells – Living cells/ Temporary and Permanent preparations.
2. Squash preparation of giant chromosome of salivary gland of chironomous larva.
3. Squash preparation and observation of mitosis in onion root tip
4. Squash preparation and observation of meiosis in testis and anther lobes.
5. Red blood cells as osmometer.
6. Sub cellular fractionation using differential centrifugation.
7. Cytochemical study of various cells using specific dyes / reagents.
8. Immunocytochemical analysis for specific cellular constituents.
9. Metaphase chromosome preparation and preliminary banding techniques.
10. Cell size measurement using micrometry
11. Isolation of DNA from buccal / blood

## **CORE PRACTICAL 2**

### **Microbial BioTechnology**

**Semester : I**

**Sub. Code :**

#### **Microbial biotechnology**

1. Enumeration of bacteria and fungi from environmental samples – soil, water and air.
2. Water quality analysis – MPN method.
3. Staining techniques – acid fast, capsular and endospore staining
4. Motility of bacterial using Hanging drop method and Agar Butt method
5. Monitoring of bacterial growth.
6. Biochemical tests for identification of bacteria.
7. Antimicrobial assay.
8. Microbiological analysis of urine & blood.
9. Microbial analysis of food samples.
10. Microbial production of food and beverages.

**ELECTIVE PAPER I**  
**BIOPROSPECTING TECHNOLOGY**

**Semester : I**

**Sub. Code :**

**UNIT-I**

History of Pharmacology, Pharmacokinetics, Pharmacogenomics. Classification of crude drugs – Schemes for pharmacognostic studies of a crude drug; Phytopharmaceuticals – commercial significance of herbal products – current trend of market.

**UNIT-II**

Herbal products: carbohydrates and derived products – drugs containing glycosides, tannins, lipids [fixed oils, fats and waxes], volatile oils and terpenoids, enzymes and proteins, alkaloids, flavonoids – Marine drugs, microbial drugs.

**UNIT-III**

Analytical pharmacognosy; Drug adulteration – types – methods of drug evaluation; Biological testing of herbal drugs – preliminary phytochemical screening for plant products tests – Chromatography [TLC, GLC, and HPLC]. Application of GC – MS, NMR in structural elucidation.

**UNIT-IV**

Intellectual property rights – TRIP international conventions patents and methods of application of patents – legal implications biodiversity and farmer rights – beneficial application and development of research focus of the need of the poor – identification of direction for yield effects in agriculture – aquaculture and bioremediation

**UNIT-V**

Objectives of the patent system – basis principle and general requirements of patent law- biotechnological inventions and patent law- legal development – patentable subjects and protection in biotechnology – The patentability of microorganisms – IPR an WTO regime- consumer protection an plant generic resources – GATT and TRIPS, Patent search using databases.

**Reference:**

1. A Lexicon of medical plants in India, D.N. Guhabakshi, P.Sensarma and D.C.Pal, 1999. Naya prokash – publications.
2. Ethnobotany The Renaissance of Traditional Herbal Medicine, Rajiv K.Sinha, 1996. INA SHREE publishers.
3. The indigenous drugs of India, Kanny, Lall, Dey and Raj Bahadur, 1984 International Book Distributors.
4. Herbal plants and Drugs, Agnes Arber, 1999. Mangal Deep Publications.
5. Contribution to India Ethnobotany by Editor S.K.Jain, 1991 Scientific Publishers.
6. New Natural products and Plants drugs with Pharmacological, Biological (or) Therapeutical activity, H.Wagner and P. Wolff, 1979. Springer, New Delhi.
7. Ayurvedic drugs and their plant source, V.V.Sivarajan and Balachandran India 1994. Oxford IBH publishing Co.
8. Ayurveda and Aromatherapy, Miller, Light and Miller, Bryan, 1988. Banarsidass Delhi.
9. Principles of Ayurveda, Anne Green, 2000. Thorsons, London.
10. Pharmacognosy, Dr.C.K.Kokate et al.1999. Nirali Prakashan.
11. Biotechnology and Patent protection, Beier, F.K., Crespi, R.S.and Straus, 1980.Oxford and IBH Publishing Co, New Delhi.

## CORE – 4 MOLECULAR GENETICS

**Semester : II**

**Sub. Code :**

**UNIT – I:-** Cross over and Recombination: Linkage mapping in eukaryotes – Ordered and unordered tetrad analysis in *Neurospora crassa*, Cis –Trans Complementation, Bacterial virus – structure and life cycle, Benzer's experiment, Overview of genetic exchange in bacteria: Conjugation – discovery, Hfr conjugation, sexduction, determining linkage map from interrupted mating experiments. Transduction – discovery, generalized transduction, specialized transduction. Transformation – the process, competency, mechanism.

**UNIT – II:-** Mutation and DNA repair: Mutation – Basic features of the process – Somatic, germinal, spontaneous, induced, random, non-adaptive, reversible. Molecular basis for Mutation – tautomeric shifts, point mutation - transition, transversion, frameshift. Mutations induced by chemicals, radiation, transposable genetic elements. Ames Test. DNA repair mechanism - Light dependent, Excision, mismatch, and post replication repair.

**UNIT – III:-** Regulation of Gene expression in prokaryotes - Constitutive, inducible and repressible gene expression. Operon systems: Lactose operon – induction , catabolite repression. Tryptophan operon – Repression, attenuation. Arabinose operon – positive and negative controls. Translational control & gene expression, post translational regulatory mechanisms.

**UNIT – IV:-** Gene regulation in eukaryotes – spatial and temporal regulation of eukaryotic genes – tubulin genes in plants, globin genes in animals. Induction of transcriptional activity by environmental and biological factors – Temperature, Light and hormonal signal molecules.

**UNIT – V:-** Transposable genetic elements – IS elements, composite transposons, Tn3, Tn5, Tn10 elements, medical significance. Eukaryotes – Ac and Ds elements in maize, P elements in drosophila. Retro transposons. Genetic and evolutionary significance of transposable elements. Genetic basis of cancer – benign, malignant and metastatic cancer, Transfection test, Oncogenes and tumor suppressor genes, Ras protein signaling and cancer. Apoptosis.

### Reference Books

1. Molecular Biology of gene, Watson JD, Hopkins NH, Roberts JW, Weiner AM. (2004) The Benjamin / Cummmings Publishing Company.
2. Genes VII, Levin B (2003) Oxford university press.
3. Principles of Genetics by Snustad et al (1997) John Wiley Publications.
4. Fundamental Bacterial Genetics by N. Trun and J. Trempy (2004). Blackwell publishers.
5. Genetics by A.G Gardener.
6. An introduction to genetic analysis by A.J Griffiths, J.H Miller, D.T Suzuki, R.C Lewinton and W.M Gelbart. (2000) W.H Freeman and company.
7. The Science of genetics by A.G Atherly, J.R Girton and J.F McDonald (1999). Harcourt college publishers.

## CORE 5: BIOINSTRUMENTATION

**Semester : II**

**Sub. Code :**

**Unit 1:** Biomolecular Techniques: Principles, working and application of PCR and its types, RAPD, RFLP, AFLP, DNA Fingerprinting, Automated DNA - sequencer, ELISA, ELISA reader, Western blotting, Southern Blotting, Northern Blotting, GEL Documentation unit. Biomedical instrument – ECG, EEG, CT and MRI.

**Unit 2:** Microscopic Techniques: Principles of Microscopy – Light microscope, phase contrast, fluorescence, dark field, confocal, scanning, Inverted and electron microscope – SEM, TEM. Colony counter. Genetic Engineering Tools - Microinjection, Electroporation, Particle Bombardment.

**Unit 3:** Pulse – chase techniques: Radioactive isotope and Half-life & isotope; Meselson and Stahl experiment, autoradiography. Cerenkov radiation. Counting techniques – solid scintillating counter, liquid scintillating counter, photomultiplier tubes, phosphor imaging. Chemiluminescence and bioluminescence. Green Fluorescence protein. FACS.

**Unit 4:** Separation Techniques: Chromatography - Principles and application of ion exchange chromatography, affinity chromatography, Gas chromatography, gel exclusion chromatography and HPLC. Electrophoresis – types, AGE, SDS PAGE, Gradient Gel Electrophoresis, Capillary Electrophoresis and MALDI TOF. Centrifugation (Velocity and buoyant density) and its types – Ultra centrifugation, Differential, Density gradient centrifugation.

**Unit 5:** Spectroscopic techniques: Principles and application of UV – Vis, Infra - red, FTIR, Laser, Electromagnetic, Nuclear Magnetic Resonance, Mass spectrometry, GC- MS, LC – MS, spectroscopy. X –ray Diffraction, CD, Dynamic Light Scattering techniques.

### Reference Books:

1. Biophysical Chemistry by Canter and Canter (1996).
2. Molecular Biotechnology by Glick and Pasternak. ASM Press (1994).
3. Biophysical Chemistry, David Friefelder
4. Bioanalytical Techniques by M.L Srivastava. (2008)
5. Physical Chemistry by Puri & Sharma
6. Physical Chemistry by P.L Soni, S. Chand Publication



## **CORE 6 –RECOMBINANT DNA TECHNOLOGY**

**Semester : II**

**Sub. Code :**

### **UNIT-I**

Basic concept in genetic Engineering: DNA structure and properties – Restriction enzymes – modifying enzymes, linker, Adaptor, Homopolymor tailing, DAN ligase, polymerase enzyme, types – Functions and its applications. siRNA and miRNA – Applications.

### **UNIT-II**

Plasmids, Genetransfer methods & vectors, PBR.322, lambda phage, phagemids, cosmids, Artificial Chromosomes- BAC & YAC, shuttle vectors Expression Vectors -Viral vectors and their design in animal & plant cell.

Transformation, Transduction, particle bombardment, Electroporation, liposome mediated gene transfer, microinjection. Agrobacterium mediated gene transfer.

### **UNIT-III**

Molecular probes:

DNA probes, Radio active labeling, Non-radio active labeling, use of moleculer probes and DNA finger printing and its applications in forensic medicine.

Gene libraries:

Construction of cDNA and genomic liabrary – Amplification of gene libraries. Identifying the product of cDNA clones.

### **UNIT-IV**

Analysis of cloned genes:

Restriction enzyme analyses, southern blotting, Northern blotting, Western blotting, colony & plague hybridization, Factors affecting expression of cloned genes, Reporter genes, Fusion proteins. Cloning and expression of commercially useful proteins.

### **UNIT-V**

Sequencing and synthesis of gene, Polymerase chain reaction (PCR) – Basic principle, & applications, Techniques of DNA sequencing, microarray sequencing, RAPD,RFLP, Artificial DNA synthesis – Molecular mechanism of Antisense technology and its applications.

### **Reference:**

- 1.Principles of gene manipulation, R.N. Old and S.B> Primrose, 1994. Blackwell Scientific Publications.
- 2.DNA Cloning I & II , D.M. Glover & B.D. Hames, 1995. IRL Press.
3. PCR Strategies, M.A. Innis, D.H. Gelfant & J.J. Sninsky, 1995. IRL Press.
4. Recombinant DNA [2<sup>nd</sup> Ed], J.D. Watson, M.Gillman, J.Witknow Ski and M.Zoller, 1992. Scientific Americans books, N.Y.
- 5.Genetic Engineering of Animals, A.Publer, 1993. VCH Publishers, Weinheim FRG.
- 6.Gene Transfer and expression protocols – methods is molecular biology volume 7, E.T. Murray, 1991. Humana press.

## **Practical I: CORE VIII – MOLECULAR GENETICS, AND BIOINSTRUMENTATION**

### **MOLECULAR GENETICS**

1. Scoring for Mutants through Physical and Chemical agents.
2. Isolation of chromosomal DNA from bacteria.
3. Bacterial conjugation
4. Bacterial transformation
5. Isolation of plasmid DNA
6. Bacterial Transduction
7. Induction of Beta - Galactosidase activity in E. coli
8. GFP cloning

## **Practical 4 : CORE VIII – BIOINSTRUMENTATION AND RECOMBINANT DNA TECHNOLOGY**

**Semester: II**

### **BIOINSTRUMENTATION**

1. Determination of Lambda max by U-V Visible Spectrophotometer.
2. Fractionation of leaf cell by differential centrifugation technique.
3. Separation and identification of amino acids by 2D paper chromatography.
4. Native disc – gel electrophoresis of proteins.
5. Amplification of DNA using PCR.
6. Immunoblotting – Demo
7. Extraction of phytochemical compounds using Soxhlet Apparatus
8. Plant Phytopigment analysis by TLC
9. Drug identification by TLC

### **RECOMBINANT DNA TECHNOLOGY**

Agarose gel electrophoresis

Extraction of total DNA from plant and animal tissue.

Restriction digestion

Ligation

Western Blotting techniques - demonstration

Amplification of DNA using PCR.

## **ELECTIVE II– IMMUNOTECHNOLOGY**

### **Semester : II**

#### **Unit I**

Immune system- B lymphocytes T lymphocytes Macrophages Haptens Adjuvants. Antibodies- structure types and properties. Affinity and Avidity. Polyclonal and Monoclonal antibodies.

#### **Unit II**

Agglutination based tests- slide agglutination test, Tube agglutination test, Latex particle agglutination test, Coombs test, Indirect haemeagglutination test, Haemeagglutination- inhibition test. Applications of Agglutination based tests. Complement fixation test, RIA, ELISA, ELOSA. Immunoblotting

#### **Unit III**

Immunoelectrophoresis, counter- immunoelectrophoresis Rocket electrophoresis 2D electrophoresis Gel diffusion by Ouchterlony method. Immunofluorescence assays- FACS & MACS. Immunoenzymatic cytochemical techniques. Immunogold technique Immunoelectron microscopy

#### **Unit IV**

Separation of Immunoglobulins using precipitation methods- Ammonium sulphate, Polyethylene Glycol. Isolation of IgG – DEAE cellulose chromatography. Purification of cellular antigens. DNA footprinting Gel-shift analysis. CAT assay. Autoradiography and fluorography.

#### **Unit V**

Monoclonal antibody production using hybridoma technology- fusion – medium selection – myeloma cell line maintenance – immunization – cloning and medium selection – Macrophage feeder layer preparation – screening – recloning – Expansion of culture. Large amount antibody production. Thymectomy, Splenectomy. Reconstitution of mice.

### **Reference Books**

- Kuby J, Cameron J, Todd C, Mitchell J, Immunology, W.H. Freeman and Co., 2000.
- Elgert KD, Immunology: Understanding Immune system, John Wiley and Sons, 1996.
- Roitt I, Brostoff, Male, Immunology, Mosby Publications, 2001

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**PAPER - I****BIOLOGICAL MACROMOLECULES – I****Paper Code:****6Hrs/Week – 5 Credits****Total – 90 Hrs****Objectives**

To understand the structure, properties & functions of various biological macromolecules.

**UNIT –I Carbohydrates – I****20Hrs**

Classifications of carbohydrates, stereo isomerism and optical isomerism of sugars, ring structure, anomeric form and mutarotation. Reactions of carbohydrates due to the presence of hydroxyl, aldehyde and ketone groups. Occurrence, structure and biological importance of monosaccharides, disaccharides.

**UNIT – II Carbohydrates – II****20 Hrs**

Polysaccharides - starch, glycogen, cellulose, chitin and agar. An introduction to mucopolysaccharides - chondroitin sulphate, dermatansulphate, keratin sulphate, hyaluronic acid, heparin, heparin sulphate, proteoglycan, bacterial cell wall polysaccharides. Glycoproteins - blood group polysaccharides.

**UNIT – III Amino acids****15 Hrs**

Standard amino acids – classification, structure, physical and chemical properties, zwitter ions. Stereo and optical isomerism, essential, non-essential & non-protein amino acids. Amino acid derivatives useful as drugs.

**UNIT –IV Proteins****20 Hrs**

Classification – IUPAC, function & nutritional. Structure of proteins-primary, secondary-, Ramachandran plot, tertiary and quaternary (Peptide bond,  $\alpha$ -helix,  $\beta$ -pleated sheets, collagen). Bonds responsible for protein structure. Biologically important peptides-structure and function (insulin, glutathione, vasopressin). Denaturation & renaturation of proteins.

**UNIT –V Vitamins****15 Hrs**

Fat soluble & water soluble vitamins – structure, source, daily requirements, deficiency symptoms, significance, and their coenzyme structure.

## **TEXT BOOKS**

1. Fundamentals of Biochemistry-J. L. Jain, Sunjayjain, Nitinjain, S. Chand & Company
2. Harper's Biochemistry –RoberK.Murray, Daryl K. Grammer, McGraw Hill, Lange Medical Books.25<sup>th</sup> edition
3. Text book of Biochemistry – West & Todd

## **REFERENCES**

1. Fundamentals of Biochemistry –A.C.Deb., Jain Book Depot (JBD) Publisher.
2. Biochemistry- Dr.Ambikashanmugam, Published by Author.
3. Biochemistry –Dr.Amit Krishna De, S.Chand & Co., Ltd.
4. LehningerPrinciples of Biochemistry-David L.Nelson, Michael M.Cox, Macmillan Worth Publishers.
5. Illustrated Review of Biochemistry – Lippincott
6. Instant notes on Biochemistry - Nagini

## **II SEMESTER**

### **PAPER II**

#### **Biological Macromolecules – II**

**Paper Code:**

**6 Hrs/Week – 5 Credits**

**Total – 90 Hrs**

#### **Objectives**

To understand the structure, properties & functions of various biological macromolecules.

#### **UNIT –I Lipids - I**

**20 Hrs**

Introduction, definition of fatty acids. Classification [essential & non-essential fatty acids], nomenclatures, structures, properties of fatty acids (saponification value, iodine value, acid number, rancidity of fats, Reichert -Meissel number). Structure and function of tri-acyl glycerol. Antioxidants. Structure and functions of phospholipids - lecithin, cephalin, phosphatidyl inositol and phosphatidyl serine. Sphingomyelin, plasmalogens.

#### **UNIT – II Lipids - II**

**20 Hrs**

Structure and function of glycolipids (cerebrosides, gangliosides), cholesterol, lipoproteins, steroids (steroid hormones, bile acids, bile salts), structure and function of prostaglandins, leukotrienes, membrane lipids, liposomes, general formula for carotenoids & terpenes.

#### **UNIT – III Nucleic acids**

**15 Hrs**

Structure of purine and pyrimidine bases, sugars, nucleoside, and nucleotide. Purine and pyrimidine nucleotide analogs. Biologically important nucleosides. Structure of DNA - polymorphisms - A, B & Z. Properties of DNA – denaturation, annealing, T<sub>m</sub>, hypo & hyper chromicity. Structure of RNA & its types. Cellular RNA and their functions. Ribozymes.

#### **UNIT –IV Porphyrins**

**20 Hrs**

Porphyrin nucleus and classifications – important metalloporphyrins - chlorophyll & heme. Bile pigments – chemical nature and physiological significance.

#### **UNIT –V Heterocyclic compounds**

**15 Hrs**

Heterocyclic rings of biological importance – pyridine, pyrrole, quinoline, pteridine, thiazole, imidazole, indole with examples.

Antibiotics – structure and functions of penicillin, streptomycin and chloramphenicol.

## **TEXT BOOKS**

1. Fundamentals of Biochemistry-J. L. Jain, Sunjayjain, Nitinjain, S. Chand & Company
2. Biochemistry- Dr. Ambikashanmugam, Published by Author
3. Text book of Biochemistry – West & Todd

## **REFERENCES**

1. Biochemistry –C. Kannan, MJP Publishers, Chennai - 5.
2. Biochemistry –Dr. Amit Krishna De, S. Chand & Co., Ltd.
3. Lehninger Principles of Biochemistry-David L.Nelson, Michael M.Cox, Macmillan Worth Publishers.
4. Harper's Biochemistry –RoberK.Murray, Daryl K. Grammer, McGraw Hill, Lange Medical Books.25<sup>th</sup> edition
5. Illustrated Review of Biochemistry – Lippincott
6. Instant notes on Biochemistry - Nagini



## **SEMESTER – I**

### **CORE PRACTICAL - I**

#### **Quantitative & Qualitative Analysis – I**

**Paper Code:**

**3 Hrs/Week - 3 Credits**

**Total – 45 Hrs**

#### **Objectives:**

1. Student should know the principles, theory and calculation of each experiment.
2. They should know to prepare all the solutions by themselves. They should standardize the solutions individually.

#### **I. Quantitative Analysis**

- i) Estimation of amino acids by formal titration method.
- ii) Determination of Saponification value of edible oil.
- iii) Determination of Acid number of edible oil.
- iv) Iodine value of oil.

#### **II. Qualitative Analysis**

- i) Reaction of simple sugars including glucose, fructose, galactose, mannose, pentose, maltose, sucrose, lactose, starch, glycogen and dextrin.

#### **Text Books**

1. Practical Clinical Biochemistry – Harold Varley, CBS, New Delhi
2. Medical Laboratory Technology – Kanai L. Mukherjee, Tata McGraw Hill., Vol. I, II, III.
3. Practical Biochemistry – David T. Plummer

#### **References**

1. Laboratory manual in Biochemistry – Jayaraman
2. Biochemical methods – S.Sadasivan and Manickam
3. Experimental Biochemistry – Deshpandey&Rajapandian

**SEMESTER – II**  
**CORE PRACTICAL - II**  
**Quantitative & Qualitative Analysis – II**

**Paper Code:**  
**3 Hrs/Week - 3 Credits**  
**Total – 45 Hrs**

**Objectives:**

1. Student should know the principles, theory and calculation of each experiment.
2. They should know to prepare all the solutions by themselves. They should standardize the solutions individually.

**I. Quantitative Analysis**

- i. Estimation of ascorbic acid by titrimetric method using 2, 6 – Dichlorophenol indophenol.
- ii. Estimation of reducing sugar from biological fluids by Benedict's titrimetric method.
- iii. Estimation of reducing sugar by iodimetry

**II. Qualitative Analysis**

- i. Reaction of Proteins – Solubility, Denaturation, precipitation by acidic reagents, pH change. Biuret, Millons, Xanthoproteic test. Colour reaction of amino acids like typtophan. Tyrosine, cystine, Methonine. Arginine, Proline and histidine.
- ii. Reactions of lipids – Solubility, Saponification test for unsaturation, Liebermann Burchard test for cholesterol.

**Text Books**

1. Practical Clinical Biochemistry – Harold Varley, CBS, New Delhi
2. Medical Laboratory Technology – Kanai L. Mukherjee, Tata McGraw Hill., Vol. I, II, III.
3. Practical Biochemistry – David T. Plummer

**References**

1. Laboratory manual in Biochemistry – Jayaraman
2. Biochemical methods – S. Sadasivan and Manickam
3. Experimental Biochemistry – Deshpandey & Rajapandian

**PAPER I - CELL BIOLOGY**

**Paper Code:**  
**5 Hrs/Week - 4 Credits**  
**Total – 75 Hrs**

**Objectives:** To understand the structure, functions and dynamics of cells.

**Unit -1****15 Hrs**

Organization of Prokaryotic and Eukaryotic cells, Cell division- Mitosis, Meiosis, Cell cycle and its regulation. Cell motility- role of molecular motors, Structure and Composition of Microtubules. Microtubular associated proteins- role in cell motility; Flagella & Cilia.

**Unit –II****15 Hrs**

Cell organelles – Internal organization of Nucleus, Ultrastructure & functions of Endoplasmic Reticulum, Mitochondria, Chloroplast, Golgi apparatus, Lysosomes, Microsomes, Peroxisomes and Glyoxisomes. Protein sorting and transport. Traffic between Nucleus and Cytoplasm- Importins & Docking proteins.

**Unit –III****15 Hrs**

Methods for disrupting tissues and cells, Organ and tissue slice techniques, Cell fixation- Fluid fixatives, Freezing & drying, Staining for Electron microscopy. Fixation of organic and inorganic substances and Staining techniques.

**Unit – IV****15 Hrs**

Differentiation of cell membrane- Microvilli, Tight junction, Gap junction, Epithelia, Bell and Sqot desmosomes, cell adhesion proteins- Fibronectin & Laminin. Cell surface of Plant cells.

**Unit –V****15 Hrs**

Composition of Plasma Membrane. Membrane fluidity, Solute transport across membrane- Active and Passive transport, types of transport system. Cell ageing and death- Necrosis & Apoptosis, Role of Free Radicals, enzymatic and non enzymatic antioxidants, cancer cells.

**Text Books:**

1. Text books of cytology by P.S.Verma & V.K.Agarwal, Edition 8. B.Chand, 1999.
2. The cell, A molecular approach, fourth edition by Geoffrey M.Cooper
3. Cell and Molecular biology concepts by Gerald Karp (2005)

**References:**

1. The world of cell by Becker, Kliensmmith and Harden academic internet publishers, 5<sup>th</sup> edition (2006)
2. The cell – biochemistry, physiology and morphology by J.Brachet and A.E.Mirsky , Academic press (1963)

## **PAPER II – BIOMOLECULES**

**Paper Code:**

**5Hrs/Week-4Credits**

**Total-75Hrs**

**Objectives:** To understand the Structure, Properties & Functions of Various Biological Macromolecules.

### **Unit I**

**15Hrs**

Polysaccharides - Homo and Heteroglycans, Occurrence structure. Isolation Properties and Functions of Homoglycans- Starch, Glycogen, Cellulose, Dextrin, Inulin Chitins, Xylans, Arabinans, Glycans. Occurrence, Structure, Properties and Functions of Heteroglycans – Bacterial Cell Wall Polysaccharides, Glycosaminoglycans, Agar, Alginic acid, Pectins, Amino sugars and Deoxy sugars. Blood Group Antigens Substances Glycoproteins and their Biological Applications. Lectins- Structure and Functions.

### **Unit II**

**15Hrs**

Proteins-Classification on the basis of Solubility and Shape, Structure and Biological Functions. Isolation, Fractionation and Purification of Proteins. Denaturation and Renaturation of Proteins. Primary Structure. Ramachandran Plot. Secondary structure. Super Secondary Structures- Helix-Loop Helix. Tertiary Structure, Quaternary Structure.

### **Unit III**

**15Hrs**

Protein Sequencing, Determination of Primary structure, Sanger's Method Edman's Method, Role of Mass Spectrometry in Protein Sequencing, Solid Phase Synthesis of Peptides, DNA – Protein interactions, Protein Folding.

### **Unit IV**

**15Hrs**

Lipids, Classification of Saturated and Unsaturated Fatty acids, Phospholipids Classification, Structure and Functions. Ceramides and Sphingomyelins. Eicosanoids Structure and Functions of Plasma Lipoproteins. Steroids, Biological role of Bile Acids Bile Salts, Terpenoids.

### **Unit V**

**15Hrs**

Watson & Crick model of DNA Structure. A, B and Z-DNA. Cruciform Structure in DNA, Primary, Secondary and Tertiary structure of RNA, hnRNA. Nucleic Acid Sequencing by Maxam & Gilbert's Method and Sanger's Method. Denaturation & Renaturation of DNA, Hypochromic effect, C-Value, Cot Curve, Molecular Hybridization.

## REFERENCES:

1. Biochemistry by L.Stryer, W.H.Freeman and Co 5<sup>th</sup> (2002)
2. Fundamentals of Biochemistry by Voet and Voet, John Wiley and Sons NY (2002)
3. Lehninger Principles of Biochemistry by David L. Nelson and Micheael M.Cox. W.H.Freeman, 4<sup>th</sup> edition (2004)
4. Text Book of Biochemistry with Clinical Correlation by Thomas.MI.Devlin, John Wiley-Liss,Hobokhen NJ Publishers.
5. Biochemistry by Zubey, GL WCB Publishers.

## **PAPER III HUMAN PHYSIOLOGY AND NUTRITION**

**Paper Code:**

**5 Hrs/Week -4 Credits**

**Total – 75 Hrs**

**Objectives:** To study the structure & functions of organ system in human body and nutritive value of food substances.

### **UNIT- I**

**15 Hrs**

Digestion-secretions, composition, functions and regulation of saliva, gastric, pancreatic, intestinal and bile juice. Digestions and absorption of carbohydrates, Lipids, Proteins and Nucleic acids. Excretory system-structure of nephron. Formation of urine-glomerular filtration, tubular reabsorption, tubular secretion. Fluid electrolyte balance-regulation of water balance and sodium balance-role of Renin-angiotensin and ADH.

### **UNIT – II**

**15 Hrs**

Composition and functions of blood. Blood coagulation–mechanism, fibrinolysis, anticoagulants. Structure of heart, cardiac cycle, heart sounds, E.C.G (Elementary knowledge), blood pressure. Composition and function of Lymph.

### **UNIT-III**

**15 Hrs**

Structure of Lungs, mechanism and regulation of Respiration. Transport of O<sub>2</sub> and CO<sub>2</sub>. Acid-base balance-role of buffers, erythrocytes, lungs and kidneys. Structure and function of reproductive organs, composition of semen, transport of sperm, ovulation, sexual cycle, physiology of pregnancy, parturition and lactation.

### **UNIT IV**

**15 Hrs**

Structure and function of Brain. Composition and functions of cerebrospinal fluid. Structure and function Neurons. Resting and action potential- transmission of nerve impulses, Synaptic transmission, Neuromuscular junction, Neurotransmitters. Structure of muscle cells and muscle contraction, Energy for Contraction.

### **UNIT-V**

**15 Hrs**

BMR, factors affecting BMR, SDA determination of BMR-direct and indirect method, height, respiratory quotient, biological oxygen demand. Role of fiber in diet, role of essential amino acids-reaction with Marasmus, Kwashiorkor 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, adolescences, pregnancy and old age.

**Text Books:**

1. Human Physiology by C.C.Chatterjee.1th edition (1985).
2. Illustrated Physiology by Macckana.
3. Principles of Nutrition by M.S.Swaminathan.

**References**

1. Review of Medical Physiology by William.F. Ganong. McGraw-Hill 2005
2. Human Physiology & Mechanisms of Disease by Guyton. Saunders 6<sup>th</sup> edi 1996
3. Human Nutrition and Dietetics by Davidson and Passmore.; 8<sup>th</sup> edition (1986).
4. Modern Nutrition and Health Diseases by M.E.Skillis and V.R.Young.



## **ELECTIVE I – MICROBIOLOGY AND GENETICS**

**Paper Code:**

**5 Hrs/Week -3 Credits**

**Total – 75 Hrs**

### **Unit I**

**15 Hrs**

Ultra structure of bacteria, algae, fungi, yeast and protozoa. Classification of viruses- adeno viruses, retroviruses, viroids, tumor viruses. Lytic cycle, lysogenic cycle. Prions.

### **Unit II**

**15 Hrs**

Microbial growth - growth curve measurement of growth and growth yields, synchronous growth and Diauxic growth. Factors affecting growth. Batch culture, Continuous culture, microbial medium formulation.

### **Unit III**

**15 Hrs**

Photosynthesis, photorespiration, Role of Chlorophylls, Carotenoids and Phycobilins. Light Reaction and Calvin Cycle- $C_3$ ,  $C_4$  pathway. Chemoautotrophs, Chemoheterotrophs, Chemolithotrophs. Hydrogen ion, Nitrite and Sulphate Reduction. Nitrogen Fixation, Hydrocarbon Transformation.

### **Unit IV**

**15 Hrs**

Mendelian principles-segregation, independent assortment, dominance relations and multiple alleles. Incomplete dominance, over dominance, co-dominance, epistasis, sex linked inheritance-hemophilia and color blindness.

Chromosomal theory of inheritance, linkage and crossing over, sex determination and Sex linkage in diploids. Population genetics, Hardy-Weinberg law, gene frequency, gene pool, inbreeding, outbreeding, Eugenics and Euphenics.

**Text Books:**

1. Principles of Genetics by P.K.Gupta
2. Text book of Microbiology by R.C.Dubey

**References**

1. Prescott et al. 1999 Microbiology Mcgraw Hill
2. Peclzar et al. 2000 Microbiology 5<sup>th</sup> Ed Mc graw Hill
3. Davis, et al 1989 Microbiology 4<sup>th</sup> Ed Lippincott. Williams and Wilkins
4. Gardner et al 1991 Principles of Genetics. John Wiley and Sons Pvt Ltd
5. Strickberger 1996 Genetics 1996 Printice-Hall.NewDelhi
6. Principles of Genetics by Gardner et al 1991 John Wiley & Sons Pvt Ltd
7. Principles of Genetics by Tamarin, R.H.2002 Seventh Edition. Tata Mc Graw Hill.

## **CORE PRACTICAL –I**

**Paper Code:**  
**5 Hrs/Week -3 Credits**  
**Total – 75 Hrs**

### **Objectives:**

To understand the principles, theory and calculation of quantitative photometric analysis of biological components.

### **QUANTITATIVE PHOTOMETRIC ANALYSIS**

1. Determination of Pyruvate.
2. Determination of Lactate.
3. Determination of Tryptophan.
4. Determination of Protein by Lowry's method.
5. Estimation of Glucose by orthotoulidine method.
6. Estimation of Glucose by Glucose Oxidase method.
7. Estimation of Sodium by Flame Photometry.
8. Estimation of Inorganic Phosphorus by Fiske and Subba Rao method.
9. Determination of calcium using sodium chloranilate.

### **Text Books**

4. Practical Clinical Biochemistry – Harold Varley, CBS, New Delhi
5. Medical Laboratory Technology – Kanai L. Mukherjee, Tata McGraw Hill., Vol. I, II, III.

### **References**

4. Laboratory manual in Biochemistry – Jayaraman
5. Biochemical methods – S.Sadasivan and Manickam

## **CORE PRACTICAL –II**

**Paper Code:**  
**5 Hrs/Week -3 Credits**  
**Total – 75 Hrs**

### **Objectives:**

Learning the techniques concerned with the isolation and characterization of biological molecules.

### **ISOLATION AND CHARACTERIZATION TECHNIQUES**

1. Preparation of Buffers and measurement of PH using indicators and PH meter.
2. Isolation and Estimation of Glycogen from Liver.
3. Isolation and Estimation of DNA from Liver and Spleen.
4. Isolation and Estimation of RNA from Yeast.
5. Denaturation of DNA and UV absorption studies.
6. Separation of Aminoacids by Thin Layer Chromatography (TLC).
7. Separation of Sugars by Thin Layer Chromatography (TLC).
8. Separation of Plant Pigments by Column Chromatography.
9. Separation of Serum Proteins by Poly Acrylamide Gel Electrophoresis (PAGE).
10. Isolation of Lecithin from egg yolk.

### **Reference:**

1. Medical Laboratory technology – kanai L. Mukherjee, Tata McGraw Hill Publication and Co. ltd., vo. I, II, III.
2. Practical clinical biochemistry – Harold Varley, CBS, New Delhi.

### **Text Books**

1. Laboratory manual in Biochemistry – Jayaraman
2. Biochemical methods – S.Sadasivan and Manickam

## SEMESTER – II

### PAPER IV – ANALYTICAL BIOCHEMISTRY

**Paper Code:**  
**6 Hrs/Week - 4 Credits**  
**Total – 90 Hrs**

#### **Unit I** **17 Hrs**

Electrophoresis- general principles, factors affecting electrophoretic mobility, support media, paper electrophoresis, gel electrophoresis. Electrophoresis of Proteins - SDS-PAGE, 2D PAGE, native gels, detection, estimation and recovery of proteins in gels.

#### **Unit II** **17 Hrs**

Electrophoresis of Nucleic Acid, Agarose gel electrophoresis, capillary electrophoresis, Pulse field gel electrophoresis. Isoelectric focusing and Immunoelectrophoresis. Types of Blotting – southern, northern, western, dot blot and slot blot.

#### **Unit III** **21 Hrs**

General principle of chromatography, ion exchange chromatography, molecular gel exclusion chromatography, Affinity Chromatography, Gas Liquid Chromatography, High performance liquid chromatography (HPLC). Basic principle of centrifugation techniques, Preparative ultracentrifuge, Differential centrifugation, density gradient centrifugation, rate zonal, isopycnic isodensity, equilibrium isodensity centrifugation, determination of molecular weight by sedimentation in an ultracentrifuge.

#### **Unit IV** **18 Hrs**

UV-Visible Spectroscopy, Atomic force microscopy, Circular Dichorism (CD) spectroscopy and Optical Rotatory Dispersion (ORD) spectroscopy - principle, instrumentation and application. Structural determination of biomolecule using X-ray diffraction method.

#### **Unit V** **17 Hrs**

Principle and applications of Atomic flame and flameless spectrophotometry. Electronic spin Resonance (ESR), Nuclear Magnetic Resonance (NMR), Infrared, Raman spectroscopy and Mass spectroscopy.

#### **Text Books**

1. Practical Biochemistry by K.Wilson and J.Walker. 5<sup>th</sup> edition Cambridge Univ 2005.
2. Introductory Practical Biochemistry (Narosa,2000) by K.Shawney & Randhir Singh.

#### **Reference**

1. Physical Biochemistry by David Friefielder, W.H.Freeman 2<sup>nd</sup> edition (1982)
2. Introduction to Medical Laboratory Techniques by Mukherjee, Volume I,II & III
3. Introduction to instrumental analysis by Robert D.Brown, Pharma Book Syndicate (2006)

## **PAPER V-ENZYMES AND ENZYME TECHNOLOGY**

**Paper Code:**  
**4 Hrs/Week -4 Credits**  
**Total – 60 Hrs**

**Objectives:** To understand the structure, properties, biological significance and actions of enzymes.

### **Unit I**

**15Hrs**

Nomenclature and Classification of Enzymes, Isolation and Purification of Enzymes, Intracellular localization of enzymes. Active site - Determination of Active site amino acids-chemical probe, affinity label & site directed mutagenesis. Investigation of 3D structure of active site. Enzyme Specificity- 'Lock & Key' and 'Induced Fit' Hypothesis.

### **Unit II**

**15 Hrs**

Kinetics of single substrate enzyme catalyzed reactions. Pre steady state and steady state kinetics - Michaelis Menten equation. Lineweaver-burke plot, Eadie-Hofstee plot, Kinetics of multi-substrate enzyme catalyzed reaction – random order, ping pong bi bi and compulsory order mechanism.

### **Unit III**

**10 Hrs**

Mechanism of enzyme action-General acid-base catalysis, covalent catalysis, mechanism of serine proteases-chymotrypsin, lysozyme, carboxy peptidase A and ribonuclease. Derivation and determination of  $K_M$ . Reversible inhibition-Competitive, uncompetitive, noncompetitive inhibition. Irreversible inhibition.

### **Unit IV**

**10 Hrs**

Structure and functions of Coenzymes and prosthetic group - Coenzyme A, Biotin, Folate, vitamin B12, Vitamin C, Lipoic acid, nucleoside triphosphate and S-adenosylmethionine, NAD, NADP, FMN and FAD. Mechanism of action of thiamine pyrophosphate, pyridoxyl phosphate, and biotin.

### **Unit V**

**10 Hrs**

Industrial uses of enzymes - Thermophilic enzymes, amylases, cellulose degrading enzymes, lipases, proteolytic enzymes in meat and Leather industry, detergents and cheese production. Immobilization of enzymes and their applications. Introduction to Biosensors.

## **Text Books**

1. Understanding enzymes by Palmer, Prentice Hall, 4 sub edition (1995)
2. Harper's Biochemistry, Murray, Granner, Mayes, Rodwell 25<sup>th</sup> Edition. McGrawhill Co.

## **References**

1. Biochemistry by Metzler. Academic press (2000)
2. Biochemistry by Stryer. W.H. Freeman 6<sup>th</sup> edition (2006)
3. Enzymes by Boyer. Academic press 3<sup>rd</sup> edition (Nov 1983)
4. Enzymes by Dixon and Webb, Academic Press (1964)

## PAPER VI – BIOENERGETICS & METABOLISM

**Paper Code:**

**5Hrs/Week-4Credits**

**Total-75Hrs**

**Objectives:** To understand the Synthesis and Degradation of Biomolecules.

### **Unit I**

**15Hrs**

Definition-Laws of Thermodynamics and its Applications. Free energy, Enthalpy and Entropy. Calculation of Free Energy Change in Biological Reactions. Enzymes involved in Redox reactions. The Electron Transport Chain, Oxidative Phosphorylation. F<sub>1</sub>, F<sub>0</sub> ATPase-Structure and Mechanism of action. The Chemiosmotic theory. Inhibitors of Respiratory Chain and Oxidative Phosphorylation-Uncouplers and Ionophores. Regulation of Oxidative Phosphorylation.

### **Unit II**

**15Hrs**

Glycolysis and Gluconeogenesis Pathways and its Regulations. The Citric Acid Cycle and its Regulation. The Pentose Phosphate Pathway. Metabolism of Glycogen and Regulation. The Glyoxylate Cycle.

### **Unit III**

**15Hrs**

Oxidation of Fatty acids  $\alpha$ ,  $\beta$  &  $\omega$ . Ketone Bodies Utilization Excretion and Clinical Significance. Biosynthesis of Fatty acids. Metabolism of Triglycerides (TGs). Phospholipids and Sphingolipids. Cholesterol Biosynthesis and its Regulation. Metabolism of Lipoproteins.

### **Unit IV**

**15Hrs**

Overview of Biosynthesis of Aromatic Amino Acids, Catabolism of Amino Acids Transamination, Deamination, Urea Cycle. Catabolism of Carbon skeletons of amino acids. Conversion of Amino Acids to specialized products, Melanin.

### **Unit V**

**15Hrs**

*De-novo* and Salvage pathways of Purine & Pyrimidine Nucleotides. Catabolism of Purine and Pyrimidines. Biosynthesis and Degradation of Heme and Porphyrins. Integration of metabolism interconversion of major food stuffs. Metabolic profile of the liver, adipose tissue and brain. Altered metabolism in starvation.



## REFERENCES:

1. Campbell and Farrell, 2002 Biochemistry 4<sup>th</sup> edition. Brooks/Cole Pub Co.
2. Davidson and Sittman 1999. Biochemistry NMS 4<sup>th</sup> edition. Lippincott. Williams and Wilkins.
3. Donald Voet, J.G. Voet and John Wiley, 1995. Biochemistry
4. Kuchel and Ralston, 1998. Biochemistry, 2<sup>nd</sup> edition. Schaum's Outlines McGraw Hill.
5. Murray, et al. 2003. Harper's Biochemistry. 26<sup>th</sup> edition. McGraw Hill
6. Nelson Cox, 2004. Lehninger's Principles of Biochemistry, 4th edition. McMillan Worth.
7. Biochemistry by Stryer. W.H. Freeman, 6<sup>th</sup> edition. 2006.

## **ELECTIVE II - ECOLOGY EVOLUTION & BIODIVERSITY**

**Paper Code:**  
**4 Hrs/Week -3 Credits**  
**Total – 60 Hrs**

**Objective:** To understand the hierarchy of Evolution & Biodiversity.

### **Unit I**

**15Hrs**

Emergence of evolutionary thoughts. Lamarck, Darwin –concepts of variation, adaptation, struggle, fitness and natural selection. Mendelism, spontaneity of mutations, the evolutionary synthesis.

### **Unit II**

**15 Hrs**

Origin of cells and unicellular evolution, Origin of basic biological molecules, abiotic synthesis of organic monomers and polymers, concept of Oparin and Haldane, experiment of Miller(1953), the first cell, evolution of prokaryotes, Origin of eukaryotic cells, evolution of unicellular eukaryotes.

### **Unit III**

**10 Hrs**

The mechanisms, Population genetics, concepts and rate of change in gene frequency through natural selection, migration and random genetic drift, adaptive radiation and modification, isolating mechanisms, speciation, allopatricity and sympatricity, convergent evolution, sexual selection, co-evolution.

### **Unit IV**

**10 Hrs**

Interaction between environment and biota, concept of habitat and ecological niches, Limiting factors, energy flow, food web and trophic levels. Ecological pyramids and recycling, Biotic community –concept, structure dominance, fluctuation and succession, N,P,C,S cycles in nature, Ecosystem dynamics and management, stability and complexity of ecosystems, speciation and extinctions, environmental impact assessment.

### **Unit V**

**10 Hrs**

Physio –chemical properties of water, kinds of aquatic habitat (fresh water and marine), distribution of and impact of experimental factors on the aquatic biotic productivity and biodegradation in

different ecosystems, fish and fishes of India with respect to the management of estuarine, coastal water systems and man made reservoirs, biology and ecology of reservoirs.

**Text Books:**

1. Environmental Biodiversity – P.R.Yadav
2. Text Book of Ecology Eugene P.Oodum.
3. Ecology Environment and Pollution by A.Balasubramanian.

**References**

1. Biodiversity of Microbial Life – Staley Reysenbach.
2. Glimpses of Biodiversity – B.Bhosetti

## **CORE PRACTICAL – III**

**Paper Code:**  
**5 Hrs/Week -3 Credits**  
**Total – 75 Hrs**

**Objectives:** Learning the techniques concerned with subcellular fractionation and enzyme purifications.

### **SUBCELLULAR ENZYMOLOGY**

1. Subcellular fractionation of Liver Cells and Identification of Marker Enzymes - 5'Nucleotidase.
2. Purification of Alkaline Phosphatase from Kidney
3. Determination of Optimum PH on Alkaline phosphatase
4. Determination of Optimum Temperature on Alkaline phosphatase
5. Effect of Substrate Concentration on Alkaline Phosphatase Activity
6. Purification of Acid Phosphatase from Potato
7. Determination of Optimum PH on Acid phosphatase
8. Determination of Optimum Temperature on Acid phosphatase
9. Inhibition of Acid Phosphatase Activity by EDTA
10. Effect of Activator on Alkaline Phosphatase Activity

#### **Text Books:**

1. Laboratory manual in Biochemistry – Jayaraman
2. Biochemical methods – S.Sadasivan and Manickam

#### **Reference:**

1. Medical Laboratory technology – kanai L. Mukherjee, Tata McGraw Hill Publication and Co. ltd., vo. I, II, III.
2. Practical clinical biochemistry – Harold Varley, CBS, New Delhi.

## **CORE PRACTICAL – VI**

**Paper Code:**  
**5 Hrs/Week -3 Credits**  
**Total – 75 Hrs**

### **CLINICAL ENZYMOLOGY & MICROBIOLOGY**

**Objectives:** Learning the techniques concerned with clinically important enzyme detection in blood and microbial culture techniques.

1. Assay of Serum Acid Phosphatase Activity
2. Assay of Serum Alkaline Phosphatase Activity
3. Assay of Serum Alkaline Aminotransferase Activity (SGOT)
4. Assay of Serum Aspartate Aminotransferase Activity (SGPT)
5. Sterilization techniques
6. Preparation of Media-Liquid, Solid, Agar deep, Slant & Plate
7. Staining Techniques – Simple, Differential & Gram Staining
8. Pure Culture Techniques – Streak Plate, Pour Plate
9. Growth Curve – Visual Method – Haemocytometer Method, Turbidity Method
10. Identification and enumeration of Micro-organisms from Water-Standard Plate Count, MPN test & Membrane filtration technique.

#### **Text Books:**

1. Laboratory manual in Biochemistry – Jayaraman
2. Biochemical methods – S.Sadasivan and Manickam

#### **Reference:**

1. Medical Laboratory technology – kanai L. Mukherjee, Tata McGraw Hill Publication and Co. ltd., vo. I, II, III.
2. Practical clinical biochemistry – Harold Varley, CBS, New Delhi.

**Common to B.Sc., (CS ) / BCA / B.Sc.,(SW)**

**I Year – First Semester**

**(For Candidates admitted from 2013 onwards)**

**DIGITAL LOGIC FUNDAMENTALS**

**Subject Code :**

**Credits : 5**

**OBJECTIVES:**

To understand number systems, logic fundamentals and circuits , organization of computers , operating systems such as Windows and Linux.

**Unit I**

**10**

**Hours**

**Number Systems** -Decimal, Binary, Octal, Hexadecimal and their inter conversions, Representation of negative numbers- Binary Arithmetic - Fixed point and Floating point representation of numbers. Binary codes - BCD, Excess-3, Gray code, alphanumeric Codes, Error detecting and error correcting codes.

**Unit II**

**10**

**Hours**

**Boolean Algebra** :Axioms - Simplification of Boolean Functions - Logic gates - Truth Table – Universal Gates - The K-map method up to five variable, don't care conditions, POS & POS forms - Quine Mc-Clusky method (Tabular method)

**Unit III**

**15**

**Hours**

**Combinational Logic:** Half/Full adder/subtractor , code converters, combinational circuit design, Multiplexers,demultiplexers, encoders, decoders, Combinational design using MUX & DEMUX. Binary adder/subtractor, BCD adder, binary multiplier, magnitude comparator,

**Unit IV****15****Hours**

**Sequential logic:** Latches, Flip flops (RS,Clocked RS,D,JK,JK Master Slave,T)-Counters & types

Synchronous and Asynchronous counters- Counters of arbitrary sequence. Shift registers and their types.

**Unit V****10****Hours**

**Computer Organisation :** Primary Memory & its types and differences . Secondary Memory: Hard Disk and optical Disk, Cache Memory, I/O devices. Access methods -Random, Direct, Sequential. Softwares –High-Level- Assembly and Low Level languages. Translators -Assembler, Interpreter and compiler. Operating Systems: Types -real Time, Single/Multi User – Single/Multi tasking, GUI based OS. Windows and LINUX.

**Text Book:****Total****Hours:60**

1. Morris Mono M., “**Digital Logic and Computer Design**”, PHI

**Reference Books :**

1. Morris Mano M, Kime .R.Charles, ”**Logic And Computer Design Fundamentals**”(2<sup>nd</sup> Edition Updated )

**PC SOFTWARE LAB**

**a) Excel**

1. Using formulae ( Numeric, String, Date, Financial etc) to compute Simple Compound Interest, EMI, FV etc
2. Drawing various graphs Chart - Line, XY, Bar and Pie for a given set of data.
3. Conditional Formatting
4. Sorting and Import / Export features.
5. Macros and VBA

**b) Access**

- 6) Creation of table / primary key /
- 7) Query / Parameter Query / Relations
- 8) Filtering Records
- 9) Left / Right / Equi / Cross Joins
- 10) Design of forms / Reports / Modules

**c) HTML**

- 11) Creating web page with simple & advanced tags.
- 12) Drawing Tables
- 13) Web Page with Frames and Links ( internal & external )
- 14) Creating Simple forms
- 15) Applying CSS to HTML

**REFERENCE BOOK:**

- 1.LAB MANUAL



**Common to B.Sc., (CS) / BCA / B.Sc.,(SW)**

**I Year – Second Semester**

**(For Candidates admitted from 2013 onwards)**

**PROGRAMMING IN C**

**Subject Code:**

**Credits : 5**

**OBJECTIVES:**

The purpose of this course is to understand simple algorithms , language constructs and to develop programming skills in C.

**UNIT – I**

**10**

**Hours**

**Fundamental Algorithms & Factoring Methods:** Algorithm characteristics, Structure of algorithm - Linear, iterative, loop, decision constructs – Flow chart – need – Illustrative examples through : Exchanging the values of two variables , Counting, Summation of a set of numbers, Factorial computation, Generation of Fibonacci sequence, Reversing the digits of a number, Base conversion, Finding the square root of a number, Smallest divisor of an integer, GCD of two numbers, Generating prime numbers, Computing the prime factors, Generating the pseudo random numbers, Computing the nth Fibonacci number.

**UNIT – II**

**10**

**Hours**

**Introduction to C:** C character set -Identifiers and keywords. Data types and sizes, Declarations, Expressions, statements and symbolic constants, Input/output functions – type conversions – precedence and order of evaluation. Operators and expressions: Arithmetic, unary, logical, bit-wise, assignment and conditional operators, Library function, user defined functions -Control statements, comma operator.

**UNIT – III**

**15**

**Hours**

**Arrays:** Defining and processing, passing to a function, Multi dimensional arrays. Functions: Defining and accessing: passing arguments, Function prototypes, Recursion, Use of library functions, Storage classes, automatic, external and static and register variables. Strings: Operations on strings.

**UNIT – IV****15****Hours**

**Pointers:** Declarations, Passing to a function. Operations on pointers, Pointers and arrays, Arrays of pointers. Structures- nested structures - defining and processing, passing to a function, Unions. Pre processors, Command line arguments.

**UNIT – V****10****Hours**

**Files:** Open, close, create, process, Unformatted data files. Text and binary files - Dynamic memory allocation – streams - error handling.

**Text Books:****Total****Hours: 60**

1. How to solve it by computer by R.G.Dromey, PHI International ( Unit I )
2. E. Balagurusamy, “Programming in C”, Tata McGrawhill Publishers ( Unit II to V )

**Reference Books:**

1. Kernighan, B.W. and Ritchie, D.M., “The C Programming Language (ANSIC)”, PHI.
2. Foster & Foster , “C by Discovery”, Penram International Publishers, Mumbai.

**Common to B.Sc., (CS ) / BCA / B.Sc.,(SW)**

**I Year – Second Semester**

**(For Candidates admitted from 2013 onwards)**

**Programming in C – Lab**

**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.LAB MANUAL

## **M.Sc., (Computer Science)**

### **I Year-First Semester**

**(For Candidates admitted from 2013 -2014)**

#### **ADVANCED JAVA PROGRAMMING**

##### **OBJECTIVES:**

The course covers several general-purpose topics: using and building generic types, writing multi-threaded applications, the Reflection API and annotations, and network programming using sockets. It combines with various other topics like JDBC, secure coding, Swing GUI programming, design patterns, and so on.

##### **Unit I : Java Basics Review:**

**8 Hours**

Java streaming - Networking - Event handling - Multithreading - Byte code Interpretation - Customizing application - Data Structures - Collection classes.

##### **Unit II : Distributed Computing:**

**10**

##### **Hours**

Custom sockets - Remote Method Invocation - Activation - Object serialization -Distributed garbage collection - RMI - IIOP - Interface definition language - CORBA - JINI overview.

##### **Unit III : Java Beans and Swing:**

**12**

##### **Hours**

Bean concepts - Events in bean box - Bean customization - Persistence - Application - deployment using swing - Advanced swing techniques - JAR file handling.

##### **Unit IV : Java Enterprise Applications:**

**12**

##### **Hours**

JNI - Servlets - Java Server Pages - JDBC - Session beans - Entity beans - Programming and deploying enterprise Java Beans - Java transactions.

##### **Unit V : Related Java Techniques:**

**10**

##### **Hours**

Java Media Frame work - 3D graphics - Internationalization - Case study - Deploying n-tier application,

E- commerce applications.

##### **TEXT / REFERENCE BOOKS**

**Total Hours: 52**

1. Java How to Program : Dietel and Dietel – 6<sup>th</sup> Edition – PHI Publication.
2. Gary Cornell and Cay S. Horstmann, "Core Java Vol 1 and Vol 2", Sun Microsystems Press.

**M.Sc., (Computer Science)**  
**I Year-First Semester**  
**(For Candidates admitted from 2013 -2014)**  
**ADVANCED JAVA LAB**

1. Write a java program that demonstrates
  - a. FileInputStream and FileOutputStream.
  - b. FileReader and FileWriter.
  - c. BufferedReader & BufferedWriter.
  - d. DataInputStream and DataOutputStream.
2. Implement the Java program for echo server and echo client to demonstrate networking in Java using Sockets.
3. Create a simple java bean and demonstrate it using Bean Box.
4. Create a Java bean that demonstrates
  - a. Indexed Property.
  - b. Bound Property.
  - c. Constrained Property.
  - d. Event Handling and communication between two beans.
5. Write a Java program that demonstrates user define packages.
6. Write a Java program that demonstrates JDBC.
7. Write a Java program that demonstrates JSP.
8. Write a Java program that demonstrates different types of EJB.
9. Write a Java program to demonstrate the use of Swing Classes/Components.
10. Write a Java program(s) that demonstrates the use of collection classes listed below
  - a) Stack      b) Queue      c) Array      d) Vector
  - e) Map      f) Multi-map      g) Set      h) Multi-set
  - i) TreeSet      j) List      k) Linked list      l) HashMap
  - m) HashSet      n) LinkedHashMap      o) LinkedHashSet

**REFERENCE BOOK:**

- 1.LAB MANUAL

**M.Sc., (Computer Science)**

**I Year-First Semester**

**(For Candidates admitted from 2013 -2014)**

**SOFTWARE ENGINEERING**

**OBJECTIVES:**

This course introduces the concepts and methods required for the construction of large software intensive systems. It seeks to complement this with a detailed knowledge of techniques for the analysis and design of complex software intensive systems.

**UNIT - I: INTRODUCTION TO SOFTWARE ENGINEERING: 10**

**Hours**

Definition and size factors – Quality and productivity factors – Managerial issue-Planning a Software Project: Defining the problem – Developing a solution strategy – planning the development process – planning an organization structure – other planning activities

**UNIT - II: SOFTWARE COST ESTIMATION 10**

**Hours**

Software – Cost factors – Software cost estimation techniques – specification techniques – level estimation – estimating software maintenance costs.

**UNIT - III: SOFTWARE REQUIREMENTS DEFINITION 8**

**Hours**

The software requirements specification – formal languages and processors for requirements specification.

**UNIT - IV: SOFTWARE DESIGN 10**

**Hours**

Fundamental Design concepts – Modules and modularizing Criteria – Design Notations – Design Techniques – Detailed Design Consideration – Real time and distributed system design – Test plan – Mile stones walk through and inspection – Design guide lines

## **UNIT - V: SOFTWARE TESTING AND MAINTENANCE**

**10**

### **Hours**

Quality assurance – Static analysis – symbolic exception – Unit testing and Debugging – System testing – Integration testing-White box testing-Black box testing –Managua aspects of software maintenance – Configuration management – source code metrics – other maintenance tools and techniques.

### **TEXT / REFERENCE BOOK**

**Total**

### **Hours:48**

1. Software Engineering Concepts, Richard E. Fairly, McGraw-Hill book Company.
2. A concise introduction to software engineering –Pankaj Jalote- TMH ,2004.

**M.Sc., (Computer Science)**

**I Year-First Semester**

**(For Candidates admitted from 2013-2014)**

**ADVANCED NETWORKS**

**OBJECTIVES:**

This course provides advanced details and applications of layers like physical, data link layer, network layer, transport and application layers.

**UNIT I : PHYSICAL LAYER**

**10 Hours**

Data Communications – Networks – Networks models – ISO-OSI Layer Model – TCP / IP Reference Model – Classification of Networks: LAN,MAN,WAN,SAN, public and private Networks. Novell Netware Reference Model.

**UNIT II : DATA LINK LAYER**

**15 Hours**

Data link control: Framing – Flow and error control – Error Correction: VRC-LRC-CRC, High level data link control (HDLC)- LLC and MAC- Fiber distributed data Interface(FDDI)- IEEE Standards 802.3, IEEE 802.4, IEEE 802.5, and IEEE 802.11 Bluetooth.

**UNIT III : NETWORK LAYER**

**10 Hours**

Internet Protocol: Internetworking - IPv4, IPv6 – Address mapping – ARP, RARP,BOOTP, DHCP, ICMP, IGMP, Delivery – Forwarding – Routing – Distance Vector Routing, Link State Routing Algorithm

**UNIT IV : TRANSPORT LAYER**

**10 Hours**

Process-to-Process delivery – User Datagram Protocol (UDP) –Transmission Control Protocol(TCP) – Congestion Control – Quality of services (QoS). Multiplexing and De Multiplexing

**UNIT V : Cell Relay and Asynchronous Transfer Mode(ATM)**

**15 Hours**

ATM features- Protocol Architecture- Virtual Channel and Virtual Paths- ATM Cells – Structure at UNI and NNI- Generic Flow Control- Header Error Control- ATM Services –CBR-VBR-UBR- ABR. ATM Adaptation Layers-AAL1- AAL2- AAL3/4- AAL5. ATM Traffic Control: Connection Admission Control (CAC)- Usage Parameter Control (UPC)-Virtual Scheduling Algorithm- Continuous State Leaky Bucket Algorithm. Traffic Shaping.



**TEXT / REFERENCE BOOKS****Total Hours: 60**

1. William Stallings, “Data and Computer Communication”, Eighth Edition, Pearson Education, 2000.
2. Andrew S. Tannenbaum, “Computer Networks”, Pearson Education, Fourth Edition, 2003
3. Wayne Tomasi, “Introduction to Data Communication and Networking”, 1/e, Pearson Education.
4. James .F. Kurose & W. Rouse, “Computer Networking: A Topdown Approach Featuring”, 3/e, Pearson Education.
5. Behrouz A. Foruzan, “Data communication and Networking”, Tata McGraw-Hill, 2006

**M.Sc., (Computer Science)**

**I Year-First Semester**

**(For Candidates admitted from 2013 -2014)**

**NETWORK PROGRAMMING LAB**

1. Implement TCP and UDP Client-Server programs for following services:
  - a) Printing the Host ID, local port, also the client should indicate connection status
  - b) Echo Service              c) Day Time Service              d)Chargen Service
  - e)Mathematical Operation on numbers              f)Checking number for prime, palindrome etc.
  - g)Calculating factorial   h)Calculating Fibonacci series   i)Case conversion in given string
2. Implement Client-Server programs for demonstrating working of Concurrent Connection Oriented Servers using single process.
3. Implement Client-Server programs for demonstrating working of Concurrent Connection Oriented Servers using multiple processes.
4. Implement Telnet Server program for providing different types of Telnet Services.
5. Demonstrate and implement the file transfer using FTP.
6. Develop the Chat Client and Server program. The Server should be concurrent such as to provide intercommunication between multiple clients.
7. Develop a simple web server capable of accepting request from standard client like IE, Netscape, Opera etc (use standard protocol HTTP).

**REFERENCE BOOK:**

- 1.LAB MANUAL

**M.Sc., (Computer Science)**

**I Year-First Semester**

**(For Candidates admitted from 2013 -2014)**

**THEORY OF COMPUTATION**

**OBJECTIVES:**

To provide a study about Finite Automata and Non-Finite Automata, To understand regular expressions, context free grammars and languages and Realize some simple mathematical functions as turing machines

**UNIT I : AUTOMATA**

**9 Hours**

Introduction to formal proof – Additional forms of proof – Inductive proofs –Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

**UNIT II : REGULAR EXPRESSIONS AND LANGUAGES**

**9 Hours**

Regular Expression – FA and Regular Expressions – Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.

**UNIT III : CONTEXT-FREE GRAMMARS AND LANGUAGE**

**9 Hours**

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG– Deterministic Pushdown Automata.

**UNIT IV : PROPERTIES OF CONTEXT-FREE LANGUAGES**

**9 Hours**

Normal forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

**UNIT V : UNDECIDABILITY**

**9 Hours**

A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post's Correspondence Problem – The classes P and NP.

1. J.E. Hopcroft, R. Motwani and J.D. Ullman, “Introduction to Automata Theory, Languages and Computations”, second Edition, Pearson Education, 2007.
2. H.R. Lewis and C.H. Papadimitriou, “Elements of the theory of Computation”, Second Edition, Pearson Education, 2003.
3. Thomas A. Sudkamp,” An Introduction to the Theory of Computer Science, Languages and Machines”, Third Edition, Pearson Education, 2007.
4. Raymond Greenlaw and H. James Hoover, “ Fundamentals of Theory of Computation, Principles and Practice”, Morgan Kaufmann Publishers, 1998.
5. Michael Sipser, “Introduction of the Theory and Computation”, Thomson Brooks/Cole, 1997.
6. J. Martin, “Introduction to Languages and the Theory of computation” Third Edition, Tata McGraw Hill, 2007

**M.Sc., (Computer Science)**

**I Year-Second Semester**

**(For Candidates admitted from 2013 onwards)**

**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 : DIVIDE AND CONQUER METHOD**

**8 Hours**

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort ,Heap sort, Strassen's matrix multiplication

**UNIT II : GREEDY METHOD**

**10 Hours**

Greedy method: Single source shortest path problem-Knapsack problem-Flow shop scheduling-Minimum spanning trees-. Search techniques-Code optimization, Depth first search, breadth first search. .

**UNIT III : DYNAMIC PROGRAMMING**

**10 Hours**

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, All pairs shortest path problem-0/1 knapsack problem- Travelling sales person problem.

**UNIT IV : BACKTRACKING**

**10 Hours**

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles. Branch and Bound: General method, applications - Travelling sales person problem.

**UNIT V : NP-COMPLETENESS**

**10 Hours**

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem.

**TEXT / REFERENCEBOOKS :****TotalHours:48**

- 1.Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam,Galgotia publications pvt. Ltd.
- 2.Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia,John wiley and sons.
3. Introduction to Algorithms, secondedition,T.H.Cormen,C.E.Leiserson, R.L.Rivest,and C.Stein,PHI Pvt. Ltd./ Pearson Education.

## **M.Sc., (Computer Science)**

### **I Year-Second Semester**

**(For Candidates admitted from 2013 onwards)**

## **CYBER FORENSICS**

### **OBJECTIVES:**

To study the fundamentals of computer forensics, various threats associated with security and information warfare and the tools and tactics associated with cyber forensics. To have an overview of techniques for Data Recovery and Evidence Collection

### **Unit I : Introduction**

**8 Hours**

History of Forensics- Rules of Computer Forensics- Technology Abuses Affecting - Corporate and Personal Securities- Defining Cyber Forensics- Cyber Forensics- Investigation Process- Dividing Force Behind implementing Corporate Cyber. Overview of cyber crimes.

### **Unit II : Cyber Forensics Tools and Utilities & Concealment Techniques**

**15 Hours**

Introduction- Cyber Forensics Tools- Tool Review- Coroner's Toolkit- EnCase Forensic- i2 Analyst's notebook- LogLogic's LX2000- Mandiant First Response- NetWitness- ProDiscover Incident Resoinsem Sleuth Kit and Autopsy Browser- Additional Tools for the Investigators- SafeBack- GetTime- FileList-FileCnvt- Getfree- Swap Files- Temporary Files- Spoliation- Secret Key Cryptography- Public Key Cryptography- Hash Function- Spoofing- Internet Protocol- Transmission Control Protocol- Hijacked Session Attacks- Polymorphism- Steganography- Reversing the Steganographic process- Counter or Anti Forensics- Cloaking Techniques: Data hide and seek- Renaming Files- Manipulating File Systems- and Data Hiding on NTFS

### **Unit III : Network Traffic and Applications**

**10 Hours**

Introduction- NIST- Using Data from Operating Systems- BIOS- Volatile Data- Using Data From Network Traffic- Network Forensics Analysis Tools- Collecting Network Traffic Data- Examining Collected data- Identify an Event of Internet- Examine data sources- Data Source Value- Examination and Analysis Tolls- Attackers Identification- e-mail- Web Usage- Interactive Communication- Security Applications.

### **Unit IV : Standard Operating Procedures: Digital Forensic Lab Accreditation Standards**

**8 Hours**

Digital Forensic Laboratory accreditation Standards- Laboratory Manager Checklist- Digital Forensics Examiner Checklist- Technician or Assistant Checklist- Budget Checklist- Training and Testing Checklist- Evidence Control Checklist- Quality Assurance Checklist- Equipment Checklist- Health and Safety Checklist- Laboratory Facilities Checklist

## **Unit V : Data Recovery, Forensic Analysis & Privacy**

**7 Hours**

Recovering Deleted Files and Deleted Partitions (Windows & Linux)- Deleting Files- Recycle Bin- Deleted File and Partition recovery Tools- Data Acquisition and Duplication-

Digital Forensics- Acquiring Images- Forensic Analysis- File Carving.

Law Relating and Privacy- Common Law Privacy- Constitutional Law- Legal Liability for Mistakes.

### **TEXT / REFERENCE BOOKS:**

**Total Hours:48**

1. Albert J.Marcella- Jr. Doug Menendez- “Cyber Forensics”- Second Edition- Auerbach Publications.

2. Anthony Reyes & Jack Wiles- “Cybercrime and Digital Forensics”- Syngress.

3. Dan Farmer & Wietse Venema- “Forensics Discovery”- Addison-Wesley- Professional Computing Series

Jonathan Rosenoer- “Cyber Law:The law of the internet”- Springer Verlag- 1996



## **M.Sc.- (Computer Science)**

### **I Year-Second Semester**

**(For Candidates admitted from 2013 onwards)**

## **MOBILE COMPUTING**

### **OBJECTIVES:**

To build a solid foundation of the fundamental details of wireless communication-telecommunication networks and WLAN standards. It gives more details about mobile layers- mobile servers and mobile OS.

### **Unit I : Introductory Framework & WAMC Access**

**10 Hours**

Concept of mobile computing- basic architecture. mobile devices- limitations of mobile devices- GSM architecture and operations - radio interfaces- handover- security; General Packet Radio Service (GPRS); CDMA Systems - WCDMA- IMT-2000- UMTS-

### **Unit II : LAMC Access & Mobile Network Layer**

**15 Hours**

Basic MAC protocol CSMA/CA- Infrastructure and ad hoc network topologies- MACA- MACAW- use of PCF- IEEE 802.11 standards- Hiperlan; IrDA; Blue Tooth- ZigBee -Routing algorithms - DSR- AODV- TORA- CGSR. Mobile IP- basic concept- handover management- location management- registration- tunneling- route optimization- dynamic host configuration.

### **Unit III : Mobile Transport Layer & Mobile Databases**

**15 Hours**

Limitations of TCP in mobile wireless systems- TCP fixes – Snooping- Indirect TCP; TCP variants - Fast retransmit/recovery- TCP - Reno- TCP-freeze- TCP- Transaction oriented- Explicit notification.

Basic concepts - Hoarding and caching- cache invalidation- client - server computing architecture- transaction models- query processing- data recovery. Data dissemination - communication asymmetry- data delivery mechanisms- broadcast disks- selective tuning and indexing; synchronization protocols.

### **Unit IV : Mobile Server and Management & Mobile OS**

**10 Hours**

Mobile agents- gateways- service discovery- device management- mobile file system. Basic concepts; requirements- Symbian OS- Palm OS.

**Unit V : Programming and Language Support & Security in Mobile Computing      10 Hours**

WAP architectures- WML- X HTML - MP- XML- J2ME. Information security- techniques and algorithms- protocols- trust- security models and frame works.

**TEXT / REFERENCE BOOKS**

**Total Hours : 60**

1. Raj Kamal- "Mobile Computing"- Oxford University Press.
2. A.K. Talukder and R.R. Yavagal- "Mobile Computing : Applications and Service Technology- Creation"- Tata-McGraw Hill.
3. W. Stallings- "Wireless Communications and Networks"- Pearson Education.

**M.Sc.- (Computer Science)**

**I Year-Second Semester**

**(For Candidates admitted from 2013 onwards)**

**OPEN SOURCE PROGRAMMING LAB**

1. Develop a PHP program using controls and functions
2. Develop a PHP program and check message passing mechanism between pages.
3. Develop a PHP program using String function and Arrays.
4. Develop a PHP program to display student information using MYSQL table.
5. Develop a college application form using MYSQL table.
6. Develop a PHP program using parsing functions (use Tokenizing)
7. Develop a PHP program and check Regular Expression- HTML functions- Hashing functions.
8. Develop a PHP program and check File System functions- Network functions- Date and time functions.
9. Develop a PHP program using session.
10. Develop a PHP program using cookie and session.

**REFERENCE BOOK:**

- 1.LAB MANUAL

**M.Sc.- (Computer Science)**

**I Year-Second Semester**

**(For Candidates admitted from 2013-2014)**

**MOBILE APPLICATION DEVELOPMENT LAB**

1. EditText-Button-OnClickListener-Counter
2. EditText-RadioButton-OnCheckedChangeListener-Discount Calculator
3. Background-SetColor-RadioButton-Coloring
4. Intent-MediaPlayer-Thread-Splash Screen with sound
5. SeekBar-OnSeekBarChangeListener-Coloring Layout
6. TabWidget-onInitListener-Talking Clock
7. ListView-onItemClick/onItemLongClick/AlertDialog
8. GridView-ImageView-BaseAdapter-SetLayout
9. Reading/Writing file in SD Card
10. Menu Inflate

**REFERENCE BOOK:**

1. LAB MANUAL

**M.Sc.- (Computer Science)**

**I Year-Second Semester**

**(For Candidates admitted from 2013 -2014)**

**FUZZY LOGIC AND NEURAL NETWORKS**

**Subject Code:**

**Credits : 3**

**OBJECTIVES:**

This course provides the details and structure of biological and artificial neuron and the applications of artificial neural networks- including the fuzzy systems and fuzzy logic controls.

**UNIT-I: ARCHITECTURES**

**10 Hours**

Introduction – Biological neuron – Artificial neuron – Neuron modeling – Learning rules – Single layer – Multi layer feed forward network – Back propagation – Learning factors.

**UNIT-II: NEURAL NETWORKS FOR CONTROL**

**10 Hours**

Feed back networks – Discrete time hop field networks – Transient response of continuous time networks – Applications of artificial neural network - Process identification – Neuro controller for inverted pendulum.

**UNIT-III: FUZZY SYSTEMS**

**8 Hours**

Classical sets – Fuzzy sets – Fuzzy relations – Fuzzification – Defuzzification – Fuzzy rules.

**UNIT-IV: FUZZY LOGIC CONTROL**

**10 Hours**

Membership function – Knowledge base – Decision-making logic – Optimisation of membership function  
using neural networks – Adaptive fuzzy system – Introduction to genetic algorithm.

**UNIT-V: APPLICATION OF FLC**

**10 Hours**

Fuzzy logic control – Inverted pendulum – Image processing – Home heating system – Blood pressure during anesthesia – Introduction to neuro fuzzy controller.

1. Jacek M. Zurada- 'Introduction to Artificial Neural Systems' - Jaico Publishing home- 2002.
2. Timothy J. Ross- 'Fuzzy Logic with Engineering Applications' - Tata McGraw Hill- 1997.
3. Laurance Fausett- Englewood cliffs- N.J.- 'Fundamentals of Neural Networks' - Pearson Education- 1992.
4. H.J. Zimmermann- 'Fuzzy Set Theory & its Applications' - Allied Publication Ltd.- 1996.
5. Simon Haykin- 'Neural Networks' - Pearson Education- 2003.
6. John Yen & Reza Langari- 'Fuzzy Logic – Intelligence Control & Information' - Pearson Education- New Delhi- 2003.

**ENVIRONMENTAL STUDIES**  
**(For all UG Degree Courses)**  
**(SUBJECT CODE: U3ENV101)**

**Objective:** Economic development and general welfare of a society largely depend upon a pollution free environment. This bond between Environment and Economics is sure to motivate the future generation to undertake environment friendly economic activities.

**UNIT – I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES:**

Environmental Sciences – Relevances – 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 CONVERSATION:**

Ecosystem - Concept – Structure and Function – Producers, Consumer and Decomposers – Food Chain – Food Web Ecological Pyramids – Energy flow – Forest, Grassland, Desert and Equatic Eco-system

**UNIT – III: ENVIRONMENTAL POLLUTION AND MANAGEMENT:**

Environmental Pollution – Causes – Effects and controls measures of Air, Water, Marine , Soil, Solid Waste, Thermal, Nuclear Pollution and Disaster Management – Floods, Earth Quake, Cyclone and Landslides. 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 – 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– women and child welfare – public awareness – case studies

**UNIT – V: FIELD WORK:**

Meet to a local area/ Local polluted site/ local simple ecosystem – Report Submission

**Reference Books**

1. KUMARASAMY, K., A.ALAGAPPA MOSES AND M.VASANTHY, 2004.
2. ENVIRONMENTAL STUDIES, BHARATHIDASAN UNIVERSITY PUB,1,TRICHY
3. RAJAMANNAR,2004,ENVIRONMENTAL STUDIES, EVR COLLEGE PUB,TRICHY
4. KALAVATHY,S.(ED)2004, ENVIRONMENTAL STUDIES , BISHOP HEBER COLLEGE PUB, TRICHY

**VALUE EDUCATION**  
**(For all UG Degree Courses)**  
**SUBJECT CODE: U3VED201**

**UNIT – I**

Value Education – Definition – Relevance to Present day – Concept of Human Values – Self Introspection – Self Esteem.

**UNIT – II**

Family Values – Components, Structures and Responsibilities of Family – Joint family – Nucleus 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 And 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 Science 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/ Issues of Globalization – Modern Welfare – Terrorism. Environmental Issues – Mutual Respect of Different Cultures, Religions and their Beliefs.

**Reference Books**

1. T. Anchukandam and J. Kuttainimaththil (ED), Grow Free Live Free, Krisity Jyoti Publication, 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.
7. The Holy Quran.



# **HUMAN RIGHTS**

## **SEMESTER II**

### **P3HR2001**

#### **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 till World War II - Human Rights and the U.N.O. - Universal Declaration of Human Rights - International Covenant on Civil and Political Rights - International Covenant 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

## ANNEXER-I

### SEMESTER I

#### Paper- I ALLIED PHYSICS

Credits : 3

No. of hrs/wk : 5

**Objective:** This paper is offered to the students of mathematics, Chemistry and Computer Science as allied Subjects. The logical reasoning behind the description of the physics problem and obtaining the solution to such problems are taught in this paper.

#### 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 – Rigidity Modulus – Determination of rigidity modulus by Torsional oscillation (without masses) .

**Viscosity:** viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – comparison of viscosities of two liquids by graduated burette method.

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

#### UNIT II – Heat

Specific heat – Callender's Barne's method to determine the specific heat of a liquid – Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive power- Kirchoff's laws of radiation.

#### UNIT – III – Electricity and Magnetism

**Electricity: Potentiometer** – Principle – Calibration of low range voltmeter - Measurement of internal resistance of cell – measurement of an unknown resistance- Capacitance of a conductor - Capacitance of spherical and parallel plate capacitor – energy of a charge capacitor - Loss of energy due to sharing of charges

**Magnetism** –Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – period of oscillation

#### UNIT IV- SOUND AND ACOUSTICS OF BUILDING

**Sound:** Transverse vibration of strings – Vibration of strings – Velocity and frequency of vibrations of a stretched string – laws of vibrations along a stretched string – 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

**Physical Optics:** Interference –Air Wedge –description - 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 lines using a grating by normal Incidence.

**Polarisation:** Optical activity –specific rotatory power – Polarimeter – Determination of specific rotatory power of a solution using the polarimeter.

### Books for study:

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).

### Books for Reference:

1. Modern Physics –R. Murugesan S. Chand & Co.(2004)
2. Electronic Principles and applications – A. B. Bhattacharya, New Central Book Agency, Culcutta.
3. Introduction to Solid state Physics – C. Kittel, 5<sup>th</sup> Edition Wiley Eastern Ltd.
4. Renewable & sustainable energy sources – Agarwal.
5. Introduction to Fiber optics by K. Thyagarajan and Ajay Ghatak, Cambridge, University Press (1999)

## Semester II

### Paper- II ALLIED PHYSICS

Credits : 3

No. of hrs/wk : 5

**Objective:** This paper is offered to the students of mathematics, Chemistry and Computer Science as allied Subjects. The logical reasoning behind the description of the physics problem and obtaining the solution to such problems are taught in this paper.

#### Unit I - Atomic physics

Atom model - vector Atom model- electron spin and spacial quantization - quantum numbers - Pauli's exclusion principle - excitation and ionization potentials- experimental determination-Franck and Hertz method

#### Unit II - Nuclear Physics

Particle Accelerator- Linear accelerator, cyclotron – Particle detectors – GM counter – Transmutation – Types – The Q value equation for a nuclear reaction – Types of nuclear reaction – Basic concepts of fission and fusion – Nuclear reactor – Harmful effects of nuclear radiation - Prevention.

#### Unit III –Electromagnetism and Transient current

Faraday's laws of electromagnetic induction - vector form – Lenz's law – self and mutual inductance – Determination of coefficient of self inductance – Rayleigh's method – Induction coil – Growth and Decay of current in LR circuit – Growth and Decay of charge in RC circuit – Determination of High Resistance by Leakage method.

#### Unit IV - Crystallography and Fiber Optics

Types of Solids - Crystalline - and amorphous - Crystalline matter - Periodic Array of Atoms - The crystal structure - Unit cell - Miller indices – Determination - Bragg's law. Types of bonding in crystal-Principle and propagation of light within the fiber - classification of optical fiber - fiber optic communication system block diagram.

#### Unit V - Electronics

Basic Electronics: Junction Diode - LED - Zener diode - voltage regulator - Junction transistor - Characteristics of Transistor - common base - common emitter mode

Digital electronics: AND, OR, NOT gates - construction using diodes and transistors - NAND and NOR gates - Universal building Blocks. Boolean algebra - Demorgan's theorem – verification.

#### Books for study:

1. Allied Physics by Dr.R.Sabesan and Dr.Mrs.Dhanalakshmi
2. Allied Physics by Mr. Kamalakkannan and Jayraman.
3. Text book of optics by Brijal and Subramanian
4. Modern Physics by R. Murugesan S.Chand & Co.

**Books for Reference:**

1. Physics, 4<sup>th</sup> Edition, Vols I, II & II Extended by D.Halliday, R.Resnick and K.S.Krane, Wiley, NY, 1994.
2. Digital Principles and Application - Malvino & Leach.
3. Basic Electronics, 6<sup>th</sup> Edition by B. Grob, McGraw- Hill, NY, 1989.

# Semester I

## Allied Practical Paper-I

Credits : 2

No. of hrs/wk : 2

**Objective:** It is aimed at exposing the Allied students to the technique of handling simple measuring instruments and also make them measure certain mechanical and thermal properties of matter.

### List of Experiments (All ten experiments compulsory)

1. Young's Modulus – Non-uniform bending method using Pin and Microscope.
2. Rigidity Modulus – Torsional oscillation method (without symmetric masses)
3. Determination of Co-efficient of viscosity – Graduated Burette.
4. Specific heat capacity of a liquid – Method of mixtures.
5. Sonometer — Determination of frequency of tuning fork (Screw Gauge is given)
6. Newton's Rings – Radius of curvature of the convex lens.
7. Spectrometer- Refractive index of a glass prism (minimum deviation)
8. Potentiometer – calibration of low range voltmeter.
9. Determination of  $M$  and  $B_H$  using Deflection magnetometer in Tan C position and vibration magnetometer.
10. Characteristics of junction diode

### Books for Reference

1. M.N. Srinivasan, S. Balasubramanian, R. Ranganathan, A Textbook of practical Physics, Sultan Chand & Sons
2. C.C. Ouseph, G. Rangarajan, R. Balakrishnan- A Textbook of practical Physics- S. Viswanathan Publisher-PartII (1996)

## Semester II

### Allied Practical Paper-II

Credits : 2

No. of hrs/wk : 2

**Objective:** It is aimed at exposing the Allied students to the technique of handling simple measuring instruments and also make them measure certain mechanical and thermal properties of matter

#### List of Experiments (All ten experiments compulsory)

1. Young's Modulus – Non-uniform bending method using Scale and Telescope.
2. Rigidity Modulus – Torsional oscillation method (with symmetric masses)
3. Surface tension and interfacial surface tension – by drop weight method.
4. Specific heat capacity of a liquid – by Newton's law of cooling
5. Sonometer – Determination of AC frequency Using steel wire (Electromagnet)
6. Spectrometer Grating – Normal incidence – Wavelength of mercury spectral lines.
7. Potentiometer – calibration of low range ammeter.
8. Figure of merit – Current Sensitiveness and voltage sensitiveness of a galvanometer.
9. Construction of AND, OR gates using diodes and NOT by transistors.
10. Zener diode – Voltage Regulation.

#### Books for Reference

1. M.N. Srinivasan, S. Balasubramanian, R. Ranganathan, A Textbook of practical Physics, Sultan Chand & Sons
2. C.C Ouseph, G. Rangarajan, R. Balakrishnan- A Textbook of practical Physics- S. Viswanathan Publisher-PartII (1996)

## SEMESTER-II

### I B.Sc- Core Practical- II

Credits : 3

No. of hrs/wk : 4

**Objective:** It is aimed at exposing the under graduate students to the technique of handling simple measuring instruments and also make them measure certain mechanical and thermal properties of matter.

#### List of Experiments (All ten experiments compulsory)

1. Rigidity modulus – Torsional pendulum – without masses.
2. Rigidity modulus and moment of inertia – Torsional pendulum – with identical masses
3. Coefficient of viscosity of a liquid – graduated burette - Radius of capillary tube by mercury pellet method.
4. Specific heat capacity – Joules calorimeter
5. Specific heat capacity of a liquid – Newton's law of cooling.
6. Sonometer – Determination of AC frequency Using brass wire (Barmagnet)
7. Sonometer – Comparison of radii of the given wires.
8. Spectrometer – Refractive index of a glass prism (minimum deviation)
9. Post office box – temperature coefficient of resistance of the coil.
10. Unregulated and Zener regulated power supply. (full wave)

#### TEXT BOOKS:-

1. C.C Ouseph, G.Rangarajan- A Text Book of Practical Physics- S. Viswanathan Publisher- Part I (1990)
2. C.C Ouseph, C.Rangarajan, R.Balakrishnan- A Text Book of Practical Physics- S.ViswanathanPublisher-Part II ( 1996)

#### Books for Reference

1. S.L Gupta and V.Kumar- Practical Physics- Pragati Prakashan – 250<sup>th</sup> Edition (2002)
2. M.N. Srinivasan, S. Balasubramanian, R. Ranganathan, A Textbook of practical Physics, Sultan Chand & Sons



