

# **Bachelor of Science**

**(Mathematics, Physics & Computer Science)**

## **Syllabus**



**School of Distance Education  
Andhra University, Visakhapatnam, Andhra Pradesh**

**ANDHRA UNIVERSITY**  
**B.Sc. (MPCs)**

First Year Courses

Paper 1: English Language  
Paper 2: Telugu/Hindi/Sanskrit  
Paper 3: Foundation course  
Paper 4: Computer Course : Introduction to Computers  
Paper 5: Mathematics : Differential equations & Solid Geometry  
Paper 6: Physics - Mechanics, Waves and Oscillations  
Paper 7: Computer Science : PC Software and “C” Programming

Second Year Courses

Paper 1: English Language  
Paper 2: Telugu/Hindi/Sanskrit  
Paper 3: Environmental Studies  
Paper 4: Mathematics : Abstract Algebra & Real Analysis  
Paper 5: Physics - Thermodynamics and Optics  
Paper 6: Computer Science: Object Oriented Programming with Java and Data Structures  
Paper 7: Computer Course : Office Automation Tools

Third Year Courses

Paper 1: Foundation Course II  
Paper 2: Mathematics :Linear Algebra & Vector Calculus  
Paper 3: Mathematics: Numerical Analysis  
Paper 4 : Physics - Electricity, Magnetism and Electronics  
Paper 5: Physics - Physics: Modern Physics  
Paper 6 : Computer Science :(Database Management Systems)  
Paper 7: Computer Science : Operating Systems

**SYLLABUS**  
**BA/B.Com/B.Sc Common Paper**

**ENGLISH TRACKS**  
**A COURSE IN POETRY, PROSE AND GRAMMAR**

**POETRY :**

John Keats : Ode to Autumn  
Matthew Arnold : Dover Beach  
W.H.Auden : The Unknown Citizen  
Wilfred Owen : Insensibility  
R. Parthasarathy : From Homecoming  
Aduri Satyavathi Devi - Myraid - Winged Bird  
Telephone Conversation

**PROSE :**

Bernard Shaw : Spoken English and Broken English  
Will and Ariel Durant : Is Progress Real  
Stephen Leacock : The Conjuror's Revenge  
A.J. Cronin : The best investment I ever made  
Dr. B.R. Ambedkar : Prospects of Democracy in India  
Martin Luther King Jr. : I have a Dream  
Students of Barbiana : Letter to a teacher  
J.B.D'Souza : Taking the law into their hands

**GRAMMAR :**

Idioms  
Tenses  
Detection of Errors

**BUILDING COMPETENCY**

**A Course in Reading and Writing English**

**SHORT STORIES**

Leo Tolstoy : Little Girls are Wiser Than Men  
Ruskin Bond : How Far Is the River  
William Shakespeare : The Merchant of Venice  
Rabindranath Tagore : Sacrifice

**A Course in Listening and Speaking I**

SCHOOL OF DISTANCE EDUCATION

ANDHRA UNIVERSITY

(B.A/B.Com/B.Sc. Degree First Year)

పేపర్ - 1 ద్వితీయ భాష - జనరల్ తెలుగు

**అభ్యసన ఫలితాలు (Course Objectives)**

ఈ పాఠాన్ని ఒక క్రమబద్ధమైన పద్ధతిలో రూపొందించి అందిస్తున్నాం.

1. పాఠాల్లో పరిచయం, ఉద్దేశం, పాఠ్యం అర్థతాత్పర్యాలు, విషయ విభాగం పాఠ్యభాగ సారాంశం, సందర్భ సహిత వ్యాఖ్యలు మాదిరి ప్రశ్నలు అభ్యాసాలు గుర్తించుకోవలసిన ముఖ్యాంశాలు
2. పరీక్ష దృష్ట్యా ప్రశ్నలు సమాధానాలు, ఆధారగ్రంథాలు చదవదగిన పుస్తకాలు అనే విభజన పాటించడమైంది.
3. పరిచయంలో ప్రక్రియ గురించి, రచయిత గురించి, పాఠ్యం గురించి పరిచయం ఉంటుంది.
4. ఉద్దేశంలో పాఠ్యం స్థూలపరిచయం ఉంటుంది. పాఠ్యంలో చదవలసిన అంశం ఉంటుంది
5. విషయ విభాగంలో పాఠ్యభాగ సారాంశంలోని ముఖ్యాంశాల విభజన ఉంటుంది. తద్వారా పాఠ్యభాగ సారాంశం ఉంటుంది.
6. పద్యాలకు అర్థతాత్పర్యాలు, కొన్ని వాక్యాలకు సందర్భ సహిత వ్యాఖ్యలు ఉంటాయి
7. పాఠం చివర అదనపు సమాచారం చదవదగిన పుస్తకాలు సమకూర్చారు
8. సాహిత్య పఠనాభిలాషను, అధ్యయన కౌశలాన్ని, విమర్శనా దృష్టిని రచనా శక్తిని పెంపొందిస్తాయనీ ప్రత్యేకించి పరీక్షల్లో మీకు కృతార్థతను చేకూర్చి పెడతాయని మేం ఆశిస్తున్నాము.

**SCHOOL OF DISTANCE EDUCATION**

**ANDHRA UNIVERSITY**

**(B.A/B.Com/B.Sc. Degree First Year)**

పేపర్ - 1 ద్వితీయ భాష - జనరల్ తెలుగు పాఠ్యప్రణాళిక

**ప్రాచీన కవిత్వం (Syllabus)**

1. గంగాశంతనుల కథ - నన్నయ
2. మూషిక మార్జాల వృత్తాంతం - తిక్కన
3. హంసీచక్రవాక సంవాదం - అల్లసాని పెద్దన
4. ఎఱుకత - తరిగొండ వెంగమాంబ

**ఆధునిక కవిత్వం**

5. మా కొద్దీ తెల్లదొరతనము - గరిమెళ్ళ సత్యనారాయణ
6. మహాప్రస్థానం - శ్రీశ్రీ
7. ముసాపరులు - జాషువ
8. మేఘదూతము - పుట్టపర్తి నారాయణాచార్యులు కథానికలు
9. గాలివాన - పాలగుమ్మి పద్మరాజు
10. ఆకలి - కొలకలూరి ఇనాక్
11. నమ్మకున్న నేల - కేతు విశ్వనాథ రెడ్డి
12. జైలు - పొట్లపల్లి రామారావు

**వ్యాకరణం:**

1. సవర్ణదీర్ఘ, గుణ, యణాదేశ, వృద్ధి, త్రిక, గసడదవాదేశ, రుగాగమ, టుగాగమ, ఆమ్రేడిత, అత్వసంధి మొదలైనవి. సంధులు.

2. తత్పురుష, కర్మధారయు, ద్వంద్వ, ద్విగు, బహువ్రీహి మొదలైనవి. సమాసాలు ఉపవాచకము: నవల:

ప్రజల మనిషి - వట్టి కోట ఆశ్వురుస్వామి

# I B.A. B.COM B.SC DEGREE

## SANSKRIT Paper - 1

### Course Objectives

1. To develop basic skills in reading, writing, and speaking Sanskrit, including mastery of the Devanagari script, pronunciation, and basic sentence construction.
2. To acquire foundational knowledge of Sanskrit grammar, including noun declensions, verb conjugations, and sentence structure.
3. To build a basic Sanskrit vocabulary, including common nouns, verbs, adjectives, and adverbs.
4. To cultivate an appreciation for the literary and cultural richness of Sanskrit, including the study of major literary genres like epic poetry, and lyric poetry.
5. To develop skills in translating simple Sanskrit sentences and passages into English or Telugu.
6. To deepen understanding of Indian culture and philosophy through the study of Sanskrit texts in these fields, including the Ramayana and Mahabharata and Panchatantra tales.
7. To cultivate an awareness of the historical and cultural contexts in which Sanskrit was used, including the study of major periods and movements in Indian history.
8. To prepare for intermediate-level study in Sanskrit, including the mastery of more complex grammatical concepts and the study of more challenging texts.
9. To develop a critical awareness of the limitations and biases of translations of Sanskrit texts, and to develop the ability to evaluate different translations for accuracy and readability.
10. To engage with the wider community of scholars and enthusiasts of Sanskrit Language and culture, including the use of online resources, attendance at public lectures and events, and participation in student-led activities.

### Syllabus

#### **POETRY :**

Lesson No. 1                      Saranagathi

From Valmiki Ramayanam Yuddhakanda 17<sup>th</sup>  
Canto Slokas 11 – 68

Lesson No. 2                      Ahimsa Paramodharmah

From Srimadbharatam, Adiparva 8<sup>th</sup> chapter Sloka 10  
– to the end of 11 Chapter

Lesson No. 3                      Raghoh Audaryam

From Raghuvamsa 5<sup>th</sup> Canto 1 – 35 Slokas

## **PROSE:**

Lesson No. 4	Mitrasampraptih From Pancatantra – Ist Story (Abridged)
Lesson No. 5	Modern prose Chikroda katha Andhra Kavya Kathah By Sannidhanam Suryanarayana Sastry
Lesson No. 6	Computer Yanthram By Prof. K.V. Ramakrishnamacharyulu

## **GRAMMAR**

### **DECLENSIONS:**

#### **Nouns ending in Vowels:**

Deva, Kavi, Bhanu Dhatr, Pitr, Go, Rama, Mati, Nadee, Tanu, Vadhoo,  
Matr, Phala, Vari & Madhu

### **SANDHI:**

Swara Sandhi :	Savarnadeergha, Ayavayava, Guna, Vrddhi, Yanadesa
Vyanjana Sandhi :	Scutva, Stutva, Anunasikadvitva, Anunasika, Latva, Jastva
Visarga Sandhi :	Visarga Utva Sandhi, Visargalopa Sandhi, Visarga Repha Sandhi, Ooshma Sandhi

### **SAMASA :**

(1) Dwandwa	(2) Tatpurusha (Common)
(2a) Karmadharaya	(2b) Dwigu
(2c) Paradi Tatpurusha	(2d) Gatitaturusha
(2e) Upapada Tatpurusha	(3) Bahuvrihi
(4) Avyayibhava	

### **CONJUGATIONS**

Ist Conjugations – Bhoo, Gam, Shtha, Drhs Labh, Mud,

IInd Conjugation – As

IIIrd Conjugation – Yudh,

IV th Conjugation – Ish

VIII Conjugation – Likh, Kri

IXth Conjugation – Kree

Xth Conjugation – Kath, Bhash, Ram, Vand,

# SYLLABUS

## **BA/B.Com/B.Sc Common Paper Hindi**

- A. Prose - Gadya Sandesh,  
Editor : Dr. V.L. Narasimham Shiva KotiLorven Publications, Hyderabad.
- B. Non-Detailed - Katha LokEditor : Dr. Ghanshyam  
Sudha Publications, Hyderabad
- C. **GRAMMAR** Pertaining to the following topics
  - I. Rewriting of sentences as directed based on : Case, Gender, Number, Tense, Voice.
  - II. Correction of sentences
  - III. Usage of words into sentences
  - IV. Karyalaya Hindi; Administrative Terminology (Prashasanik shabdavali), officialdesignations (padnam)
    - a. Changing English terms to Hindi
    - b. Changing Hindi terms to English
  - V. Sandhi Vichchhed
  - VI. Antonyms (Vilom Shabd)
- D. Letter Writing - Personal Letters, Official Letters, Letter of Complaints, Application forappointment.

**SYLLABUS**  
**FOUNDATION COURSE**  
**Common to all 1<sup>st</sup> Year Degree Students (B.A. / B.Com. / B.Sc.,)**  
**CONTEMPORARY INDIA : ECONOMY, POLITY AND SOCIETY**

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**UNIT - I**

Basic features of Indian Economy - Trends in National Income - Role of Agriculture Sector - Problems, Remedial Measures; Industry - Large Scale, Small scale - Problems and remedial measures; a brief review of Industrial policies in India. Role of Public Sector in the context of globalization.

**UNIT - II**

Population, Poverty, Unemployment and Income Inequalities - Causes and Consequences - Remedies - Inflation - Causes and Remedies - Indian Tax Structure Globalisation, Economic Reforms and their impact on Indian Economy.

**UNIT - III**

Indian National Movement - Various stages - Its legacy. Integration of Native States and Formation of Modern India. Formation of Andhra Pradesh.

**UNIT - IV**

Basic Characteristics of Indian Constitution - Indian Political System, Emergence of All India Parties - Regional Parties - Coalition Politics.

Centre - State Relations - Emerging trends - Various Commissions - Rajamannar Committee, Anandpur Sahib Resolutions, Sarkaria Commission. Indian Foreign Policy - Non - Aligned Movement

- Local Self Governments in the light of 73<sup>rd</sup> 74<sup>th</sup> Constitutional amendments. Right to Information Act

- Governance- factors influencing Governance - Civil Society.

**UNIT - V**

Salient features of Indian Social Structure, Social Groups : Primary and Secondary, Association - Institution. Status and Role - Norms, Values and Customs. Concept of Socialisation – Agencies of Socialization.

Gender Issues - Women Liberation Movements in India - Domestic Violence, Women empowerment - Entrepreneurship Programs - Child Labour.

Human Rights – Importance and violation of Human Rights.

ANDHRA UNIVERSITY  
FOR ALL B.A/B.COM/B.Sc. Common Paper  
I YEAR  
THEORY PAPER-IV  
INTRODUCTION TO COMPUTERS

**Course Objectives**

1. Demonstrate the basic principles of computer software and hardware, Input devices, output devices.
2. Apply skills and concepts of computer hardware and software.
3. Learning about storage devices and operating system basics
4. Learning how data communicates.
5. Understanding the basics of email and web based communication.
6. Understanding the basics of information security and privacy.
7. Create personal, academic and business documents using MS-word.
8. Create PowerPoint presentations

**COURSE OUTCOMES:**

1. Gaining practical experience in using office automation tools for professional and personal use.
2. Prepare for further study or careers in office administration, data entry or other related fields.
3. Able to use of office automation tools, including formatting documents, creating spreadsheets, and designing presentations.
4. Developing a foundational understanding of office automation tools and their applications.
5. Developing skills in file management and data backup.

**Syllabus**

**Unit-1: Exploring Computers**

Exploring Computers and their uses :

Overview: Computers in our world, The computer defined, Computers for individual users, Computers for organizations, Computers in society, Why are

computers so important.

Looking inside the computer system:

Overview: Detecting the ultimate machine, The parts of a computer system, The information processing cycle, Essential computer hardware: processing devices, memory devices, Input and output devices, Storage devices, System software, Application software, Computer data, Computer users.

Using the keyboard and mouse:

Overview: The keyboard and mouse, The keyboard, How the computer accepts input from the keyboard, The mouse, Variants of the mouse, Ergonomics and input devices.

Inputting data in other ways:

Overview: Options for every need and preference, Devices for hand, optical input devices, Audio-visual input devices.

Video and Sound:

Overview: Reaching our senses with sight and sound, Monitors, Ergonomics and monitors, Data projectors, Sound systems.

## **Unit-2:Storage Devices and Operating System Basics**

Printing: Overview: putting digital content in your hands, Commonly used printers, High-quality printers, Thermal – wax printers, Dye-sublimation printers, Plotters.

Transforming data into information:

Overview: The difference between data and information, How computers represent data, How computers process data, Machine cycles, Memory, Factors effecting processing speed, The computer's internal clock, The Bus, Cache memory.

Types of storage devices:

Overview: An ever-growing need, Categorizing storage devices, Magnetic storage devices—How data is stored on a disk, How data is organized on a magnetic disk,

How the operating system finds data on a disk, Diskettes, hard disks ,Removable high-capacity magnetic disks, Tape drivers, Optical storage devices, Solid-state storage devices, Smart cards, Solid-state disks.

Operating system basics:

Overview: The purpose of operating systems, Types of operating systems, Providing a user interface, Running programs, Managing hardware, Enhancing an OS utility software.

Networking Basics:

Overview: Sharing data anywhere, anytime, The uses of a network, Common types of networks, Hybrid networks, How networks are structured, Network topologies and protocols, Network media, Network hardware.

### **Unit-3:Data Communications and Computer Programs**

Data Communications:

Overview: The local and global reach of networks, Data communications with standard telephone lines and modems, Modems, uses for a modem, Using digital data connections, Broadband connections, Wireless networks.

Productivity Software:

Overview: Software to accomplish the work of life, Acquiring software, Commercial software, Freeware and public domain software, Open-source software, Word processing programs, Spreadsheet programs, Presentation programs, Presenting information managers.

Database management Systems:

Overview: The mother of all computer applications, Databases and Database Management Systems, Working with a database.

Creating Computer programs:

Overview: What is a computer program, Hardware/Software interaction, Code, machine code, programming languages, Compilers and interpreters, Planning a computer program, How programs solve problems. Programming languages and the programming process:

Overview: The keys to successful programming, The evolution of programming languages, Worldwide web development languages, The Systems development lifecycle for programming.

#### **Unit-4:MS-Word**

Word Basics: Starting word, Creating a new document, Opening pre existing document, The parts of a word window, Typing text, Selecting text, Deleting text, Undo, Redo, Repeat, Inserting text, Replacing text, Formatting text, Cut, Copy, Paste – Formatting Text and Documents: Auto format, Line spacing, Margins, Borders and Shading.

Headers and Footers : Definition of headers and footers, creating basic headers and footers, creating different headers and footers for odd and even pages.

Tables : Creating a simple table, Creating a table using the table menu, Entering and editing text in a table, selecting in table, adding rows, changing row heights, Deleting rows, Inserting columns, Deleting columns, changing column width.

Graphics: Importing graphics, Clipart, Insert picture, Clip Art Gallery, using word's drawing features, drawing objects, text in drawing.

Templates: Template types, using templates, exploring templates, modifying templates.

Macros: Macro, Recording macros, editing macros, running a macro.

Mail Merge: Mail Merge concept, Main document, data sources, merging data source and main document, Overview of word menu options word basic toolbar.

#### **Unit-5:Ms-Power Point**

Power Point: Basics, Terminology, Getting started, Views

Creating Presentations : Using auto content wizard, Using blank presentation option, Using design template option, Adding slides, Deleting a slide, Importing Images from the outside world, Drawing in power point, Transition and build effects, Deleting a slide, Numbering aslide, Saving presentation, Closing presentation, Printing presentation elements.

**BA/B.Com./B.Sc. Common Paper**  
**PAPER I : General English**  
**SYLLABUS**

**POETRY :**

1. John Donne: THE SUN RISING
2. Wordsworth: THE SOLITARY REAPER
3. Robert Frost: THE ROAD NOT TAKEN
4. Chinua Achebe: REFUGEE MOTHER AND CHILD
5. Nissim Ezekiel: GOODBYE PARTY FOR MISS PUSHPA
6. Tripuraneni Srinivas: I WILL EMBRACE ONLY THE SUN

**PROSE :**

7. Satyajit Ray: FILM MAKING
8. Isai Tobolsky: NOT JUST ORANGES
9. Herman Wouk: A TALK ON ADVERTISING
10. AG Gardiner: ON SHAKING HANDS
11. Arnold Joseph Toynbee: INDIA'S CONTRIBUTION TO WORLD UNITY
12. Ngugi wa Thiongó: DECOLOISING MIND

**SHORT STORIES FOR READING COMPETENCE :**

13. Gita Hariharan: GAJAR HALWA
14. Norah Burke: MY BROTHER, MY BROTHER

**ONE-ACT PLAYS FOR READING COMPETENCE :**

15. Fritz Karinthy: REFUND (One Act Play)
16. William Shakespeare: JULIUS CAESAR (CAESAR'S MURDER SCENE)

**WRITTEN COMMUNICATION:**

17. WRITING CURRICULA VITAE
18. E-CORRESPONDENCE

**EXERCISES FOR WRITING COMPETENCE:**

19. JUMBLED PASSAGES
20. PARAGRAPH-WRITING

**A COURSE IN LISTENING AND SPEAKING II:**

- Part- I: Listening Skills
- Part- II: Speaking Skills
- Part- III: communication Skills
- Part- IV: Telephone Skills

SCHOOL OF DISTANCE EDUCATION

ANDHRA UNIVERSITY

(B.A/B.Com/B.Sc, Degree Second Year)

పేపర్ - 2 ద్వితీయ భాష - జనరల్ తెలుగు

**అభ్యసన ఫలితాలు (Course Objectives)**

ఈ పాఠాన్ని ఒక క్రమబద్ధమైన పద్ధతిలో రూపొందించి అందిస్తున్నాం.

1. పాఠాల్లో పరిచయం, ఉద్దేశం, పాఠ్యం అర్థతాత్పర్యాలు విషయ విభాగం, పాఠ్యభాగ సారాంశం, సందర్భసహిత వ్యాఖ్యలు మాదిరి ప్రశ్నలు అభ్యాసాలు గుర్తించుకోవలసిన ముఖ్యాంశాలు
2. పరీక్ష దృష్ట్య ప్రశ్నలు సమాధానాలు, ఆధారగ్రంథాలు చదవదిగిన పుస్తకాలు అనే విభజన పాటించడమైంది.
3. పరిచయంలో ప్రక్రియ గురించి, రచయిత గురించి, పాఠ్యం గురించి పరిచయం ఉంటుంది
4. ఉద్దేశంలో పాఠ్యం స్థూల పరిచయం ఉంటుంది. పాఠ్యంలో చదవలసిన అంశం ఉంటుంది.
5. విషయ విభాగంలో పాఠ్యభాగ సారాంశంలోని ముఖ్యాంశాల విభజన ఉంటుంది తద్వారా పాఠ్యభాగ సారాంశం ఉంటుంది
6. పద్యాలకు అర్థతాత్పర్యాలు, కొన్ని వాక్యాలకు సందర్భ సహిత వ్యాఖ్యలుంటాయి
7. పాఠం చివర అదనపు సమాచారం చదవగిన పుస్తకాలు సమకూర్చారు
8. సాహిత్య పఠనాభిలాషను, అధ్యయన కౌశలాన్ని, విమర్శనా దృష్టిని, రచనా శక్తిని పెంపొందిస్తాయనీ ప్రత్యేకించి పరీక్షల్లో మీకు కృతార్థతను చేకూర్చి పెడతాయని మేం ఆశిస్తున్నాము.

**SCHOOL OF DISTANCE EDUCATION**

**ANDHRA UNIVERSITY**

**(B.A/B.Com/B.Sc, Degree Second Year**

**పేపర్ - 2 ద్వితీయ భాష - జనరల్ తెలుగు**

**ప్రాచీన కవిత్వం (Syllabus)**

1. వామనావతారము - పోతన
  2. శాలివాహన విజయము - కొఱవి గోపరాజు
  3. గ్రీష్మర్తువు - రఘునాథ నాయకుడు
- ఆధునిక కవిత్వం

4. హరిజన శతకము - కుసుమ ధర్మన్న
5. ధర్మసంవాదము - పింగళి, కాటూరి
6. బతకమ్మా! బ్రతుకు - కాళోజీ నారాయణరావు
7. మనిషి - డా॥అందెశ్రీ
8. రాయలసీమ - గంజి కేంద్రము - బెళ్లూరి శ్రీనివాసమూర్తి
9. వంటిల్లు - విమల

**గద్యభాగం**

1. తెలుగుభాష - ఆచార్య గుజ్జర్లమూడి కృపాచారి
2. వ్యక్తిత్వ వికాసం - ఆచార్య రాచపాళెం చంద్రశేఖరరెడ్డి
3. మాధ్యమాలకు రాయడం - ఆచార్య యస్.జి.డి. చంద్రశేఖర్
4. అభివ్యక్తి నైపుణ్యాలు - డా॥ పి.వి. సుబ్బారావు

**ఉపవాచకం:**

1. పాలేరు - బోయిభీమన్న

**వ్యాసాలు, వ్యాకరణం**

అలంకారములు - ఉపమ, రూపక, ఉత్పేక్ష, స్వభావోక్తి, అతిశయోక్తి - అర్థాంతరన్యాస, దృష్టాంతము

ఛందస్సు - ఉత్పలమాల, చంపకమాల, శార్దూలం, మత్తేభం, కందం, తేటగిత్రి ఆటవెలది.

School of Distance Education  
Andhra University - Visakhapatnam  
II B.A. B.COM B.SC DEGREE  
SANSKRIT Paper – 2

**Course Objectives**

1. To continue building a strong foundation in Sanskrit grammar, including the mastery of Alankaaras, Pratyas, and sandhi rules.
2. To develop the ability to read and comprehend simple Sanskrit texts, including prose and poetry, with the help of dictionary and basic vocabulary.
3. To deepen understanding of Sanskrit vocabulary, including the ability to recognize and use common words, idioms, and expressions.
4. To develop skills in translating Sanskrit texts into English or Telugu, with attention to accuracy, clarity, and style.
5. To cultivate an appreciation for the literary and cultural richness of Sanskrit texts, including the study of major genres like moral prose, drama, and lyric poetry.
6. To deepen understanding of Indian philosophy and religion through the study of Sanskrit texts in these fields, including the Mahabharata and Upanishads.
7. To develop skills in analysis and interpretation of Sanskrit texts, including the ability to identify themes, motifs, and rhetorical devices.
8. To cultivate an awareness of the historical and cultural contexts in which Sanskrit texts were produced, including the study of major periods and movements in Indian history.
9. To prepare for advanced study in Sanskrit or related fields, including the pursuit of graduate degrees or careers in academia, publishing, translation, or cultural preservation.
10. To develop independent research skills through the completion of assignments on a topic related to Sanskrit language, literature, or culture.

## Syllabus

- |                           |                           |
|---------------------------|---------------------------|
| (1) Drama                 | (2) Drama (Modern)        |
| (3) Upanishad             | (4) Prose                 |
| (5) Bhoja Prabandha story | (6) History of Literature |
| (7) Alankaras ,           | (8) Grammar               |

## **Drama**

### 1) Pratima Gruham

Pratima of Bhasa III act only

### 2) Modern Drama

Bharata Samskruteh mulam

P. Sreeramachandrudu from (Susamhata Bharatam VI act)

## **Prose**

### 4) Sukanasopadesah

From Kadambari Sangraha

### 5) Bhojasya Saraswati Sushama

From Bhojaprabandha Page No. 74 (Abridged form)

### 6) Poets and Books from History of literature

1) Panani

(2) Kautilya

3) Bharatamuni

(4) Bharavi

5) Magha

(6) Sri Harsha

7) Bhavabhuti

(8) Sankaracharya

9) Dandin

(10) Jagannadha

### 7) Alankaras from Kuvalayananda

(1) Upama

(2) Ananvayaa

(3) Utpreksha

(4) Deepakam

(5) Aprastutaprasamsa

(6) Drstantam

(7) Arthantaranyasa

(8) Virodha Bhasa

(9) Ullekha

(10) Vyajasthuti

## 8) Grammar

Declensions :

Halanta Nouns

- |             |              |
|-------------|--------------|
| (1) Jalamuc | (2) Vac      |
| (3) Marut   | (4) Bhagavat |
| (5) Pachat  | (6) Rajan    |
| (7) Gunin   | (8) Naman    |
| (9) Vidwas  | (10) Manas   |

Pronouns :

Asmad, Yushmad, Idam, Tat, Etat, Yat, KimParticiples :

Ktva, Lyap, tumun, Kta. Ktavat, Shatr, Shanac, Tavya

BA/B.Com/B.Sc Common Core  
SECOND LANGUAGE

HINDI

PAPER-II

A. Poetry Text - Kavya Deep

Editor : Sri B.Radha Krishna Murthy, Maruthi Publications, Guntur.

B. History of Hindi Literature:

Main tendencies of all the four ages with special references to the following authors and poets:

(1) Chand Vardai (2) Kabir das (3) Surdas (4) Tulasidas (5) Mirabai (6) Raheem (7) Biharila (8) Bharatendu Harisdhendra (9) Mahaveer Prasad Dwivedi (10) Maithilisharan Gupt (11) Premchand (12) Jayashankar Prasad (13) Pant (14) Nirala (15) Maha Devi Verma (16) Agryeya (17) Dinkar.

C. General Essay:

(1) Sahitya Aur Samaj (2) Vidyarthi Rajniti (3) Vidyarthi Aur Anushasan (4) Aaj Ki Shiksha Niti (5) Vigyan: Abhishap Ya Vardan (6) Nari Shiksha (7) Samaj Main Nari ka Sthan (8) Adhunik Shiksha Aur Nari (9) Bharat Main Berojgari Ki Samasya (10) Bharat Par Bhoomdalikaran Ka Prabhav (11) H.I.V./Aids (12) Paryavaran Aur Prabooshan (13) Bharat Main Badhati Hui Janasankhya Ki Samasya

D. Translation from English to Hindi

E. Prayojan Moolak Hindi: (1) Prayojanmooka Hindi: Arth Evam Swarop (2) Raj Bhasha, Rastra Bhasha aur Sampark Bhasha.

**SYLLABUS**  
**(BA/B.Sc/ B.COM COMMON PAPER)**  
**Paper-III ENVIRONMENTALSTUDIES**

**Course Objectives:**

1. To make the students realize the importance and their role in the protection and maintenance of a healthy Environment for sustainable development
2. To enable students to grasp the significance and issues related to ecosystems, biodiversity and natural resources, ways of managing/ protecting the environment
3. To enable students to have minimal understanding of environmental pollution, solid waste management and climate change and act with concern environmental issues.
4. To make students aware of the environmental policies and movements, and the role of individuals and communities in environmental protection for educating and inspiring the young minds.

At the end of the course, students will—

1. Understand the importance and dimension of a healthy environment, become environmentally conscious, skilled and responsible in all their action with a concern for sustainable development.
2. Comprehend the significance and issues related to ecosystems, natural resources and biodiversity and become aware of the need and ways to protect/preserve them.
3. Grasp the issues related to environmental pollution, solid waste management and climate change and become conscious and proactive in the discharge of their responsibilities towards the environment
4. Become aware and appreciate the value and concern of environmental movement and policies and the role of communities, and act responsibly on environment related issues.

**Unit – 1: Environmental studies - Introduction**

1. Definition of Environment-Its scope and importance.
2. Measuringand defining Environmentaldevelopment; indicators

**Unit – 2: Basic principles of Ecosystem functioning**

1. Concept of an ecosystem
2. Structureand function of an ecosystem.

3. Producers, Consumers and decomposers,
4. Energy flow in the ecosystem.
5. Food chains, food webs and ecological pyramids
6. Introduction, types, characteristic features, structure and functions
  - Forest ecosystem
  - Grassland ecosystem
  - Desert ecosystem
  - Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

### **Unit – 3:Environmental and Natural Resources**

1. Forest resources
  - Use and over-exploitation
  - Deforestation
  - Timber extraction
  - Mining and dams- their effects on forest tribal people
  - Case studies
2. Water resources
  - Use and over—utilization of surface and ground water
  - Floods, droughts
  - Conflicts over water
  - Dams –benefits and costs
  - Mineral resources
  - Use and exploitations
  - Effects of extracting and using mineral resources
  - Case studies
3. Food resources
  - World food problem
  - Changes caused by agricultural and overgrazing
  - Effects of modern agriculture, fertilizer, pesticide problems, water logging and salinity.
  - Case studies
4. Energy resource
  - Growing energy needs
  - Renewal and non renewable energy sources
  - Use of alternate energy sources
  - Case studies

## 5. Land resources

- Land resource
- Common property resources
- Land degradation
- Soil erosion and desertification

## **Unit – 4: Biodiversity and its conservation**

1. Introduction – Genetic, species and ecosystem diversity
2. Bio-geographical classification of India
3. Value of biodiversity – consumptive and productive use, social ethical, and option values
4. Biodiversity – global, national and local levels
5. Hot spots of biodiversity – habitat loss, poaching of wildlife, man-wildlife conflicts
6. India as mega diversity nation.
7. Endangered and endemic species of India.
8. Conservation of biodiversity -in-situ and ex-situ conservation

**II YEAR B.A./B.Com., /B.Sc.,  
PAPER-2 OFFICE AUTOMATION TOOLS**

**OBJECTIVES:**

1. Understanding the features and functionality of office automation tools, including word processing software, spreadsheet software and presentation software.
2. Learning how to create and manage databases.
3. Understanding the basics of email and web based communication.
4. Understanding the basics of information security and privacy.

**COURSE LEARNING OUTCOMES:**

1. Gaining practical experience in using office automation tools for professional and personal use.
2. Prepare for further study or careers in office administration, data entry or other related fields.
3. Able to use of office automation tools, including formatting documents, creating spreadsheets, and designing presentations.
4. Developing a foundational understanding of office automation tools and their applications.
5. Developing skills in file management and data backup.

**Unit-1: MS EXCEL BASICS**

Excel basics: The usual spread sheet features, overview of excel features, Getting Started, creating a new work sheet, selecting cells, navigating with the undoing and repeating actions, entering and formatting numbers, entering and editing formulas, repeating cells, order of evaluation in formulas, look up tables, copying entries and equations to minimize typing, more auto fill examples, creating custom fill lists, protecting and an protecting documents and cells.

Rearranging worksheets: Moving cells, copying cells, sorting cell data, inserting rows, inserting columns, inserting cells, inserting as you paste, deleting parts of a worksheet, clearing parts of a worksheet, how formulas react to worksheet design changes, auditing tools help spot potential problems.

Excel formatting tips and techniques: Excel page setup, changing column widths and row heights, auto format, manual formatting, using styles, forma codes alter a number's appearance, format printer speeds up format copying, changing font sizes and attributes, adjusting alignments, centering text across columns, using border

buttons and commands, changing colors and shading, inserting and removing page breaks, hiding rows and columns.

Organizing large projects: Using names, splitting windows and fixing titles, outlining your worksheets, working with multiple worksheets, using multiple worksheets in a workbook, viewing multiple windows, summarizing information from multiple worksheets.

An introduction to functions: Parts of a function, functions requiring add-ins, online functions help, the function wizard, examples of functions by category, error messages from functions.

Unit-2: EXCEL CHARTS, GRAPHICS AND FUNCTIONS Excel's chart features: chart parts and terminology, instant charts with the chart wizard, creating charts on separate worksheets, resizing and moving charts, adding chart notes and arrows, editing charts, rotating 3-D charts, changing worksheet values by drawing chart parts, printing charts, deleting charts, setting the default chart type, controlling which series on which axis, adding overlay charts, creating trend lines, data map.

Working with graphics in Excel: Creating and placing graphic objects, resizing graphics, positioning graphics on worksheets, drawing lines and shapes, examples of graphics, possible sources of excel graphics, excel slide shows.

Introduction to Excel's command macros: Recording your own macros, running macros, assigning macros to buttons.

Using worksheets as databases: Database concepts and terms, creating an excel database, working with data forms, filtering-a better way to find, sorting excel databases, cross-tabulating databases, adding subtotals to databases.

Automating what-if projects: General organizational tips, scenario manager, finding the right number with solver.

Auditing and troubleshooting worksheets: Using error values to locate problems, using iteration to solve circular references, using the info window to find errors, using the auditing command to trouble shoot.

### Unit-3: MS ACCESS BASICS

Introduction to Access : Access concepts and terms, starting and quitting access, the access workspace and tools, the views.

Creating a simple database and tables: The access table wizard, creating databases without the wizard, field names, data types and properties, adding or deleting fields in tables, resizing fields, changing the appearance of text in tables, freezing columns, primary key fields, indexing fields, viewing a list of database properties.

Forms: The form wizard, saving forms, modifying forms.

Entering and editing data: Typing, adding records, duplicate previous entries without retyping, switching out of data entry mode, when do entries get saved?, undo, correcting entries, global replacements, moving from record to record in a table, entry and navigational shortcuts.

Finding, sorting and displaying data: Queries and dynasets, creating and using queries, returning to the query design, multiple search criteria, finding incomplete matches, using wildcards in queries, requesting range of records, hiding columns, reformatting dynasets, multilevel sorts, showing all records after a query, saving queries for latter use, cross tab queries, find and replace.

#### Unit-4: ACCESS REPORTS, FORMS AND GRAPHICS

Printing reports, forms, letters and labels: Simple table, forms, and database printing, defining advanced reports, manual reporting and modifying, modifying section contents, properties in reports, saving formula for reuse, printing mailing labels, changing label designs.

Relational databases: Flat versus relational, how relationships work, exercise: creating a simple relationship, types of relationships, defining and redefining relationships, deleting relationships, creating relationships.

Expressions, macros and other automation: Expressions, using expressions in reports, using expressions in queries, using expressions in forms, expression builders.

Graphics in databases: Objects: linked, embedded, bound and unbound, graphics as form and report embellishments, bound graphics in records, adding graphics to buttons, chart wizard: charting your data.

Linking, importing and exporting records: Importing versus linking, linking other databases as tables, importing data from spread sheet files, importing data from word files, exporting access data.

## Unit-5: FUNDAMENTALS OF INTERNET

The Internet and the world wide web: Overview: What is Internet, the Internet's history, The Internet's major services, Understanding the world wide web, using your browser and the world wide web, navigating the web, closing your browser, getting help with your browser, searching the web, search results and web sites.

E-mail and other Internet Services: Overview: Communicating through the Internet, using e-mail, using an e-mail program, stopping out spam, using web-based e-mail services, more features of the Internet.

Connecting to the Internet: Overview: Joining the Internet phenomenon, connecting to the Internet through wires, how PC applications access the Internet, connecting to the Internet wireless.

Doing business in the online world: Overview: commerce on the world wide web, E-commerce at the consumer level, E-commerce at the business level, Business, the Internet and everything, telecommuters.

### **III BA/B.Com./B.Sc. Common Paper**

#### **Paper I :**

#### **Science, Technology & Development(Foundation Course - II)**

##### **Course Objectives :**

CO1 : Learner will get the knowledge on Earth system

CO2 : Able to develop the concept on Evolution

CO3 : Gets general awareness about drugs

CO4 : Telecommunication types familiarity

##### **Unit - I : Science :**

1. Earth System : Characteristics features - Lithosphere, Hydrosphere - Atmosphere, Lithosphere- Soil Characteristics, texture, fertility and its control. Hydrosphere - Hydrological cycle - water bodies - ponds, lakes, rivers and their characteristics - Water consumption at global level and regional level - Management of water bodies. Atmosphere - Troposphere, Stratosphere, Ionosphere - Composition of air - Ozone - Ozone layer - its importance.
2. Life Sciences - Concepts of origin life - Evolution and diversity of life - Cell - Molecular basis of life and living forms - Mendelian concepts on inheritance - its impact on society - Blood - Blood groups - transfusion - Wild life and its conservation.
3. Chemical Science - The definitions, general awareness and importance of
  - i) Drugs - Antibiotics, Penicillin, Tetracycline, Sulpha Drugs, Anti - Malarials, Anti pyretics, Analgesics.
  - ii) Soaps and Detergents - Sources - mechanism of soap action - development of detergents - applications - disadvantages of detergents.
  - iii) Plastics and polymers - Polyethylene, polyvinylchloride (PVC), nylon 66 - rubber and synthetic rubber.
  - iv) Agrochemical and Fertilizers - Pesticides - Introduction - DDT, BHC, Malathion, Parathion - Fungicides - Rodenticides, Weedicides, Nitrogen and Phosphorus fertilizers - Microfertilizers, Bio - pesticides, neem and bacillus thuringensis.
  - v) Bio fertilizers - Applications and their affects on nature.
  - vi) Vitamins - Natural sources - importance - deficiencies (Structure and preparation methods for the syllabus mentioned in (i) to (iv) are excluded).

## **Unit - II : Technology and Development :**

1. Communication - Definition, nature and concept of communication role of communication in society. Types of Communication - Intrapersonal, Interpersonal, group and mass communication. Traditional and folk forms of communication in India. New Media technologies - Satellite, Cable and Internet. Process of Communication : Functions of communication, elements and barriers of communication. Mass Media - Press, Radio, TV and Films. Functions of mass communication. Transport - Wheel, Steam, Engine, Automobile, Ship, Airplane. Comparison of Road, Rail, Water and Air transports in terms of infrastructure, speed, costs etc.
2. Energy - Sources - Renewable sources of energy - Non - renewable sources of energy - Conventional energy sources - non conventional energy- wind, water, tidal, Solar, geothermal, atomic energy, bio - fuels - sources and their applications - Energy Management - Energy Conservation - Future needs of energy.
3. Health - Problems - Sex education - Venereal diseases, AIDS, General Protozoan, Bacterial & Viral diseases.
4. Bio - Technology - Introduction - Applications - health and Human welfare - Agriculture - Mush- room culture - Medical Plants.
5. Green Revolution - Introduction - Types of crops developed in green revolution.
6. Food Technology - Introduction - Food processing - Methods of processing - Food preservation and methods of preservation.
7. National institutions (Science) - Institutions imparting education - Institutions performing research and development - Role of Scientific institutions in Research, Technology and Development.

## **B.A./B.Sc Mathematics**

### **Mathematics Paper-1**

## **DIFFERENTIAL EQUATIONS & SOLID GEOMETRY**

### **DIFFERENTIAL EQUATIONS**

#### **Course Objectives:**

1. Solve linear differential equations.
2. Convert non exact homogeneous equations to exact differential equations by using integrating factors.
3. Know the methods of finding solutions of differential equations of the first order but not of the first degree.
4. Solve higher-order linear differential equations, both homogeneous and non homogeneous, with constant coefficients.
5. Understand the concept and apply appropriate methods for solving differential equations.
6. Get the knowledge of planes.
7. Basic idea of lines, sphere and cones.
8. Understand the properties of planes, lines, spheres and cones.
9. Express the problems geometrically and then to get the solution.

#### **Unit – I: Differential equations of first order and first degree**

Linear differential equations, Differential equations reducible to linear form Exact differential equations Integrating factor Change of variables Simultaneous differential equations: Orthogonal trajectories

#### **Differential equations of the first order but not of first degree:**

Equations solvable for  $y$ . Equations solvable for  $x$ . Equations solvable for  $x$  and  $y$ . Equations that do not contain  $x$  (or  $y$ ), Equations of the first degree in  $x$  and  $y$ -Clairaut's equation.

#### **UNIT-II: Higher order linear differential equations**

Solution of homogeneous linear differential equations of order  $n$  with constant coefficients. Solution of the non-homogeneous linear differential equations with constant coefficients by means of operations Method of undetermined coefficients; Method of variation of parameters. Linear differential equations with non-constant coefficients, The Cauchy-Euler equation

#### **System of linear differential equations:**

Solution of a system of linear equations with constant coefficients; A non-equivalent triangular system Degenerate Case  $\rho_1(D)\rho_4(D)-P_2(D)P_3(D)=0$

## **SOLID GEOMETRY**

### **UNIT-III: The Plane**

Equation of plane in terms of its intercepts on the axis. Equations of the plane through the given points, Length of the perpendicular from a given point to a given plane. Bisectors of angles between planes, Combined equation of two planes. Orthogonal projection on a plane.

#### **The Line:**

Equation of a line, Angle between a line and a plane. The condition that a given line given plane. The condition that no given lines are coplanar. Number of arbitrary constants in the straight line. Sets of conditions which determine a line. The shortest distance between two lines length and equations of the line of shortest distance between two straight lines. Length of the perpendicular from a given point to a given line. Intersection of three planes. Triangular Prism

#### **The Sphere:**

Definition and equation of the sphere. Equation of the sphere through four given points. Plane sections of a sphere. Intersection of two spheres: Equation of a circle. Sphere through a given circle, Intersection of a sphere and a line Power of a point. Tangent plane. Plane of contact. Polar plane.

Pole of a plane, Conjugate points, Conjugate planes Angle of intersection of two spheres Conditions for two spheres to be orthogonal, Radical plane. Coaxial system of spheres: Simplified form of the equation of two spheres.

### **UNIT-IV:**

#### **Cones, Cylinders and conicoids:**

Definitions of a cone vertex guiding curve, generators Equation of the cone with a given vertex and guiding curve. Enveloping cone of a sphere Equations of cone with vertex at origin are homogeneous. Conditions that the general equation of the second degree should represent a cone. Condition that a cone may have three mutually perpendicular generators Intersection of a line and cone. Tangent lines and tangent plane at a point Condition that a plane may touch a conic. Reciprocal cones Intersection of two cones with a given vertex, axis and semi-angle.

Definition of a cylinder, Equation of the cylinder whose generators intersect a given conic and are parallel to a given line, Enveloping cylinder of a sphere. The right circular cylinder Equation of the right circular cylinder with a given axis and radius.

The general equation of the second degree and the various surfaces represented by it, Shapes of some surfaces. Nature of Ellipsoid. Nature of Hyperboloid of one sheet.

## Practicals Paper

1. Integrating Factors
2. Equations of the form  $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$   
(Method of Grouping)
3. Equations of the form  $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$   
(Method of Multipliers)
4. Equations of First Order and First Degree  
(Clairaut's Equation)
5. Differential Equations with Constant Coefficients  
[Where  $Q = be^{ax}$  (or)  $Q = b \sin x$  (or)  $b \cos x$ ]
6. Linear Differential Equations with Constant Coefficients  
[When  $Q = e^{ax}v$  (or)  $Q = xv$ ]
7. Linear Differential Equations with Constant Coefficients  
[When  $Q = bx^k$ ]
8. Solutions of Differential Equations by the Method of Undetermined Coefficients
9. "Bisectors of Angles Between two Planes"
10. The Length and Equations of the Line of Shortest Distance Between two Straight Lines
11. "Sphere Through a Given Circle"
12. Angle of intersection of two Spheres
13. Condition that the General Equation of the Second Degree Should Represent a Cone
14. Reciprocal Cones
15. Right Circular Cone
16. The Right Circular Cylinders Equation of Right Circular Cylinders

**PAPER – II :ABSTRACT ALGEBRA & REAL ANALYSIS**

**Course Objectives**

1. Acquire the basic knowledge and structure of groups, subgroups and cyclic groups.
2. Get the significance of the notation of a normal subgroups.
3. Get the behavior of permutations and operations on them.
4. Study the homomorphisms and isomorphisms with applications.
5. Get a clear idea about the real numbers and real valued functions.
6. Obtain the skills of analyzing the concepts and applying appropriate methods for testing convergence of a sequence/ series.
7. Test the continuity and differentiability and Riemann integration of a function.
8. Know the geometrical interpretation of mean value theorems.
9. Understand the ring theory concepts with the help of knowledge in group theory and to prove the theorems.
10. Understand the applications of ring theory in various fields.

**UNIT-I: GROUPS:**

Binary operations-Definitions and properties, Groups--Definition and elementary properties, Finite groups and group composition tables, Subgroups and cyclic subgroups Permutation Functions and groups of permutations, cycles and cyclic notation, even and odd permutations. The alternating groups. Cyclic groups-Elementary properties. The classification of cyclic groups, sub groups of finite cyclic groups. Isomorphism-Definition and elementary properties, Cayley's theorem, Groups of cosets, Applications, Normal subgroups-Factor groups. Criteria for the existence of a coset group, Inner automorphisms and normal subgroups, factor groups and simple groups. Homomorphism Definition and elementary properties. The fundamental theorem of homomorphisms, applications

**UNIT-II:RINGS:**

Definition and basic properties, Fields, Integral domains, divisors of zero and Cancellation laws Integral domain. The characteristic of a ring some non commutative rings, Examples, Matrices over a field. The real quaternions Homomorphism of Rings - Definition and elementary properties, Maximal and Prime ideals, Prime fields

### **UNIT-III:REAL NUMBERS:**

The Completeness Properties of  $\mathbb{R}$ , Applications of the Supremum Property. (No question is to be set from this portion)

Sequences and Series Sequences and their limits, limit theorems, Monotonic Sequences Sub-sequences and the Bolzano-Weinstrass theorem, The Cuchy's Criterion Properly divergent sequences, Introduction series, Absolute convergence, test for absolute convergence, test for non-absolute convergence Continuous Functions, continuous functions, combinations of continous functions. continuous functions on intervals, Uniform continuity.

### **UNIT-IV:DIFFERENTIATION AND INTEGRATION:**

The derivative, The mean value theorems, 'Hospital Rule, Taylor's Theorem.

Riemann integration Riemann integral, Riemann integrable functions,theorem.

## **IInd Year MATHS, PRACTICAL**

### **Unit – 1:**

1 Permutations and Group of Permutations

2(a)Cyclic Groups-Basic Properties

2(b)Cyclic Groups-Classification of Cyclic Groups

### **Unit – 2:**

3. Integral domains

4. Fields

5. Characteristics of a Ring

6. Non-Commutative Rings

7. Evaluation of Homomorphisms

8.Division Algorithm in  $F(x)$

### **Unit-3**

9. Sequences and their Limits

10. Series on Real Numbers

11.Limits of Functions

12. Continuous Functions

### **Unit - 4**

13.Mean Value Theorems

14. Hospital's Rule

15. Riemann Sums

**SYLLABUS**  
**MATHEMATICS SYLLABUS B.A./B.Sc**  
**LINEAR ALGEBRA AND VECTOR CALCULUS**  
**Paper- III**

**Course Objectives**

1. Understand the concepts of vector spaces, subspaces, basis, dimension and their properties.
2. Understand the concepts of linear transformations and their properties
3. Apply Cayley- Hamilton theorem to problems for finding the inverse of a matrix and higher powers of matrices without using routine methods 4. Learn the properties of inner product spaces and determine orthogonality in inner product spaces.
4. Learn multiple integrals as a natural extension of a definite integral to a function of two variables in the case of double integral / three variables in the case of triple integral.
5. Learn applications in terms of finding surface area by double integral and volume by triple integral.
6. Determine the gradient, divergence and curl of a vector and vector identities.
7. Evaluate line, surface and volume integrals.
8. Understand relation between surface and volume integrals (Gauss divergence theorem), relation between line integral and volume integral (Green's theorem), relation between line and surface integral (Stokes theorem).

**Unit-1:**

Vector spaces General properties of vector spaces, Vector subspaces, Algebra of subspaces, linear combination of vectors Linear span, linear un of two subspaces, Linear dependence and independence of vectors, Basis of vector space, Finite dimensional vector spaces, Dimension of a vector space, Dimension of a space, Linear transformations, linear operators, Range and null space of linear transformation, Rank and nullity of linear transformations, Linear transformations as vectors, Product of linear transformations Invertible lines transformation

**Unit-II:**

The adjoint or transpose of a linear transformation, Sylvester's law of nullity, characteristic vales and characteristic vectors, Cayley-Hamilton theorem, Diagonalizable operators. Inner product spaces, Euclidean and unitary spaces, Norm or length of a vector, Schwartz Inequality, Orthogonality, Orthonormal set, complete orthonormal set, Gram-Schmidt orthogonalisation process

## **Part B: Multiple integrals and Vector Calculus**

### **Unit-III:**

**Multiple integrals:** Introduction, the concept of a plane, Curve, line integral-Sufficient condition for the existence of the integral The iris of a subset of  $R^2$ , Calculation of double Integrals, Jordan curve, Area, Change of the order of integration, Double integral as a limit, Change of variable in a double integration

### **Unit-IV:**

Vector differentiation. Ordinary derivatives of vectors, Space curves, Continuity, Differentiability, Gradient, Divergence, Curl operators, Formulae involving these operators. Vector integration, Theorems of Gauss and Stokes, Green's theorem in plane and applications of these theorems.

## **IIIrd Year Paper III MATHS, PRACTICAL**

### **Unit-I**

1. Vector spaces
2. Sub spaces
3. Linear combination Dependence and Independence of Vectors
4. Basis of Dimension
5. Linear transformations
6. Range, Null space and Nullity of a Linear transformation

### **Unit – II**

7. Characteristics roots and the corresponding vectors
8. Cayley-Hamilton Theorem
9. Inner product spaces
10. Orthogonality

### **Unit – III**

11. Change of Order of Integration and Change of Variable of Integration in a Double Integral
12. Differential Operators

### **Unit-IV**

13. Integral Transforms (Gauss Divergence Theorem)
14. Integral Transforms (Green's Theorem)
15. Integral Transforms (Stoke's Theorem)

**SYLLABUS**  
**BA/B.Sc. ACADEMIC YEAR 2011-12**  
**Mathematics: Paper IV**  
**NUMERICAL ANALYSIS**

**Course Objectives**

1. Understand various finite difference concepts and interpolation methods.
2. Find numerical solutions of ordinary differential equations by using various numerical methods.
3. Analyze and evaluate the accuracy of numerical methods.
4. Analyze and evaluate the accuracy of numerical methods.
5. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
6. Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.
7. Find numerical solutions of ordinary differential equations by using various numerical methods
8. Analyze and evaluate the accuracy of numerical methods.
9. Acquire basic knowledge in solving interpolation with equal interval problems by various numerical methods. Estimate the missing terms through interpolation methods.
10. Develop skills in analyzing the methods of interpolating a given data, properties of interpolation with unequal intervals and derive conclusions, approximate a function using an appropriate numerical method.
11. Be able to derive Least – Squares curve fitting procedures, fitting a straight line, fitting a parabola, nonlinear curve fitting, Curve fitting by a sum of exponentials.
12. Be able to find the solution of ordinary differential equations of first order by Euler, Taylor and Runge-Kutta methods.

**UNIT-I**

Errors in Numerical computations: Numbers and their Accuracy, Errors and their Computation, Absolute. Relative and percentage errors. A general error formula. Error in a series approximation. Solution of Algebraic and Transcendental Equations: The bisection method. The Iteration method. The method of false position, Newton-Raphson method, Generalized Newton-Raphson method, Ramanujan's method, Muller's method

**UNIT-II:**

Interpolation: Errors in polynomial interpolation, Forward differences, Backward differences, Central Differences, Symbolic relations, Detection of errors by use of D. Tables, Differences of a polynomial Newton's formulae for interpolation formulae,

Gauss's central difference formula, Stirling's central difference formula, Interpolation with unevenly spaced points, Lagrange's formula, Error in Lagrange's formula, Derivation of governing equations, End conditions, Divided differences and their properties. Newton's general interpolation

### **UNIT-III:**

Curve Fitting: Least Squares curve fitting procedures, fitting a straight line, non-linear curve fitting. Curve fitting by a sum of exponentials Numerical Differentiation and Numerical Integration: Numerical differentiation, Errors in numerical differentiation. Maximum and minimum values of a tabulated function, Numerical integration, Trapezoidal rule, Simpson's 1/3-rule, Simpson's 3/8-rule, Boole's and Weddle's rule.

### **UNIT-IV:**

Linear systems of equations, Solution of linear systems Direct methods, Matrix L inversion method, Gaussian elimination method, Method of factorization, Ill-conditioned linear systems. Iterative methods: Jacobi's method, Gauss-Seidel method, Numerical solution of ordinary differential equations: Introduction, Solution by Taylor's Series, Picard's method of successive approximations. Euler's method, Modified Euler's method, Runge-Kutta methods, Predictor - Corrector methods, Milne's method.

## **Practicals Paper**

1. Errors Bisection and Ramanujan's Method
2. Regular fals: and Newton's Raphson's methods.
3. Forward Backward Tabues and Hissing and Terms
4. Newton forward backward formula Lagrange's and Newton's divided formula.
5. Gausse forward and Gausse backward formula
6. Sterling, Bassel and Laplace Everett's formula
7. Fitting of Straight line and Parabola
8. Fitting of a power curve and exponential curve
9. Numerical integration : trapezoidal and Simpson's 1/3 rule
10. Numerical integrations: Simpson's 3/8 Rule and Weddle's Rule
11. Double integration and Romberg integration
12. Numerical solution: Euler's, Euler's modified and Taylor's series
13. Numerical solution: Picard's and R-K method
14. MILINE, GAUSS Elimination and factorization method
15. Gauss Jacobi, Gauss – Seidel Method

**B.Sc. Physics**  
**Three Year Programme Structure**

**The Programme Objectives (POs) of B.Sc. Physics are:**

This undergraduate course in Physics would provide the opportunity to the students:

PO1 : To understand the basic laws and explore the fundamental concepts of physics

PO2: To understand the concepts and significance of the various physical phenomena.

PO3 : To carry out experiments to understand the laws and concepts of Physics.

PO4 : To apply the theories learnt and the skills acquired to solve real time problems.

PO5 : To acquire a wide range of problem solving skills, both analytical and technical and to apply them.

PO6 : To enhance the student's academic abilities, personal qualities and transferable skills this will give them an opportunity to develop as responsible citizens.

PO7 : To produce graduates who excel in the competencies and values required for leadership to serve a rapidly evolving global community.

PO8: To motivate the students to pursue PG courses in reputed institutions.

PO9: This course introduces students to the methods of experimental physics. Emphasis will be given on laboratory techniques specially the importance of accuracy of measurements.

PO10 : Providing a hands-on learning experience such as in measuring the basic concepts in properties of matter, heat, optics, electricity and electronics

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**B.Sc. Physics - Theory and Practical Papers for three years:**

First year Paper - I: Mechanics and Waves and Oscillations

Practical - I Mechanics and Waves and Oscillations

Second year Paper-II: Thermodynamics and Optics

Practical- II Thermodynamics and Optics

Third year Paper-III: Electricity, Magnetism and Electronics

Practical-III Electricity, Magnetism and Electronics

Third year Paper-IV: Modern Physics

Practical- IV Modern Physics

**B.Sc. Physics first year theory paper**

## **Paper - I: Mechanics and Waves and Oscillations**

### **Course Objectives:**

On successful completion of this course, the students will be able to

- CO1 : Understand Newton's laws of motion and motion of variable mass system and its— application to rocket motion and the concepts of impact parameter, scattering cross section.
- CO2: Apply the rotational kinematic relations, the principle and working of gyroscope and its applications and the precessional motion of a freely rotating symmetric top.
- CO3 :Comprehend the general characteristics of central forces and the application of—Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.
- CO4 :Understand postulates of Special theory of relativity and its consequences such as— length contraction, time dilation, relativistic mass and mass-energy equivalence.
- CO5 :Examine phenomena of simple harmonic motion and the distinction between un damped, damped and forced oscillations and the concepts of resonance and quality factor with reference to damped harmonic oscillator.
- CO6 : Appreciate the formulation of the problem of coupled oscillations and solve them to obtain normal modes of oscillation and their frequencies in simple mechanical systems.
- CO7: Figure out the formation of harmonics and overtones in a stretched string and acquire
- CO8 : The knowledge on Ultrasonic waves, their production and detection and their applications in different fields

## **Mechanics and Waves and Oscillations**

### **Unit-I**

1. Vector Analysis: Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field and related problems. Vector integration, line, surface and volume integrals. Stokes, Gauss and Greens theorems-simple applications.
2. Mechanics of Particles Laws of motion, motion of variable mass system, motion of a rocket, multi-stage rocket, conservation of energy and momentum. Collisions in two and three dimensions, concept of impact parameter, scattering cross-section, Rutherford scattering.
3. Mechanics of rigid bodies Definition of Rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum and inertial tensor. Eulers equation, precession of a top, Gyroscope, precession of the equinoxes

### **Unit-II**

- 4 Mechanics of continuous media Elastic constants of isotropic solids and their relation, Poisson's ratio and expression for Poisson's ratio in terms of  $\gamma$ ,  $n$ ,  $k$ . Classification of beams, types of bending, point load, distributed load, shearing force and bending moment, sign conventions, simple supported beam carrying a concentrated load at mid span, cantilever with an end load.
5. Central forces Central forces-definition and examples, conservative nature of central forces, conservative force as a negative, gradient of potential energy, equation of motion under a central force, gravitational potential and gravitational field, motion under inverse square law, derivation of Kepler's laws, Coriolis force and its expressions.
6. Special theory of relativity Galilean relativity, absolute frames, Michelson-Morley experiment, Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation. Concept of four vector formalism.

### **Unit-III**

7. Fundamentals of vibrations Simple harmonic oscillator, and solution of the differential equation-Physical characteristics of SHM, torsion pendulum, - measurements of rigidity modulus, compound pendulum, measurement of 'g' combination of two mutually

perpendicular simple harmonic vibration of same frequency and different frequencies, Lissajous figures

8. Damped and forced oscillations Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparison with undamped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance, velocity resonance

9. Complex vibrations Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic wave function-square wave, triangular wave, saw-tooth wave

#### **Unit-IV**

10. Vibrations of bars Longitudinal vibrations in bars-wave equation and its general solution. Special cases (i) bar fixed at both ends ii) bar fixed at the mid point iii) bar free at both ends iv) bar fixed at one end. Transverse vibrations in a bar-wave equation and its general solution. Boundary conditions, clamped free bar, free-free bar, bar supported at both ends, Tuning fork.

11. Vibrating Strings Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at both ends, overtones, energy transport, transverse impedance

12. Ultrasonics Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostriction methods, detection of ultrasonics, determination of wavelength of ultrasonic waves. Velocity of ultrasonics in liquids by Sear's method. Applications of ultrasonic waves.

**B.Sc. Physics first year Practical paper**  
**Paper - I: Mechanics and Waves and Oscillations**

**Course Objectives:**

On successful completion of this practical course, the student will be able to;

- CO1: Perform experiments on Properties of matter such as the determination of moduli of elasticity viz., Young's modulus, Rigidity modulus of certain materials;
- CO2: Surface tension of water, Coefficient of viscosity of a liquid ,
- CO3: Moment of inertia of some regular bodies by different methods and compare the experimental values with the standard values.
- CO4: Know how to determine the acceleration due to gravity at a place using Compound, pendulum and Simple pendulum.
- CO5: Notice the difference between flat resonance and sharp resonance in case of volume→ resonator and sonometer experiments respectively.
- CO6: Verify the laws of transverse vibrations in a stretched string using sonometer and comment on the relation between frequency, length and tension of a stretched string under vibration.
- CO7: Demonstrate the formation of stationary waves on a string in Melde's string experiment.
- CO8: Observe the motion of coupled oscillators and normal modes.

## **Syllabus for B.Sc. Physics First year Practical-I**

### **Mechanics and Waves and Oscillations**

1. Study of A Compound Pendulum-Determination of "G" And "K"
- 2 Study of Damping Of And Oscillating Disc
- 3 Moment of Inertia-Bifilar Pendulum
4. Study of Oscillation of A Mass Under Different Combinations Of Springs
- 5a. Young's Modulus By Non-uniform Bending
- 5b. Young's Modulus By Uniform Bending
6. Coefficient of Viscosity Of Liquid-Poiseuille Method
- 7a. Surface Tension By Method of Drops
- 7b. Surface-tension-by Capillary Rise Method
8. Coefficient of Viscosity of Liquids (Searle's Viscometer)
9. Determination of Speed of Waves
10. Sonometer-Laws of Stretched Strings
11. The Volume Resonator
12. Moment of Intertia of A Fly Wheel
13. PlePendulem
14. Melde's Experiment
15. Torsion pendulum
16. Torsion pendulum

## **B.Sc. Physics Second year Theory**

### **Part II : Paper-II : Thermodynamics and Optics**

#### **Course Objectives:**

On successful completion of this course, the student will be able to:

- CO1: Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzmann distribution law, equipartition of energies, mean free path of molecular collisions and the transport phenomenon in ideal gases
- CO2: Gain knowledge on the basic concepts of thermodynamics, the first and the second law of thermodynamics, the basic principles of refrigeration, the concept of entropy, the thermodynamic potentials and their physical interpretations.
- CO3: Understand the working of Carnot's ideal heat engine, Carnot cycle and its efficiency. Develop critical understanding of concept of Thermodynamic potentials, the formulation of Maxwell's equations and its applications.
- CO4: Differentiate between principles and methods to produce low temperature and liquefy air and also understand the practical applications of substances at low temperatures. Examine the nature of black body radiations and the basic theories.
- CO5: Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude.
- CO6: Distinguish between Fresnel's diffraction and Fraunhofer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating.
- CO7: Describe the construction and working of zone plate and make the comparison of zone plate with convex lens.
- CO8: Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields.
- CO9: Understand the basic principles of fibre optic communication and explore the field of Holography and Nonlinear optics and their applications.

#### **Syllabus for B.Sc. Physics Second year Theory Paper-II**

## **Thermodynamics and Optics**

### **Unit – I**

1. Kinetic theory of gases: Introduction – Deduction of Maxwell's law of distribution of molecular speeds, Experimental verification Toothed Wheel Experiment, Transport Phenomena – Viscosity of gases – thermal conductivity – diffusion of gases.

2. Thermodynamics: Introduction – Reversible and irreversible processes – Carnot's engine and its efficiency – Carnot's theorem – Second law of thermodynamics, Kelvin's and Clausius statements – Thermodynamic scale of temperature – Entropy, physical significance – Change in entropy B.Sc. (Physics) 7 of 19 in reversible and irreversible processes – Entropy and disorder – Entropy of universe – Temperature- Entropy (T-S) diagram – Change of entropy of a perfect gas-change of entropy when ice changes into steam.

3. Thermodynamic potentials and Maxwell's equations: Thermodynamic potentials – Derivation of Maxwell's thermodynamic relations – ClausiusClayperon's equation – Derivation for ratio of specific heats – Derivation for difference of two specific heats for perfect gas. Joule Kelvin effect – expression for Joule Kelvin coefficient for perfect and Vanderwaal's gas.

### **Unit – II**

4. Low temperature Physics: Introduction – Joule Kelvin effect – liquefaction of gas using porous plug experiment. Joule expansion – Distinction between adiabatic and Joule Thomson expansion – Expression for Joule Thomson cooling – Liquefaction of helium, Kapitza's method – Adiabatic demagnetization – Production of low temperatures – Principle of refrigeration, vapour compression type. Working of refrigerator and Air conditioning machines.Effects of Chloro and Fluro Carbons on Ozone layer; applications of substances at lowtemperature.

5. Quantum theory of radiation: Black body-Ferry's black body – distribution of energy in the spectrum of Black body – Wein's displacement law, Wein's law, Rayleigh-Jean's law – Quantum theory of radiation - Planck's law – deduction of Wein's law, Rayleigh-Jeans law, from Planck's law - Measurement of radiation – Types of pyrometers – Disappearing filament optical pyrometer – experimental determination – Angstrom pyroheliometer - determination of solar constant, effective temperature of sun.

6. Statistical Mechanics: Introduction to statistical mechanics, concept of ensembles, Phase space, MaxwellBoltzmann's distribution law, Molecular energies in an ideal gas,

Bose-Einstein Distribution law, Fermi-Dirac Distribution law, comparison of three distribution laws, Black Body Radiation, Rayleigh-Jean's formula, Planck's radiation law, Weins Displacement, Stefan's Boltzmann's law from Plancks formula. Application of FermiDirac statistics to white dwarfs and Neutron stars.

### **Unit III**

7 The Matrix methods in paraxial optics: Introduction, the matrix method, effect of translation, effect of refraction, imaging by a spherical refracting surface. Imaging by a co-axial optical system. Unit planes. Nodal planes. A system of two thin lenses. B.Sc. (Physics) 8 of 19

8 Aberrations: Introduction – Monochromatic aberrations, spherical aberration, methods of minimizing spherical aberration, coma, astigmatism and curvature of field, distortion. Chromatic aberration – the achromatic doublet – Removal of chromatic aberration of a separated doublet.

9 Interference: Principle of superposition – coherence – temporal coherence and spatial coherence – conditions for Interference of light Interference by division of wave front: Fresnel's biprism – determination of wave length of light. Determination of thickness of a transparent material using Biprism – change of phase on reflection – Lloyd's mirror experiment. Interference by division of amplitude: Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (Cosine law) – Colours of thin films – Non reflecting films – interference by a plane parallel film illuminated by a point source – Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film) – Determination of diameter of wire-Newton's rings in reflected light with and without contact between lens and glass plate, Newton's rings in transmitted light (Haidinger Fringes) – Determination of wave length of monochromatic light – Michelson Interferometer – types of fringes – Determination of wavelength of monochromatic light, Difference in wavelength of sodium D1,D2 lines and thickness of a thin transparent plate.

### **Unit IV:**

10 Diffraction: Introduction – Distinction between Fresnel and Fraunhofer diffraction Fraunhofer diffraction:- Diffraction due to single slit and circular aperture – Limit of resolution – Fraunhofer diffraction due to double slit – Fraunhofer diffraction pattern with N slits (diffraction grating) Resolving Power of grating – Determination of wave length of light in normal and oblique incidence methods using diffraction grating. Fresnel diffraction:- Fresnel's half period zones – area of the half period zones –zone plate –

Comparison of zone plate with convex lens – Phase reversal zone plate – diffraction at a straight edge – difference between interference and diffraction.

11 Polarization Polarized light : Methods of Polarization, Polarization by reflection, refraction, Double refraction, selective absorption , scattering of light – Brewsters law – Malus law – Nicol prism polarizer and analyzer – Refraction of plane wave incident on negative and positive B.Sc. (Physics) 9 of 19 crystals (Huygen's explanation) – Quarter wave plate, Half wave plate – Babinet's compensator – Optical activity, analysis of light by Laurent's half shade polarimeter.

12 Laser, Fiber Optics and Holography: Lasers: Introduction – Spontaneous emission – Stimulated emission – Population inversion . Laser principle – Einstein coefficients – Types of Lasers – He-Ne laser – Ruby laser – Applications of lasers. Fiber Optics : Introduction – Optical fibers – Types of optical fibers – Step and graded index fibers – Rays and modes in an optical fiber – Fiber material – Principles of fiber communication (qualitative treatment only) and advantages of fiber communication. Holography: Basic Principle of Holography – Gabor hologram and its limitations, Holography applications. NOTE: Problems should be solved at the end of every chapter of all units.

## **B.Sc. Physics Second year Practical paper**

### **Paper - II: Thermodynamics and Optics**

#### **Course Objectives:**

On successful completion of this practical course the student will be able to,

- CO1: Gain hands-on experience of using various optical instruments like spectrometer, polarimeter and making finer measurements of wavelength of light using Newton Ringsexperiment, diffraction grating etc.
- CO2: Understand the principle of working of polarimeter and the measurement of specific rotatory power of sugar solution
- CO3: Know the techniques involved in measuring the resolving power of telescope and dispersive power of the material of the prism.
- CO4: Be familiar with the determination of refractive index of liquid by Boy's method and the determination of thickness of a thin wire by wedge method
- CO5: Perform some basic experiments in thermal Physics, viz., determinations of Stefan's constant, coefficient of thermal conductivity, variation of thermo-emf of a

thermocouple with temperature difference at its two junctions, calibration of a thermocouple and Specific heat of a liquid.

### **Syllabus**

1. Heating efficiency of an Electrical Kettle with varying voltage
2. Specific heat of a liquid by applying Newton's law of cooling correction
3. Thermal conductivity of a Bad Conductor Lee's Method
4. Measurement of Stefan's constant
5. Thickness of a wire-wedge method
6. Determination of radius of curvature of a given convex lens, Newton's Rings
7. Determination of wavelength of Monochromatic light - Biprism
8. Resolving Power of a Grating
9. Polarimeter
10. Dispersive power of Prism
11. Diffraction grating - Minimum Deviation
12. Refractive index of a liquid using Pulfrich refractometer
13. Diffraction grating - Normal Incidence
14. Refractive Index of Liquid & Glass
15. Wave length of a Laser using Diffraction grating
16. Resolving Power of a Telescope

### **B.Sc. Physics Third year Theory**

#### **Part II : Paper-III : Electricity, Magnetism and Electronics**

#### **Course Objectives:**

On successful completion of this course, the students will be able to:

- CO1: Understand the Gauss law and its application to obtain electric field in different cases and formulate the relationship between electric displacement vector, electric polarization, Susceptibility, Permittivity and Dielectric constant.
- CO2: Distinguish between the magnetic effect of electric current and electromagnetic induction and apply the related laws in appropriate circumstances.
- CO3: Understand Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.
- CO4: Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves.
- CO5: Phenomenon of resonance in LCR AC-circuits, sharpness of resonance, Q-factor, Power factor and the comparative study of series and parallel resonant circuits.
- CO6: Describe the operation of p-n junction diodes, zener diodes, light emitting diodes and transistors Understand the operation of basic logic gates and universal gates and their truth table

## **Syllabus for B.Sc. Physics Third year Theory Paper-III**

### **Electricity, Magnetism and Electronics**

#### **UNIT – I**

1. ELECTROSTATICS: Gauss law and its applications. Uniformly charged sphere, charged cylindrical conductor and an infinite conducting sheet of charge. Deduction of Coulomb's law from Gauss' law. Mechanical force on a charged conductor. Electric potential-Potential due to a charged spherical conductor, electric field strength from the electric dipole and an infinite line of charge. Potential of a uniformly charged circular disc.
2. DIELECTRICS: An atomic view of dielectrics, potential energy of a dipole in an electric field. Polarization and charge density, Gauss' law for dielectric medium-Relation

between three electric vectors  $D$ ,  $E$  and  $P$ . Dielectric constant, susceptibility and relation between them. Boundary conditions at the dielectric surface. Electric fields in cavities of a dielectric-needle shaped cavity and disc shaped cavity.

3. CAPACITANCE: Capacitance of concentric spheres and cylindrical condenser, capacitance of parallel plate condenser with and without dielectric. Electric energy stored in a charged condenser. Construction and working of attracted disc electrometer, measurement of dielectric constant and potential difference.

## **UNIT – II**

1. MAGNETOSTATICS: Magnetic shell-potential due to magnetic shell-field due to magnetic shell-equivalent of electric circuit and magnetic shell-magnetic induction ( $B$ ), and field ( $H$ )-permeability and susceptibility Hysteresis loop.

2. MOVING CHARGE IN ELECTRIC AND MAGNETIC FIELDS: Hall Effect, cyclotron, synchrocyclotron and synchrotron-force on a current carrying conductor placed in a magnetic field. Force and torque on a current loop. Biot-Savart's law and calculation of  $B$  due to long straight wire, a circular current loop and solenoid.

3. ELECTROMAGNETIC INDUCTION: Faraday's law-Lenz's law-expression for induced emf-time varying magnetic fields-Betatron-Ballistic galvanometer-theory-damping correction-self and mutual inductance, coefficient of coupling. Calculation of self inductance of a long solenoid-toroid-energy stored in a magnetic field. Transformer-construction, working, energy losses and efficiency.

## **UNIT – III**

1. VARYING AND ALTERNATING CURRENTS: Growth and decay of currents in LR, CR and LCR circuits critical damping. Alternating current relation between current and voltage in pure R, C and L. vector diagrams-power factor in ac circuits. LCR series and parallel resonant circuits-Q-factor. AC and DC motors-single phase, three phase (basics only)

2. MAXWELL'S EQUATIONS AND ELECTROMAGNETIC WAVES: A review of basic laws of electricity and magnetism-displacement current-Maxwell's equations in differential form-Maxwell's wave equation, plane electromagnetic waves-Transverse nature of electromagnetic waves, Poynting theorem, production of electromagnetic waves (Hertz experiment)

## **UNIT – IV**

1. BASIC ELECTRONICS: Formation of electron energy bands in solids, classification of solids in terms of energy gap, intrinsic and extrinsic semiconductors. Fermi energy level, continuity equation-p-n junction diode, Zener diode characteristics and its application as voltage stabilizer. Half wave and full wave rectifiers and filters, ripple factor (qualitative). P-n-p and N-p-n transistors, current component in transistors, CB, CE and CC configurations-transistor hybrid parameters-determination from transistor characteristics. Transistor as an amplifier-concept of negative feedback-Barkhausen condition-RC coupled amplifier and Phase shift oscillator (qualitative).

2. DIGITAL PRINCIPLES: Binary number system, converting binary to decimal and vice versa. Binary addition and subtraction (1s and 2s component methods). Hexadecimal number system. Conversion from binary to Hexadecimal and vice versa. Logic gates, OR, AND, NOT gates, truth tables, realization of these gates using discrete components. NAND and NOR as universal gates, exclusive OR gate. De Morgan's laws statement and proof. Half adder and Full adder, parallel adder circuits. (Note: problems should be solved from every chapter in all units)

### **B.Sc. Physics Third year Practical paper**

#### **Paper - III: Electricity, Magnetism and Electronics**

##### **Course Objectives:**

On successful completion of this practical course the student will be able to,

CO1: Measure the current sensitivity and figure of merit of a moving coil galvanometer.

CO2: Observe the resonance condition in LCR series and parallel circuit

CO3: Learn how a sonometer can be used to determine the frequency of AC-supply.

CO4: Observe the variation of magnetic field along the axis of a circular coil carrying current using Stewart and Gee's apparatus.

CO5: Understand the operation of PN junction diode, Zener diode and a transistor and their  $\rightarrow$  V-I characteristics.

CO6: Construct the basic logic gates, half adder and full adder and verify their truth tables.  $\rightarrow$  Further, the student will understand how NAND and NOR gates can be used as universal building blocks.

### **Syllabus for B.Sc. Physics Third year Practical-III**

01. Careyfooster Bridge - Comparison of Resistances
02. Potentio meter - Internal Resistance of a Cell
03. Figure of Merit of a moving Coil galvanometer
04. Voltage Sensitivity of a moving coil Galvanometer
05. RC Circuit - Frequency Response
06. RL Circuit - Frequency Response
07. LCR Circuit - Series and Parallel Resonance
08. Power Factor of An A.C. Circuit

09. Frequency of A.C. Supply - Sonometer
10. Design and Construction of a Multimeter
11. Construction of a Model D.C. Power Supply
12. Characteristics of a Junction Diode
13. Characteristics of a Transistor
14. Characteristics of a Zener Diode
15. Verification of Kirchhoff's Laws

### **B.Sc. Physics Third year Theory**

#### **Part II : Paper-IV : Modern Physics**

#### **Course Objectives:**

On successful completion of this course, the students will be able to:

CO1: Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.

CO2: Develop critical understanding of concept of Matter waves and Uncertainty principle.

CO3: Get familiarized with the principles of quantum mechanics and the formulation of the Schrodinger wave equation and its applications.

CO4: Examine the basic properties of nuclei, characteristics of Nuclear forces, salient features of Nuclear models and different nuclear radiation detectors.

CO5: Classify Elementary particles based on their mass, charge, spin, half life and interaction. Get familiarized with the nano materials, their unique properties and applications.

CO6: Increase the awareness and appreciation of superconductors and their practical applications.

## **Syllabus for B.Sc. Physics Third year Theory Paper-IV**

### **Modern Physics**

#### **UNIT – I**

1. ATOMIC AND MOLECULAR SPECTROSCOPY: Atomic spectra-drawbacks of Bohr's atomic model-Somerfield's elliptical orbits-relativistic correction (no derivation). Stern Gerlach experiment, Vector atom model and quantum numbers associated with it. L-S and j-j coupling schemes. Spectral terms, selection rules, intensity rules. Spectra of

Alkali atoms, doublet fine structure. Alkaline earth spectra, singlet and triplet fine structure. Zeeman Effect and Stark effect (basic ideas).

2. MOLECULAR SPECTROSCOPY: Types of molecular spectra, pure rotational energies and spectrum of diatomic molecule, determination of inter nuclear distance. Vibrational energies and spectrum of diatomic molecule. Raman Effect, classical theory of Raman Effect. Experimental arrangement for Raman Effect and its applications.

## **UNIT – II**

1. QUANTUM MECHANICS: Inadequacy of classical Physics (discussion only), Spectral radiation, Planck's law. Photoelectric effect-Einstein's Photoelectric equation, Compton Effect (quantitative), experimental verification. Stability of atom, Bohr's atomic theory. Limitations of old quantum theory.

2. MATTER WAVES: de-Broglie hypothesis, wavelength of matter waves, properties of matter waves. Phase and group velocities, Davisson and Germer experiments. Double slit experiment, standing de-Broglie waves of electron in Bohr orbits. Uncertainty principle. Heisenberg's uncertainty principle for position and momentum. Energy and time. Gamma ray microscope, diffraction by a single slit. Position of electron in a Bohr orbit. Particle in a box. Complementary principle of Bohr.

3. SCHROEDINGER WAVE EQUATION: Schrodinger time dependent and independent wave equations. Wave function properties-significance –basic postulates of quantum mechanics. Operators, Eigen functions and Eigen values, expectation values. Application of the wave equation to particle in one and three dimensional boxes, potential step and barrier.

## **UNIT – III**

1. NUCLEAR PHYSICS: Nuclear structure, basic properties of nucleus, size, charge, magnetic dipole moment and electric quadrupole moment. Binding energy, deuteron binding energy. P-p, n-n and n-p scattering (concepts), nuclear forces. Nuclear models-liquid drop model, shell models.

2. ALPHA AND BETA DECAYS: Range of alpha particles, Geiger-Nuttall law, Gamow's theory of alpha decay, Geiger-Nuttall law from Gamow's theory-Beta spectrum-neutrino hypothesis. Fermi's theory of beta decay (qualitative).

3. NUCLEAR REACTIONS: Types of nuclear reactions, channels, nuclear reaction kinematics. Compound nucleus, direct reactions (concepts). Nuclear detectors, GM counter scintillation counter, Wilson cloud chamber and solid state detector.

#### **UNIT - IV**

1. SOLID STATE PHYSICS: Crystalline structure, crystalline nature of matter, crystal lattice. Unit cell, elements of symmetry, crystal systems, Bravais lattice, Miller indices, simple crystal structure (SC, BCC, Cs Cl, FCC, NaCl, diamond and Zinc blends). X-ray diffraction, diffraction of X-rays by crystals, Bragg's law of diffraction, experimental verification, Laue method and powder crystal method.

2. NANO-MATERIALS: Introduction, nanoparticles, metal nanoclusters, semiconductor nanoparticles, carbon clusters, carbon nanotubes, quantum nanostructures -nanodot, nanowire and quantum well. Fabrication of quantum nano structures.

3. BONDING IN CRYSTALS: Types of bonding in crystals, characteristics of crystals with different bindings, Lattice energy of ionic crystals, determination of Madelung constant for NaCl, calculation of Born coefficient and repulsive constant. Born-Haber cycle. Magnetism, magnetic properties of dia, para, and ferro magnetic materials, Langevin theory of paramagnetism. Weiss' theory of ferro magnetism, concepts of magnetic domains, antiferromagnetism and ferri magnetism, ferrites and their applications. Super conductivity, basic facts, zero resistance, effect of magnetic field. Meissner effect, persistent current, isotope effect, thermodynamic properties, specific heat, entropy. Type I and Type II superconductors. Elements of BCS theory, Cooper pairs, applications. High temperature superconductors (general information only)

### **B.Sc. Physics Third year Practical paper**

#### **Paper - IV: Modern Physics**

#### **Course Objectives:**

On successful completion of this practical course the student will be able to,

CO1: Measure charge of an electron and  $e/m$  value of an electron by Thomson method

CO2: Understand how the Planck's constant can be determined using Photocell and LEDs.

CO3: Study the absorption of  $\alpha$ -rays and  $\beta$ -rays, Range of  $\beta$ -particles and the characteristics of GM counter

CO4: Determine the Energy gap of a semiconductor using thermistor and junction diode.

### **Syllabus for B.Sc. Physics Thirdyear Practical-IV**

01.  $e/m$  of an Electron by Thomson's Method

02. Energy Gap of an intrinsic Semiconductor

03. Energy gap of a Semiconductor using a Junction Diode

- 04. Temperature Characteristics of Thermistor
- 05. RC Coupled Amplifier
- 06. Logic Gates - AND, OR, NOT, X - OR Gates
- 07. Verification of Demorgan Theorems
- 08. Verification of Truth Tables for Half and Full Adders
- 09. Phase Shift Oscillator
- 9A. Hysteresis Curve of a Transformer Core (I H curve – )
- 10. Determination of Planck's Constant
- 11. Study of the Spectra of Hydrogen Atom (Rydberg Constant)
- 12. Study of Absorption of  $\alpha$   $\beta$  and Rays
- 13. Hall Probe Method for Measurement of magnetic Field
- 14. Absorption Spectrum of Iodine Vapour

**Computer Science**  
**B.Sc. I Year**  
**Part I: PC Software and 'C' Programming**

**Course Objectives**

This course aims at providing exposure to students in skill development towards basic office applications.

CO1: Demonstrate basic understanding of computer hardware and software.

CO2: Apply skills and concepts for basic use of a computer.

CO3: Identify appropriate tool of MS office to prepare basic documents, charts, spreadsheets, and presentations.

CO4: Create personal, academic, and business documents using MS office.

CO5: Create spreadsheets, charts, and presentations.

CO6: Analyze data using charts and spread sheets.

**Unit – 1: Fundamentals of Computers**

Computer definition – Types of Computer – Logical Organization of a Digital Computer – Memory: Main Memory : RAM, ROM and Cache – Secondary Memory : Magnetic type, Floppy disk, Hard disk, Compact disk – Input devices – Output devices – Operating system : Definition, functions of an operating system, Types of Operating systems : Brief details of batch processing, Multi Programming, multi-tasking, time sharing, real time operating systems - Introduction to DOS, DOS internal commands, DOS External Commands – Introduction to Windows, Desktop, File, Folder, My Computer, My documents, Recycle bin, Internet Explorer, Windows Explorer – Types of Programming Languages.

## **Unit - 2: MS Word and MS Power Point**

Word Basics: Starting word, creating a new document, Opening preexisting document, The parts of a word window, Typing text, Selecting text, Deleting text, Undo, Redo, Repeat, Inserting text, Replacing text, Formatting text, Cut, Copy, Paste – Printing.

Formatting Your Text and Documents: Auto format, Line spacing, Margins, Borders and Shading.

Working with Headers and Footers: Definition of headers and footers, creating basic headers and footers, creating different headers and footers for odd and even pages.

Tables: Creating a simple table, Creating a table using the table menu, Entering and editing text in a table, selecting in table, adding rows, changing row heights, Deleting rows, Inserting columns, Deleting columns, changing column width .

Graphics: Importing graphics, Clipart, Insert picture, Clip Art Gallery, using word's drawing features, drawing objects, text in drawing.

Templates: Template types, using templates, exploring templates, modifying templates. Macros: Macro, Recording macros, editing macros, running macro.

Mail Merge: Mail Merge concept, Main document, data sources, merging data source and main document. Overview of word menu options word basic tool bar.

Power Point: Basics, Terminology, Getting started, Views.

Creating Presentations : Using auto content wizard, Using blank presentation option, Using design template option, Adding slides, Deleting a slide, Importing Images from the outside world, Drawing in power point, Transition and build effects, Deleting a slide, Numbering a slide, Saving presentation, Closing presentation, Printing presentation elements.

Word Basics: Starting word, Creating a new document, Opening preexisting document, The parts of a word window, Typing text, Selecting text, Deleting

text, Undo, Redo, Repeat, Inserting text, Replacing text, Formatting text, Cut, Copy, Paste – Printing.

Formatting Your Text and Documents: Auto format, Line spacing, Margins, Borders and Shading.

Working with Headers and Footers: Definition of headers and footers, creating basic headers and footers, creating different headers and footers for odd and even pages.

Tables: Creating a simple table, Creating a table using the table menu, Entering and editing text in a table, selecting in table, adding rows, changing row heights, Deleting rows, Inserting columns, Deleting columns, changing column width .

Graphics: Importing graphics, Clipart, Insert picture, Clip Art Gallery, using word's drawing features, drawing objects, text in drawing.

Templates: Template types, using templates, exploring templates, modifying templates. Macros: Macro, Recording macros, editing macros, running a macro.

Mail Merge: Mail Merge concept, Main document, data sources, merging data source and main document. Overview of word menu options word basic tool bar.

Power Point: Basics, Terminology, Getting started, Views

Creating Presentations: Using auto content wizard, using blank presentation option, using design template option, Adding slides, Deleting a slide, Importing Images from the outside world, Drawing in power point, Transition and build effects, Deleting a slide, Numbering a slide, Saving presentation, Closing presentation, Printing presentation elements.

### **Unit - 3: MS Excel and MS Access**

#### *MS Access*

Creating a Simple Database and Tables: Creating a contacts Databases with

the wiz, The Access Table Wizard, Creating Database Tables without the wizard, Field Names, Data Types and Properties, Adding, deleting fields, renaming the fields in a table.

Forms: The Form Wizard, Saving Forms, Modifying Forms

Entering and Editing Data: Adding Records, Duplicating previous entries without Retyping, Undo, Correcting Entries, Global Replacements, Moving from Record to Record in a table.

Finding, Sorting and Displaying Data: Queries and Dynasets, Creating and using select queries, Returning to the Query Design, Multilevel Sorts, Finding incomplete matches, Showing All Records after a Query, Saving Queries, Crosstab Queries.

Printing Reports : Simple table, Form and Database printing, Defining advanced Reports, Manual Reporting, properties in Reports, Saving Reports.

Relational Databases: Flat Versus Relational, Types of Relationships, Viewing Relationships, Defining and Redefining Relationships, Creating and Deleting Relationships.

### *MS Excel*

Excel Basics: Overview of Excel features, Getting started, creating a new worksheet, Selecting cells, Entering and editing text, Entering and editing Numbers, entering and editing Formulas, Referencing cells, moving cells, copying cells, sorting cell data, inserting rows, inserting columns, Inserting cells, Deleting parts of a worksheet, clearing parts of a worksheet.

Formatting: Page setup, changing column widths and Row heights, auto format, changing font sizes and Attributes, centering text across columns, using border buttons and Commands, changing colors and shading, hiding rows and columns.

Introduction to functions: Parts of a functions, Functions Requiring Add-ins, The Function Wizard. Examples functions by category: Data and time

functions, Engineering functions, Math and Trig functions, Statistical functions, Text functions.

Excel Charts: Chart parts and terminology, Instant charts with the chart wizard, creation of different types of charts, printing charts, deleting charts – Linking in Excel

Excel Graphics: Creating and placing graphic objects, Resizing Graphics, Drawing Lines and Shapes.

#### **Unit - 4: C Language fundamentals**

Introduction – ‘C’ Fundamentals : Programming – High Level Languages – compiling programs – Integrated Development Environments – Language Interpreters – Compiling your first program – Running your program – understanding your first program – comments – variables, Data types, and Arithmetic Expressions : working with variables – Understanding Data types and constants – working with Arithmetic Expressions – The Assignment operators – The printf function – The scanf function -Decision making : The if statement – the if else construct – Nested if statements – The else if construct – The switch statement – Boolean variables – The conditional operator – program looping : The for statement – Relational operators – Nested for loops – The while statement – The do statement  
– The break statement – The continue statement – working with Arrays:  
Defining an array –

Initializing Arrays – character Arrays – The const Qualifier – Multidimensional arrays- variable length Arrays.

Working with Functions: Defining a Function-Arguments and Local variables – Returning Function Results – Function calling – Declaring Return Types and Argument types – Top-Down programming  
– Functions and Arrays – global variables – Automatic and static variables – Recursive Functions.

#### **Unit - 5: Programming in C**

Working with structures: Defining structure – Functions and structures – Initializing structures – Array of structures- structures containing structures – structures containing Arrays – Structure variants – Character strings : Array of characters – variable length character strings – Escape characters –

character strings, structures and arrays - character operations.

Pointers: Defining a pointer variable – using pointers in Expressions – pointers and structures (Exclude Linked List) – Pointers and Functions – pointers and Arrays – operations on pointers – pointers and Memory address.

Operations on Bits: Bit operators – Bit fields

The preprocessor: The # define statement – The # # operator – The #include statement – conditional compilation.

More on Data Types: Enumerated Data Types – The typedef statement – Data Type conversions

Input and Output Operations in “C”: Character I/O – formatted I/O – Input and Output Operations with Files – Special functions for working with Files.

Miscellaneous and Advanced features: The Go to Statement, the null statement, working with unions-the comma operator-type qualifiers.

**Computer Science**  
**B.Sc. I Year**  
**Part I: PC Software and 'C' Programming**  
**PRACTICAL PAPER – I: Productivity Tools and 'C' Lab**

**Course objectives**

**CO1: Understanding the concept of productivity and its significance in professional and personal life.**

**CO2: Gaining proficiency in using productivity tools such as time management tools, task management tools, project management tools, and collaboration tools.**

**CO3: Learning to automate repetitive tasks using tools like macros and scripts.**

**CO4: Developing an understanding of data analysis and visualization using tools like Excel.**

**CO5: Enhancing the ability to communicate and collaborate effectively with team members using tools like email, instant messaging, and video conferencing.**

**MS-WORD**

**1. Design a visiting card for Managing Director of a Company with following specification.**

- i. Size of visiting card is 3.5” x 2.”
- ii. Name of a company with big font using Water Mark
- iii. Phone number, fax number and e-mail address with appropriate symbols
- iv. Office and residence address separated by line.

**2. Create a letter head of a company.**

- i. Name of Company on the top of the page with big font and good style
- ii. Phone numbers, fax numbers, e-mail address with appropriate symbols
- iii. Main products manufactured to be described at the bottom.
- iv. Slogans if any should be specified in bold at the bottom.

**3. Creation of your Biodata:** consisting of Name, email-id, Contact Address, Carrier Objective, Educational qualifications, social activities, achievements.

### **MS-POWERPOINT**

1. Make a Power point presentation on your strengths, weaknesses, hobbies, factors that waste your time.
2. Make a Power point presentation on any Current affair (Not less than 8 slides)
3. Make a Power point presentation to represent your college profile.
4. Make a Power point presentation of all the details of the books that you had studied in B.Sc. First Year.

### **MS-ACCESS**

1. **Create a database using MS-ACCESS with at least 5 records**

**TABLE1 STRUCTURE:**

**REGISTER NUMBER NAME DOB GENDER CLASS**

**TABLE2 STRUCTURE:**

**REGISTER NUMBER M1 M2 M3 M4 M5 TOTAL**

Maintain the relationship between two tables with REGISTER NUMBER as a Primary Key and answer the following queries:

Show the list of students with the following fields as one query.

**REGISTER NUMBER NAME GENDER TOTAL MARKS**

2. **Maintain the relationship between above two tables with REGISTER NUMBER as a Primary Key and answer the following reports:** Reports must have followed columns.

Report1 with REGISTER NUMBER, NAME, MARKS OF ALL SUBJECTS and

TOTAL

Report2 with REGISTER NUMBER, TOTAL, PERCENTAGE.

3. **Create a database using MS-ACCESS with at least 5 records TABLE1**

**STRUCTURE:**

**EMP-CODE    EMP-NAME    AGE    GENDER    DOB    TABLE2**  
**STRUCTURE:**

**EMP-CODE    BASIC-PAY**

Maintain the relationship between two tables with EMP-CODE as a Primary Key generate the following reports:

**REPORT1:**

**EMP-CODE EMP-NAME BASIC-PAY DA HRA GROSS-SALARY**

**REPORT2:**

**EMP-CODE    EMP-NAME    AGE    GENDER    GROSS-SALARY    MS-EXCEL**

1. Create an electronic spreadsheet in which you enter the following decimal numbers and convert into Octal, Hexadecimal and Binary numbers Vice versa.

Decimal Numbers: 35,68,95,165,225,355,375,465

Binary Numbers: 101,1101,111011,10001,110011001,111011111.

2. The ABC Company shows the sales of different products for 5 years. Create column chart,3D-column, and Bar chart for the following data.

YE AR	PRO DUC T-1	PRO DUC T-2	PRO DUC T-3	PRO DUC T-4
2003	1000	800	900	1000
2004	800	80	500	900
2005	1200	190	400	800
2006	400	200	300	1000
2007	1800	400	400	1200

3. Create a suitable examination data base and find the sum of the marks(total) of each student and respective class secured by the student rules:

Pass if marks in each subject  $\geq 35$  Distinction if average  $\geq 75$

First class if average  $\geq 60$  but  $< 75$  Second class if average  $\geq 50$  but  $< 60$  Third class if average  $\geq 35$  but  $< 50$  Fail if marks in any subject is  $< 35$

Display average marks of the class, subject wise and pass percentage.

## **C-PROGRAMMING LAB CYCLE**

1. Program for
  - i. Sum of factors of a number
  - ii. Sum of digits of a number
2. Program to check whether a given number is.
  - i. Prime number or not
  - ii. Perfect number or not
  - iii. Armstrong number or not
3. Program using recursion for
  - i. Factorial of a given number
  - ii. Fibonacci series
4. Program for roots of a quadratic equation
5. Program using functions.
  - i. With out return value
  - ii. With return value
  - iii. With parameters
  - iv. With out parameters
6. Program to find largest/smallest of n numbers by using arrays.
7. Program for sorting an array.
8. Program for matrix addition & subtraction
9. Program for matrix multiplication
10. Program for transpose of a given matrix.
11. Program for (with and without string functions)
  - i. Comparison of two strings
  - ii. Concatenation of two strings
  - iii. Length of a string
12. Program to process student information. Student structure consists of Sno, Sname, Marks in 6 subjects, Total, average. Calculate total and average of n students and assign grade with following criteria.  
Grade A: All pass and avg  $\geq 75$   
Grade B: All pass and avg  $\geq 60$  and avg  $< 75$  Grade C: All pass and avg  $\geq 50$  and avg  $< 60$  Grade D: All pass and avg  $\geq 40$  and avg  $< 50$  Grade E: If fails in one or more subjects.
13. Program for (i) Nesting of Structure (ii) Passing structures to functions.
14. Program to demonstrate (i) Unions (ii) enumerated data types.
15. Program for sum of diagonal elements of a square matrix?
16. Program to access (i) array elements (ii) Structure elements using pointers.
17. Program for sorting strings using pointers.

18. Program to count number of (i) words (ii) lines (iii) Special Characters in each text.
19. Program to create a file to store and retrieve strings using fputs() and fgets().
20. Program to create a file to store and update employee records. The employee record consists of ENO, ENAME, DEPTNO, DEPTNAME, BASICSalary, HRA, DA, DEDUCTIONS, TOTALSalary and NETSalary.
21. Program to evaluate following expressions.  $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots + \frac{1}{n}$
22. Program to find square root of a given no.
23. Program to create table of Triangular Numbers.
24. Program for reversing digits of a no.
25. Program for Base Conversion.

**Computer Science**  
**B.Sc. II Year**  
**Part II: Object Oriented Programming with Java and Data Structures**

**Course Objectives**

- CO1: Understand basic concepts of Object-Oriented Programming and Java Programming Constructs like constants, variables, operators, and control statements.
- CO2: Understand the concepts of classes, objects, method overloading, inheritance, arrays, strings, and vectors.
- CO3: Understand the need for interfaces and how to achieve multiple inheritance in Java and the concepts of multi-threading by using thread class and implementing. Runnable interface.
- CO4: Understand the concepts of errors and exceptions, keywords that are used to manage Exceptions and various stream classes like byte streams and character stream classes.
- CO5: Understand the concept of applets by how to create and run applets and Graphics programming by various classes in the graphics class.

**Unit – 1: Java Fundamentals**

Fundamentals of Object Oriented programming: Object Oriented paradigm – Basic concepts of Object Oriented Programming – Benefits of OOP – Applications of OOP.

Java Evolution: Java Features – How Java differs from C and C++ - Java and Internet – Java and World Wide Web – Web Browsers – Hardware and Software Requirements – Java Environment. Overview of Java Language: Simple Java Program – Java Program Structure – Java Tokens- Java Statements – Implementing a Java Program – Java Virtual Machine –

Command Line Arguments.

Constants, Variables and Data types: Constants – Variables – Data types – Declaration of Variables- Giving Values to variables- Scope of Variables- Symbolic Constants-Type Casting.

(Chapters: 1,2,3,4)

## **Unit – 2: Oops Concepts in Java**

Operators and Expressions: Arithmetic Operators – Relational Operators- Logical Operators – Assignment Operators – Increment and Decrement Operators – Conditional Operators – Bitwise Operators – Special Operators – Arithmetic Expressions – Evaluation of Expressions – Precedence of Arithmetic Operators – Operator Precedence and Associativity.

Decision Making and Branching: Decision Making with If statement – Simple If Statement-If else Statement-Nesting If Else Statement- the Else If Ladder- The switch Statement – The ?: operator.

Decision Making and Looping: The while statement – The do statement – The for statement – Jumps in Loops.

Class, Objects and Methods: Defining a Class – Fields Declaration – Methods Declaration – Creating Objects – Accessing class members – Constructors – Methods Overloading – Static Members – Nesting of Methods – Inheritance – Overriding Methods – Final Variables and Methods – Final Classes – Abstract Methods and Classes – Visibility Control.

(Chapters: 5,6,7,8)

## **Unit – 3: Packages and Interfaces in Java**

Arrays, Strings and Vectors: One-dimensional Arrays-creating an Array – Two dimensional Arrays – Strings – Vectors – Wrapper Classes – Enumerated Types.

Interfaces: Multiple Inheritance: Defining Interfaces – Extending Interfaces – Implementing Interfaces – Accessing Interface Variables.

Packages: Java API Packages – Using system Packages – Naming Conventions – Creating Packages – Accessing a Package – Using a Package – Adding a

Class to a Package – Hiding Classes – Static Import.

(CHAPTERS: 9,10,11)

#### **UNIT – 4: Multithreaded programming and Applets.**

Multithreaded Programming: Creating Threads – Extending the Thread Class – Stopping and Blocking a Thread – Life Cycle of a Thread – Using Thread Methods – Thread Exceptions – Thread Priority – Synchronization.

Managing Errors and Exceptions: Types of Errors – Exceptions – Syntax of Exception Handling Code

– Multiple Catch Statements – Using Finally Statement – Throwing our own Exceptions – Using Exceptions for debugging.

Applet Programming: How Applets differ from Applications – Preparing to write Applets – Building Applet Code – Applet Life Cycle – Creating an executable Applet – Designing a Webpage – Applet Tag – Adding Applet to HTML file – Running the Applet – More about Applet Tag – Passing parameters to Applets – Aligning the display – More about HTML tags – Displaying Numerical Values – Getting Input from the user.

(Chapters: 12, 13, 14 )

#### **Unit – 5: Data Structures**

Sorting: Bubble Sort – Selection Sort – Insertion Sort – Quick Sort-Stacks and Queues: Stacks – Queues – Circular Queue – Deques - Priority Queue – Parsing Arithmetic Expressions – Linked List: Simple Linked List – Finding and Deleting Specified Links – Double Ended Lists – Abstract Data types – Sorted Lists – Doubly Linked Lists – Advanced Sorting : Quick Sort - Binary Trees : Tree Terminology – Finding a Node – Inserting a Node – Traversing the Tree – Finding Maximum and Minimum values – Deleting a Node – Efficiency of Binary Trees – Trees Represented as Arrays – Graphs: Introduction to Graphs – Searches – Minimum Spanning Tree – Topological Sorting with Directed Graphs – Connectivity in Directed Graphs.

(Chapters: 3,4,5,7 (Only Quick Sort), 8,13)

**Computer Science**  
**B.Sc. II Year**  
**Part II: Java and Data structures Lab**

**Course objectives**

- CO1: Understanding the basics of object-oriented programming and programming concepts such as abstraction, encapsulation, inheritance, and polymorphism.
- CO2: Developing proficiency in the Java programming language including data types, control structures, objects, classes, interfaces, and exception handling.
- CO3: Gaining knowledge of various data structures such as arrays, linked lists, stacks, queues, trees, and graphs, and their implementation in Java.
- CO4: Learning to analyze and compare the efficiency of various data structures and algorithms based on time and space complexity.
- CO5: Developing the ability to design and implement efficient algorithms and data structures to solve real-world problems.
- CO6: Learning to use programming tools and techniques like debugging, testing, and profiling to improve code quality.
- CO7: Enhancing problem-solving skills and the ability to apply programming concepts to real-world scenarios.

1. Write a java program to determine the sum of the following harmonic series for a given value of 'n'.  
 $1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n}$
2. Write a program to perform the following operations on strings through interactive input.
  - i. Sort given strings in alphabetical order.
  - ii. Check whether one string is sub string of another string or not.
  - iii. Convert the strings to uppercase.
3. Write a program to simulate on-line shopping.
4. Write a program to identify a duplicate value in a vector.
5. Create two threads such that one of the threads print even no's and another prints odd no's upto a given range.
6. Define an exception called "Marks Out of Bound" Exception, that is thrown if the entered marks are greater than 100.
7. Write a JAVA program to shuffle the list elements using all the possible permutations.
8. Create a package called "Arithmetic" that contains methods to deal with all arithmetic operations. Also, write a program to use the package.
9. Write an Applet program to design a simple calculator.
10. Write a program to read a text and count all the occurrences of a given word. Also, display their positions.
11. Write an applet illustrating sequence of events in an applet.
12. Illustrate the method overriding in JAVA.
13. Write a program to fill elements into a list. Also, copy them in reverse order into another list.

14. Write an interactive program to accept name of a person and validate it. If the name contains any numeric value throw an exception “Invalid Name”.
15. Write an applet program to insert the text at the specified position.
16. Prompt for the cost price and selling price of an article and display the profit (or) loss percentage.
17. Create an anonymous array in JAVA.
18. Create a font animation application that changes the colors of text as and when prompted.
19. Write an interactive program to wish the user at different hours of the day.
20. Simulate the library information system i.e. maintain the list of books and borrower’s details.

### **Data Structures Lab Cycle**

21. Program to create, insert, delete, and display operations on single linked list?
22. Program to create, insert, delete and display operations on double linked list ?
23. Program to create, insert, delete and display operations on circular single linked list?
24. Program to split a single linked list.
25. Program to reverse a single linked list.
26. Program to implement Insertion Sort.
27. Program to implement PUSH and POP operations on Stack using array method.

28. Program to implement PUSH and POP operations on Stack using Linked list method.
29. Program to implement insert and delete operations on Queue using array method.
30. Program to implement insert and delete operations on Queue using linked list method.
31. Program to implement insert and delete operations on Priority Queue?
32. Program to implement insert and delete operations on Double Ended Queue?
33. Program to evaluate postfix expression by using Stack?
34. Program to construct Binary Search Tree and implement tree traversing Techniques.
35. Program to delete a leaf node from binary search tree.
36. Program to implement Selection Sort.
37. Program to implement Bubble Sort.
38. Program to implement Operations on Circular Queue.
39. Program to implement Quick Sort.
40. Program to Find number of Leaf nodes and non-Leaf nodes in a Binary Search Tree.
41. Program for Insertion Sort.

**Computer Science**  
**B.Sc. III Year**  
**Paper-III : DATABASE MANAGEMENT SYSTEMS**

**Course Objective:**

**Database Management Systems after successfully completing this course, students will be able to:**

CO1: Will understand the fundamental concepts of database.

CO2: Will understand user requirements and frame it in data model.

CO3: Will understand creations, manipulation and querying of data in databases

CO4: Solve real world problems using appropriate set, function, and relational models.

CO5: Design E-R Model for given requirements and convert the same into database tables.

CO66: Use SQL.

**Unit-1: Database Systems Introduction and Fundamentals.**

Database Systems: Introducing the database and DBMS, Why the database is important, Historical Roots: Files and File Systems, Problems with File System Data Management, Data base Systems.

Data Models: The importance of Data models, Data Model Basic Building Blocks, Business Rules, The evaluation of Data Models, Degree of Data Abstraction.

The Relational Database Model: A logical view of Data, Keys, Integrity Rules, Relational Set Operators, The Data Dictionary and the systematical, Relationships within the Relational Database, Data Redundancy revisited, Indexes, Codd's relational data base rules.

**Unit-2 : Data Modeling and Normalization**

Entity Relationship Model: The ER Model, Developing ER Diagram, Database Design Challenges: Conflicting Goals.

Advanced Data Modeling: The Extended Entity Relationship Model, Entity clustering, Entity integrity: Selecting Primary keys, Design Cases: Learning Flexible Database Design.

Normalization of database tables: Database Tables and Normalization, The need for Normalization, The Normalization Process, Improving the design, Surrogate Key

Considerations, High level Normal Forms, Normalization and database design, de normalization.

### **Unit-3 : Interaction with Databases and Construction of Information System**

Introduction to SQL: Data Definition Commands, Data Manipulation Commands, Select queries, Advanced Data Definition Commands, Advanced Select queries, Virtual Tables, Joining Database Tables.

Advanced SQL: Relational Set Operators, SQL Join Operators, Sub queries and correlated queries, SQL Functions, Oracle Sequences, Updatable Views, and Procedural SQL.

Database Design: The Information System, The Systems Development Life Cycle, The Database Life Cycle, Database Design Strategies, Centralized Vs Decentralized design.

### **Unit-4 : Transaction Management in DBMS Environment.**

Transaction Management and Concurrency Control: What is transaction, Concurrency control, Concurrency control with locking methods, Concurrency control with timestamping methods, Concurrency control with optimistic methods, database recovery management.

Distributed Database Management Systems: The evolution of Distributed Database Management Systems, DDBMS advantages and Disadvantages, Distribution Processing and Distribution Databases, Characteristics of Distributed database management systems, DDBMS Components, Levels of Data and Process distribution, Distributed database Transparency Features, Distributed Transparency, Transaction Transparency, Performance Transparency and Query Optimization, Distributed Database Design, Client Server VS DDBMS.

### **Unit-5 : Data Warehouse Concepts and Database Administration.**

The Data Warehouse: The need for data analysis, Decision support systems, the data warehouse, Online analytical processing, Star schemas, Data mining, SQL extension for OLAP.

Database Administration: Data as a corporate asset, The need for and role of databases in an organization, The evolution of the database administration function, The database environment's Human Component, Database administration Tools, The DBA at work: Using Oracle for Database Administration.

**Computer Science**  
**B.Sc. III Year**  
**Part III: DBMS Lab**

**course objectives**

- CO1: Understanding the basics of database management systems, data models, and database design.
- CO2: Gaining proficiency in SQL (Structured Query Language), including the ability to create and manipulate tables, views, indexes, and queries.
- CO3: Learning to design and implement a database system using a DBMS (Database Management System) such as MySQL, Oracle, or SQL Server.
- CO4: Understanding the concepts of database normalization and entity-relationship modeling and applying them to create efficient and effective database designs.
- CO5: Gaining knowledge of advanced database concepts such as concurrency control, transaction management, and database security.
- CO6: Learning to use database tools and techniques like backup and recovery, monitoring, and tuning to improve database performance.
- CO7: Developing the ability to work in teams to design and implement a real-world database application.

The Order Tracking Database consists of the following defined six relation schemas.

**EMPLOYEES(ENO,ENAME,ZIP,HDATE)**  
**PARTS(PNO,PNAME,QOH,PRICE,LEVEL) (HINT: QOH: QUALITY**  
**ON HAND) CUSTOMERS(CNO,CNAME,STREET,ZIP,PHONE)**  
**ORDERS(ONO,CNO,ENO,RECEIVED DATE,SHIPPED DATE)**  
**ODETAILS(ONO,PNO,QTY)**  
**ZIPCODES (ZIP, CITY)**

**Solve the following queries**

1. GET ALL PAIRS OF CUSTOMER NUMBERS FOR CUSTOMERS BASED ON SAME ZIPCODE.
2. GET PART NUMBERS FOR PARTS THAT HAVE BEEN ORDERED BY AT LEAST TWO DIFFERENT CUSTOMERS.
3. FOR EACH ODETAIL ROW, GET ONO, PNO, PNAME, QTY AND PRICE VALUES ALONG WITH THE TOTAL PRICE FOR THE ITEM. (TOTAL PRICE=PRICE\*QTY)
4. GET CUSTOMER NAME AND EMPLOYEE PAIRS SUCH THAT THE CUSTOMER WITHNAME HAS PLACED AN ORDER THROUGH THE EMPLOYEE.

5. GET CUSTOMER NAMES LIVING IN FORT DODGE OR LIBERAL.
6. GET CNAME VALUES OF CUSTOMERS WHO HAVE ORDERED A PRODUCT WITH PNO 10506.
7. GET PNAME VALUES OF PARTS WITH THE LOWEST PRICE.
8. GET CNAME VALUES OF CUSTOMERS WHO HAVE PLACED AT LEAST ONE ORDER THROUGH THE EMPLOYEE WITH NUMBER 1000.
9. GET THE CITIES IN WHICH CUSTOMERS OR EMPLOYEES ARE LOCATED.
10. GET THE TOTAL SALES IN DOLLARS ON ALL ORDERS.
11. GET PART NAME VALUES THAT COST MORE THAN THE AVERAGE COST OF ALL PARTS.
12. GET PART NAMES OF PARTS ORDERED BY AT LEAST TWO DIFFERENT CUSTOMERS.
13. GET FOR EACH PART GET PNO, PNAME AND TOTAL SALES
14. FOR EACH PART, GET PNO, PNAME, TOTAL SALES, WHOSE TOTAL SALES EXCEEDS 1000
15. GET PNO, PART NAMES OF PARTS ORDERED BY AT LEAST TWO DIFFERENT CUSTOMERS.
16. GET CNAME VALUES OF CUSTOMERS WHO HAVE ORDERED PARTS FROM ANYONE EMPLOYEE BASED IN WICHITA OR LIBERAL.

### **SHIPMENT DATABASE**

AN ENTERPRISE WISHES TO MAINTAIN THE DETAILS ABOUT HIS SUPPLIERS AND OTHER CORRESPONDING DETAILS. FOR THAT IT USES THE FOLLOWING TABLES

**TABLE**

**S(SID,SNAME,ADDRESS)**

**PRIMARY KEY :**

**SID**

**TABLE**

**P(PID,PNAME,COLOR)**

**PRIMARY KEY :**

**PID**

**TABLE CAT(SID,PID,COST)**

**PRIMARY KEY :**

**SID+PID**

**REFERENCE KEY : SID REFERENCES  
S.SID**

**PID REFERENCES P.PID**

**Solve the following queries.**

1. FIND THE P NAMES OF PARTS FOR WHICH THERE IS SOME SUPPLIER
2. FIND THE S NAMES OF SUPPLIERS WHO SUPPLY EVERY PART.
3. FIND THE S NAMES OF SUPPLIERS WHO SUPPLY EVERY RED PART.
4. FIND THE P NAMES OF PARTS SUPPLIED BY LONDON  
SUPPLIER AND BY NOONE ELSE
5. FIND THE SIDS OF SUPPLIERS WHO CHARGE MORE FOR SOME  
PART OTHER THAN THE AVERAGE COST OF THAT PART
6. USING GROUP BY WITH HAVING CLAUSE GET THE PART  
NUMBERS FOR ALL THE PARTS SUPPLIED BY MORE THAN ONE  
SUPPLIER.

7. GET THE NAMES OF THE SUPPLIERS, WHO DO NOT SUPPLY PART P2.
8. FIND THE SIDS OF SUPPLIERS WHO SUPPLY A RED AND A GREEN PART
9. FIND THE SIDS OF SUPPLIERS WHO SUPPLY A RED OR A GREEN PART
10. FIND THE TOTAL AMOUNT HAS TO PAY FOR THAT

SUPPLIER BY PART LOCATED FROM LONDON

### **Employee Database**

An enterprise wishes to maintain a database to automate its operations. Enterprise divided into to certain departments and each department consists of employees. The following two tables describes the automation schemas.

**DEPT (DEPTNO, DNAME, LOC)**

**EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, COMM, DEPTNO)**

1. CREATE A VIEW, WHICH CONTAIN EMPLOYEE NAMES AND THEIR MANAGER NAMES WORKING IN SALES DEPARTMENT.
2. DETERMINE THE NAMES OF EMPLOYEE, WHO EARN MORE THAN THEIR MANAGERS.
3. DETERMINE THE NAMES OF EMPLOYEES, WHO TAKE HIGHEST SALARY IN THEIR DEPARTMENTS.
4. DETERMINE THE EMPLOYEES, WHO LOCATED AT THE SAME PLACE.
5. DETERMINE THE EMPLOYEES, WHOSE TOTAL SALARY IS LIKE THE MINIMUM SALARY OF ANY DEPARTMENT.
6. UPDATE THE EMPLOYEE SALARY BY 25%, WHOSE EXPERIENCE IS GREATER THAN 10 YEARS.
7. DELETE THE EMPLOYEES, WHO COMPLETED 32 YEARS OF SERVICE.
8. DETERMINE THE MINIMUM SALARY OF AN EMPLOYEE AND HIS

DETAILS, WHO JOIN ON THE SAME DATE.

9. DETERMINE THE COUNT OF EMPLOYEES, WHO ARE TAKING COMMISSION AND NOT TAKING COMMISSION.
10. DETERMINE THE DEPARTMENT DOES NOT CONTAIN ANY EMPLOYEES.
11. FIND OUT THE DETAILS OF TOP 5 EARNER OF COMPANY.
12. DISPLAY THOSE MANAGERS NAME WHOSE SALARY IS MORE THAN AVERAGE SALARY OF HIS EMPLOYEES.
13. DISPLAY THOSE EMPLOYEES WHO JOINED THE COMPANY BEFORE 15TH OF THE MONTH?
14. DISPLAY THE MANAGER WHO IS HAVING MAXIMUM NUMBER OF EMPLOYEES WORKING UNDER HIM?
15. PRINT A LIST OF EMPLOYEES DISPLAYING 'LESS SALARY' IF LESS THAN 1500 IF EXACTLY 1500 DISPLAY AS 'EXACT SALARY' AND IF GREATER THAN 1500 DISPLAY 'MORE SALARY'?
16. DISPLAY THOSE EMPLOYEES WHOSE FIRST 2 CHARACTERS FROM HIRE DATE- LAST 2 CHARACTERS OF SALARY?
17. DISPLAY THOSE EMPLOYEES WHOSE 10% OF SALARY IS EQUAL TO THE YEAR OF JOINING?
18. IN WHICH YEAR DID MOST PEOPLE JOIN THE COMPANY? DISPLAY THE YEAR AND NUMBER OF EMPLOYEES.
19. DISPLAY THE HALF OF THE ENAMES IN UPPER CASE AND REMAINING LOWER CASE
20. DISPLAY ENAME, DNAME EVEN IF THERE NO EMPLOYEES WORKING IN A PARTICULAR DEPARTMENT (USE OUTER JOIN).

### **University Database**

University wishes to computerise their operations by using the following relations.

Student (snum: Integer, sname: string, major: string, level: string, age: integer)

Class (name: String, Hour: Integer, room: string, fid: integer) Enrolled (sum: integer, cname: string)  
 Faculty (fid: Integer, fname: String, deptid: Integer) Depart (deptid: Integer, dname: String, loc: integer)

**By using above schema definitions, resolve the following queries**

1. FIND THE NAMES OF ALL JUNIORS (LEVEL=JR) WHO ARE ENROLLED IN A CLASS TAUGHT BY SMITH.
2. FIND THE AGE OF THE OLDEST STUDENT WHO IS EITHER A HISTORY MAJOR OR IS ENROLLED IN THE COURSE OF SMITH.
3. FIND THE NAMES OF ALL CLASSES THAT EITHER MEET R128 OR HAVE FIVE OR MORE STUDENTS ENROLLED.
4. FIND THE NAMES OF ALL STUDENTS WHO ARE ENROLLED IN TWO CLASSES THAT MEET AT THE SAME HOUR.
5. FIND THE NAMES OF FACULTY MEMBERS WHO TEACH IN EVERY ROOM IN, WHICH SOME CLASS IS TAUGHT.
6. FIND THE NAMES OF FACULTY MEMBERS FOR WHOM THE COMBINED ENROLLMENT OF THE COURSES THAT THEY TEACH IS LESS THAN FIVE.
7. PRINT THE LEVEL AND AVERAGE AGE OF STUDENTS FOR THAT LEVEL, FOR EACH LEVEL.
8. PRINT THE LEVEL AND AVERAGE AGE OF THE STUDENT FOR THAT LEVEL, FOR ALL LEVELS EXCEPT JR.
9. FIND THE NAMES OF STUDENTS WHO ARE ENROLLED IN THE MAXIMUM NUMBER OF CLASSES.
10. FIND THE NAMES OF THE STUDENTS WHO ARE NOT ENROLLED IN ANY CLASS.

### **Airline Database**

An Airline System would like to keep track their information by using the following relations. Flights (flno: integer, from: string, to string, distance: integer,

Price: integer)  
 Aircraft (aid: integer, aname: string, cruising\_range: integer) Certified (eid: integer, aid: integer)  
 Employees (eid: integer, ename: string, salary: real)

**Note that the employees relation describes pilots and other kinds of**

**employees as well; every pilot is certified for aircraft and only pilots are certified to fly. Resolve the following queries:**

1. FOR EACH PILOT WHO IS CERTIFIED FOR MORE THAN THREE AIRCRAFT, FIND THE EID'S AND THE MAXIMUM CRUISING RANGE OF THE AIRCRAFT THAT HE (OR SHE) CERTIFIED FOR.
2. FIND THE NAMES OF PILOTS WHOSE SALARY IS LESS THAN THE PRICE OF THE CHEAPEST ROUTE FROM LOS ANGELES TO HONOLULU.
3. FIND THE NAME OF THE PILOTS CERTIFIED FROM SOME BOEING AIRCRAFT.
4. FOR ALL AIRCRAFT WITH CRUISING RANGE OVER 1,000 MILES, FIND THE NAME OF THE AIRCRAFT AND THE AVERAGE SALARY OF ALL PILOTS CERTIFIED FOR THIS AIRCRAFT.
5. FIND THE AID'S OF ALL AIRCRAFT THAT CAN BE USED FROM LOS ANGELS TO CHICAGO.
6. PRINT THE ENAMES OF PILOTS WHO CAN OPERATE PLANES WITH CRUISING RANGE GREATER THAN 3,000 MILES, BUT ARE NOT CERTIFIED BY BOEING AIRCRAFT.
7. FIND THE TOTAL AMOUNT PAID TO EMPLOYEES AS SALARIES.
8. FIND THE EID'S OF EMPLOYEES WHO ARE CERTIFIED FOR EXACTLY THREE AIRCRAFTS.
9. FIND THE EID'S OF EMPLOYEE WHO MAKE SECOND HIGHEST SALARY.
10. FIND THE AID'S OF ALL THAN CAN BE USED ON NON-STOP FLIGHTS FROM BONNTO CHENNAI.

### **PL/SQL PROGRAMS**

1. WRITE A PL/SQL PROGRAM TO CHECK THE GIVEN NUMBER IS STRONG OR NOT.
2. WRITE A PL/SQL PROGRAM TO CHECK THE GIVEN STRING IS PALINDROME OR NOT.
3. WRITE A PL/SQL PROGRAM TO SWAP TWO NUMBERS WITHOUT USING THIRD VARIABLE.
4. WRITE A PL/SQL PROGRAM TO GENERATE MULTIPLICATION TABLES FOR 2,4,6
5. WRITE A PL/SQL PROGRAM TO DISPLAY SUM OF EVEN NUMBERS AND SUM OF ODD NUMBERS IN THE GIVEN RANGE.
6. WRITE A PL/SQL PROGRAM TO CHECK THE GIVEN NUMBER IS POLLINNDROME OR NOT.
7. THE HRD MANAGER HAS DECIDED TO RAISE THE EMPLOYEE SALARY BY 15%. WRITE A PL/SQL BLOCK TO ACCEPT THE EMPLOYEE NUMBER AND UPDATE THE SALARY OF THAT EMPLOYEE. DISPLAY APPROPRIATE MESSAGE BASED ON THE EXISTENCE OF THE RECORD IN EMP TABLE.

8. WRITE A PL/SQL PROGRAM TO DISPLAY TOP 10 ROWS IN EMP TABLE BASED ON THEIR JOB AND SALARY.
9. WRITE A PL/SQL PROGRAM TO RAISE THE EMPLOYEE SALARY BY 10%, FOR DEPARTMENT NUMBER 30 PEOPLE AND ALSO MAINTAIN THE RAISED DETAILS IN THE RAISE TABLE.
10. WRITE A PROCEDURE TO UPDATE THE SALARY OF EMPLOYEE, WHO ARE NOT GETTING COMMISSION BY 10%

WRITE A PL/SQL PROCEDURE TO PREPARE AN ELECTRICITY  
BILL BY USING FOLLOWING TABLE

**TABLE USED: ELECT**

<u>NAME</u>	<u>NULL?</u>	<u>TYPE</u>
-------------	--------------	-------------

MNO	NOT	NULL
NUMBER(3)CNAME		
		VARCHAR2(
20) CUR_READ		
		NUMBER(5)
PREV_READ		NUMBER(5)
NO_UNITS		NUMBER(5)
AMOUNT		NUMBER(8,2)
SER_TAX		NUMBER(8,2)
NET_AMT		NUMBER(9,2)

WRITE A PL/SQL PROCEDURE TO PREPARE AN TELEPHONE  
BILL BY USING FOLLOWING TABLE. AND PRINT THE  
MOTHLY BILLS FOR EACH CUSTOMER

**TABLE USED : PHONE.**

NAME	NULL?	TYPE
------	-------	------

-----		
TEL_NO	NOT	NULL
		NUMBER(6)
CNAME		
		VARCHAR2(20)
CITY		
		VARCHAR2(10)
PR_READ		
		NUMBER(5)
CUR_READ		NUMBER(5)
NET_UNITS		NUMBER(5)
TOT_AMT		NUMBER(8,2)

WRITE A PL/SQL PROGRAM TO RAISE THE EMPLOYEE  
SALARY BY 10%, WHO ARE COMPLETED THERE 25 YEARS  
OF SERVICE.

WRITE A PL/SQL PROCEDURE TO EVALUATE THE GRADE OF A STUDENT WITH FOLLOWING CONDITIONS:

- i. FOR PASS: ALL MARKS > 40
  - ii. FOR I CLASS: TOTAL% > 59
  - iii. FOR II CLASS: TOTAL% BETWEEN >40 AND <60
  - iv. FOR III CLASS: TOTAL% = 40
- AND ALSO MAINTAIN THE DETAILS IN ABSTRACT TABLE.

### TABLES USED TABLE STD

SQL> DESC STD

NAME	NULL?	TYPE
NO	NOT	NULL
NUMBER NAME		
		VARCHAR2(
10)		
INTNO		NUMBER
CLASS	NOT	NULL
VARCHAR2(10)M1		NUMBER
M2		NUMBER
M3		NUMBER
M4		NUMBER
M5		NUMBER

### TABLE ABSTRACT

SQL> DESC ABSTRACT

NAME	NULL?	TYPE
-----	-----	
----		STDNO
		N
NUMBER		

<b>STDNAME</b>	<b>VARCHA</b>
<b>R2(10)</b>	<b>CLASS</b>
<b>R2(10)</b>	<b>VARCHA</b>
<b>INTNO</b>	<b>NUMBER</b>
<b>TOT</b>	<b>NUMBER</b>
<b>GRADE</b>	<b>VARCHAR2(10)</b>
<b>PERCENT</b>	<b>NUMBER</b>
<b>DAT_ENTER</b>	<b>DATE</b>

WRITE A PROCEDURE TO UPDATE THE SALARY OF EMPLOYEE,  
WHO BELONGS TO CERTAIN DEPARTMENT WITH A CERTAIN  
PERCENTAGE OF RAISE.

## **Computer Science**

### **B.Sc. III Year**

#### **Paper-III: OPERATING SYSTEMS**

##### **Course Objective:**

CO1: To understand the services provided by and the design of an operating system.

CO2: To understand what a process is and how processes are synchronized and scheduled.

CO3: To understand different approaches to memory management.

CO4: Students should be able to use system calls for managing processes, memory, and the file system.

CO5: Students should understand the data structures and algorithms used to implement an OS.

##### **Unit–1: OS Fundamentals and Structure of OS.**

Introduction – What Operating Systems do – Computer – system organization – Computer System Architecture – Operating Systems structure – Operating System operations Process management -Memory management,

Storage management, Protection, and security– Distributed systems–Computing environments.

System structures – Operating System services – User Operating System interface – system calls –Typesofsystemcalls–systemprograms–Operatingssystemstructure–systemBoot.Processconcept – Process scheduling – Operations on processes – Inter process communication – Examples of IP systems–Communication in Client server systems.

##### **Unit–2: Multithreading and Process Synchronization.**

Multi-threaded programming–Multithreading models – Thread Libraries– Threading

issues–Operating System examples. Process Scheduling – Basic concepts – Scheduling Criteria–Scheduling Algorithms–Multiple process scheduling – Thread scheduling – Operating System examples. Process Synchronization – The Critical section problem – Peter’s solution – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Monitors – Synchronization examples. Deadlocks – System model – Deadlock Characterization –Methods for Handling Deadlocks – Deadlock prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.

### **Unit-3: Memory Management Strategies.**

Memory–management strategies – swapping–contiguous Memory allocation – paging – structure of the page table – Segmentation. Virtual – Memory management – Demand paging – Page Replacement. File system –File concept – Access Methods–Directory structure–Protection.

### **Unit-4: File Systems and I/O Management.**

Implementing file systems–File system structure File system implementation–Directory implementation – Allocation methods – Free space management – Efficiency and Performance –Recovery. Secondary storage structure – overview of Mass-storage structure-Disk structure - Disk Attachment – Disk Scheduling – Disk Management – Swap space Management – RAID structure. I/O systems – overview – I/O hardware – Application I/O interface – Kernal I/O subsystem –Transforming I/O requests to Hardware Operations.

### **Unit-5: Real Time Systems and Case Study.**

Real Time systems – Overview – System characteristics – Features of Real time Kernels – Implementing Realtime Operating Systems–Realtime CPU Scheduling – Vxworks5.x Case study: The Linux System: Linux history – Design principles – Kernel Modules – Process Management –Scheduling–Memory Management–File systems–Input and Output–Inter process communication – Network structure.

## **Computer Science**

### **B.Sc. III Year**

#### **Paper-III: OPERATING SYSTEMS LAB**

##### **Course Objectives**

- CO1: To learn shell scripting concepts, including variable declaration, arithmetic operations, and conditional execution.
- CO2: To understand how to use conditional execution operators in shell scripts.
- CO3: To learn how to perform file tests using shell scripts.
- CO4: To understand how to retrieve and display information about recent user logins to the Unix system.
- CO5: To learn how to use shell scripts to perform directory operations, such as finding the number of files in a directory.
- CO6: To understand how to use loops in shell scripts to print specific output formats.
- CO7: To learn how to calculate the number of days in a given month and year using shell scripts.
- CO8: To understand how to check whether a given number is a perfect number or not using shell scripts.
- CO9: To learn how to concatenate strings using arguments in shell scripts.
- CO10: To understand how to use break and continue statements in shell

scripts.

CO11: To learn how to create a menu-driven shell script.

CO12: To understand how to delete files of zero bytes using shell scripts.

CO13: To learn how to display reverse numbers from given argument lists  
Using shell scripts.

CO14: To understand how to display factorial values using shell scripts.

CO15: To learn how to greet the user according to the current time using shell scripts.

CO16: To understand the concepts of different process scheduling algorithms and implement them in shell scripts.

CO17: To learn how to implement different memory allocation algorithms and file organization techniques using shell scripts.

1. Write a shell script to accept two numbers and perform all arithmetic operations on it.
2. Write a shell script to find largest of three numbers using conditional execution operators.
3. Write a shell script to accept the name of the file from standard input and perform the following tests on it
  - a) File executable
  - b) File readable
  - c) File writable
  - d) Both readable & writable
4. Write a shell script which will display the username and terminal

name who login recently into the Unix system.

5. Write a shell script to find number of

files

in a directory

6. Write a shell script to print the

following

format

1

12

123

1234

.....

1. Write a shell script which will display the number of days in the given month and year.

2. Write a shell script to check whether a given number is perfect number or not.

3. Write a shell script for concatenation of two strings using arguments.

4. Write a shell script to demonstrate break and continue statements.

5. Write a shell script to satisfy the following menu options.

a. Display current directory path.

b. Display today's date.

c. Display users who are connected to the Unix system.

d. Quit

6. Write a shell script to delete all files whose size is zero bytes from current directory.

7. Write a shell script to display reverse numbers from given argument list.

8. Write a shell script to display factorial value from given argument list.

9. Write a shell script which will greet you "Good Morning", "Good Afternoon", "Good Evening" and "Good Night" according to current time.

10. To implement the FCFS Algorithm
11. To implement the Shortest Job First Algorithm
12. To implement Priority Algorithm
13. To implement the round robin Algorithm
14. To implement the FIFO page replacement Algorithm
15. To implement LRU page replacement Algorithm
16. To implement Resource Request Algorithm
17. To implement First-Fit, Best-Fit, Worst-Fit Algorithm
18. To implement Sequential File Organization
19. To implement Random File Organization