CHRISTIAN EMINENT COLLEGE, INDORE
(Academy of Management, Professional Education & Research)
An Autonomous Institution Established in 1996
NAAC (UGC) Accredited WITH GRADE "A"
F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23(AS)

Annual System

Scheme of Examination
&
Syllabus
For
Bachelor of Science
B.Sc.
Part III
SESSION 2022-23

CHRISTIAN EMINENT COLLEGE, INDORE
ACADEMY OF MANAGEMENT, PROFESSIONAL EDUCATION & RESEARCH
An Autonomous Institution Established in 1996
AFFILIATED TO DEVI AHILYA VISHWAVIDYALAYA, INDORE
F-SECTOR, R.S.S. NAGAR, H.I.G. MAIN ROAD, INDORE

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2022-23(AS)

Scheme of Examination – Annual System – B.Sc. Part III
Mathematical Sciences (Computer Science)

Group	Paper Code	Subject	Max. Marks					Min. Marks		
			External Theory Examination	Internal Theory Examination	Practical Marks	TOTAL MARKS	GRAND TOTAL	External Theory Exam.	Internal Theory Exam.	Practical Marks
GROUP-I	BSC 3011	Hindi Language and Moral Values	30	05	-	35	100	28	05	-
	BSC 3012	English Language	30	05	-	35				
	BSC 3013	Basics of Computer & Information Technology	25	05	-	30				
GROUP-II A	BSC 3041	Computer Science - I	40	10	-	50	100	26	07	-
	BSC 3042	Computer Science - II	40	10	-	50				
GROUP-II B	BSC 3043	Practicals	-	-	50	50	50	-	-	17
GROUP-III A	BSC 3091	Physics - I	40	10	-	50	100	26	07	-
	BSC 3092	Physics - II	40	10	-	50				
GROUP-III B	BSC 3093	Practicals	-	-	50	50	50	-	-	17
GROUP-IV	BSC 3071	Mathematics - I	40	10	-	50	150	40	10	-
	BSC 3072	Mathematics - II	40	10	-	50				
	BSC 3073	Mathematics - III	40	10	-	50				
TOTAL MARKS			365	85	100	550	550	-	-	-
GRAND TOTAL			550					198		

Subject Combinations:

1. Comp. Sc., Physics, Mathematics & Foundation

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2022-23(AS)

Scheme of Examination – Annual System – B.Sc. Part III
Mathematical Sciences (Information Technology)

Group	Paper Code	Subject	Max. Marks					Min. Marks		
			External Theory Examination	Internal Theory Examination	Practical Marks	TOTAL MARKS	GRAND TOTAL	External Theory Exam.	Internal Theory Exam.	Practical Marks
GROUP-I	BSC 3011	Hindi Language and Moral Values	30	05	-	35	100	28	05	-
	BSC 3012	English Language	30	05	-	35				
	BSC 3013	Basics of Computer & Information Technology	25	05	-	30				
GROUP-II A	BSC 3061	Information Technology - I	40	10	-	50	100	26	07	-
	BSC 3062	Information Technology - II	40	10	-	50				
GROUP-II B	BSC 3063	Practicals	-	-	50	50	50	-	-	17
GROUP-III A	BSC 3051	Electronics - I	40	10	-	50	100	26	07	-
	BSC 3052	Electronics - II	40	10	-	50				
GROUP-III B	BSC 3053	Practicals	-	-	50	50	50	-	-	17
GROUP-IV	BSC 3071	Mathematics - I	40	10	-	50	150	40	10	-
	BSC 3072	Mathematics - II	40	10	-	50				
	BSC 3073	Mathematics - III	40	10	-	50				
TOTAL MARKS			365	85	100	550	550	-	-	-
GRAND TOTAL			550					198		

Subject Combinations:

1. Information Technology, Electronics, Mathematics & Foundation

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2022-23(AS)

Scheme of Examination – Annual System – B.Sc. Part III
Biological Sciences

Group	Paper Code	Subject	External Theory Examination	Internal Theory Examination	Practical Marks	TOTAL MARKS	GRAND TOTAL	External Theory Exam.	Internal Theory Exam.	Practical Marks
.GROUP-I	BSC 3011	Hindi Language and Moral Values	30	05	-	35	100	28	05	-
	BSC 3012	English Language	30	05	-	35				
	BSC 3013	Basics of Computer & Information Technology	25	05	-	30				
GROUP-II A	BSC 3041	Computer Science - I	40	10	-	50	100	26	07	-
	BSC 3042	Computer Science - II	40	10	-	50				
GROUP-II B	BSC 3043	Practicals	-	-	50	50	50	-	-	17
OR										
GROUP-I A	BSC 3081	Pharma. Chemistry - I	40	10	-	50	100	26	07	-
	BSC 3082	Pharma. Chemistry - II	40	10	-	50				
GROUP-I B	BSC 3083	Practicals	-	-	50	50	50	-	-	17
GROUP-II A	BSC 3021	Biotechnology - I	40	10	-	50	100	26	07	-
	BSC 3022	Biotechnology - II	40	10	-	50				
GROUP-II B	BSC 3023	Practicals	-	-	50	50	50	-	-	17
GROUP-III A	BSC 3031	Chemistry - I	29	05	-	34	100	28	05	-
	BSC 3032	Chemistry - II	28	05	-	33				
	BSC 3033	Chemistry - III	28	05	-	33				
GROUP-III B	BSC 3034	Practicals	-	-	50	50	50	-	-	17
	TOTAL MARKS		330	70	150	550	550	-	-	-
	GRAND TOTAL		550					198		

Subject Combinations:

1. Comp. Sc., Biotechnology, Chemistry & Foundation

OR

2. Pharma. Chemistry, Biotechnology, Chemistry & Foundation

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2022-23(AS)

Scheme of Examination – Annual System – B.Sc. Part III
Mathematical Sciences (Computer Science-Honours)

Group	Paper Code	Subject	Max. Marks					Min. Marks		
			External Theory Examination	Internal Theory Examination	Practical Marks	TOTAL MARKS	GRAND TOTAL	External Theory Exam.	Internal Theory Exam.	Practical Marks
GROUP-I	BSC 3011	Hindi Language and Moral Values	30	05	-	35	100	28	05	-
	BSC 3012	English Language	30	05	-	35				
	BSC 3013	Basics of Computer & Information Technology	25	05	-	30				
GROUP-II	BSC 3041	Computer Science - I	40	10	-	50	100	26	07	-
	BSC 3042	Computer Science - II	40	10	-	50				
GROUP-III	BSC 3043	Computer Science – III	40	10	-	50	150	40	10	-
	BSC 3044	Computer Science – IV	40	10	-	50				
	BSC 3045	Computer Science - V	40	10	-	50				
GROUP-IV	BSC 3046	Practicals	-	-	50	50	200	-	-	66
	BSC 3047	Practicals	-	-	50	50				
	BSC 3048	Practicals	-	-	50	50				
	BSC 3049	Practicals	-	-	50	50				
TOTAL MARKS			285	65	200	550	550	-	-	-
GRAND TOTAL			550					198		

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Syllabus
B.Sc. Part III

GROUP I
BSC- 3011 – FOUNDATION COURSE GROUP
PAPER I – HINDI LANGUAGE & MORAL VALUES
(हिन्दी भाषा और नैतिक मूल्य)

MAX. MARKS: 30 + 05   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 42**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**08 Lectures**
हिन्दी भाषा	

1. मेरे सहयात्री (यात्रावृतांत) – अमृतलाल बेगड़
2. मध्यप्रदेश की लोककलाएं (संकलित)
3. लोकोक्तियाँ एवं मुहावरे (संकलित)

Unit-II	**08 Lectures**
हिन्दी भाषा	

1. जनसंचार माध्यम (प्रिंट, इले. एवं सोशल मीडिया)
2. टूटते हुए (एकांकी) – सुरेशचंद्र शुक्ल
3. संक्षिप्तियाँ (संकलित)

Unit-III	**08 Lectures**
हिन्दी भाषा	

1. पत्रकारिता के विभिन्न आयाम (संकलित)
2. मध्यप्रदेश का लोक साहित्य (संकलित)
3. पत्र लेखन – आवेदन, प्रारूपण, आदेश, परिपत्र, ज्ञापन, अनुस्मारक

Unit-IV	**08 Lectures**
हिन्दी भाषा	

1. राजभाषा हिंदी : हिंदी की संवैधानिक एवं व्यावहारिक स्थिति (संकलित)
2. दूरभाष और मोबाइल (संकलित)
3. हिंदी की शब्द सम्पदा (संकलित)
4. अनुवाद अर्थ प्रकार एवं अभ्यास (संकलित

Unit-V	**10 Lectures**
नैतिक मूल्य	

1. विश्व के प्रमुख धर्म एवं महत्वपूर्ण विशेषताएं (हिन्दू धर्म, जैन धर्म, बौद्ध धर्म, सिख धर्म, ईसाई धर्म, इस्लाम धर्म)
2. सत्य के साथ मेरे प्रयोग (महात्मा गाँधी की आत्मा कथा का संक्षिप्त संस्करण)

BOOKS:

1. हिन्दी भाषा और नैतिक मूल्य मध्य प्रदेश हिन्दी ग्रंथ अकादमी द्वारा प्रकाशित

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Syllabus
B.Sc. Part III

GROUP I
BSC- 3012 – FOUNDATION COURSE GROUP
PAPER II – ENGLISH LANGUAGE

MAX. MARKS: 30 + 05   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 42**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**14Lectures**
1. Stopping by Woods on a Snowy Evening: Robert Frost. 2. Cherry Tree : Ruskin Bond 3. The Axe: R.K. Narayan 4. The Selfish Giant: Oscar Wilde 5. On the Rule of the Road: A.G. Gardiner 6. A song of Kabir: Translated by Tagore	
Unit-II	**08 Lectures**
Basic Language Skills - Transformation of sentences, Direct-Indirect Speech, Active-Passive Voice, Confusing words, Misused words, Similar words with different meaning.	
Unit-III	**08 Lectures**
Report Writing: Definition, Format, Types, Report on Accidents, Crime etc. Narration Skills, Narration of events and situations.	
Unit-IV	**06 Lectures**
Drafting of E-mails: Definition, Format, Importance, email for Business Correspondence, Preparation of Power Point Presentation	
Unit-V	**06Lectures**
Drafting CV: Definition, Purpose, Art of Writing CV, Difference in Bio-data, Resume and CV, Covering Letter. Prepare a CV for the post of an English Professor. Manager, Accountant etc	

BOOKS:

1. English Language Published by Hindi Granth Academy
2. Living English Structure by W.S. Allen

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Syllabus
B.Sc. Part III

GROUP I
BSC- 3013 – FOUNDATION COURSE GROUP
PAPER III – BASICS OF COMPUTER & INFORMATION TECHNOLOGY

MAX. MARKS: 25 + 05   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 42**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	08 Lectures

INTRODUCTION TO COMPUTER
BASIC Organization of Computer System: Block diagram & Functions (Central Processing Unit, Input/ Output Unit, Storage Unit), Characteristics, Capabilities & Limitations. Types of Computing Devices: Desktop, Laptop & Notebook Smart-Phone, Tablet PC, Server, Workstation & their Characteristics.
Primary Memory & Their Types: RAM, ROM, PROM, EPROM, EEPROM,; Cache Memory.
PERIPHERAL DEVICES
Input Devices : Keyboard, Mouse, Trackball, Joystick, Digitizer or Graphic tablet, Scanners, Digital Camera, Web Camera, MICR, OCR, OMR, Bar-Code Reader, Voice Recognition device, Light pen & Touch Screen.
Output Devices: Display Devices (CRT, TFT, LCD, LED, Multimedia Projectors); Video Standard: VGA, SVGA,
XGA etc. Impact Printers (Daisy Wheel, Dot Matrix & Line Printer); Non impact printer (Inkjet, Laser, Thermal).
STORAGE DEVICES
Magnetic Tape, Cartridge, Data Drives, Hard Disk Drives (Internal & External), Floppy Disks, CD, VCD, CD-RW, Zip Drive, DVD, DVD-RW, USB Flash Drive, Blue Ray Disc & Memory cards.

Unit-II	08 Lectures

OPERATING SYSTEM (OS):
DOS Basics : FAT, File & Directory Structure and naming rules, Booting process, DOS system files. Internal & External DOS commands.
Windows Basics (only elementary ides):
Windows 7 & 8: Desktop, Control Panel; saving, renaming, moving, copying and searching files & folders, restoring from recycle Bin. Creating shortcut, Establishing Network Connections.

Unit-III	09 Lectures

MS Word
Text Editing and formatting using Word 2007 & onwards versions: Creating documents using Template; Saving Word file in various file formats; Previewing documents, Printing document to file/page; Protecting document; Editing of selected text, Inserting, Deleting and Moving text.
Formatting documents: page Layout, Paragraph format, Aligning text and Paragraph, orders and Shading, Headers and Footers.

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B.Sc. Part III

GROUP I
BSC- 3013 – FOUNDATION COURSE GROUP
PAPER III – BASICS OF COMPUTER & INFORMATION TECHNOLOGY

MAX. MARKS: 25 + 05   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 42**

Unit-IV	**09 Lectures**

MS Power Point & MS Excel

- Creating presentation using slide master and template in various themes & variants.
- Working with slides: New slide, move, copy, delete, duplicate, slide layouts, presentation views.
- Format menu: Font, paragraph, drawing & Editing.
- Printing presentation: Print slides, notes, handouts and outlines.
- Saving presentation in different file formats.
- Workbook & Worksheet Fundamentals: Concept of Row, Column Cell; Creating a new workbook through blank & template.
- Working with worksheet: Entering data into worksheet (General , Number, Currency, Date, Time, Text, Accounting, etc); Renaming, Copying, Inserting, deleting & protecting worksheet.
- Working with Row & Column (Inserting, deleting, Pasting, Resizing & Hiding), Cell & Cell formatting Concept of range.

Unit-V	**08 Lectures**

Internet and Cyber Security

- Internet: World wide Web, Dial up connectivity, leased line, VSAT, Broad Band, Wi-Fi, URL, Domain name, Web Browser (internet Explorer, Firefox, Google Chrome, Opera, UC Browser, etc.) Search Engine (Google, Bing, Ask, etc) ; Website: Static & Dynamic; Difference between Website & Portal.
- E-mail: Account opening. Sending & Receiving Mails, Managing Contacts & Folders.
- E-mail, Internet & Social Networking Ethics.
- Types of viruses & antivirus.
- Computer security issues & its protection through firewall & antivirus
- Making secured online transactions.

BOOKS:

1. PC Software for Windows by R.K. Taxali
2. Fundamental of Computers by P.K. Sinha
3. Computer Toclay by Suresh K. Basandra
4. Computer fundamentals and Architecture by B. Ram
5. S. Internet Security by Kenneth Einar Himma, 2007
6. Internet Security Secrets by John R. Vacca, 2007

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Syllabus
B.Sc. Part III

GROUP II A
BSC- 3021 – BIOTECHNOLOGY GROUP
PAPER-I - MOLECULAR BIOLOGY AND GENETIC ENGINEERING

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**12 Lectures**
DNA and RNA, Chemical Structure, Types and Properties, Experimental Proof of DNA as genetic material, Genome-Concept, Plant, Animal, Bacterial and Viral Genome, DNA Replication. Types, Experimental proof of semi conservative replication, Replicon- Concept. Proteins and enzymes involved in replication in prokaryotes and eukaryotes, Modes of DNA replication. Unidirectional, Bidirectional, Types of DNA replication. Y shaped, 0 mode, rolling circle mechanism.	
Unit-II	**12 Lectures**
Eukaryotic chromosomal organization, Euchromatin, Heterochromatin. Chromatin structure. Nucleosomes, Histone and Non Histone proteins, Histone modifications, Introduction to epigenetics.	
Unit-III	**14 Lectures**
Origin of life: Classical experiments and current concepts. Evolution of biological macromolecules, Evolution of early forms, Mendelian genetics: Mendel's Laws, Chromosomal basis of heredity, Chromosomal analysis, allelic variation, dominance. Linkage and Crossing over.	
Unit-IV	**12 Lectures**
Introduction to Recombinant DNA technology, Scope & importance. Gene Cloning, PCR, Introduction to Restriction endonuclease, Vectors for DNA transfer and their types: Plasmids, Phagemids, Cosmids, BAC. Gene amplification.	
Unit-V	**14 Lectures**
Plasmids Types Properties and cloning vectors. Recombinant DNA techniques and cloning with Restriction endonuclease and recombinant DNA. Mutation, Types of mutations; Point mutation (Base pair change, frame shift, deletion). Transcription, translation and gene expression in eukaryotes (yeast), Alternate splicing.	

BOOKS:
1. Gene Cloning, T.A. Brown
2. Molecular Cell Biology, Lodish, Berk and Zippursky
3. Molecular Biology of the cell, Bruce Alberts
4. Gene IX, Benjamin Lewin

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B.Sc. Part III

GROUP II A
BSC- 3022 – BIOTECHNOLOGY GROUP
PAPER-II - APPLIED BIOTECHNOLOGY

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit		Lectures
Unit-I		**14 Lectures**
Food Microbiology-Microbial contamination & Spoilage, Food preservation. Industrial Production of Ethyl Alcohol, Penicillin, Cyanocobalamin, Glutamic Acid, Citric Acid, Amylase, Protease.		
Unit-II		**12 Lectures**
Introduction to plant tissue culture, Nutritional requirements, In vitro culture. Single cell culture, Anther culture, Ovule culture, Somatic embryogenesis, Organogenesis, Protoplast culture, Somatic hybridization, Genetic manipulation of plants using Agrobacterium tumfaciens.		
Unit-III		**10 Lectures**
Immunity- Innate and Acquired, Host defense mechanism- Infection and its types, Organs and Cells of Immune system, Vaccines and its types. Antigens- Properties and types. Adjuvants, Immunoglobulins- Structure, types and functions. Generation of Antibodies, Primary and Secondary response, Agglutination and Precipitation reactions. History, Equipment and materials for animal cell culture technology. Physical requirement for animal cell culture, growth curve in culture. Commonly used cell lines — their organization and characteristics, Differentiation of cells. Organ culture -- techniques, advantage and applications. Applications of animal biotechnology: Methods of Transfection and Cell fusion of animal cells, Selectable markers, HAT selection, Transgenic animals, Stem cell culture. Transplantation of cultured cells, Bioreactors for large scale production of animal cells.		
Unit-IV		**12 Lectures**
Fermentation Technology, Primary and Secondary Screening, Strain Improvement, Inoculum Development, Industrial Sterilization process, Scale-up and Harvest and Recovery. Types of fermentation — Batch, Continuous, Fed Batch Process; Submerged and Solid State fermentation Process, Basic design of a fermentor and factors affecting fermentor design. Types of fermentors- Fluidized, Packed Bed, Air Lift Fermentor, Tray Fermentor and Tower Fermentor.		
Unit-V		**16 Lectures**
Environment: Basic concept, Significance, Public awareness. Environmental pollution, Assessment of water quality, Treatment of waste-water — Primary, Secondary and Tertiary Treatment. Solid waste management (composting, vermi-composting, methane production). Biopesticides- Bacterial and Fungal, Genetically modified crops, Biofertilizers - Nitrogen fixers, PSB, Mycorrhiza and VAM, Microbial leaching, Microbial Enhanced Oil Recovery. Bioremediation and Biodeterioration. Modern fuels- Methanogenic bacteria and biogas, microbial hydrogen production.		

BOOKS:
1. Plant biotechnology- Jitendra prakash
2. Expanding Horizon-BD Singh
3. Environmental Microbiology- PD Sharma

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Syllabus
B.Sc. Part III

GROUP II B
BSC- 3023 – BIOTECHNOLOGY GROUP
BIOTECHNOLOGY PRACTICALS

MAX. MARKS: 50   **MIN. PASS MARKS: 17**

No. of Laboratory per Week: 06 Hours   **Total Lectures: 96**

1. Chromosomal DNA isolation from Plant cells.
2. Chromosomal DNA isolation from Animal cells.
3. Genomic DNA isolation from Micro-Organisms.
4. Analysis of isolated DNA by Agarose gel electrophoresis.
5. Spectrophotometric analysis of DNA and DNA melting.
6. UV as a physical mutagen.
7. Gradient Plate Technique.
8. Estimation of DNA using diphenylamine method.
9. Estimation of RNA using orcinol method.
10. Isolation of RNA from Yeast.
11. Isolation of plasmid DNA from bacteria.
12. Effect of UV radiation on microbial cell
13. Demonstration of repair mechanism in microbes.
14. Bacteriophage and determination of latent period of infection
15. Isolation of total RNA from Plant tissue by SDS phenol method.
16. Elution of DNA from agarose gel band.
17. Transformation in E-coli cell.
18. Growth of plant tissue into undifferentiated mass of callus.
19. Preparation of animal cell culture media.
20. Separation and culture of lymphocyte from blood.
21. Demonstration of fermentor.
22. Preparation of wine.
23. Extraction of citric acid from A. niger.
24. Production of ethanol by yeast.
25. Demonstration of PCR.
26. Immobilization of microbial cells.
27. Extraction and preparation of lactic acid.
28. Extraction and preparation of citric acid.
29. Demonstration of Radial immuno diffusion analysis.
30. Isolation of microorganism from polluted site/ industrial waste.
31. Blood group analysis.
32. Differential count of WBC.
33. To examine flocculation reaction using VDRL test.
34. To observe the agglutination reaction using WIDAL test
35. Determine the concentration of unknown antigen using Radial Immuno Diffusion technique.

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Syllabus
B.Sc. Part III

GROUP IV A
BSC- 3031 – CHEMISTRY GROUP
PAPER-I - PHYSICAL CHEMISTRY

MAX. MARKS: 29+ 05   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	14 Lectures

A. Elementary Quantum Mechanics: Black-body radiation. Planck's radiation law. photoelectric effect. heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects. Compton effect.

de-Broglie hypothesis, the Heisenberg's uncertainty principle. Sinusoidal wave equation. Hamiltonian operator. Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one-dimensional box and related numerical problems.

B. Molecular orbital theory: Basic ideas-criteria for forming M.O. from A.O., construction of M.O.'s by LCAO-H2 ion, calculation of energy levels from wave functions, physical picture of bonding and antibonding wave functions. Concept of , σ^* ,π,π^* orbitals and their characters. Hybrid orbitals- sp.sp2,sp3: :calculation of coefficients of A.O.'s used in these hybrid orbitals. Introduction to valence bond model of H2 ion, comparison of M.O. and V.B. models.

Unit-II	12 Lectures

Spectroscopy :

Introduction: Electromagnetic radiation, regions of the spectrum. Basic features of different spectrometers. statement of the Born-Oppenheimer approximation. Degrees of freedom.

Rotational Spectrum: Diatomic molecules, Energy levels of a rigid rotor (semi-classical principles), selection rules. spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotor, isotope effect.

Vibrational Spectrum: Infra-red spectrum: Energy levels of simple harmonic oscillator, selection rules. pure vibrational spectrum, intensity. Determination of force constant and qualitative relation of force constant and bond energies, effect of an harmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

Unit-III	12 Lectures

Raman Spectrum: Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

Electronic Spectrum: Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle. Qualitative description of G,n and n M.O. their energy levels and the respective transition.

UV Spectroscopy: Electronic excitation, elementary idea of instrument used, Application to organic molecules. Woodward-Fieser rule for determining λ_{max}, of dienes, polyenes and $a\alpha \; and \; \beta$ unsaturated carbonyl compounds.

Unit-IV	14 Lectures

Photochemistry

Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus-Draper law, Stark-Einstein law, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, nonradioactive processes (internal conversion, intersystem crossing), quantum yield and related numerical problems, photosensitized reactions energy transfer processes (simple examples.)

Physical Properties and Molecular Structure:

Optical activity, Polarisation (Clausius — Mossotti equation). orientation of dipoles in an electric field, dipole moment, induced dipole moment measurement of dipole moment, temperature method and refractive method, dipole moment and structure of molecules, magnetic properties —paramagnetism , diamagnetism and ferromagnetism

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2022-23 (AS)

Syllabus
B.Sc. Part III

GROUP IV A
BSC- 3031 – CHEMISTRY GROUP
PAPER-I - PHYSICAL CHEMISTRY

MAX. MARKS: 29+ 05   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

Unit-V	12 Lectures
(**A) Solutions, dilute solutions and colligative properties-I:** Ideal and non ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solutions- colligative properties. Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurements, determination of molecular weight from osmotic pressure and related numerical problems. **(B) Solutions dilute solutions and colligative properties-II:** Elevation of boiling point and depression of freezing point. Thermodynamic derivation of relation between molecular weight and elevation of boiling point and depression in freezing point. Experimental methods of determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solute	

BOOKS:

1. Peter Atkins, Oxford University press, New Delhi

2. Advance Physical Chemistry ; Gurdeep Raj, Goel Publishing house

3. Essential of Physical Chemistry, B. S. Bahl , G. D. Tuli , Arun Bhal , S. Chand and Company.

4. Unified Chemistry M.M.N.T Tandon ,Shiva Lal Agarwal and company

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Syllabus
B.Sc. Part III

GROUP IV A
BSC- 3032 – CHEMISTRY GROUP
PAPER-II - INORGANIC CHEMISTRY

MAX. MARKS: 28 + 05   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	11 Lectures

A . **Hard and Soft Acids and Bases (HSAB) :** Introduction. Classification of hard and soft acid-base, Hard and soft acid-base concept of Pearson, Application of hard-soft acid base theory, Symbosis, acid-base strength and hardness and softness; Theoretical basis of hardness and softness, electronic theory, π-bonding theory, and Dragowayland theory, electronegativity and hardness and softness, limitations of hard soft acid-base concept.

B. Inorganic polymer : Introduction: silicones-methods of preparation, classification, properties and application (uses). Phosphazenes (Phosphonitrilic chloride)-Methods of preparation and properties:, Structure of Triphosphazenes. Someother phosphazenes and uses of phosphazenes.

Unit-II	11 Lectures

A. Metal Ligand Bonding in Transition Metal Complexes : Introduction, limitations of valence bond theory. Crystal field theory, crystal field splitting of d-orbitals. d- orbital splitting and stabilisation energy in octahedral, tetrahedral and square planar complexes; factors affecting the crystal field parameters. Applications of crystalfield theory and likitations of crystal field theory.

B. Thermodynamic and Kinetic Aspects of Metal Complexes : Introduction. Thermodynamic aspects of metal complexes, factors affecting, thermodynamic stability of complexes. kinetic aspects of metal complexes, stabilisation reactions of square planer complexes and factors affecting the rate of substitution reactions in square planar complexes

Unit-III	14 Lectures

A. Magnetic Properties of Transition Metal Complexes : Introduction, Types of magnetic behavior, diamagnetism, Paramagnetism, Ferromagnetism, Antiferromagnetism, Ferrimagnetis„ Origin and calculation of magnetism. Methods of determinig magmetic susceptibility-Guoy, Bhatnagar Mathur, Quincke's, Curie and Nuclear magnetic Resonance method. Magnetic moment; L-S coupling, Determination of ground state term symbol, Correlation of μs and μ_{eff} values. Orbital contribution to magnetic moments and application of maganetic moment data for 3d-metal complexes.

B. Organometallic Chemistry : Introduction: Nomenclature and Classification of Organometallic compounds, General methods of Preparation: Alkyl and aryl organometallic compounds of Lithium-Preparation, Properties, Bond nature and pplication; Organometallic compounds of Al Hg, Sn and Ti-Preparation, Poperties, Bond nature and applications .

A. brief account of metal-ethylenic complexes and homogeneous hydrogenation; mononuclear carbonyls and the nature of bonding in metal carbonyls. Transition metal organometallic compounds with bonds to hydrogen and boron.

Unit-IV	14 Lectures

A. Electronic Spectra of Transition Metal Complex Introduction, Type of electronic transition, Selection rules for d-d transitions, spectroscopic ground states-Notations, Spectroscopic states and spectroscopic ground states in complexes, Spectrochemical series, Orgal energy level diagram-Uses in octahedral and tetrahedral complexes having d^1 to d^9 states, Electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

B. Gravimetric Analysis : Principles of gravimetric estimation, supersaturation, co-precipitation, post-precipitation and Ash treatment with respect to the estimation of Ba, Zn and Cu.

Water Analysis: Hardness, importance of water for industry, types of hardness-Temporary, permanent and total hardness, acidity and alkalinity, BOD, COD and DO, Numerical Problems based on BOD, COD and DO.

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Syllabus
B.Sc. Part III

GROUP IV A
BSC- 3032 – CHEMISTRY GROUP
PAPER-II - INORGANIC CHEMISTRY

MAX. MARKS: 28 + 05   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

Unit-V	14 Lectures

A. Bio-Inorganic Chemistry : Introduction, Essential and trace elements in biological processes. Biological function of the bio-elements. Availability of bio-metals and bio-non-metals: Metalloporphyrins. Haemoglobin structure and biological function, Myoglobin-mechanism of oxygen transfer through haemoglobin and myoglobin; Relation between haemoglobin and myoglobin and chemical reaction of haemoglobin and myoglobin; Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+}; Nitrogen fixation.

B. Metal nitrosyls : modes of coordination, nature of bonding and probable applications.

C. Bioinorganic Chemistry- II : Role of metal ions in biological process, Na/K pump, metal complexes as therapeutic agents- anticancer agents, antiarthritis drugs and chelation therapy. Introduction to Green Chemistry.

BOOKS:

1. Advance Inorganic chemistry; Vol. II Gurdeep Raj, Goel Publishing house

2. Advance Inorganic chemistry; Vol. I Satya Praskash Tuli ,Basu and R.D. Madan

3. Coordination Chemistry – M.satake ,Discovery Publishing House New Delhi

4. Chemistry Of Transition Elements ,M.S. yadav ,Dominant Publishers and Distributer New Delhi

5. Unified Chemistry M.M.N.T Tandon ,Shiva lal Agarwal and company

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Syllabus
B.Sc. Part III

GROUP IV A
BSC- 3033 – CHEMISTRY GROUP
PAPER-III - ORGANIC CHEMISTRY

MAX. MARKS: 28 + 05   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	12 Lectures

Spectroscopy : Nuclear Magnetic Resonance Spectroscopy. Proton Magnetic Resonance (1HNMR) Spectroscopy, Nuclear shielding and dis-shielding, chemical shift and molecular structure, spin-spin coupling and coupling constant, region of signals, Explanation of PMR spectra of simple organic molecules like ethyl bromide, ethanol, acetaldehyde, 1,1,2 tribromo ethane, ethylacetate, toluene and acetophenone. Applications of UV, IR and PMR spectroscopy for simple organic compounds.

Unit-II	11 Lectures

A. Organo-Metallic Compounds : Organomagnesium compounds- Grignard reagent, preparations, structure and chemical reactions. Organozinc compounds – Preparations and chemical reactions. Organolithium compounds – Preparations and chemical reactions.

B. Organo sulphur Compounds. : Nomenclature, structural characteristics. Thiol, thio-ether, sulphonic acid, sulphonamide and sulphaguanidine-methods of preparations and chemical reaction.

C. Organic synthesis by enolates : Acidity of hydrogen, alkylation of diethyl malonate and ethyl acetoacetate, synthesis of ethylacetoacetate – Claisen condensation. Keto-enol tautomerism in ethylacetoacetate. Alkylation of 1,3 dithiane. Alkylation and acetylation of enamin.

Unit-III	11 Lectures

A. Carbohydrates : Classification and nomenclature. Monosaccharides, mechanism of osazone formation, inter conversion of glucose into fructose. Ascending and descending series in aldose. Configuration of monosaccharides. Stereo isomers of erythro and threo sugars. Conversion of glucose into mannose. Glycosides, determination of the size of the ring of monosaccharides. Ring structure of D(+) glucose, Mechanism of mutarotation. Structure of ribose and deoxyribose. Disaccharides-introductory idea of maltose, sucrose, and lactose(Excluding structures) Polysaccharides-introductory idea of starch and cellulose (Excluding structures)

B. Fat,Oil and Detergents : Natural fat, edible and industrial oil of plant origin. Normal fatty acids, glycerides. Hydrogenation of unsaturated oil, saponification value, iodine value and acid value. Synthetic Detergents:-Alkyl and aryl sulphonate.

Unit-IV	14 Lectures

A . Amino Acid : Peptide, Protein and nucleic acid, Classification of amino acids, structure and stereo chemistry. Acid base behavior, Isoelectric point and electrophoresis. Preparations and chemical reactions of alpha amino acids. Nomenclature and structure of peptide and proteins. Classifications of proteins, determination of peptide structure, end group analysis, selective hydrolysis of peptides, peptide synthesis, solid phase peptide synthesis, Structure of peptide and proteins, level of proteins structure, denaturation of proteins.

Nucleic Acids: Constitution of nucleic acids, ribonucleoside and ribonucleotide. Double helix structure of DNA.

B .Synthetic Dyes : Colour and constitution (electronic concept). Classification of dyes-Methyl orange, Congored, Malachite green, crystal violet, Phenolphthalein, Fluoroscein, Alizarine and indigo- Chemical study and synthesis.

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Syllabus
B.Sc. Part III

GROUP IV A
BSC- 3033 – CHEMISTRY GROUP
PAPER-III - ORGANIC CHEMISTRY

MAX. MARKS: 28 + 05   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

Unit-V	14 Lectures
Hetrocyclic Compounds: Introduction of pyrrol , Furane, Thiophne and pyridine. Molecular orbital scenario and aromatic characteristics, method of synthesis and specific chemical reactions with reference to electrophillic substitutions. Reaction mechanism of nucleophillic substitution in pyridine derivatives. Comparison of basicity between pyridine , piperidine and pyrrole. Introductory idea about five- and six-membered condensed hetercyclic compounds. Indole, Quinoline and isoquinoline - preparations and chemical properties (Fischer-Indole synthesis, Skraup's synthesis, Bischler Napiaralsky synthesis). Electrophilic substitution reactions of Indole, Quinoline and Isoquinoline	

BOOKS:

1. A Text Book of Organic Chemistry , B.S. Bahl , G.D.Tuli , Arun Bhal , S. Chand and Company.

2. Advance Organic Chemistry, O.P. Agarwal, Goyal Publishing House, Meerut U.P.

3. Reaction and Mechanism in Organic Chemistry, S. M . Mukharji, S. P. Singh, McMillan India Ltd.

4. Unified Chemistry, M.M.N.T Tandon, Shiva Lal Agarwal and Company.

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Syllabus
B.Sc. Part III

GROUP IV B
BSC- 3034 – CHEMISTRY GROUP
CHEMISTRY PRACTICALS

MAX. MARKS: 50   **MIN. PASS MARKS: 17**

No. of Laboratory per Week: 06 Hours   **Total Lectures: 96**

Duration of Practical Examination: 04 Hours

Inorganic Chemistry   **12 Marks**

(i) Gravimetric analysis:

Barium as Barium sulphate, Copper as cuprous-thiocynate.

(ii) Complex compound preparation

a. Potassium chlorochromate (IV)

b. Tetramine copper **(II)** sulphate monohydrate

c. Hexamminenickel (11) chloride

(iii) Effluent water analysis, Identification of cations and anions in different samples

(iv) Water analysis, To determine dissolved oxygen in water samples in ppm

Physical Chemistry   **12 Marks**

(i) To determine the velocity constant (specific reaction rate) of hydrolysis of methyl acetate / ethyl acetate catalyzed by hydrogen ions at room temperature

(ii) Determination of partition coefficient of iodine between carbon tetra chloride and water

(iii) Job's method

(iv) pH-metric titrations, conductometric titrations

(v) To determine specific gravity of soil by using a pycnometer

(vi) To determine pH of given aerated drinks and fruit juices

(vii) To determine the moisture content of grains

Organic Chemistry   **12 Marks**

(i) **Binary mixture analysis containing two solids:**

Separation, identification and preparation of derivatives

(ii) **Preparation**

(i) Acetylation   (ii) Benzolylation   (iii) *Meta* dinitro benzene   (iv) Picric acid

Viva   **06 Marks**
Records   **08 Marks**

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Syllabus
B.Sc. Part III

GROUP II A
BSC- 3041 – COMPUTER SCIENCE GROUP
PAPER-I - DATABASE MANAGEMENT SYSTEM

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**14 Lectures**
Purpose of database system, views of data, data models: relation, network, hierarchical, instances and schemas, data dictionary, types of database languages:-DDL, DML, structure of DBMS, advantages and disadvantages of DBMS, 3-level architecture proposal:-external, conceptual & internal levels.	
Unit-II	**14 Lectures**
Entity relationship model as a tool of conceptual design: entities & entities set, relationship and relationship set, attributes and mapping constraints, keys, ER diagram:-strong and weak entities, generalization, specialization & aggregation, reducing ER diagram to tables	
Unit-III	**12 Lectures**
Fundamentals of set theoretical notations: relations, domains, attributes, tuples, concept of keys: primary key, super key, alternate key, candidate key, foreign key, fundamentals of integrity rules: entity & referential integrity ,extension and intention, relational algebra :select ,project, Cartesian product, different types of joins: theta, equi, natural, outer joins, set operations.	
Unit-IV	**14 Lectures**
Functional Dependencies, Good & Bad Decomposition and Anomalies as a database: A consequences of bad design, Universal relation, Normalization: INF, 2NF, 3NF &BCNF normal forms, Multivalued dependency, Join dependency, 4NF, 5NF.	
Unit-V	**10 Lectures**
Basic concepts: -Indexing and Hashing, B-tree Index files, Hashing: Static & Dynamic hash function, Index definition in SQL: Multiple key accesses,	

TEXT BOOKS:

1. Database System Concepts by Henry Korth and A. Silberschatz.
2. Simplified approach to DBMS, Prateek Bhatia, Gurvinder Singh Kalyani Publication.

REFERENCE BOOK:

1. An Introduction to Database System by Bipin Desai
2. An Introduction to Database System by C .J. Date.

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Syllabus
B.Sc. Part III

GROUP II A
BSC- 3042 – COMPUTER SCIENCE GROUP
PAPER-II - OPERATING SYSTEM CONCEPTS

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	14 Lectures
Operating system definitions, its components, evolution of operating system, types of operating systems: batch, multiprogramming, multitasking, multiprocessor, real time, client-server, peer-to-peer, distributed, clustered, operating system services, system calls, protection of I/O, memory and CPU.	
Unit-II	**14 Lectures**
Process scheduling: concept of a process, process states, PCB, process life cycle, operations on processes, context switch, types of schedulers, CPU burst- I/O burst cycles, dispatcher, scheduling criteria, scheduling algorithms — FCFS, SJF, STRN, Round Robin, priority, event driven, multilevel queue. Performance evaluation of algorithms through deterministic modelling.	
Unit-III	**12 Lectures**
Memory Management: address binding, logical and physical address space, dynamic loading and linking. Contiguous memory allocation: static and dynamic partitioned memory, fragmentation, swapping relocation, compaction, protection. Non-contiguous memory allocation: Paging Segmentation. Virtual Memory: demand paging, page fault, page replacement algorithms- FIFO, LRU, optimal. Thrashing, page fault frequency.	
Unit-IV	**14 Lectures**
Interprocess communication need for synchronization, Deadlocks- definition, avoidance, prevention, detection and recovery. Disk organization, Directory structure, disk space management- contiguous and non-contiguous allocation strategies, disk address translation, disk caching, disk scheduling algorithms. Device Management: dedicated devices, shared devices. Security and protection: security threats and goals, penetration attempts. Security policies and mechanisms, authentication, protection and access control.	
Unit-V	**10 Lectures**
Linux: History and features of Linux, Linux architecture, file system of Linux, hardware requirements, Linux standard directories, Linux Kernel. Working with Linux: KDE and Gnome graphical interface, various types of shells available in Linux. Vi editor, Linux commands. File security in Linux.	

TEXT BOOKS AND REFERENCE BOOKS:

1. Operating system Concepts: by Silberschatz, Galvin and Gagne.
2. Operating system Design and Concepts, by Milan Milenkovic
3. Operating system by Andrew Tanenbaum
4. Operating system by Peterson
5. Linux Bible by Christopher Negus
6. Linux by Sumitabh Das

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Syllabus
B.Sc. Part III

GROUP II B
BSC- 3043 – COMPUTER SCIENCE GROUP
COMPUTER SCIENCE - PRACTICALS

MAX. MARKS: 50   **MIN. PASS MARKS: 17**

No. of Laboratory per Week: 06 Hours   **Total Lectures: 96**

Practical Session 01 – Practical on DBMS	**Suggested Practicals:**
	Create the appropriate table and apply the following queries :
	1. WAQ to insert some new records in emp table.
	2. WAQ to list the number of employees whose name is not 'ford', 'jams' or `Jones,
	3. WAQ to list the name and salary and sort them in descending order of their salary
	4. WAQ to list the details of employees whose name is starts from 'a'
	5. WAQ to delete all records from emp table
	6. WAQ to insert values in 3 fields.
	7. WAQ to list the student name having 'd' as second character.
	8. WAQ to list the name and salary and sort them in descending order of their salary
	9. WAQ to list the name and salary and sort them in descending order of their salary
	10. WAQ in employee table find all the manager who earns between 1000 and 2000.
	11. Display record of employee who have salary between 1000 and 2000.
	12. List the name salary and department number of the employee and order them by their salary in descending order.
	13. In employee table change the city of employee from existing one to new one.
	14. Add a column salary of datatype 'number' & having size '5' with default value 1000.
	15. WAQ to find the employee who earns the lowest salary in each department. Display in ascending order of salary.
	16. List the employee who earns maximum salary in their department. Find the name of all employee who works for 'first bank corporation'. Display the record of employee whose name start with 's' & age is greater than 18.
	17. Find the name, street & city of residence of all employee who works for 'the'
	18. WAQ to update the salary of employee number 1902 to Rs. 10,000
	19. WAQ to find the name, street and city of all employee who works for 'the' and who earn more than 1000.
	20. WAQ to increase the salary by 2000 and rename the column as "newsalary"
	21. WAQ to find the name, street and city of all employee who works for 'fbc' and who earn more than 1000.
	22. WAQ to find total of salaries of all employees from emp table
	23. WAQ to decrease the salary of emp from 5000 and rename column as 'newsalary'
	24. List the employee number of employee who belone to department 10,20.
	25. List the employye no of employees who earn greater than 2000
	26. Insert new field called category in emp table.
	27. Display different jobs in departments 20,30
	28. List the names of employees having two `aa' in the name
	29. Print the name, emp no, sal of employees in emp table.
	30. List the names of employees who do the job of clerks or salesman
Practical Session 02 – Practical on OS	**Suggested Practicals:**
	31. Basic Linux Commands and vi editor
Note	

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Syllabus
B.Sc. Part III

GROUP III A
BSC- 3051 – ELECTRONICS GROUP
PAPER-I - THYRISTORS, IC TECHNOLOGY, MICROPROCESSOR AND ELECTRICAL MOTORS

MAX. MARKS: 40 + 10 **MIN. PASS MARKS:**

No. of Lectures per Week : 02 Hours **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I :	12 Lectures
Power Devices : **UJT :** Structural Description and working and Characteristic Curve of Unijunction Transistor (UJT), UJT as a relaxation Oscillator. **SCR:** Structural description, Working and Characteristic Curve of Silicon Controlled Rectifier, Two Transistor Analogy of SCR, Forward and Reverse Blocking States, Triggering Methods. Construction, Working and Characteristic curves of DIAC and TRAC, TRIAC as a switch.	
Unit-II :	**13 Lectures**
Applications of SCR : SCR as a static AC switch, Phase Controlled Rectification, Half Wave and Full wave Rectifiers using SCR with resistive, capacitive and inductive load. Power Inverters using SCR: with and without reactive feedback.	
Unit-III :	**13 Lectures**
IC Technology : Refining and growth of Silicon Crystals : Production of electronic grade silicon, Crystal growth apparatus, Silicon Wafer Preparation: Ingot Trimming and Slicing, Wafer Polishing and Cleaning, Wafer Processing Considerations, Diffusion of Dopant Impurities, Diffusion Systems. Ion Implantation, Ion Implantation System, Properties of Ion Implantation, Thermal Oxidation: Utility of Thermal Oxidation, Photolithography Process steps, Idea of relative plasma etching, Chemical Vapour Deposition: Epitaxial deposition	
Unit-IV :	**13 Lectures**
INTEL 8086 Microprocessor : Register Organization of INTEL 8086, Architecture, Pinout Description of 8086, Physical Memory Organization, General Bus Operation, I/O Addressing Capability, Minimum and maximum modes. Addressing Modes of 8086, Instruction set of 8086: Data Copy/Transfer Instructions, Arithmetic and Logical Instructions, Branch Instructions, Loop Instructions, Machine Control Instructions, Shift and Rotate Instructions. Simple Programs for arithmetic operations.	
Unit-V :	**13 Lectures**
Electrical Motors: Types of motors, DC Motor: Design and Working Principles; Induction motors: Idea of rotating magnetic field, Starting and Rotating Torque, Slip, Asynchronous Motor, Equivalent circuit of an induction motor. Synchronous motor: principle of operation. Single phase induction motor: different circuits to make itself starting.	

TEXT BOOKS :

1. An Introduction to Thyristors and Their Applications by M. Ramamoorty; Publishers: Affiliated East-West
2. Press Pvt. Ltd., New Delhi
3. Power Electronics by P.C. Sen; Publishers: Tata McGraw Hill Publishing Company, New Delhi.
4. Integrated Circuits by K. R. Botkar; Publishers: Khanna Publishers, Delhi.
5. Advanced Microprocessors and Peripherals by A.K.Ray and K.M.Bhurchandi; Publishers: Tata
6. McGraw Hill Publishing Company Ltd., New Delhi.
7. Electrical Technology by B.L. Theraja; Vol. I and 2, Publisher: S. Chand and Company Ltd.
8. Op-Amp and Integrated Circuits by Ramakant A. Gaikwad; Publishers: Prentice Hall of India Pvt. Ltd., New Delhi.
9. Power electronics by P.S. Bimbhra; Publishers: Khanna Publihsres, Delhi.
10. Microprocessors and Interfacing by Douglas V. Hall; Publishers: Tata McGraw Hill Publishing Company Ltd., New Delhi.
11. Digital Electronics — R.P. Jain, Tata McGraw Hill.

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Syllabus
B.Sc. Part III

GROUP III A
BSC- 3052 – ELECTRONICS GROUP
PAPER-II - COMMUNICATION ELECTRONICS

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week : 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I :	**12 Lectures**

Noise: Thermal Noise, Shot Noise, Partition Noise; Low Frequency and transit time noise, Generation and Recombination Noise, Equivalent Noise Resistance, Signal-to-noise ratio, Noise Factor, Noise Temperature.

Radio Wave Propagation: Introduction, Propagation in Free Space, Tropospheric Propagation, Ionopheric Propagation, Surface Wave, HF and VHF propagation, Ground wave, Sky wave and Space wave propagations, Dead zones, Skip Distance, Maximum Usable Frequency, Stratification of Ionosphere.

Unit-II :	**13 Lectures**

Modulation: Principle of Modulation, Need of Modulation, **Amplitude Modulation**: Principle and waveform, Modulation Index, Derivation for the modulated wave and modulation index, Linear and Square Modulators, Balanced Modulator, Single side band transmission: advantages, disadvantages and methods of generation.

Elements of Frequency and Phase Modulation, Frequency spectrum of FM waves. Phase modulation; Modulation Indices.

Unit-III :	**13 Lectures**

Generation of Frequency Modulation: Direct and Indirect Methods; Varactor Diode and FET circuits. FM Demodulation: Foster Seelay Discriminator and Ratio Detector.

Pulse Modulation, Pulse Transmission, Pulse Amplitude Modulation, Pulse Position and Pulse Width Modulation, Time Division Multiplexing. Frequency Division Multiplexing.

Pulse Code Modulation: Block diagram of PCM, Transmitting and receiving Systems of PCM.

Unit-IV :	**13 Lectures**

Antenna: Antenna Equivalent Circuits, Radiation Fields, Polarization, Isotropic Radiator, Power Gain, Effective area, Half Wave Dipole, Vertical Antenna, Folded Elements, Loop and ferrite core receiving antennas, YAGI Antenna, non-resonant antenna, driven arrays, parasitic arrays, Microwave antenna.

Television Engineering: Characteristics of Human Eye, Persistence of Vision and Flicker, Scanning Process, Interlaced Scanning, Composite Video Signal, Vestigial Sideband Signal, Standard Channel Characteristics. Block diagram of TV Transmitter and Receiver.

Unit-V :	**13 Lectures**

Fiber Optic Communication: Introduction to Optical Fibers, Principles of Light Transmission in a Fiber: Propagation within a Fiber, Effect of Index Profile on Propagation, Modes of Propagation, Number of Modes supported by a fiber; Losses in Fiber, Dispersion, Light Sources for Optical Fibers, Photo Detectors, Connector and Slices.

Wireless Communication System: Introduction to Cellular Telephony, Cells, Frequency Re-use Principle, Transmission, Reception, Handoff, Roaming, Generations of Cellular Telephony; Global System for Mobile Communication (GSM): Introduction, Switching System, Base Station System, Operation and Support System, GSM Specifications, VSAT

TEXT BOOKS :

1. Electronic Communications by Roddy and Coolen; Publishers: Prentice Hall of India, New Delhi.
2. Monochrome and Colour Television by R. R. Gulati; Publishers: New Age International Publishers, New Delhi.
3. Data Communications and Networking by Behrouz A. Forouzan; Publishers: Tata McGraw Hill Publishing Company, New Delhi
4. Electronic Communication Systems by George Kennedy; Publishers: Tata McGraw Hill Publication Company, New Delhi
5. Modern Digital and Analog Communication Systems : B.P. Lathi

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GROUP III B
BSC- 3053 – ELECTRONICS GROUP
ELECTRONICS PRACTICALS

MAX. MARKS: 50   **MIN. PASS MARKS: 17**

No. of Laboratory per Week: 06 Hours   **Total Lectures: 96**

Note : A student is required to do at least 10 experiments. Any other experiments of similar Standard may also be incorporated. The scheme of practical examination will be as follows:

Scheme of Examination:
1.   One experiment of three hours duration.
2.   Marks:
        Experiment   30
        Sessional   10
        Viva   10
        Total Marks   50

List of Experiments

1. Study of SCR Characteristics.
2. Study of D1AC and TRIAC Characteristics.
3. Study of UJT Characteristics
4. Study of UJT as relaxation oscillator
5. Assembly language programming to perform basic arithmetic operations using INTEL 8086 microprocessor.
6. Assembly language programming for the summation of two data series using INTEL 8086 microprocessor.
7. Assembly language programming for finding the squares of the elements of a series using call procedure.
8. ALP using Macros.
9. Study of Amplitude Modulation and Demodulation.
10. Study of Frequency Modulation, and Demodulation.
11. Study of Time Division Multiplexing and frequency division multiplexing.
12. Study of Pulse Code Modulation.
13. Study of Optical Fiber Communication
14. Study of various sections of Television Receiver.

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Syllabus
B.Sc. Part III

GROUP II A
BSC- 3061 – INFORMATION TECHNOLOGY GROUP
PAPER-I - DBMS AND RDBMS USING ORACLE

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	14 Lectures
Traditional File Systems versus Modern Database Systems, Introduction and applications of DBMS, Purpose of data base, Data Independence, Schemas and Instances, Database System architecture, level of abstraction, Database users and DBA, Classification of Database Management Systems, Components of database system. ER Model Concept, Components of an ER Model, Attributes, Relationships, Roles, Participation, Constraints on Relationship Types, Strong & Weak entity set, Advance ER Model Features.	

Unit-II	14Lectures
Database Languages and Interfaces, Evaluation of SQL, Between clause, Distinct Clause, Order by Clause, Group by Clause, SQL Functions, Sub queries, Handling null value, Aggregate function, User Defied Function, View, Join Operations. Introduction to Relational Algebra, Relational Model Constraints, Various operations on Relations. Relational Calculus, Introduction, Tuple Relational Calculus, Domain Relational Calculus.	

Unit-III	14Lectures
Relational Database design, Features of good relational database design, Codd's Rule, Integrity constraints, Keys, Armstrong Axioms, Functional Dependency, Closure Set of Functional Dependency, Closure Set of Attributes, Canonical Cover, INF, 2NF, Transitive Dependency & 3NF, BCNF, Multivalue Dependency & 4NF, Join Dependency & 5NF.	

Unit-IV	12Lectures
Transaction Management, ACID properties, Serializability, Concurrency Control, Lock and types of Locks, Two Phase Locking Protocol, Check Points, Recovery Techniques, Deferred and Immediate data modification. Emerging Database Technology, Data Warehouse, Data Mining, Distributed database, Mobile Database, Object Oriented Database, Geographical Database, Query Processing and Query Optimization.	

Unit-V	10 Lectures
PL/SQL Programming using Oracle, Oracle Data types, Looping and Decision Making, Working with Stored Procedure, Trigger, Cursor, Package, Index, Synonym and Sequence. Various Programming Examples.	

TEXT BOOK:
1. Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems",
2. Database Management System by Seema Kedar, Technical Publication

REFERENCE BOOK:
1. C. J. Date, A.K annan and S. Swamynathan, "An Introduction to Database Systems"
2. Atul Kahate, "Introduction to Database Management Systems"
3. Raghu Ramakrishnan, "Database Management Systems"
4. G. K. Gupta, "Database Management Systems", Tata Mc Graw Hill, 2011

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GROUP II A
BSC- 3062 – INFORMATION TECHNOLOGY GROUP
PAPER-II - INFORMATION TECHNOLOGY TRENDS

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**Lectures14**

Distributed Systems: introduction, Distributing the processing and storage function, Concept of Parallel systems, Difference between parallel & Distributed systems, Advantages & Disadvantages of Parallel and Distributed system, wireless networks, Architecture of Distributed systems, Security of Distributed system, Services of distributed system.
E-Supply Chain Management: Introduction, E-Supply-Chain components, E-Supply-Chain architecture, Major Trends in E-SCM, Examples of using E-SCM.
E-Customer Relationship Management (E-CRM): Customer Relationship management concepts. How technology can help in this? E-CRM solutions, advantages, ECRM capabilities, Data Mining & E-CRM, Examples of using E-CRM. Enterprise Resource Planning concepts.

Unit-II	**Lectures12**

DATAWAREHOUSE AND DATA MARTS: Introduction, Advantages of data warehouse, Data warehouse components, Summarized data, Current details, System of records, Integration and transformation programs, Archives, Metadata, Structure of a data warehouse, Uses of a data warehouse, Standards reports and queries, Queries against summarised data, Data mining, Interface with other warehouse.
DATAMINING: Introduction, Evolution of data mining, Data mining —verification versus discovery, Advantages of data mining, Technologies used in data mining. Big Data concepts, Introduction to HADOOP

Unit-III	**Lectures12**

Mobile Commerce: Introduction, Growth, Success stories of Mobile commerce, Technologies for mobile commerce, WAP & its basics, WAP programming model, other wireless technology, different generations in wireless communications, GSM versus CDMA security issues, M-Commerce in India.
GEOGRAPHIC INFORMATION SYSTEM (GIS): Components of a GIS -Hardware, software, data, People, Methods, Working of GIS, Geographic references, Vector and Raster Models, Data for GIS, GIS and Related Technologies, Desktop Mapping, CAD, Remote sensing and GPS, Virtual private Network: Concept of VPN, Elements and basic requirements of VPN, its uses.

Unit-IV	**Lectures12**

Introduction and basic concepts of modern communication and telephony technology: CDMA, WLL, GSM, VOIP, Blue-tooth, Wi-Fi. Communication Technology: 2G, 3G, 4G, 5G. Communication over Radio, Microwave systems, Communication satellites, Radar, Fiber optics, ISDN their properties, pros & cons of each device.
Network Security: Aspects of Security, Privacy: Encryption and Decryprtion.

Unit-V	**Lectures14**

Multimedia: Concept, types of graphics-bitmap & vector graphics, graphic effects and techniques, sound, Music and Video, Uses of multimedia, advantage and Application of Multimedia. Artificial Intelligence and Expert system- Concepts of AI & Expert Systems, Building of Expert system, Merits and Demerits of Expert system, Application of Expert system and AI.
Introduction to virtual reality: Definition, Applications of VR in Defense, Media, Education & Business.
Elementary Concepts of IOT, Smart Systems, Embedded systems, Cloud Computing.

TEXT & REFERENCE BOOKS:
1. Fundamentals of Information Technology by Alex Leon & M. Leon,Vikas Publications, New Delhi.
2. Frontiers of Electronic Commerce, by Kalakota, Ravi, Stone, Tom,Whinston, Andrew B, Addison Wesley Publishing Co.
3. E-Commerce An Indian Perspective (Second Edition) — by P.T. Joseph,S.J. Prentice-Hall of India
4. Security in Computing, third edition, by C.P. Pfleeger, S.Pfleeger and S. Ware,Prentice Hall 2002
5. Mobile communications, Joschen Schiller, Pearson Education Recent Magazines of Computers and Communication

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GROUP II B
BSC- 3063 – INFORMATION TECHNOLOGY GROUP
INFORMATION TECHNOLOGY – PRACTICALS

MAX. MARKS: 50   **MIN. PASS MARKS: 17**

No. of Laboratory per Week: 06 Hours   **Total Lectures: 96**

Practical Session -01 - Practical on RDBMS	**Suggested Practicals:** **Note: Solve the following queries using ORACLE.** 1. List the name & salary of the employee who is working in deptno 30. 2. List the name & salary of the employee who is working as an Analyst in deptno 10. 3. List the name & job of the employee whos salary more than 1000 but less than 2000. 4. List all the deptno from EMP table. 5. List the name & salary of the employee who is working in deptno10, 20, and 30. 6. List the name & salary of the employee who is not working in deptno10, 20. 7. List the entire analyst who is working in deptno 20. 8. Display following output. "SCOTT IS A MANAGER IN DEPARTMENT NUMBER 10 " 9. List the entire clerk whose salary is more than 800 & not working for deptno 10. 10. Give bonus of Rs 500 to all employees working for deptno 30. 11. Find the total salary of the each employee working for deptno 20. 12. Find the oldest employee. 13. List the name of the employee whose salary is more than 1000 & working either in dept 10 or 20. 14. List the name & salary of the employee who are getting no commission for dept 10. 15. List the name & employee code of the employee whose salary is not in the range of 1000 & 1800. 16. List the id & job of the employee whose salary > 2000 & name starts with S. 17. List all employees who joined in 1981. 18. List all employee names and their salaries, whose salary lies between 1500/- and 3500/- both inclusive. 19. List all employees which start with either J or T. 20. List all employee names and jobs, whose job title includes M or P. 21. List all jobs available in employee table. 22. List all employees who belong to the department 10 or 20. 23. List all employee names, salary and 15% rise in salary. 24. List minimum, maximum, average salaries of employee. 25. Find how many job titles are available in employee table. 26. Find second highest salary

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27. Display all employee names and salary whose salary is greater than minimum salary of the company and job title starts with 'NI'.

28. Find how much amount the company is spending towards salaries

29. Display name of the department with deptno 20.

30. List ename whose commission is NULL.

31. List ename whose manager is not NULL.

32. Display the employee no and total salary for all the employees

33. Display the employee name and annual salary for all employees.

34. Display the names of employees who are working as clerks, salesman or analyst and drawing a salary more than 3000.

35. Display the names of the employees who are working in the company for the past 5 years;

36. Display the names of all tables from current user;

37. Display the name of the current user.

38. Display the names of employees working in depart number 10 or 20 or 40 or employees working as CLERKS, SALESMAN or ANALYST.

39. Display the names of employees whose names have second alphabet A in their names.

40. Display the names of the employee whose names is exactly five characters in length

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GROUP IV
BSC- 3071 – MATHEMATICS GROUP
PAPER-I - LINEAR ALGEBRA AND NUMERICAL ANALYSIS

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**13 Lectures**

Definition and Examples of Vector Spaces, Subspaces. Sum and Direct Sum of Subspaces. Linear Span, Linear Dependence, Independence and their Basic Properties. Basis, Existence Theorem for Basis. Extension Theorem, Invariance of The Number of Elements of a Basis. Dimension, Finite Dimensional Vector Spaces, Existence of Complementary Subspaces of a Subspace of a Finite Dimensional Vector Space, Dimension of Sum of Subspaces. Quotient Space and its Dimension.

Unit-II	**12Lectures**

Linear Transformations and their Representation as Matrices. Algebra of Linear Transformations. Rank-Nullity Theorem, Change of Basis, Dual Space, Bi-Dual Space and Natural Isomorphism, Adjoint of a Linear Transformation, Eigen Values and Eigen Vectors of a Linear Transformation. Diagonalisation, Bilinear, Quadratic and Hermitian Forms.

Unit-III	**14Lectures**

Inner Product Space- Cauchy-Schwartz Inequality, Orthogonal Vectors, Orthogonal Complements, Orthonormal Sets and Bases, Bessel's Inequality for Finite Dimensional Spaces, Gram-Schmidt Orthogonalization Process.

Unit-IV	**13Lectures**

Solution of Equations: Bisection, Secant. Regula Falsi, Newton's Methods, Roots of Second Degree Polynomials Equations. Interpolation: Lagrange Interpolation. Divided Differences. Interpolation Formula Using Differences, Numerical Quadrature, Newton- Cote's Formulae, Gauss Quadrature Formulae.

Unit-V	**12Lectures**

Linear Equations Direct Methods for Solving Systems of Linear Equations (Gauss Elimination. LU Decomposition, Choleskv Decomposition), Iterative Methods (Jacobi, Gauss- Seidel Reduction Methods).

Ordinary Differential Equations: Euler Method. Single Step Method. Runge Kutta's Method, Multistep Methods, Milne Simpson Method. Methods Based on Numerical Integration, Methods Based on Numerical Differentiation.

TEXTS BOOKS:
1. K. B .Datta, Matrix And Linear Algebra, Prentice Hall Of India Pvt. Ltd. New Delhi, 2000.
2. S. S. Sastry, Introductory Methods of Numerical Analysis, P11.1 Learning Pvt. Ltd.

REFERENCE BOOKS:
1. K. Hallman and R. Kunze, Linear Algebra, 2nd Edition. Prentice I Lull Englewood Cliffs. New Jersey, 1971.
2. S. K. Jam. A Gunawardena &. P. B. Bhattacharya, Basic Linear Algebra With Matlab Key College Publishing (Springer- Verlag) 2001
3. S. Kumarsaran, Linear Algebra. A Bermetric Approach Prentice-Hall of India.
4. Balaguruswamy, Numerical Methods. Tata McGraw Hill Publication, New York.

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GROUP IV
BSC- 3072 – MATHEMATICS GROUP
PAPER-II - REAL AND COMPLEX ANALYSIS

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**14 Lectures**
Riemann Integral, Integrability of Continuous and Monotonic Functions, Integrability of the Modulus Intergrable Function, The Fundamental Theorem of Integral Calculus. Mean Value Theorems of Integral Calculus. Partial Derivatives and Differentiability of Real-Valued Functions of Two Variables, Schwarz's and Young's Theorem, Implicit Function Theorem,	

Unit-II	**13 Lectures**
Improper Integrals and Their Convergence. Comparison Tests. Abel's and Dirichlet's Tests. Frullani's Integral as a Function of a Parameter. Continuity, Derivability and Integrability of an Integral of a Function of a Parameter, Fourier Series of Half and Full Intervals.	

Unit-III	**13 Lectures**
Definition and Examples of Metric Spaces, Neighborhoods, Limit Points, Interior Points, Open and Closed Sets, Closure and Interior , Boundary Points. Subspace of Metric Space, Cauchy Sequences, Completeness, Cantor's Intersection Theorem, Contraction Principle, Real Number as a Complete Ordered Field, Dense Subsets. Baire Category Theorem, Separable, Second Countable and First Countable Spaces, Continuous Functions. Uniform Continuity ,Properties of Continuous Functions on Compact Sets.	

Unit-IV	**12 Lectures**
Continuity and Differentiability of Complex Functions, Analytic Functions, Cauchy-Riemann Equations, Harmonic Functions, Cauchy's Theorem, Cauchy's Integral Formula.	

Unit-V	**12 Lectures**
Power Series Representation of an Analytic Function. Taylor's Series, Laurent's Series, Singularities, Cauchy's Residue Theorem, Contour Integration.	

TEXT BOOKS:
1. Mathematical Analysis by S. C. Malik and Savita Arora, New Age Publication, Delhi.
2. G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw Hill, New York 1963.
3. L. V. Alhfors, Complex Analysis McGraw Hill, New York.

REFERENCE BOOKS:
1. Walter Rudin, Real and Complex Analysis, McGraw Hill, New York.
2. Ponnuswamy, Complex Analysis, Narosa Publication, New Delhi.
3. R. V. Churchill & J.W. Brown, Complex Variables and Application.

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GROUP IV
BSC- 3073 – MATHEMATICS GROUP
PAPER-III - (A) STATISTICAL METHODS

MAX. MARKS: 40 + 10　　　　　　　　　　　　　　**MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours　　　　　　　**Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**13Lectures**
Frequency Distribution- Measures of Central Tendency. Mean, Median, Mode, G.M,H.M. Partition Values, Measures of Dispersion- Range. Interquartile Range, Mean Deviation, Standard Deviation, Moments, Skewness and Kurtosis.	
Unit-II	**13Lectures**
Probability- Event, Sample Space. Probability of an Event, Addition and Multiplication Theorems, Baye's Theorem. Continuous Probability- Probability Density Function and Its Applications for Finding The Mean, Mode, Median and Standard Deviation of Various Continuous Probability Distributions. Mathematical Expectation, Expectation of Sum And Product of Random Variables. Moment Generating Function.	
Unit-III	**13Lectures**
Theoretical Distribution- Binomial. Poisson, Rectangular and Exponential Distributions, Their Properties and Uses.	
Unit-IV	**12Lectures**
Methods of Least Squares. Curve Fitting, Co-Relation and Regression. Partial and Multiple Correlations (Upto Three Variables Only).	
Unit-V	**13Lectures**
Sampling- Sampling of Large Samples. Null and Alternative Hypothesis, Errors of First and Second Kinds, Level of Significance, Critical Region, Fests of Significance Based on Chi-Square.T, F And Z-Statistics.	

TEXT BOOKS:
1. FL C. Saxena and J. N. Kapoor. Mathematical Statistics, S. Chand and Company.
2. M. Ray Statistical Methods.

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GROUP IV
BSC- 3073 – MATHEMATICS GROUP
PAPER-III - (B) DISCRETE MATHEMATICS

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week : 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**13Lectures**
Boolean Functions-Disjunctive & Conjunctive Normal Forms (Canonical & Dual Canonical), Bool's Expansion Theorem. Relations- Binary Relation. Inverse Relation, Composite Relation, Equivalence Relation, Equivalence Classes & its Properties Partition of a Set.	
Unit-II	**13Lectures**
Partial Order Relation, Partially Ordered Sets, Totally Ordered Sets, Hasse Diagram, Maximal and Minimal Element, First and Last Element Lattice- Definition and Examples, Dual Lattice, Bounded Lattice. Distributive Lattice. Complemented Lattice.	
Unit-III	**13Lectures**
Graph: Definition, Types Of Graphs. Subgraphs. Walk, Path . Circuit. Connected and Disconnected Graphs: Euler Graph. Hamiltonian Path and Circuit. Shortest Path in Weighted Graph, Dijkstra's Algorithm For Shortest Paths.	
Unit-IV	**12Lectures**
Trees and Its Properties, Rooted Tree. Binary Tree, Spanning Tree., Rank and Nullity of a Graph. Kruskal's Algorithm and Prim's Algorithm.	
Unit-V	**13Lectures**
Matrix Representation of Graphs, Incidence and Adjacency Matrix, Cutset and Its Properties. Planar Graphs (Definition) Kuratowski's two Graphs.	

TEXT BOOKS:
1. C. L. Liu.- Elements of Discrete Mathematics , Mcgraw Hill New-York
2. Narsingh Deo- Graph Theory, Prentice Hall.

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GROUP IV
BSC- 3073 – MATHEMATICS GROUP
PAPER-III - (C) MECHANICS

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week : 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**13Lectures**
Moments, Work and Energy, Conservation of Energy, Potential Energy, Analytical Conditions of Equilibrium of Coplanar Forces, Virtual work Catenary.	
Unit-II	**13Lectures**
Friction, Forces in three dimensions, Poinsors central axis, Null lines and Planes, Stable and unstable Equilibrium.	
Unit-III	**13Lectures**
Velocities and Accelerations along Radial and Transverse directions and along Tangential and Normal Directions. Simple Harmonic Motion, Elastic Strings, Projectile	
Unit-IV	**12Lectures**
Motion on Smooth and Rough Plane Curves, Motion in a Resisting Medium, Motion of Particles of Varying mass. Central Orbits. Kepler's Law of Motion. Motion of a particle in three dimensions	
Unit-V	**13Lectures**
Generalized Co-Ordinates, D'Alembert's Principle and Lagrange's Equations, Hamilton Equations, Moments of Inertia, Motion of Rigid Bodies in Two Dimensions. Equation of Continuity, Euler's Equations of Motions for Inviscid Flow, Stream Lines, Path of a Particle, Potential Flow, Two Dimensional and Axisymmetric Motion, Sources and Sinks, Vortex Motion, Navier-Stokes Equation for a Viscous Fluid.	

TEXT BOOKS:
1. R.S. Verma, Statics
2. S. L. Loney, An Elementary Treatise on The Dynamics of Particle of' Rigid Bodies.

REFERENCE BOOKS:
1. M. Ray, Dynamics
2. M. Ray And H. S. Sharma, Dynamics of Rigid Bodies

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GROUP IV
BSC- 3073 – MATHEMATICS GROUP
PAPER-III - (D) MATHEMATICAL MODELLING

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week : 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**13Lectures**
Mathematical Modelling Through Ordinary Differential Equations of First Order: Linear Growth and Decay Models. Non-Linear Growth and Decay Models. Dynamic Problems, Geometrical Problems.	
Unit-II	**13Lectures**
Mathematical Modelling Through System of Ordinary- Differential Equations of First Order: Population Dynamics, Epidemics. Compartment Models, Economic Medicine, Arms Race. Battles and International Trade, Dynamics Models.	
Unit-III	**13Lectures**
Mathematical Modelling Through Ordinary Differential Equations of Second Order: Planetary Motions, Circular Motions and Motion of Satellites. Mathematical Modeling Through Linear Differential Equations of Second Order and Miscellaneous Mathematical Models.	
Unit-IV	**12Lectures**
Mathematical Modelling Through Difference Equations: Simples Models. Basic Theory of Linear Difference Equations with Constants Coefficients, Economic And Finance-Population Dynamics and Genetics. Mathematical Model in Probability Theory.	
Unit-V	**13Lectures**
Mathematical Modelling Through Graphs: Solutions that Can be Modelled Through Graph, Mathematical Modelling in Terms of Directed Graphs. Signed Graphs. Weighted Digraphs and Un-Oriented Graphs.	

TEXT BOOKS:
1.   N. Kapur, Mathematical Modeling, New Age International Publishers.

Reference Books:
1.   Stefan Heinz, Mathematical Modeling
2.   Dr. V. P. Saxena, Rio-Mathematics.
3.   Belinda Barnes And Glenn Robert Fullord, Mathematical Modelling
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Syllabus
B.Sc. Part III

GROUP IV
BSC- 3073 – MATHEMATICS GROUP
PAPER-III - (E) FINANCIAL MATHEMATICS

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week : 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**13Lectures**
Financial Management- Nature and Scope of Financial Management. Goals of Financial Management and Main Decisions of Financial Management, Difference Between Risk, Speculation and Gambling.	
Unit-II	**13Lectures**
Time Value of Money-Interest Rate and Discount Rate. Present Value and Future Value, Discrete Case as well as Continuous Compounding Case. Annuities and Its Kinds	
Unit-III	**13Lectures**
Meaning of Return. Return As Internal Rate of Return (IRR). Numerical Methods Like Newton Raphson Method to Calculate IRR, Measurement of Returns Under Uncertainty Situations.	
Unit-IV	**12Lectures**
Meaning of Risk, Difference Between Risk and Uncertainty, -I-Ypes of Risks. Measurements of Risk. Calculation of Security and Portfolio Risk and Return-Markowitz Model, Sharpe's Single Index Model- Systematic Risk and Unsystematic Risk.	
Unit-V	**13Lectures**
Taylor Series and Bond Valuation, Calculation of Duration and Convexity Bonds, Financial Derivatives- Futures. Forward, Swaps and Options. Call and Put Option. Call and Put Parity Theorem.	

TEXT BOOKS:
1. Sheldon M. Ross, An Introduction to Mathematical Finance.
2. **Mark S. Dorfman, Introduction to Risk Management and Insurance, Prentice Hall.**

REFERENCE BOOKS:
1. Aswath Damodaran, Corporate Finance, Theory and Practice, John Wiley & Inc.
2. John C. Hull- Options, Futures and Other Derivatives, Prentice Hall of India Private Ltd.
3. C. D. Daykin, T. Pentikainen and M. Pesonen, Practical Risk Theory for Actuaries, Chapman & Hall.

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Syllabus
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GROUP II A
BSC- 3081 – PHARMA CHEMISTRY GROUP
PAPER-I - MEDICINAL CHEMISTRY- II

MAX. MARKS: 40+10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**12 Lectures**

Adrenergics: Classification, mechanism of action and SAR of ethylamine analogues, synthesis of adrenaline, epinephrine, norepineprine, ephedrine, dopamine.
Anticoagulants: Classification, mechanism of action, synthesis and uses of heparin, dicoumarol.
Expectorants and anti-tussives: Classification, mechanism of action. Synthesis of acetylcysteine, guaifensin and noscapine.

Unit-II	**16 Lectures**

Antibiotics: Historical background, Structure activity relationship, Chemical classification of β-Lactam antibiotics. Penicillin, Cephalosporins, Aminoglycosides: Streptomycin and neomycin, Tetracyclines: Tetracycline, Macrolide: Azithromycin; constitution and synthesis and uses of chloramphenicol.
Sulphonamide: Classification and mechanism of action, synthesis and uses of sulphacetamide, sulphaguianidine, dapsone.

Unit-III	**10 Lectures**

Anti-malarials : Classification, mechanism of action, SAR of 4-amino quinolines, synthesis of chloroquine phosphate, **amodiaquine** hydrochloride, primaquine phosphate
Anti-tubercular Drugs: Classification, mechanism, synthesis and uses of para amino salicylic acid, isoniazide, rifampicin.
Anti-amoebics: Classification, mechanism of action and synthesis and uses of metronidazole.

Unit-IV	**12 Lectures**

Anti-diabetics: Classification. Mechanism, synthesis and uses of **metoformin,** sitagliptin, glimperide.
Anti-neoplastics: Types of cancer, Classification, mechanism , synthesis and uses of 5-fluoro-uracil, 6-mercaptopurine, thiotepa, busulphan.

Unit-V	**14 Lectures**

Drug Design: Various approaches used in drug design. Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammet's electronic parameter, Tafts steric parameter and Hansch analysis, Free Wilson analysis. Introduction to 3D QSAR approaches.

BOOKS:

1. Foye's Medicinal Chemistry
2. Wilson and Gisvold's Text Book of Organic and Medicinal Chemistry
3. Medicinal Chemistry by A. Kar
4. Medicinal Chemistry by Sriram, and Yogeeeswari
5. Medical Pharmacology, Tripathi
6. Pharmaceutical Chemistry, Chatwal

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GROUP II A
BSC- 3082 – PHARMA CHEMISTRY GROUP
PAPER-II - INSTRUMENTAL ANALYSIS

MAX. MARKS: 40+10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	14 Lectures
Conductometry- Introduction, Conductivity cell, Conductometric titrations, applications. **Potentiometer**-Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications. **Polarography** - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications	
Unit-II ;	**12 Lectures**
UV: Principle, instrumentation and application of UV spectroscopy. IR: Principle, instrumentation and application of IR spectroscopy.	
Unit-III	**14 Lectures**
NMR: Principle, The spinning nucleus, Magnetic and non magnetic nuclei, rules to find nuclear spin, effect of external magnetic field, precessional motion and frequency, chemical shift: measurement, shielding and deshielding, factors affecting spin-spin coupling, coupling constants, Instrumentation, interpretation of NMR spectra. **MASS Spectrometry:** Principle, instrumentation, types of ions and use of mass spectrometry in the determination of molecular weight	
Unit-IV	**14 Lectures**
Chromatography: Introduction to chromatography, Adsorption and partition column chromatography-Methodology, advantages, disadvantages and applications. Thin layer chromatography- Introduction, Principle, Methodology, R_f values, advantages, disadvantages and applications. **Paper chromatography:** Introduction, methodology, development techniques, advantages, disadvantages and applications	
Unit-V	**10 Lectures**
Gas chromatography: Introduction, theory, instrumentation, temperature programming, advantages, disadvantages and applications, **High performance liquid chromatography (HPLC)**-Introduction, theory, instrumentation, advantages and applications.	

BOOKS:

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Instrumental Methods of Chemical Analysis by Chatwal.
3. Pharmaceutical Analysis by Kar.
4. Beckett and Stenlake's, Practical Pharmaceutical Chemistry Vol. I and II

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Syllabus
B.Sc. Part III

GROUP II B
BSC- 3083 – PHARMA CHEMISTRY GROUP
PHARMACEUTICAL CHEMISTRY – PRACTICALS

MAX. MARKS: 50   **MIN. PASS MARKS: 17**

No. of Laboratory per Week: 02 Hours   **Total Lectures: 64**

1. Preparation of N-phenyl azo β -naphthol and diphenyl thiourea.

2. Preparation and synthesis of Vicks, Cold Cream, and Sodium Chloride Injection.

3. Preparation of methyl orange and phenolphthalein.

4. Interpretation of given UV spectrum.

5. Interpretation of given IR spectrum.

6. Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds

7. Assay of paracetamol by UV-Spectroscopy

8. Estimation of dextrose by colorimetry

9. Weight variation, hardness, friability, and disintegration test of tablets.

10. Systematic separation and identification of organic binary mixture.

11. Separation of mixture of amino acid and determination of Rf value by thin layer chromatography.

12. Assay of Ammonium Chloride, Citric acid and Milk of Magnesia.

13. Demonstration experiment on HPLC.

14. Demonstration experiment on Gas Chromatography.

15. Viva-voce

16. Practical Record

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Syllabus
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GROUP III-A
BSC- 3091 – PHYSICS GROUP
PAPER-I - QUANTUM MECHANICS AND SPECTROSCOPY

MAX. MARKS: 40 + 10   MIN. PASS MARKS:

No. of Lectures per Week : 02 Hours   Total Lectures: 64

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I Quantum Mechanics-1	**13 Lectures**

Particles and Waves: Photoelectric effect. Black body radiation. Planck's radiation law. Stefan Boltzmann law. Wien's displacement law and Rayleigh- Jean's law. Compton effect. De Broglie hypothesis. Wave particle duality. Davisson-Germer experiment. Wave packets. Concept of phase and group velocity. Two slit experiment with electrons. Probability. Wave amplitude and wave functions. Heisenberg's uncertainty principle with illustrations. Basic postulates and formalism of Schrodinger's equation. Eigenvalues. Probabilistic interpretation of wave function. Equation of continuity. Probability current density. Boundary conditions on the wave function. Normalization of wave function.

Unit-II Quantum Mechanics-2	**13 Lectures**

Time independent Schrodinger equation: One dimensional potential well and barrier. Boundary conditions. Bound and unbound states. Reflection and transmission coefficients for a rectangular barrier in one dimension. Explanation of alpha decay. Quantum phenomenon of tunneling. Free particle in one-dimensional box, eigen functions and eigen values of a free particle. One-dimensional simple harmonic oscillator, energy eigen values from Hermite differential equation, wave function for ground state. Particle in a spherically symmetric potential. Rigid rotator. Particle in a three dimensional box. Angular momentum. Properties of Pauli's spin matrices.

Unit-III Atomic Spectroscopy	**13 Lectures**

Atoms in electric and magnetic fields: Quantum numbers, Bohr model and selection rules. Stern-Gerlach experiment. Spin as an intrinsic quantum number. Incompatibility of spin with classical ideas. Orbital angular momentum. Fine structure. Total angular momentum. Pauli exclusion principle. Many particles in one dimensional box. Symmetric and anti-symmetric wave functions. Atomic shell model. Spectral notations for atomic states. Spin-orbit coupling. L-S and J-J coupling. Zeeman effect. Continuous and characteristic X-rays. Moseley's law.

Unit-IV Molecular Spectroscopy	**12 Lectures**

Various types of spectra. Rotational spectra. Intensity of spectral lines and determination of bond distance of diatomic molecules. Isotope effect. Vibrational energies of diatomic molecules. Zero point energy. Anharmonicity. Morse potential. Raman effect, Stokes and anti-Stokes lines and their intensity difference. Electronic spectra. Born-Oppenheimer approximation. Frank-Condon principle, singlet and triplet states. Fluorescence and phosphorescence. Introduction to laser Raman spectroscopy. Elementary concept and application of NMR and EPR.

Unit-V Nuclear Physics	**13 Lectures**

Basic properties of nucleus: Shape, Size, Mass and Charge of the nucleus. Stability of the nucleus and Binding energy. Alpha particle spectra — velocity and energy of alpha particles. Geiger-Nuttal law. Nature of beta ray spectra. The neutrino and its physics. Energy levels and decay schemes. Positron emission and electron capture. Selection rules. Beta absorption and range of beta particles. Kurie plot. Nuclear reactions. Pair production. Q-values and threshold of nuclear reactions. Nuclear reaction cross-sections. Examples of different types of reactions and their characteristics. Compound nucleus. Bohr's postulate of compound nuclear reaction.
Semi Empirical mass formula. Shell model, Liquid drop model. Nuclear fission and fusion (concepts). Classification of elementary particles and their interactions. Conservation laws. Quark structure of hadrons. Elementary idea about unification of forces.

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B.Sc. Part III

GROUP III-A
BSC- 3091 – PHYSICS GROUP
PAPER-I - QUANTUM MECHANICS AND SPECTROSCOPY

Reference Books:

1. Quantum Mechanics by Satya Prakash.

2. Quantum Mechanics by Shrivastava .

3. Quantum Mechanics by Matheves and Venkarteasan.

4. Physics of Atoms and Molecules: B.H. Bransden and C.J. Joachairn, Pearson Education, Singapore. 2003

5. Fundamentals of Molecular Spectroscopy: C.M. Banwell and M. McCash. McGrak' Hill (U.K. edition).

6. Introduction to Atomic Physics, H. E. White.

7. Nuclear Physics by R.C.Sharma.

8. Nuclear Physics by D.G.Tayal.

9. Elements of Nuclear Physics by Pandey and Yadav.

10. Unified Physics by R.P.Goyal.

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Syllabus
B.Sc. Part III

GROUP III-A
BSC- 3092 – PHYSICS GROUP
PAPER-II - SOLID STATE PHYSICS AND ELECTRONIC DEVICES

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I Solid State Physics-1	**13 Lectures**

Crystal Structure and Bonding: Crystalline and amorphous solids. Translational symmetry. Lattice and basis. Unit cell. Reciprocal lattice. Fundamental types of lattices (Bravias Lattice). Miller indices. Lattice planes. Simple cubic, Face centered cubic, Body centered cubic lattices. Laue and Bragg's equations. Determination of crystal structure with X-rays, X-ray spectrometer. Ionic, covalent, metallic, van der Waals and hydrogen bonding. Band theory of solids. Periodic potential and Bloch theorem. Kronig-Penny model (Qualitative).

Unit-II Solid State Physics-2	**13 Lectures**

Lattice Structure and Properties: Dulong Petit, Einstein and Debye theories of specific heats of solids. Elastic and atomic force constants. Dynamics of a chain of similar atoms and chain of two types of atoms. Optical and acoustic modes. Electrical resistivity. Specific heat of electron. Wiedemann-Franz law. Hall effect. Response of substances in magnetic field, Dia-, para- and ferromagnetic materials. Classical Langevin theory of dia and paramagnetic domains. Curie's law. Weiss' theory of ferromagnetism and ferromagnetic domains. Discussion of BH hysteresis. Superconductivity. Meissner effect. Josephson junction effect and high temperature superconductivity.

Unit-III Semiconductor Devices-I	**13 Lectures**

Electronic Devices: Types of Semiconductors (P and N). Formation of Energy Bands. Energy level diagram. Conductivity and mobility. Junction formation, Barrier formation in p-n junction diode. Current flow mechanism in forward and reverse biased diode (recombination), Drift and saturation of drift velocity. Derivation of mathematical equations for barrier potential, barrier width. Single p-n junction device (physical explanation, current voltage characteristics and one or two applications). Two terminal devices. Rectification. Zener diode. Photo diode, Light emitting diode. Solar cell. Three terminal devices. Junction field effect transistor (JFET). Two junction devices. Transistors as p-n-p and n-p-n. Physical mechanism of current flow. Characteristics of transistor.

Unit-IV Semiconductor Devices-2	**13 Lectures**

Amplifiers (only bipolar junction transistor). CB. CE and CC configurations. Single stage CE amplifier (biasing and stabilization circuits). Q-point, Equivalent circuit, Input impedance, Output impedance, Voltage and current gain. Class A, B, C amplifiers (definitions). RC coupled amplifiers (frequency response). Class B push-pull amplifier. Feedback amplifiers. Voltage feedback and current feedback. Effect of negative voltage series feedback on input impedance. Output impedance and gain. Stability, distortion and noise. Principle of an Oscillator, Barkhausen criterion, Colpitts, RC phase shift oscillators. Basic concepts of amplitude, frequency and phase modulations and demodulation.
Digital Electronics: Boolean identities, De-Morgan's law, Logic gate and Truth tables, Simple logics circuits, Thermistors, solar cells, Concepts of microprocessors and digital Computers.

Unit-V Nano Materials	**12 Lectures**

Nanostructures: Introduction to nanotechnology, Structure and size dependent properties. 3D, 2D, 1D, OD nanostructure materials and their density of states, Surface and Interface effects. Modelling of quantum size effect. Synthesis of nano particles - Bottom Up and Top Down approach, Wet Chemical Method. Nanolithography. Metal and Semiconducting nanomaterials. Essential differences in structural and properties of bulk and nano materials (qualitative description). Naturally occurring nano crystals. Applications of nanomaterials.

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GROUP III-A

BSC- 3092 – PHYSICS GROUP

PAPER-II - SOLID STATE PHYSICS AND ELECTRONIC DEVICES

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

Text and Reference Books:

1. Solid State Physics by Gupta and Kumar

2. Introduction to Solid State Physics by C. Kittel.

3. Solid State Physics by S.O. Pillai.

4. Solid State Physics by R.L. Singhal.

5. Principles of Electronics by V.K. Mehta

6. The Physics and Chemistry of Nanosolids: Frank J. Owens, and Charles P. Poole Jr., Wiley Inter Science, 2008

7. Physics of Low Dimensional Semiconductors: An introduction; J.H. Davies. Cambridge University Press, U.K., 1998

8. "Nanoscience and Nanotechnology" by Dr K. K. Choudhary, Narosa Publications, 2015.

9. Unified Physics by R. P. Goyal.

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B.Sc. Part III

GROUP III-B
BSC- 3093 – PHYSICS GROUP
PHYSICS PRACTICALS

MAX. MARKS: 50   **MIN. PASS MARKS: 17**

No. of Laboratory per Week: 06 Hours   **Total Lectures: 96**

For Regular Students

Practical	Sessional	Viva	Total
25	10	15	50

For Ex – Student

Practical	Sessional	Viva	Total
35	00	15	50

Suggested Practicals:

1. Specific resistance and energy gap of a semiconductor.
2. Study of half wave and full wave rectification.
3. Characteristics of P-N junction diode.
4. Characteristics of Zener Diode.
5. Characteristic of a tunnel diode.
6. Characteristics of LED.
7. Characteristics of FET.
8. Characteristics of a transistor.
9. Study of regulated power supply.
10. Study of RC coupled amplifiers.
11. Determination of Planck's constant.
12. Determination of elm using Thomson's method.
13. Determination of e by Millikan's method.
14. Study of spectra of hydrogen and deuterium (Rydberg constant).
15. Absorption spectrum of iodine vapour.
16. Study of Zeeman Effect for determination of Lande g-factor.
17. Study of Raman spectrum using laser as an excitation source.
18. To draw B-H curve of ferro-magnetic material with the help of CRO.
19. Hysteresis Curve a transformer core.
20. Hall probe method for measurement of resistivity.
21. Study of Hartley Oscillator.
22. Study of Wien Bridge Oscillator

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Syllabus
B.Sc. Part III(Hons.)

GROUP II
BSC- 3041 – COMPUTER SCIENCE GROUP
PAPER-I - DATABASE MANAGEMENT SYSTEM

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	14 Lectures
Purpose of database system, views of data, data models: relation, network, hierarchical, instances and schemas, data dictionary, types of database languages:-DDL, DML, structure of DBMS, advantages and disadvantages of DBMS, 3-level architecture proposal:-external, conceptual & internal levels.	
Unit-II	**14 Lectures**
Entity relationship model as a tool of conceptual design: entities & entities set, relationship and relationship set, attributes and mapping constraints, keys, ER diagram:-strong and weak entities, generalization, specialization & aggregation, reducing ER diagram to tables	
Unit-III	**12 Lectures**
Fundamentals of set theoretical notations: relations, domains, attributes, tuples, concept of keys: primary key, super key, alternate key, candidate key, foreign key, fundamentals of integrity rules: entity & referential integrity ,extension and intention, relational algebra :select ,project, Cartesian product, different types of joins: theta, equi, natural, outer joins, set operations.	
Unit-IV	**14 Lectures**
Functional Dependencies, Good & Bad Decomposition and Anomalies as a database: A consequences of bad design, Universal relation, Normalization: INF, 2NF, 3NF &BCNF normal forms, Multivalued dependency, Join dependency, 4NF, 5NF.	
Unit-V	**10 Lectures**
Basic concepts: -Indexing and Hashing, B-tree Index files, Hashing: Static & Dynamic hash function, Index definition in SQL: Multiple key accesses,	

TEXT BOOKS:

1. Database System Concepts by Henry Korth and A. Silberschatz.
2. Simplified approach to DBMS, Prateek Bhatia, Gurvinder Singh Kalyani Publication.

REFERENCE BOOK:

1. An Introduction to Database System by Bipin Desai

2. An Introduction to Database System by C .J. Date.

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GROUP II
BSC- 3042 – COMPUTER SCIENCE GROUP
PAPER-II - OPERATING SYSTEM CONCEPTS

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 02 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	14 Lectures
Operating system definitions, its components, evolution of operating system, types of operating systems: batch, multiprogramming, multitasking, multiprocessor, real time, client-server, peer-to-peer, distributed, clustered, operating system services, system calls, protection of I/O, memory and CPU.	

Unit-II	14 Lectures
Process scheduling: concept of a process, process states, PCB, process life cycle, operations on processes, context switch, types of schedulers, CPU burst- I/O burst cycles, dispatcher, scheduling criteria, scheduling algorithms — FCFS, SJF, STRN, Round Robin, priority, event driven, multilevel queue. Performance evaluation of algorithms through deterministic modelling.	

Unit-III	12 Lectures
Memory Management: address binding, logical and physical address space, dynamic loading and linking. Contiguous memory allocation: static and dynamic partitioned memory, fragmentation, swapping relocation, compaction, protection. Non-contiguous memory allocation: Paging Segmentation. Virtual Memory: demand paging, page fault, page replacement algorithms- FIFO, LRU, optimal. Thrashing, page fault frequency.	

Unit-IV	14 Lectures
Interprocess communication need for synchronization, Deadlocks- definition, avoidance, prevention, detection and recovery. Disk organization, Directory structure, disk space management- contiguous and non-contiguous allocation strategies, disk address translation, disk caching, disk scheduling algorithms. Device Management: dedicated devices, shared devices. Security and protection: security threats and goals, penetration attempts. Security policies and mechanisms, authentication, protection and access control.	

Unit-V	10 Lectures
Linux: History and features of Linux, Linux architecture, file system of Linux, hardware requirements, Linux standard directories, Linux Kernel. Working with Linux: KDE and Gnome graphical interface, various types of shells available in Linux. Vi editor, Linux commands. File security in Linux.	

TEXT BOOKS AND REFERENCE BOOKS:

1. Operating system Concepts: by Silberschatz, Galvin and Gagne
2. Operating system Design and Concepts, by Milan Milenkovic
3. Operating system by Andrew Tanenbaum
4. Operating system by Peterson
5. Linux Bible by Christopher Negus
6. Linux by Sumitabh Das

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Syllabus
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GROUP III
BSC- 3043 – COMPUTER SCIENCE GROUP (For Hons.)
PAPER-III - JAVA PROGRAMMING

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 04 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**13 Lectures**
Primitive data types-integer, Short, Long, byte, float, double, Unicode, Character set, Boolean, their ranges, default initial values, wrapping of integer arithmetic, casting comments, identifiers and reserved words. Local variables. Operators: Arithmetic, Relational, Logical, conditional operator, Assignments, Increment and Decrement, Conditional. Bitwise. Special, Expressions & its evaluation.	
Unit-II	**13 Lectures**
Statements simple and compound: If statement, if...else... statement, Nesting of if...else... statements, else...if Ladder, Switch, case, continue, break, Loops- While, Do, For, Jumps in Loops, Labeled Loops. Class type data: String, Arrays, example and exercises.	
Unit-III	**13 Lectures**
Definitions and naming conventions for the members of the JAVA classes, instance fields and methods, Constructors, Methods Overloading, Static Members, Nesting of Methods. Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract methods and Classes, Visibility Control.	
Unit-IV	**13 Lectures**
Creating Threads, Extending the Threads Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the Runnable Interface, synchronized, Exception (try-catch-final blocks examples.)	
Unit-V	**12 Lectures**
Java Virtual machine concept, Java Platform overview, Local and Remote Applets Vs Applications, writing Applets, Applets Life Cycle, Creating an Executable Applet Designing a Web Page. Applet Tag, Adding Applet to HTML File, Running the Applet, Passing Parameters to Applets, Aligning the Display, HTML Tags & Applets.	

TEXT BOOKS:
1. Complete Reference (Java2)-Herbet Schild-Tata McGraw Hill.
2. Programming with java- E. Balagurusamy Tata Mc Graw Hill. New Delhi, 2nd edition 2002.

REFERENCE BOOKS:

1. Joseph O'Neil, Teach yourself java, Tata Mc Graw Hill, New Delhi, 2012.

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NAAC (UGC) Accredited WITH GRADE "A"
F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23 (AS)

Syllabus
B.Sc. Part III(Hons.)

GROUP III
BSC- 3044 – COMPUTER SCIENCE GROUP (For Hons.)
PAPER-IV – COMPUTER NETWORK

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 04 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	10 Lectures
Computer Network, Goals and Applications. Network, hardware-LAN, MAN and WAN and topologies, LAN components - File server, Workstations, Network Adapter Cards. Connection Oriented and Connection less services. Data commununication system, data communication links, character codes, digital data rates, serial data formats, encoded data formats, telephones systems, error detection & correction.	

Unit-II	10 Lectures
Transmission media - guided and unguided media, Switching Teclmiques - Circuit Switching, Packet Switching, Message Switching, networking medium- twisted pairs, coaxial cable, optical fibers, System network architecture, SNA operating system. Reference models – OSI and TCP/IP. A Comparative study.	

Unit-III	15 Lectures
Limits of communication, RS449 interface standards, RS422 & _RS423, FSK & V0 moderns, multiplexing methods, Sampling theorem and quantization, delta modulation, digital T carrier, CODEC.	

Unit-IV	15 Lectures
The HTML programming basics, Syntax and rules, Tables, Frames, Forms, Example of HTML page, Choice of color, banners, Linking with HTML page, Div, Span, meta tags, span, Introduction to DHTML, Java Script, Use of Java Script, Java Script Syntax, Data type, Variable, Array, Operator and Expressions. Data link protocol, character-oriented protocol & bit-oriented protocol, network architecture protocols. Ethernet & token ring.	

Unit-V	14 Lectures
Internet basics: -Elements of the web, viewing web pages with a browser, using a browser for a mail, News and chat, Security and privacy issues. Internet: advantage and disadvantage, Internet Security issues, Embedded and Software based firewall, Data encryption and Digital Signature and Certificates. Integrated services & routing protocols, B-ISDN, DSL & ATM.	

BOOKS:
1. Computer Network by Andrew S. Tannenbaum PHI
2. Computer Networks, Cyber Tech Publications, New Delhi
3. Data & Network Communication by Michael A. Miller
4. Understanding of Data Communication & Networks by William A. Shay

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2022-23 (AS)

Syllabus
B.Sc. Part III(Hons.)

GROUP III
BSC- 3045 – COMPUTER SCIENCE GROUP (For Hons.)
PAPER-V- SOFTWARE ENGINEERING

MAX. MARKS: 40 + 10   **MIN. PASS MARKS:**

No. of Lectures per Week: 04 Hours   **Total Lectures: 64**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**14 Lectures**
General business environment, Business system concept, system analysis, System development life cycle. A generic view of Software Engineering, Software Characteristics, Application, Linear Sequential model, the prototyping model, RAD Model, Spiral & evolutionary model.	
Unit-II	**14 Lectures**
Project selection: Source of project request, managing project review & selection, Preliminary investigation, system requirement specification & analysis: fact finding technique, Feasibility study, Cost & Benefit analysis.	
Unit-III	**12 Lectures**
Structured system analysis, Tools of Structured analysis, Software Design Fundamental, Data Flow Diagram, Object Oriented Design & Data Oriented design method.	
Unit-IV	**14 Lectures**
Software Quality Assurance, Software testing techniques, software testing fundamentals, White Box Testing (Basis path Testing, Control Structured testing), Black Box Testing, Software Testing Strategies: A Strategic approach to software testing, Strategic issue, unit testing, Integration testing, Validation testing, System Testing, The art of Debugging.	
Unit-V	**10 Lectures**
System Implementation & Software Maintenance, Hardware & Software Selection.	

BOOKS:
Text Books:
1. System Analysis & design by Elias M. Awad, Galgotia Pub.
2. Software Engineering by Roger S. Pressman, Mc-GrawHill.
3. An Integrated Approach to Software Engineering Pankaj Jalotc, Nakoda Publication House
4. Software Engineering Concept and Practices, Dr. Ugrasen Suman, Cengage.

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2022-23 (AS)

Syllabus
B.Sc. Part III(Hons.)

GROUP IV
BSC- 3046 – COMPUTER SCIENCE GROUP
COMPUTER SCIENCE - PRACTICALS

MAX. MARKS: 50	**MIN. PASS MARKS: 17**
No. of Laboratory per Week: 06 Hours	**Total Lectures: 96**

Practical Session -01 - Practical on DBMS	**Suggested practicals:** Create the appropriate table and apply the following queries 1. WAQ to insert some new records in emp table. 2. WAQ to list the number of employees whose name is not 'ford', 'jams' or `Jones, 3. WAQ to list the name and salary and sort them in descending order of their salary 4. WAQ to list the details of employees whose name is starts from 'a' 5. WAQ to delete all records from emp table 6. WAQ to insert values in 3 fields. 7. WAQ to list the student name having 'd' as second character. 8. WAQ to list the name and salary and sort them in descending order of their salary 9. WAQ to list the name and salary and sort them in descending order of their salary 10. WAQ in employee table find all the manager who earns between 1000 and 2000. 11. Display record of employee who have salary between 1000 and 2000. 12. List the name salary and department number of the employee and order them by their salary in descending order. 13. In employee table change the city of employee from existing one to new one. 14. Add a column salary of datatype 'number' & having size '5' with default value 1000. 15. WAQ to find the employee who earns the lowest salary in each department. Display in ascending order of salary. 16. List the employee who earns maximum salary in their department. Find the name of all employee who works for 'first bank corporation'. Display the record of employee whose name start with 's' & age is greater than 18. 17. Find the name, street & city of residence of all employee who works for 'the' 18. WAQ to update the salary of employee number 1902 to Rs. 10,000 19. WAQ to find the name, street and city of all employee who works for 'the' and who earn more than 1000. 20. WAQ to increase the salary by 2000 and rename the column as "new salary" 21. WAQ to find the name, street and city of all employee who works for 'fbc' and who earn more than 1000. 22. WAQ to find total of salaries of all employees from emp table 23. WAQ to decrease the salary of emp from 5000 and rename column as 'new salary' 24. List the employee number of employees who belong to department 10,20. 25. List the employee no of employees who earn greater than 2000 26. Insert new field called category in emp table. 27. Display different jobs in departments 20,30 28. List the names of employees having two `aa' in the name 29. Print the name, emp no, sal of employees in emp table. 30. List the names of employees who do the job of clerks or salesman
Practical Session 02 - Practical on OS	**Suggested practicals:** 31. Basic Linux Commands and vi editor
Note	

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Syllabus
B.Sc. Part III(Hons.)

GROUP IV
BSC- 3047 – COMPUTER SCIENCE GROUP
COMPUTER SCIENCE – PRACTICALS

MAX. MARKS: 50   **MIN. PASS MARKS:**
No. of Laboratory per Week: 04 Hours   **Total Lectures: 64**

PRACTICAL ON JAVA PROGRAMMING

Student Must Write 50 Programs in their Computer Practical Book with Algorithm or as directed by concerning Faculty.

1) Exercises related to use of Primitive data types- Integer, short, long, byte. float, double, Unicode character set, Boolean, their ranges, defaults initial values wrapping of integer arithmetic casting.

2) Exercises related to use of comments, Identifiers and reserved words, local variables operators and operator precedence.

3) Exercises related to use of statements simple and compound, use of control do, for, while, switch, break, case of continue, label.

4) Exercises related to use of exercises related to use class type data: String. Object Arrays, Examples of use of class type data.

5) Exercises related to use of instance fields and methods, static Fields and methods, exercises related to use of Initialization by Constructor, Initialization by default constructor.

6) Exercises related to use of Creation of object, access method.

7) Exercises related to use of Inheritance, super class, sub class, Method Overloading.

8) Exercises related to use of interface

9) Exercises related to use of thread, multithreading examples, synchronized.

10) Exercises related to use of Exception s(try-catch-final blocks examples.)

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2022-23 (AS)

Syllabus
B.Sc. Part III(Hons.)

GROUP IV
BSC- 3048 – COMPUTER SCIENCE GROUP
COMPUTER SCIENCE – PRACTICALS

MAX. MARKS: 50   **MIN. PASS MARKS:**
No. of Laboratory per Week: 04 Hours   **Total Lectures: 64**

PRACTICAL ON COMPUTER NETWORK
Student Must Write 50 Programs in their Computer Practical Book with Algorithm or as directed by concerning Faculty.

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1. Create a web page that prints your name to the screen.

2. Create a web page that prints the number s1-10, each number being a different color.

3. Print a paragraph with 1 – 5 sentences. Each sentence should be a different font.

4. Print two list with any information you want. One list should be an ordered list; the other list should be an unordered list.

5. Print a paragraph that is a description of a book; include the title of the book as well as its Author. Names and titles should be underlined, adjectives should be italicized and bolded.

6. Print some preformatted text of your choosing.

7. Create a page with a link at the top of it that when clicked will jump all the way to the bottom of the page. At the bottom of the page there should be a link to jump back to the top of the page.

8. Display an image that has a border of size 2,a width of 200,and a height of 200.

9. Display five different images. Skip two lines between each image. Each image should have a title

10. Display an image that when clicked will link to a search engine of your choice.

11. Add a simple table to for storing Train information (Train No, Name, Source, Destination, Time) without borders. Do the following 1. Add border value of 1, save and view. 2. Add a border value of 5, save and view. 3. Make the top row a table header, save and view. 4. Align all data elements to the middle of their cells, save and view. 5. Divide Time into Departure Time, Arrival Time.

12. Write a Java Script, which calculates um or product depending on the dropdown menu selection of two Numbers accepted using text box and display the result in the third text box. The action performs on click event on button.

13. Write a Java Script which displays current date and time when page loads.

14. Write a Java Script that prompts the use for his or her name as the page load (via dialog box) and then welcome the user by name in the body of the page.

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GROUP IV
BSC- 3049 – COMPUTER SCIENCE GROUP
COMPUTER SCIENCE – PRACTICALS

MAX. MARKS: 50   **MIN. PASS MARKS:**
No. of Laboratory per Week: 04 Hours   **Total Lectures: 64**

PRACTICAL ON **********************

Student Must Write 50 Programs in their Computer Practical Book with Algorithm or as directed by concerning Faculty.