Bachelor of Science

Mathematics, Physics & Chemistry

Syllabus

School of Distance Education
Andhra University, Visakhapatnam, Andhra Pradesh

ANDHRA UNIVERSITY
B.Sc. (MPC)

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: Chemistry - Inorganic, Organic, Physical and General Chemistry

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: Chemistry - Inorganic, Organic, Physical & General Chemistry – II
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 : Chemistry – Inorganic Chemistry, Organic Chemistry & Physical Chemistry
Paper 7 : Chemistry - Physico Chemical Methods of Analysis and Drugs Formulations Pesticides, Green Chemistry and Macro Molecules, Material Science and Catalysis

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. Rarthasarathy : 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 Conjurer'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 Shakespeakare : The Merchant of Venice

Rabindranath Tagore : Sacrifice

A Course in Listening and Speaking I

పేపర్ – 1 ద్వితీయ భాష – జనరల్ తెలుగు

అభ్యసన ఫలితాలు (Course Objectives)

ఈ పాఠాన్ని ఒక క్రమబద్ధమైన పద్ధతిలో రూపొందించి అందిసున్నాం.

1.పాఠాల్లో పరిచయం, ఉద్దేశం, పాఠ్యం అర్థతాత్పర్యాలు, విషయ విభాగం పాఠ్యభాగ సారాంశం, సందర్భ సహిత వాఖ్యలు 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. తద్వార పాఠ్యభాగ సారాంశం ఉంటుంది.

6. పద్యాలకు అర్థతాత్పర్యాలు, కొన్ని వాక్యాలకు సందర్భ సహిత వ్యాఖ్యలు ఉంటాయి

7. పాఠం చివర అదనపు సమాచారం చదవగిన పుస్తకాలు సమకూర్చారు

8. సాహిత్య పరనాభిలాషను, అధ్యయపన కౌశలాన్ని, విమర్శనా దృష్టిని రచనా శక్తిని పెంపొందిస్తాయని ప్రత్యేకించి పరీక్షల్లో మీకు కృతార్థతను చేకూర్చి పెడతాయని మేం ఆశిస్తున్నాము.

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. మునాసపరులు – జాషువ
8. మేఘదూతము – పుట్టపర్తి నారాయణాచార్యులు కథానికలు
9. గాలివాన – పాలగుమ్మి పద్మరాజు
10. ఆకలి – కొలకలూరి ఇనాక్
11. నమ్ముకున్న నేల – కేతు విశ్వనాథ రెడ్డి
12. జైలు – పొట్లపల్లి రామారావు

వ్యాకరణం:

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

2. తత్పురుష, కర్మధారయ, ద్వంద్వ, ద్విగు, బహుప్రీహి మొదలైనవి. సమాసాలు ఉపవాచకము: నవల:

   ప్రజల మనిషి – వట్టి కోట ఆశ్వారుస్వామి

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 Mahabharatha 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 17th Canto Slokas 11 – 68

Lesson No. 2   Ahimsa Paramodharmah

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

Lesson No. 3   Raghoh Audaryam

From Raghuvamsa 5th 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) Gatitatpurusha
(2e) Upapada Tatpurusha	(3) Bahuvrihi
(4) Avyayibhava	

CONJUGATONS

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.

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, Sarcaria Commission. Indian Foreign Policy - Non - Aligned Movement
- Local Self Governments in the light of 73ʳᵈ 74ᵗʰ 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

పేపర్ – 2 ద్వితీయ భాష – జనరల్ తెలుగు

అభ్యసన ఫలితాలు (Course Objectives)

ఈ పాఠాన్ని ఒక క్రమబద్ధమైన పద్ధతిలో రూపొందించి అందిసున్నాం.

1.పాఠాల్లో పరిచయం, ఉద్దేశం, పాత్యం అర్థతాత్పర్యాలు విషయ విభాగం, పాత్యభాగ సారాంశం, సందర్భసహిత వ్యాఖ్యలు మాదిరి ప్రశ్నలు అభ్యాసాలు గుర్తించుకోవలసిన ముఖ్యాంశాలు

2. పరీక్ష దృష్ట్య ప్రశ్నలు సమాధానాలు, ఆధార(గంథాలు చదవదిగిన పుస్తకాలు అనే విభజన పాటించడమైంది.

3. పరిచయంలో ప్రక్రియ గురించి, రచయిత గురించి, పాత్యం గురించి పరిచయం ఉంటుంది

4. ఉద్దేశంలో పాత్యం స్థూల పరిచయం ఉంటుంది. పాత్యంలో చదవలసిన అంశం ఉంటుంది.

5. విషయ విభాగంలో పాత్యభాగ సారాంశంలోని ముఖ్యాంశాల విభజన ఉంటుంది తద్వార పాత్యభాగ సారాంశం ఉంటుంది

6. పద్యాలకు అర్థతాత్పర్యాలు, కొన్ని వాక్యాలకు సందర్భ సహిత వ్యాఖ్యలుంటాయి

7. పాఠం చివర అదనపు సమాచారం చదవగిన పుస్తకాలు సమకూర్చారు

8. సాహిత్య పఠనాభిలాషను, అధ్యయన కౌశలాన్ని, విమర్శనా దృష్టినీ, రచనా శక్తిని పెంపొందిస్తాయనీ ప్రత్యేకించి పరీక్షల్లో మీకు కృతార్థతను చేకూర్చి పెడతాయని మేం ఆశిస్తున్నాము.

ప్రాచీన కవిత్వం (Syllabus)

1. వామనావతారము – పోతన
2. శాలివాహన విజయము – కొఆవి గోపరాజు
3. గ్రీష్మర్తువు – రఘునాథ నాయకుడు

ఆధునిక కవిత్వం

4. హరిజన శతకము – కుసుమ ధర్మన్న
5. ధర్మసంవాదము – పింగళి, కాటూరి
6. బతకమ్మ! బ్రతుకు – కాళోజీ నారాయణరావు
7. మనిషి – డా॥అందెశ్రీ
8. రాయలసీమ – గంజి కేంద్రము – బెళ్లారి 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. సుబ్బరావు

ఉపవాచకం:

1. పాలేరు – బోయిభీమన్న

వ్యాసాలు, వ్యాకరణం

అలంకారములు –ఉపమ, రూపక, ఉత్ప్రేక్ష, స్వభావోక్తి, అతిశయోక్తి – అర్థాంతరన్యాస, దృష్టాంతము

ఛందస్సు – ఉత్పలమాల, చంపకమాల, శార్దూలం, మత్తేభం, కందం, తేటగీత్రి 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, Pratyaas, andsandhi rules.
2. To develop the ability to read and comprehend simple Sanskrit texts, including prose and poetry, with the help of adictionary and basic vocabulary.
3. To deepen understanding of Sanskrit vocabulary, including the ability to recognize and use common words, idioms, andexpressions.
4. To develop skills in translating Sanskrit texts into English orTelugu, 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 genreslike moral prose, drama, and lyric poetry.
6. To deepen understanding of Indian philosophy and religion through the study of Sanskrit texts in these fields, includingthe Mahabharatha and Upanishads.
7. To develop skills in analysis and interpretation of Sanskrittexts, 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 thestudy 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 a assignments on a topic related to Sanskritlanguage, 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 Harisdhandra (9) Mahaveer Prasad Dwivedi (10) Maithilisharan Gupt (11) Premchand (12) Jayashankar Prasad (13) Pant (14) Nirala (15) Maha Devi Verma (16) Agyeya (17) Dinkar.

C. General Essay:

   (1) Sahitya Aur Samaj (2) Vidyarthi Rajiniti (3) Vidyarthi Aur Anushasan (4) Aaj Ki Shikasha Niti (5) Vigyan: Abhishap Ya Vardan (6) Nari Shikasha (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 surf ace 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 Internets 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, stomping 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, polyvinlychloride (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 fort 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 gr. Equations solvable for Equations solvable for$x$, Equations that do notcontains x(or y), Equations of the first degree in 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 constantcoefficients; Anequivalent 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 inthe sofa 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 teo 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 from 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 vertexand guiding curve. Enveloping cone of a sphere Equations of 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 plan 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 to 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 night 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) $Q = b\,\mathrm{Sin}x$ (or) $b\mathrm{Cos}x$]

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 ofUndetermined Coefficients

9. "Bisectors of Angles Between two Planes"

10. The Length and Equations of the Line of ShortestDistance 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, Croups--Definition and elementary properties, Fine groups and group composition tables, Subgroups and cyclic subgroups Permutation Functions and potations 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 mon 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 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 Cachy'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

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)

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 approximationSolution 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, Backwarddifferences, 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, Inter-polation 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 exponentialsNumerical 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-siedal method, Numerical solution of ordinary differential equations: Introduction, Solution by Taylor's Series, Picard's method of successive approximations. Eider's method, Modified Euler's method, Runge-Kutta methods, Predictor - Corrector methods, Milne's method.

PracticalsPaper

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. Gauses forward and Gauses 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

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B.Sc. Physics
Three Year Programme Structure

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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 processional 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

Syllabus for B.Sc. Physics First year Theory Paper-I

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 intertial 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 y, n, k. Classfication 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, comparision 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 barsLongitudinal 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 vibrartion 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-Bifillar 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

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-Boltzman 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 lawϖ 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 efficiencyϖ Develop critical understanding of concept of Thermodynamic potentials, theϖ formulation of Maxwell's equations and its applications.

CO4: Differentiate between principles and methods to produce low temperature and liquefyϖ 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 Fraunhoffer diffraction and observe theϖ 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 zoneϖ plate with convex lens.

CO8: Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasersϖ and their applications in different fields.

CO9: Understand the basic principles of fibre optic communication ande xplore the field ofϖHolography 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 Claussius 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 Fraunhoffer diffraction Fraunhoffer diffraction:- Diffraction due to single slit and circular aperture – Limit of resolution – Fraunhoffer diffraction due to double slit – Fraunhoffer 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, Polarizatioin 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 Pulfrichrefractometer
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 electromagneticϖ 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 resonantϖ circuits.

CO6: Describe the operation of p-n junction diodes, zener diodes, light emitting diodes andϖ 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 tomagnetic shell-field due to magnetic shell-equivalent of electric circuit and magnetic shell-magnetic induction (B), and field (H)-permeability and susceptibilityHysteresis 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'slaw and calculation of B due to long straight wire, a circular current loop and solenoid.

3. ELECTROMAGNETIC INDUCTION: Faraday'slaw-Lenz'slaw-expression forinducedemf-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 currentsinLR,CRandLCRcircuitscritical 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'SEQUATIONS AND ELECTROMAGNTICWAVES: A review of basic laws of electricity and magnetism-displacement current-Maxwell's equationsindifferentialform-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 bandsin solids, classification ofsolidsin 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:Binarynumbersystem, 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 lawsstatement 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¬ V-I characteristics.

CO6: Construct the basic logic gates, half adder and full adder and verify their truth tables.¬ 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. Careyfoster 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 Kirchoff'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 ϖ
Schrodinger wave equation and its applications.

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

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

CO6: Increase the awareness and appreciation of superconductors and their practical ϖ
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, Plank'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 EQATION: Schroedinger 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-Nuttal law, Gamow's theory of alpha decay, Giger-Nuttal 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, Bravis 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 Modelung 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, copper 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 ande/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 α-rays and β-rays, Range of β-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 Oscilaltor

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 α β and Rays

13. Hall Probe Method for Measurment of magnetic Field

14. Absorption Spectrum of Iodine Vapour

B.Sc CHEMISTRY

PROGRAMME OUTCOMES

PO-1: B.Sc. Chemistry curriculum is so designed to provide the students a comprehensive understanding about the fundamentals of chemistry covering all the principles and perspectives.

PO-2: The branches of Chemistry such as Organic Chemistry, Inorganic Chemistry, Physical Chemistry and Analytical Chemistry expose the diversified aspects of chemistry where the students experience a broader outlook of the subject.

PO-3: The syllabi of the B.Sc. Chemistry course are discretely classified to give stepwise advancement of the subject knowledge right through the three years of the term.

PO-4: The practical exercises done in the laboratories impart the students the knowledge about various chemical reagents and reactions. Thereby, hone their skills of handling the corrosive, poisonous, explosive and carcinogenic chemicals making themselves employable in any kind of chemical industries. They are also trained about the adverse effects of the obnoxious chemicals and the first aid treatment.

PROGRAMME SPECIFIC OUTCOMES

PSO-1: The students will understand the existence of matter in the universe as solids, liquids, and gases which are composed of molecules, atoms and sub atomic particles.

PSO-2: Students will learn to estimate inorganic salt mixtures and organic compounds both qualitatively and quantitatively using the classical methods of analysis in practical classes.

PSO-3: Students will grasp the mechanisms of different types of reactions both organic and inorganic and will try to predict the products of unknown reactions.

PSO-4: Students will learn to synthesize the chemical compounds by maneuvering the addition of reagents under optimum reaction conditions.

Andhra University B.Sc., Chemistry Syllabus

1st Year Paper – I

Course outcomes:

At the end of the course, the student will be able to;

CO1: Understand the basic concepts of p-block elements

CO2: Explainthe difference between solid, liquid and gases in terms of inter molecular interactions.

CO3: .Apply the concepts of gas equations, Ph and electrolyte swhile studying other chemistry courses.

CO4: Understand and explain the differential behaviour of organic compounds based on fundamental concepts learnt.

CO5: formulate the mechanism of organic reactions by recallingand correlating the fundamental properties of the reactants involved.

CO6:Learn and identify many organicr eaction mechanisms including Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.

CO7: Correlate and describe the stereochemical properties of organic compounds and reactions.

UNIT -1 (Inorganic Chemistry-I)

1.   s-block elements: General characteristics of groups I & II elements, diagonal relationship between Li & Mg, Be & Al.

2.   p-block elements: General characteristics of elements of groups 13,14,15,16and 17 Group -13:   Synthesis and structure of diborane and higher borances (B_4H_{10} and B_5H_9),

boron-nitrogen compounds ($B_3N_3H_6$ and BN)

Group-14   :   Preparation and applications of silences and silicones, graphitic compounds. Group-15   :   Preparation   and   reactions   of   hydrazine, hydroxylamine, phosphazenes.

Group -16   :   Classifications of oxides based on (i) Chemical behavior and (ii) Oxygen content.

Group -17   :   Inter halogen compounds and pseudo halogens

3.   Organometallic Chemistry

Definition and classification of organometallic compounds, nomenclature, preparation, properties and applications of alkyls of 1,2 and 13 group elements.

UNIT - II (Organic Chemistry -1)

1.   Structural theory in Organic Chemistry

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like H_2O, NH_3 & AlC_{13})

Bond polarization : Factors influencing the polarization of covalent bonds, electro negativity- inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes, carbanions, carbenes and nitrenes.

Types of Organic reactions: Addition - electrophilic, nucleophilic and free radical. Substitution - electrophilic, nucleophilic and free radical. Elimination - Examples (mechanism not required).

2.   Acyclic Hydrocarbons

Alkanes - IUPAC Nomenclature of Hydrocarbons. Methods of preparation: Hydrogenation of alkynes and alkenes, Wurtz reaction, Kolbe's electrolysis, Corey - House reaction. Chemical reactivity- inert nature, free radical substitution mechanism. Halogenation example - reactivity, selectivity and orientation.

Alkenes - Preparation of alkenes (a) by dehydration of alcohols (b) by dehydrochlorination of alky halides (c) by dehalogenation of 1,2 dihalides (brief mechaniaasm), Saytzev's rule.

Properties: Addition of hydrogen - heat of hydrogenation and stability of alkenes. Addition of halogen and its mechanism. Addition of HX, Markonikow's rule, addition of H_2O, HOX, H_2,SC_4 with mechanism and addition of HBr in the presence of peroxide (anti - Markonikov's addition).

Oxidation - hydroxylation by $KMnO_4$, OsO_4, peracids (via epoxidation) hydroboration, Dienes

- Types of dienes, reactions of conjugated dines -1,2 and 1,4 addition of HBr to 1,3 - butadiene

and Diel's - Alder reaction.

Alkynes - Preparation by dehydrohalogenation of dihalides, dehalogenation of tetrahalides, Properties; Acidity of acetylenic hydrogen (formation of Metal acedtylides).

Preparation of higher acetylenes, Metal ammonia reductions physical properties. Chemical reactivity-electrophilic

addition of X2, HX, H2O (Tautomerism), Oxidation with KMnO4, OsO4, reduction - and Polymerization reaction of acetylene.

3.   Alicyclic hydrocarbons (Cyeloalkanes)aa

Nomenclature, Preparation by Freunds methods, hewing dicarboxylic metal salts. Properties - reactivity of cyclopropane and cyclobutane by comparing with alkanes, Stability of cycloakanes-Baeyer's strain theory, Sachse and Mohr predictions and Pidtzer's strain theory. Conformational structures of cyclobutance, cyclopentane, cyclonehexane.

4.   Benzene and its reactivity

Concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of Benzene, mention of C-C bond lengths and orbital picture of Benzene.

Concept of aromaticity - aromaticity (definition), Huckels rule - application to Benzenoid (Benzene, Napthalene) and Non -Benzenoid compounds (cyclopropenyl cation, cyclopentadieny 1 anion and tropylium cation)

Reactions - General mechanism of electrophilic substitution, mechanism of nitration. Friedel Craft's alkylation and acylation. Orientation of aromatic substitution - Definition of ortho,

para and meta directing groups. Ring activating and deactivating groups with examples

(Electronic interpretation of various groups like NO2 and Phenolic). Orientation of (i). Amino, methoxy and methyl groups (ii). Carboxy, nitro, nitrile, carbony 1 and Sulfonic acid groups, (iii)

Halogens (Explanation by taking minimum of one example from each type)

5.   Polynuclear Hydrocarbons -

Structure of naphthalene and anthracene (Molecular Orbital diagram and resonance energy) Any two methods of preparation of naphthalene and reactivity. Reactivity towards electrophilic substitution. Nitration and Sulfonation as examples.

UNIT -III - Physical Chemistry (1)

I)   Gaseous state

Compression factors, deviation of real gases from ideal behaviour. Vander Waal's equation of state. P-V Isotherms of real gases, Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. The vander Waal's equation and the critical state. Relationship between critical constants and van Waal's constants. The law of

corresponding states reduced equation of states. Joule Thomson effect. Liquefaction of gases : i) Lindensmethod and ii) Claude's method.

II)   Liquid state

Intermolecular forces, structure of liquids (qualitative). Structural differences between solids, liquids and gases. Liquid crystals, the mesomorphic state. Classification of liquid crystals into Smectic and Nematic. Differences between liquid crystal and solid/ liquid. Application of liquid crystals as LCD devices.

Ill   Solid state

Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. The law of symmetry. Definition of lattice point, space lattice, unit cell. Bravis lattices and crystal systems. X-ray differaction and crystal structure. Bragg's law. Determination of crystal structure by Bragg's method and the powder method. Indexing of planes and structure of NaCl and KC1 crystals.

Defects in crystals. Stoichiometric and non-stoichiometric defects. Band theory of semiconductors. Extrinsic and intrisic semiconductors, n-type and p-type semiconductors and their applications in photo electrochemical cells.

IV   Solutions

Liquid-liquid-ideal solution, Raoult's law. Ideally dilute solutions, Henry's law. Non-ideal

solutions, Vapour pressure-composition and vapour pressure-temperature curves.

Azeotropes-HCI-H2O, ethanol - water systems and fractional distillation. Partially miscible liquids-phenol-water; trimethylamine-water, nicotine - water systems. Effect of impurity

on consulate temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

V   Colloids and surface chemistry

Definition of colloids. Solids in liquids (sols), preparation, purification, properties-kinetic, optical, electrical. Stability of colloids, Hardy-Schulze law, protective colloid Liquids in Liquids (emulsions) preparation, properties, uses. Liquid in solids (gels) preparation, uses,

Adsorption : Physical adsorption, chemisorption, Freybdkuch, Langmuir adsorption isotherms. Applications of adsorption.

UNIT -IV

(General Chemistry -I)

1.   Atomic structure elementary quantum mechanics

Blackbody radiation, Planck's radiation law, photoelectric effect, Compton effect, de Broglie's hypothesis, Heisenberg's uncertainty principle, Postulates of quantum mechanics. Schrodinger wave equation and a particle in a box, energy levels, wave functions and probability densities. Schrodinger wave equation for H-atom. Separation of variables, Radial and angular functions, hydrogen like wave functions, quantum numbers and their importance.

2.   Chemical Bonding

Valence bond theory, hybridization, VB theory as applied to CIF3 BrF5, Ni(CO)4, XeF2 Dipole moment - orientation of dipoles in an electric field, dipole moment, induced dipole moment, dipole moment and structure of molecules. Molecular orbital theory - LCAO method, construction of MO. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N2,O2,HC1, CO and NO). Compression of VB and MO theories.

3.   Stereochemistry of carbon compounds Molecular representations - Wedge, Fischer, Newman and Saw-Horse formulae.

Stereoisomerism, Stereoisomers: enantiomers diastereomers-definition and examples. Conformational and configurational isomerism-definition. Conformational isomerism of ethane and n-butane.

Enantiomers: Optical activity - wave nature of light, plane polarized light, interaction with molecules, optical rotation and specific rotation. Chiral molecules-definition and citeria absence of plane, center, and Sn axis of symmetry - asymmetric and dissymmetric molecules. Examples of asymmetric molecules (Glyceraldehyde, Lactic acid, Alanine) and disymmetric molecules (trans-1,2 - dichloro cyclopropane).

Chiral centers: definition - molecules with similar chiral carbon (Tartaric acid), definition of mesomers - molecules with dissimilar chiral carbons (2,3-dibromopentane). Number of enantiomers and mesomers-calculation.

D.L and R,S configuration for asymmetric and disymmetric molecules. Cahn-Ingold-Prelog rules. Racemic mixture -racemization and resolution techniques.

Diastereomers: definition-geometrical isomerism with reference to alkenes-cis, trans and E,Z-configuration.

4.   General Principles of Inorganic qualitative analysis

Solubility product, common ion effect, characteristic reactions of anions, elimination of interfering anions, separation of cations into groups, group reagents, testing of cations.

II B.Sc. Chemistry (THEORY)

Paper-II: INORGANIC, ORGANIC, CHEMICAL, PHYSICAL, GENERAL

Course outcomes:

At the end of the course, the student will be able to;

CO1. To learn about the laws of absorption of light energy by molecules and the subsequent photochemical reactions.

CO2. To understand the concept of quantum efficiency and mechanisms of photo chemical reaction

CO3. Understand and explain the differential behaviour of Organic compounds based on fundamental concepts learnt.

CO4. Formulate the mechanism of organic reactions by Recalling and correlating the fundamental properties of the reactants involved.

CO5. Learn and identify many organic reaction mechanisms including Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.

CO6. Correlateanddescribethestereochemicalpropertiesoforganiccompoundsandreactions.

UNIT-1 (Inorganic chemistry-II)

1. Chemistry of d-block elements: characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states and e.m.f. Comparative treatment of second and third transition series with their 3d analogues. Study of Ti, Cr and Cu traids in respext of electronic configuration and reactivity of different oxidation states.

II. Chemistry of f-block elements :Chemistry of lanthanides - electronic structure, oxidation states, lanthanide contaction, consequences of lanthanide contraction, magnetic properties, spectral properties and separation of lanthanides by ion exchange and solvent extraction methods. Chemistry of actinides - electronic configutation, oxidation states, actinide contraction, position of actinides in the periodic table, comparision with lanthandies terms of magnetic properties, spectral properties and complex formation.

III. Theories of bonding in metals: Valence bond theory, explanation of metallic prpoerties and its limitations, Free electron theory, thermal and electrical conductivity or

metals, limitations, Band theory, formation of bands, explanation of conductors semiconductors and insulators.

IV. Metal carbonyls and related compunds-EAN rule, classification of metal carbonyls, structures and shapes of metal carbonyls of V, Cr, Mn, Fe, Co and Ni. Metal nitrosyls and metallocenes (only ferrocence).

UNIT-II (Organic chemistry-II)

1. Halogen compounds Nomenclature and classification of alkyl (into primary, secondary, tertiary, aryl, aralkyl, allyl, vinyl, benzyl halies.

Chemical reactivity, formation of RMgX Nucleophilic aliphatic substitution reactiohn, - classification into S 1 and S2 energy profile diagram of S1 and S2 reactions. Stereochemistry of S 2 (Walden Inversion) S 1 (Racemisation). Explanation of both by taking the wxample of optically active alkyl halde-2bromobutane. Ease of hydrolysis-comparision of alkyl, benzyl, alkyl, vinyl and arly halides

2. Hydroxy compounds Nomenclature and classification of hydroxy compunds.

alcohols: Preparation with hydroboration reaction, Grignard synthesis of alcohols. Phenols: Preparation i) from diazonium salt, ii) from aryl sulphonates, iii) from cumene. Physicia properties - Hydrogen bonding (intermolecular and intramolecular). Effect of hydrogen bonding on boiling point and solubility in water.

Chemical properties:

      a. acidic nature of phenols

      b. formation of alkoxides/ Phenoxides and their reaction with RX.

      c. replacement of OH by X using PCI, PCI, PB, SOCI and with HX/ZnCI

      d. esterification by acids (Mechanism).

      e. dehydration of alcohols.

      f. oxidation of alcohols by CrO, KMnO

      g. special reaction of phenols: Bromination, Kolb-Schmidt reaction, Riemer

Tiemann reaction, Fries rearrangment, Azocoupling.

Identification of alcohols by oxidation with KMnO, ceric ammonium nitrate, lucas reagent and phenols by reaction with FeCI.

Po9lyhydroxy compunds: Pinacol-Pinacolone rearrangment.

3. Carbonyl compounds

Nomenclature of aliphatic and aromatic carbonyl compunds, structure of the carbonyl group. Synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using1,3-dithianes, synthesis of ketones fromnitriles and from carboxylic acids.

Physicia properties: absence of hydrogen bonding, keto-enol tautomerism, reactivity of carbonyl group in aldehydes and ketones.

Nucleophilic addition reaction with a) NaHSO, b) HCN, c) RMgX, d) NH OH,

e) PhNHNH, 1)2,4 DNPH, g) Alcohols-formation of hemiacetal and acetal. Halogenation using PCI with mechanism.

Base catalysed reactions: a) aldol, b) Cannizzaro reaction, c) Perkin reaction, d) Benzoin condensation, e) haloform reaction, f) Knoevenagel reaction.

Oxidationof aldehydes-Baeyer-Villager Oxidation of Ketones.

Reduction: Clemmensen reduction, Wolf-Kishner reduction, MPV reduction, reduction with LIAIH and NaBH.

Analysis of aldehydes and ketones with a) 2,4-DNT test, b) Tollen's test, c) Fehling text, d) Schiff test,

e) Haloform test (with equation).

4. Carboxylic acids and derivatives

Nomenclature, classificationand structure of carboxylic acids.

Methods of preparation by

a) hydrolysis of nitriles, amides and esters,

b) carbonation of Grignard reagents.

Special methods of preparation of aromatic acids by

a) oxidation of side chain.

b) hydrolysis by benzotrichlorides.

c) Kolbe reaction.

Physical properties: Hydrogen bonding, dimeric association, acidity- strength of acids with examples of trimethyl acetic acid and trichloroacetic acid. Relative differences in the acidities of aromatic and aliphatic acids.

Chemical properties: Reactions involving H, OH and COOH groups- salt formation,

anhydride formation, acid chloride formation, amide formation and esterification (mechanism), Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schimdt reaction, Arndt-Eistert synthesis, halogenation by Hell-Volhard- Zelinsky reaction.

Derivatives of carboxylic acids: Reaction of acid chlorides, acid anhydrides, acid amides,

esters (mechanism of the hydrolysis of esters by acids and bases).

5. Active methylene compounds

Acetoacetic esters: preparation by Claisen condensation, keto-enol tauton Tensm. Acid

hydrolysis and ketonic hydrolysis. Preparation of a) monocarboxylic acids.

b) dicarboxylic acids. Reaction with urea

Malonic ester: preparation from acetic acid. Synthetic applications; Preparation of a)

monocarboxylic acids (propionic acid and n-butyric acid).

b) dicarboxylic acids (succinic acid and adipic acid).

c) a,U-unsaturated carboxylic acids (crotonic acid).

Reaction with urea.

Exercises in interc,onversion

Unit-III (Physical chemistry-II)

1.Phase rule

Concept of phase, components, degree of freedom. Derivation of Gibbs phase rule. Phase equilibrium of one component-water system. Phase equilibrium of two-component system, solid-liquid equilibrium. Simple eutectic diagram of Pb-Ag system, desilverisation of lead. Solid solutions-compound with congruent melting point-(Mg-Zn) system, compound with incongruent melting point-NaCl-water system. Freezing mixtures.

2. Dilute solutions

Colligative properties. Raoult's law, relative lowering of vapour pressure, iTs relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal Colligative properties. Van't Hoff factor, degree of dissociation and association.

Electrochemistry

Specific conductance, equivalent conductance, measurement of equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations. Ostwald's dilution law. Debye- Huckel-Onsagar's equation for strong electrolytes (elementary treatment only). Definition of transport number, determination by Hittorf s method. Application of conductivity measurements-determination of dissociation constant (K) of an acid, determination of solubility product of sparingly soluble salt, conductometric titrations. Types of reversible electrodes-the gas electrode, metal-metal ion, metal-insoluble salt and redox electrodes. Electrode reactions, Nernst equation, single electrode potential, standard Hydrogen

electrode, reference electrodes, standard electrode potential, sign convention, electrochemical series and its significance. Reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF. Applications of EMF measurements, Calculation of thermodynamic quantities of cell reactions (AG, AH and K). Determination of pH using quinhydrone electrode, Solubility product of AgCl. Potentiometric titrations.

Unit IV (General chemistry-II)

1.Molecular symmetry

Concept of symmetry in chemistry-symmetry operations, symmetry elements. Rotational axis of symmetry and types of rotational axes. Planes of symmetry and types of planes. Improper rotational axis of symmetry. Inversion centre. Identity element. The symmetry operations of a molecule form a group. Flow chart for the identification of molecular point group.

2.Theory of quantitative analysis

 a) Principles of volumetric analysis. Theories of acid-base, redox, complexometric, Todometric and precipitation titrations, choice of indicators for these titrations.

 b) Principles of gravimetric analysis: precipitation, coagulation, peptization. coprecipitation,

post precipitation, digestion, filtration and washing of precipitate, drying and ignition! precipitation from homogenous solutions, requirements of gravimetric analysis.

3. Evaluation of analytical data.

 Theory of errors, idea of significant figures and its importance, accuracy - methods of

expressing accuracy, error analysis and minimization of errors, precision-methods of expressing precision, standard deviation and confidence limit.

 4. Introductory treatment to:

 a) Pericyclic Reactions

Concerted reactions, Molecular orbitals, Symmetry properties HOMO, LUMO, Thermal and photochemical pericyclic reactions. Types of pericyclic reactions - electrocyclic, cycloaddition and sigmatropic reactions- one example each.

b) Synthetic strategies

Terminology-Disconnection (dix), Symbol(), synthon, synthetic equivalent (SE), Functional group interconversion (FGI), Linear, Convergent and Combinatorial syntheses, Target molecule (TM). Retrosynthesis of the following molecules 1) acetophenone 2) cydohexene

3) phenylethylbromide

c) Asymmetric (Chiral) synthesis

Definitions-Asymmetric synthesis, enantiomeric excess, diastereomeric excess. stereospecific reaction, definition, example, dehalogenation of 1,2-dibromides by I". stereo selective reaction, definition, example, acid catalysed dehydration of 1-phenylpropanol

SYLLABUS

B.Sc. Ill Year 2011-2012

Part II - Paper-III

Course outcomes:

At the end of the course, the student will be able to;

CO1. Understand the basic concepts of p-block elements

CO2. Explain the difference between solid, liquid and gases in terms of Inter molecular interactions.

CO3. Apply the concepts of gas equations, Ph and electrolytes while studying other chemistry courses.

CO4. Understand concepts Of boundary conditions and quantization, probability distribution, most probable values, uncertainty and expectation values

CO5. Application of quantization to spectroscopy.

CO6. Various types of spectra and their use in structure determination.

UNIT-1 (INORGANIC CHEMISTRY-III)

1. Coordination Chemistry: IUPAC nomenclature, bonding theories-review of Wemer's theory and Sidgwick's concept of coordination, Valence bond theory, geometries of coordination numbers 4-tetrahedral and square planar and 6-octahedral and its limitations, crystal filed theory, splitting of d-orbitals in octahedral, tetrahedral and square-planar complexes-low spin and high spin complexes-factors affecting crystal-field splitting energy, merits and demerits of crystal-field theory. Isomerism in coordination compounds -structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers.

2. Spectral and magnetic properties of metal complexes: Electronic absorption spectrum of [Ti(HO), ion. Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility - Gouy method

3. Reactivity of metal complexes: Labile and inert complexes, ligand substitution reactions -S1 and S2, substitution reactions of square planar complexes - Trans effect and applications of trans effect.

4. Stability of metal complexes: Thermodynamic stability and kinetic stability, factors

affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

5. Hard and soft acids bases (HSAB): Classification, Pearson's concept of hardness and softness, application of HSAB principles-Stability of compounds/complexes, predicting the feasibility of a reaction.

6. Bioinorganic chemistry: Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and chloride (Ct). Metalloporphyrins - hemoglobin, structure and function, Chlorophyll, structure and role in photosynthesis.

UNIT-II (ORGANIC CHEMISTRY-111)

1. Nitrogen compounds

Nitro hydrocarbons: Nomenclature and classification-nitro hydrocarbons-structure, Tautomerism of nitroalkanes leading to aci and keto form. Preparation of Nitroalkanes, Reactivity-halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Michael addition and reduction.

Amines (Aliphatic and Aromatic): Nomenclature, Classification into 29,3° Amines and Quarternary ammonium compounds. Preparative methods-1. Ammonolysis of alkyl halide 2. Gabriel synthesis 3, Hoffman's bromamide reaction (mechanism). 4, Reduction of Amides and Schmidt reaction. Physical properties and basic character-Comparative basic strength of Ammonia, methylamine, dimethyl amine, trimethyl amine and an line-comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects. Use of amine salts as phase transfer catalysts, Chemical properties: a) Alkylation b) Acylation e) Carbylamino reaction d) Hinsberg separation e) Reaction with Nitrous acid of 19,2°, 3° (Aliphatic and aromatic amines), Electrophilic substitutions of Aromatic amines-Bromination and Nitrition, oxidation of aryl and 3° Amines. Diazotization Cyanides and isocyanides: Nomenclature (aliphatic and aromatic) structure, Preparation of cyanides from a) Alkyl halides b) from amides c) from aldoximes. Preparation of isocyanides from Alkyl halides and Amines. Properties of cyanides and isocyanides, a) hydrolysis b) addition of Grignard reagent iii) reduction iv) oxidation.

2. Heterocyclic Compounds

Introduction and definition: Simple 5 membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole, Importance of ring system-presence in important natural products like hemoglobin and chlorophyll, Numbering the ring systems as per Greek letter and Numbers. Aromatic character-6-electron system (four-electrons from two double bonds and a pair of non-bonded electrons from the hetero atom). Tendency to undergo substitution reactions.

Resonance structures: Indicating electron surplus carbons and electron deficient hetero atom. Explanation of feebly acidic character of pyrrole, electrophilic substitution at 2 or 5 position

Halogenation, Nitration and Sulphonation under mild conditions. Reactivity of furan as 1,3- diene, Diels Alder reactions (one example). Sulphonation of thiophene purification of Benzene obtained from coal tar). Preparation of furan, Pyrrole and thiophene from 1,4-dicarbonyl compounds only, Paul-Knorr synthesis, structure of pyridine, Basicity - Aromaticity. Comparison with pyrrole-one method of preparation and properties - Reactivity towards Nucleophilic substitution reactions-chichibabin reaction.

3. Carbohydrates

Monosa charides: All discussion to be confined to (+) glucose as an example of aldo hexoses and (-) fructose as example of ketohexoses. Chemical properties and structureal elucidation: Evidences for straight chain pentahydroxy aldehyde structure (Acetylation, reduction to n- hexane, cyanohydrin formation, reduction of Tollen's and Fehling's reagent and oxidation to gluconic and saccharic acid). Number of optically active isomers possible for the structure, configuration of glucose based on D-glyceraldehyde as primary standard (no proof for configuration is required). Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation). Cyclic structure of glucose. Decomposition of cyclic structure (Pyranose structure, anomeric Carbon and anomers). Proof for the ring size (methylation, hydrolysis and oxidation reactions). Different ways of writing pyranose structure (Haworth formula and chair conformationa formula). Structure of fructose: Evidence of 2-ketohexose structure (formation of penta acetate, formation of cyanohydrin its hydrolysis and reduction by HI to give 2-Carboxy-n-hexane). Same osazone formation from glucose and fructose, Hydrogen bonding in osazones, cyclic structure for fructose (Furanose structure and Haworth formula). Intere inversion of Monosaccharides: Aldopentose to aldo hexose-eg: Ambinose to D-Glucose, D-Mannose (Kiliani - Fischer method). Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose eg: D-glucose to D-arabinose by Ruff degradation. Aldohexose (+) (glucose) to ketohexose (-) (Fructose) and Ketohexose (fructose) to aldohexose (Glucose)

4. Amino acids and proteins

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gama amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples.

Methods of synthesis General methods of synthesis of alpha amino acids (specoc examples -Glycine, Alanine, valine and leucene) by following methods. a) from alogenated carboxylic acid b) Malonic ester synthesis c) strecker's synthesis. Physical properties: Optical activity of naturally occurring amino acids; L-configuration, respective of sign of rotation, Zwitterion structure-salt like character-solubility, meling points, amphoteric character, definition of isoelectric point.

Chemical properties: General reactions due to amino and carboxyl groups-lactams from gamma and delta amino acids by heating peptide bond (amide linkage) Structure and nomen clature of peptides and proteins.

5. Mass Spectrometry:

Basic principles-Molecular ion/parent ion, fragment ions/daughter ions. Theory-formation of parent ions. Representation of mass spectrum. Identification of parent ion,(M+I), (M+2), base peaks (relative abundance 100%) Determination of molecular formula-Mass spectra of ethylbenzene, acetophenone, n-butylamine and 1-proponol.

UNIT-III (PHYSICAL CHEMISTRY-III)

1. Chemical kinetics

Rate of reaction, factors influencing the rate of a reaction-concentration, temperature, pressure, solvent, light, catalyst. Experimental methods to determine the rate of reaction. Definition of order and molecularity. Derivation of rate constants for first, second, third and zero order reactions and examples. Derivation for time half change. Methods to determine the order of reactions. Kinetics of complex reactions (first order only): opposing reactions, parallel reactions, consecutive reactions and chain reactions Effect of temperature on rate of reaction, "Arrhenius equation, concept of activation energy. Theories of reaction rates-collision theory-derivation of rate constant for bimolecular read ion, The transition state theory (elementary treatment).

2. Photochemistry

Difference between thermal and photochemical processes Laws of photochemistry-Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield. Ferrioxalate actinometry. Photochemical hydrogen chlorine, hydrogen-bromine read ion, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing). Photosensitized reactions-energy transfer-processes

3. Thermodynamics

The first law of thermodynamics-statement, definition of internal energy and enthalpy. Heat capacities and their relationship. Joule's law-Joule-Thomson coefficient. Calculation of w, q, dU and dH for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes. State function. Temperature dependence of enthalpy of formation-Kirchoffs equation. Second law of thermodynamics. Different Statements of the law. Camot cycle and its efficiency. Carnot theorem. Thermodynamic scale of temperature. Concept of entropy, entropy as a state function, entropy changes in cyclic, reversible, and irreversible processes and reversible phase change. Calculation of entropy

changes with changes in V & T and P&T, Entropy of mixing inert perfect gases. Entropy changes in spontaneous and equilibrium processes.

The Gibbs (G) and Helmholtz (A) energies. A & Gas criteria for thermodynamic equilibrium and spontaneity-advantage over entropy change. Gibbs equations and the Maxwell relations. Variation of G with P, V and T.

B.Sc. III Year Chemistry

Paper-IV Chemistry and Industry

Course outcomes:

At the end of the course, the student will be able to;

CO1. Understand preparation, properties and reactions of haloalkanes, haloarenes and

Oxygen containing functional groups.

CO2. Use the synthetic chemistry learnt in this course to do functional group

transformations.

CO3. To propose possible mechanisms for any relevant reaction.

Unit-I (Physico Chemical methods of analysis)

1.Separation techniques

   1. Solvent extraction: Principle and process, Batch extraction, continuous extraction and counter current extraction. Application-Determination of Iron (III)

   2. Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, Rf values, factors effecting Rf values.

   a. Paper Chromatography: Principles, Rf values, experimental procedures, choice of paper and solvent systems, developments of chromatogram ascending. descending and radial. Two dimensional chromatography, applications.

   b. Thin layer Chromatography (TLC): Advantages. Principles, factors effecting Rf values. Experimental procedures. Adsorbents and solvents. Preparation of plates. Development of the chromatogram. Detection of the spots. Applications.

   c. Colum Chromatography: Principles, experimental procedures, Stationary and mobile Phases, Separation technique. Applications.

   d. High Performance Liquid Chromatography (HPLC): Principles and Applications.

   e. Gas Liquid Chromatography (GLC): Principles and Applications.

II. Spectro photometry

General features of absorption spectrosocopy, Beer - Lambert's law and its limitations, transmittance, absorbance, and molar absorptivity. Single and double beam spectrophotometers Application of Beer - Lambert law for quantitative analysis of

1.Chromium in K,Cr,O,

2. Manganese in manganous sulphate

3. Iron (III) with thiocyanate.

III. Molecular sectorscopy

i) Electronic spectroscopy:

Interaction of electromagnetic radiation with molecules and types of molecular spectra. Potential energy curves for bonding and antibonding molecular orbitals. Energy levels of molecules (s.p.n) selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore.

ii) Infra red spectrosocopy

Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection rules. Determination of force constant. Qualitative relation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules. Characteristic absorption bands of various functional groups. Finger print nature of infrared spectrum.

iii) Raman spectroscopy

Concept of polarizavility, selection rules, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

iv) proton magnetic resonance spectroscopy (H-NMR)

Principles of nuclear magnetic resonance, equivalent and non-equivalent protons,

position of signals. Chemical shift, NMR splitting of signals-spin-spin coupling.

coupling constants. Applications of NMR with suitable examples-ethyl bromide, ethanol, acetaldehyde, 1,1,2 tribromo ethane, ethyl acetate, toluene and acetophenone.

v) Spectral interpretation

Interpretation of IR, UV-Visible. 'H-NMR and mass spectral data of the following

compounds 1. Phenyl acetylene 2. Acetophenone 3. Cinnamic Acid 4. Para-nitro aniline.

 Unit-II (Drugs, formulations, pesticides and green chemistry)

1. Drugs

1. Introduction: Drug, disease (definition), Historical evolution, Sources - Plant, Animal synthetic, Biotechniology and human gene therapy.

2. Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetic (ADME, Receptors - brief teartment) Metabolites and Anti metabolites.

3. Nomenclature: Chemical name, Generic name and trade names with examples.

4. Classification: Classification based on structures and therapeutic activity with one example each.

5. Synthesis: Synthesis and therapeutic activity of the following drugs., L- Dopa, Chloroquin, Omeprazole, Albuterol and ciprofloxacin.

6. Drug Development: Pencillin, Separation and isolation, structures of different pencillins

7. HIV-AIDS: Immunity-CD-4 Cells, CD-8 cells Retrovirus, replication in human body. Investigation available, prevention of AIDS. Drugs available-examples with structures: PIS: Indinavir (Crixivan), Nelfinavir (Viracept), NNRTIS: Efavirenz (Susrtiva), Nevirapine (Viranune) NRTIs: Abacavir (Ziagen), Lamivudine (Epivir, 3TC) Zidovudine (Retravir, AZT, ZDV)

8. Monographs of drugs: Eg Paracetamol, Sulpha methoxazole (Tablets)

2. Formulaltions

1. Need f conversion of drugs into medicine. Additives and their role (brief account only)

2. Different types of formulations

3. Pesticides

1. Introduction to pesticides-types- Insecticides, Fungicides, Herbicides, Weedicides, Rodenticides plant growth regulators, Pheremones and Hormones. Brief discussion with examples, structure and uses.

2. Synthesis and present status of the following. DDT, BHC, Malathion, Parathion, Endrin, Baygon, 2,4-D and Endo-Sulphon

4. Green Chemistry

Introduction : Definition of green Chemistry, need of green chemistry, basic principles of green chemistry

Green synthesis: Evalution of the type of the reaction 1) Rearrangements (100% atom economic), ii) Addition reaction (100% atom economic), Pericyclic reactions (no by-product). Selection of solvent:

i)   Aqueous phase reactions ii) Reactions in ionic liquids iii) Solid supported synthesis iv) Solvent free reactions (solid phase reactions)

Gree catalysts: 1) Phase transfer catalysts (PTC) ii) Biocatalysts

Microwave and ultrasound assisted green synthesis:

1. Aldol condensation

2. Cannizzaro reaction

 3. Diels-Alder reactions

4. Strecker synthesis

5. Willaimson synthesis

6. Dieckmann condensation

Unit-III: (Macromolecules,Meterial Science and Catalysis)

 1. Macromolecules

Classification of polymers, chemistry of polymerization, chain polymerization, step polymerization, coordination polymerization - tacticity. Molecular weight of polymersnumber average and weight average molecular weight, degree of polymerization, determination of molecular weight of polymers by viscometry. Osmometry and light scattering methods. Kinetics of free radical polymerization. derivation of rate law. Preparation and industrial application of polyethylene. PVC, Teflon, polyacrylonitrile, terelence and Nylon66. Introduction to biodegradability.

2. Materials science

Superconductivity, characteristics of superconductors, Meissner effect types of and applications. Nanomaterials - synthetic techniques, bottom- up-sol-gel method, top-down-electro deposition method. Properties and applications of nano-materials. Composites-definition, general characteristics, particle reinforce and fiber reinforce composites and their applications.

3. Catalysis

Homogeneous and heterogeneous catalysis, comparision with examples. Kinetic of specific acid catalyzed reactions, inversion of cane sugar, Kinetics of specific base catalyzed reactions, base catalyzed conversion of acetone to diacetone alcohol. Acid and base catalyzed reactions-hydrolysis of esters, mutarotation of glucose, Catalytic activity at surfaces. Mechanisms of heterogeneous catalysis. Langmuir-Hinshelwood mechanism. Enzyme catalysis: Classification, characteristics of enzyme catalysis. Kinetic of enzyme catalyzed reactions-Michaelis Menton law, significance of Michaelis constant (K) and maximum velocity (V). Factors affecting enzyme catalysis - effect of temperature, pH, concentration cand inhibitor. Catalytic efficiency. Mechanism of oxidation of ethanol by alcohol dehydrogenase.