

**Details of UG courses & Syllabus  
(B. Sc. Three year course, Semester system)**

**Marks Distribution**

Theory : External =80, Internal assessment =20 (80+20= 100) each paper  
Practical: ( 40+ 10=50) each semester , 40 marks Practical + 10 Internal

**B Sc I Year**

**Semester I:**

**Paper I:** Mechanics and Properties of Matter

**Paper II:** Electricity and Magnetism

**Lab Course:** Practical

**Semester II:**

**Paper I:** Waves And Oscillations

**Paper II:** Optics

**Lab Course:** Practical

**B Sc II Year**

**Semester III:**

**Paper I:** Heat and Thermodynamics

**Paper II:** Solid state physics and Statistical Mechanics

**Lab Course:** Practical

**Semester IV:**

**Paper I:** Elements of Modern Physics

**Paper II:** Basic Electrical and Electronic circuits

**Lab Course:** Practical

**B Sc III Year**

**Semester V:**

**Paper I:** Electronics and Solid State Devices

**Paper II:** Mathematical Physics

**Lab Course:** Practical

**Semester VI:**

**Paper I:** Quantum Mechanics

**Paper II:** Digital and optoelectronics

**Lab Course:** Practical



# B. Sc. Syllabus

## Semester I:

### Paper I: Mechanics and Properties of Matter

**Laws of Motion and conservation laws:** Frames of reference, Newton's Laws of motion, Work and energy, uniform circular motion, Conservation of energy and momentum. Conservative and non conservative forces, Motion of rocket, Motion of a particle in a central force field, Keplers laws of planetary motion, Newton's Law of Gravitation, Gravitational field, potential and potential energy, Gravitational potential and field intensity for spherical shell. Satellite, Basic idea of global positioning system (GPS).

**Rotational Motion:** Dynamics of a system of particles, Centre of mass, Angular velocity and momentum, Torque, Conservation of angular momentum, Equation of motion, Moment of inertia, theorem of parallel and perpendicular axis, moment of inertia of rod, rectangular lamina, disc, solid sphere, spherical shell, kinetic energy of rotation, rolling along a slope.

**Fluids:** Surface Tension and surface energy, Excess pressure across surface: application to spherical drops and bubbles, variation of surface tension with temperature - Jaegar's method. Viscosity: Flow of liquid, equation of continuity, energy of fluid, Bernoulli's theorem, Poiseuille's equation and method to determine coefficient of viscosity, Variations of viscosity of a liquid with temperature

**Elasticity:** Hooke's law, Stress -strain, Elastic potential energy, Elastic moduli: Young's, Bulk and shear modulus of rigidity, Poisson's ratio, relation between elastic constants Work done in stretching and in twisting a wire, Twisting couple on a cylinder, Strain energy in twisted cylinder, Determination of Rigidity modulus by statical and dynamical method (Barton's and Maxwell's needle), Torsional pendulum, Young's modulus by bending of beam, Determination of  $Y$ ,  $\eta$  and  $\sigma$  and moment of inertia by Searle's method.

#### **Reference Books:**

1. Mechanics Berkeley Physics course, vol.1: Charles Kittel, et. Al. 2007, Tata McGraw-Hill.
2. Physics - Resnick, Halliday & Walker 9/e, 2010, Wiley
3. Mechanics: Mathur, and Hemne; S Chand Publications
4. Mechanics: J.C.Upadyaya, Ram Prasad and Sons, Agra.
5. Mechanics and General Properties of Matter: P.K.Chakraborty, Books and Allied Pvt. Ltd
6. Elements of mechanics, Prakash & agrawal, Pragati .Prakashan Meerut



## Paper II: Electricity and Magnetism

**Vector field and Electrostatics:** Scalar and Vector field, gradient, divergence, Curl. Line, surface and volume integrals of Vector fields, Gauss-divergence and Stoke's theorems, Electrostatic Field electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field and potential due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, Electric potential as line integral of electric field, electric dipole, uniformly charged spherical shell and solid sphere. Capacitance of an isolated spherical conductor, Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarization, Parallel plate capacitor filled with dielectric.

**Magnetostatics:** Lorentz force, Biot-Savart's law & its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para- and ferro-magnetic materials.

**Electromagnetic Induction and Alternating current:** Field due to Helmholtz coil, solenoid and current loop, Ballistic galvanometer, Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, Mutual inductance of coil system. Energy stored in magnetic field, Alternating currents, Alternating voltage across R-C, L-C, and R-L and LCR circuits, condition of resonance.

**Maxwell's equations and Electromagnetic wave propagation:** Equation of continuity of current. Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, polarization.

### **Reference Books:**

1. Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
2. Electricity and magnetism, Satyaprakash, Pragati prakashan, Meerut.

### **Practical List: ( Any 12 of the following)**

1. Measurements using Vernier calipers, screw gauge and spherometer
2. To determine the Moment of Inertia of a Flywheel.
3. To determine the Moment of Inertia of an irregular body by Inertia Table
4. To determine the Young's Modulus by Bending of Beam Method.
5. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
6. To determine g by Bar Pendulum.
7. To determine the Elastic Constants of a Wire by Searle's method.
8. To determine the Young's Modulus of a Wire by Optical Lever Method.

9. To determine  $g$  by Kater's Pendulum.
10. To study the Motion of a spring and to determine (a) Spring Constant (b) Value of  $g$
11. To use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) To check the electrical fuses.
12. Ballistic Galvanometer:
  - (i) Measurement of charge and current sensitivity
  - (iv) To determine Self Inductance of a Coil by Rayleigh's Method.
13. To compare capacitances using De'Sauty's bridge.
14. Measurement of field strength  $B$  and its variation in a Solenoid (Determine  $dB/dx$ ).
15. To study the Characteristics of a Series RC Circuit.
16. To study the a series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor.
17. To determine a Low Resistance by Carey Foster's Bridge.
18. Conversion of galvanometer into voltmeter.
19. Conversion of galvanometer into ammeter.
20. Comparison of two resistances by potentiometer.

### Practical Books:

1. Practical Physics vol. I. Gupta Humar, Pragati Prakasan, Meerut
2. Text Book of Practical Physics, Indu Prakash and Ramakrishna, Kitab Mahal, New Delhi
3. Practical physics, Gupta & Kumar, Pragati Prakasan, Meerut

## Semester-II

### Paper I: Waves And Oscillations

**Wave Motion :** Travelling and standing waves on a string, Normal Modes of a string, Group velocity, Phase velocity, Plane waves, Spherical waves, Wave intensity, Differential equation of SHM and its solutions, Kinetic and Potential Energies : Fourier's Theorem and it's applications to square wave, saw tooth wave and triangular wave

**Harmonic Oscillations:** Simple harmonic oscillations in mechanical and electrical systems, Superposition of Two Collinear Harmonic oscillations: Linearity and Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). Anharmonic oscillations, Superposition of two Perpendicular Harmonic Oscillations, Lissajous figures.

**Damped and Forced Oscillations:** Damped harmonic oscillator, power dissipation in damped harmonic oscillator, relaxation time and quality factor, Electrically damped



harmonic oscillator(LCR circuit), Forced harmonic oscillations in mechanical and electrical system, Transient and steady state behaviour, Resonance, sharpness of resonance, bandwidth, energy dissipation, quality factor of forced oscillator, mechanical and electrical impedances.

**Ultrasonics and Acoustics:** Intensity and loudness of sound -Decibels - Intensity levels - musical notes - musical scale. Generation of ultrasonic waves, their detection and applications, Pizo electric effect , Quartz crystal, Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula -measurement of reverberation time - Acoustic aspects of halls and auditoria.

### Reference Books:

1. Wave and oscillations : J.C.Upadhyaya- Himalaya Publishing
2. Wave and oscillations : N.Subramanyam and Brijlal
3. Oscillations, Waves and Acoustics: M.Ghosh, D.Bhattacharya- S.Chand
4. Waves and Oscillations, Satya Parkash, Pragati Prakashan , Meerut.

## Paper II: Optics

**Geometrial optics and instruments:** Fermat's Principle and laws of reflection and refraction using Fermat's principle, coaxial system, Cardinal points of an optical system, combinations of thin lences, Ramsdon's and Hygun's eyepieces, telescope, spectrometer, choromatic and spherical aberrations, various methods to minimize the chromatic aberration (achromatism) and to reduce the spherical aberration.

**Interference:** Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment, Fresnel's Biprism. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination and equal thickness Newton's Rings; measurement of wavelength and refractive index. Michelson's Interferometer: measurement of wavelength and difference of two wavelengths.

**Diffraction:** Fraunhofer diffraction: Single slit; Double Slit, Multiple slits and diffraction from plane transmission grating. Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis.

**Polarization:** Transverse nature of light waves. Plane polarized light and production by reflection and refraction, Brewster's and Malus Laws, Double refraction, Nicol prism superposition of two plane polarized light, Circular and elliptical polarization, Quarter wave and half wave plate.

### Reference Books:

1. Principles of Optics, B.K. Mathur, 1995, Gopal Printing



2. Optics, S.P.Singh and J.P.Agrawal, Pragati Prakashan Meerut.
3. Physical Optics, A.K.Ghatak.
4. Optics, Satya Prakash, Pragati Prakashan Meerut.
5. Principles of Optics, B.K. Mathur, 1995, Gopal Printing
6. A Text Book of Optics, Subramanyam & Brij Lal, S Chand Publications.

**Practical List: ( Any 12 of the following)**

1. To study damping effect of simple harmonic motion using simple pendulum.
2. To determine the frequency of AC main by sonometer using non magnetic wire.
3. To determine the frequency of AC main by electric vibrator in transverse and longitudinal arrangement.
4. To investigate the motion of coupled oscillator
5. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's Experiment in transverse and longitudinal arrangement
6. To study of Lissajous Figures using CRO.
7. To determine the velocity of sound in air at room temperature using Kundt's tube.
8. To Determination the angle of prism by Spectrometer
9. To determine the Refractive Index of the Material of Prism with mercury light
10. To determine Dispersive Power of the Material of Prism with Mercury Light
11. To determine the value of Cauchy Constants of a material of a Prism.
12. To determine the resolving power of a Prism.
13. To determine the resolving power of telescope
14. To determine wavelength of sodium light using Newton's Rings.
16. To determine wavelength light for different colors by plane diffraction Grating using mercury light.
17. To determine hight of tower using Sextant.

**Practical Books:**

1. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11<sup>th</sup> Edition, 2011, Kitab Mahal, New Delhi.
2. Practical Physics Vol II, by Gupta Kumar, Pragati prakasan, meerut.
3. Practical Physics by Vinod Goyal, Ram Nath & Kedar Nath Publications

**SEMESTER III**

**Paper I: Heat And Thermodynamics**

**Laws of Thermodynamics:** Thermodynamic systems and variables, Zeroth Law of thermodynamics and thermal equilibrium. First law and internal energy, conversion of heat into work, Indicator diagram, Thermodynamic Processes, Work Done during Isothermal and Adiabatic Processes, Joule- Thompson expansion of real gas ,

**Second Law of Thermodynamics:** Inadequacy of first law , Reversible & irreversible processes, Principle of Heat engine and refrigerator, Second law of thermodynamics, Carnot's



cycle & theorem, Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams, Third law of thermodynamics, Unattainability of absolute zero.

**Thermodynamic Potentials:** Enthalpy, Gibbs free energy, Helmholtz and Internal Energy functions, Thermodynamic relations & applications : Joule-Thompson Effect, Clausius-Clapeyron Equation, Expression for  $(C_p - C_v)$ ,  $C_p/C_v$ , second law in terms of entropy.

**Theory of Radiation and Kinetic Theory of Gases:** Blackbody radiation, Spectral distribution, Concept of Energy Density, Derivation of Planck's law, Deduction of Wien's distribution law, Rayleigh-Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law. Derivation of Maxwell's law of distribution of velocities and its experimental verification, Mean free path, Law of equipartition of energy and its applications to specific heat of gases; mono-atomic and diatomic gases.

**Books:**

1. Thermal Physics, S. Garg, R. Bansal and C. Ghosh, 1993, Tata McGraw-Hill.
2. Heat and thermodynamics, Pragati prakasan, Meerut
3. Heat and Thermodynamics, Brijlal and Subramaniam

**Paper II: Solid state physics and Statistical Mechanics**

**Crystals:** Lattice, basis and crystal structure, translation, primitive lattice, two and three dimensional lattice types, point group symmetry and miller indices, sc, fcc and bcc structure: coordination number, packing fraction, NaCl, CsCl and ZnS structures.

**Reciprocal lattice:** X-ray diffraction, Bragg's law, Laue and Powder method of X-ray diffraction, Reciprocal lattice, Reciprocal of fcc and bcc lattice, Brillouin Zone.

**Statistical Mechanics:** Probability and thermodynamical probability, postulate statistical mechanics, macrostate and microstate, Equilibrium and fluctuations constraints, ensembles and average properties, Phase space,  $\mu$ -space and gamma-space, division of phase space into cells, Microcanonical, canonical and grand canonical ensembles, Entropy and probability, interpretation of second law of thermodynamics, Boltzmann canonical distribution law,

**Kinetic theory of gases:** Kinetic theory of gases, Maxwell's distribution laws of speed and velocities, average, rms and most probable speeds, degree of freedom, Brownian motion, mean free path, law of equipartition of energy,

**Reference Books:**

1. Introduction to Solid State Physics, C. Kittel, 8th Ed., 2004, Wiley India Pvt. Ltd.
2. Elements of Solid State Physics, J.P. Srivastava, 2nd Ed., 2006, Prentice-Hall of India
3. Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill
4. Solid State Physics, R I. Sighal
5. Solid-state Physics, S O Pillai
6. Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India



7. Solid State Physics, M.A. Wahab, 2011, Narosa Publications
8. Statistical Mechanics, Gupta Kumar, Pragati Prakashan
9. Statistical Mechanics, Satya Prakash, Kedar Nath Ram Nath and Sons

**Practical list: ( Any 12 of the following)**

1. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom's Method.
2. To determine the Coefficient of Thermal Conductivity of rubber tube.
3. To determine the Coefficient of Thermal Conductivity of glass.
4. Measurement of Planck's constant
5. To determine Stefan's Constant.
6. To verify Newton's Law of Cooling.
7. To determine J by Joule's calorimeter.
8. To study I-V characteristics of Photo cell.
9. To determine the coefficient of thermal conductivity of copper by Searle's Apparatus.
10. To determine the coefficient of thermal conductivity of a bad conductor by Lee disc method.
11. To verify the laws of probability distribution throwing one coin, two coin and ten coin.
12. To show that deviation of probability from theoretical value decreases with increase in number of events.
13. Study of statistical distribution from the given data and to find most probable, average and rms value.
14. Study of random decay of nuclear disintegration and determination of decay constant using dices.
15. To determine the refractive index of a dielectric layer using SPR
16. To study the PE Hysteresis loop of a Ferroelectric Crystal.
17. To draw the BH curve of iron using a Solenoid and determine the energy loss from Hysteresis.
18. To measure the resistivity of a semiconductor (Ge) crystal with temperature by four probe method and determine its band gap.
19. To determine the Hall coefficient of a semiconductor sample.

**Practical Books:**

1. Practical Physics, Gupta & Kumar, Pragati Prakashan, Meerut
2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, Kitab Mahal, New Delhi.

## Semester-IV

### Paper I: Elements of Modern Physics

**Fundamental quantum concepts:** Planck's quantum theory, Photo-electric effect, Compton scattering, De Broglie wavelength and matter waves; Davisson-Germer experiment, Two slit interference experiment with photons, Wave-particle duality, Matter waves and wave amplitude,

**Atomic models and spectra:** Rutherford and Bohr atomic models, Problems with





Rutherford model- instability of atoms and observation of discrete atomic spectra; Bohr's quantization rule and atomic stability; energy levels and fine structure of Hydrogen like atoms spectra. Optical spectra, L- S, j-j coupling, selection rules, fine structure of sodium d line, Zeeman effect, X-ray spectra and Moseley's law

**Nuclear physics:** Size and structure of atomic nucleus and its relation with atomic weight. Nature of nuclear forces, binding energy, semi-empirical mass formula. Radioactivity,  $\alpha$ ,  $\beta$  and  $\gamma$ -radiation, stability of nucleus; Law of radioactive decay; Mean life & half-life; mass defect, Fission - nature of fragments and emission of neutrons. Nuclear fusion, Nuclear reactor and thermonuclear reactions

**Special Theory of Relativity:** Constancy of speed of light, Postulates of special theory of relativity, Lorentz transformations, length contraction, time dilation, addition of velocities, relativistic mass, mass energy relation, relativistic momentum and energy, relativistic Doppler Effect

### Reference Books:

1. Fundamentals of modern physics, Agrawal and agrawal, pragati Parkashan, Meerut
2. Concepts of Modern Physics, Arthur Beiser, 2009, McGraw-Hill
3. Quantum Physics, Berkeley Physics Course Vol.4, E.H. Wichman, 2008, Tata McGraw-Hill.

## Paper II: Basic Electrical and Electronic circuits

**Basic Electrical current and Circuits:** electric current, AC /DC electricity, current density, Equation of continuity, Lorentz -Drudge Theory, Ohm's law, Current and Power, Kirchhoff's laws and applications. Main electric circuit elements and their combinations. Basic electric devices; resistor, inductor and capacitor, colour coding of resistors, Ammeter, Voltmeter, Galvanometer, AC/DC generators, Multimeter, Transformer

**Network Analysis and Network Theorems:** current source, voltage source, Source equivalence, four terminal networks, open circuits and short circuit impedances, T and  $\pi$  representation, image parameters, iterative parameters. Network theorems: Superposition, Reciprocity, Thevenin's, Norton's and Maximum power transfer theorems

**Semiconductor devices:** Types of semiconductors: intrinsic and n-type, p-type semiconductors, temperature dependence, energy band and Fermi level in intrinsic semiconductor, concentration of Hole and Electrons, P-N Junction diode, depletion region, forward, reverse biased junction diode, Zener diode, Tunnel diode, Photo diode, LED, Point contact diode & Varactor diode

**Rectifier and filters:** Diode as circuit element, power supply, Load line concept, Half wave, Full Wave and Bridge rectifier, Shunt capacitor filter, series inductor filter, L-section,  $\pi$ -section and T- section filters, Zener diode as voltage regulator,



### Reference Books:

1. Electricity & magnetism , Satya Prakash, Pragati prakashan , meerut
2. Text Book of Electronic devices and Circuits, R S Sedha, S Chand
3. Hand Book of Electronics, Gupta Kumar , Pragati parakashan. Meerut
4. Basic Electronics, Agrawal and Agrawal, pragati parkashan, Meerut

### Practical List: ( Any 12 of the following)

1. To determine value of Boltzmann constant using V-I characteristic of PN diode.
2. To determine value of Planck's constant using LEDs of at least 4 different colours.
3. To determine the ionization potential of mercury.
4. To determine the wavelength of H-alpha emission line of Hydrogen atom.
5. To determine the absorption lines in the rotational spectrum of Iodine vapour.
6. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
7. To determine the value of e/m by Magnetron Valve method.
8. Thomson method
9. To determine the value of e/m by Millikan oil drop apparatus
10. Verification of Superposition Network theorem
11. Verification of Thevenin's Network theorem
12. Verification of Norton's Network theorem
13. Verification of Maximum power transfer theorem
14. Characteristics of Zener diode
15. Child Langmuir law
16. Frank Hertz experiment

### Practical Books:

1. Practical Physics, Gupta & Kumar, Pragati Prakashan Meerut
2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, Kitab Mahal, New Delhi.

## SEMESTER-V

### Paper -I : Electronics and Solid State Devices

**Solid state devices:** Transistors, N-P-N and P-N-P Transistors characteristics (CB, CE and CC Configurations), Current gains  $\alpha$  and  $\beta$  parameters, Relations between  $\alpha$  and  $\beta$ . Load Line analysis of Transistors. DC Load line and Q-point. Active, Cutoff, and



Saturation regions. Voltage Divider Bias Circuit for CE Amplifier. Field effect Transistors - JFET, MOSFET, UJT, SCR and their characteristics and applications.

**Transistor Amplifier:** Classification of Amplifiers, transistor biasing, h-parameters, RC coupled amplifier: single stage and double stage, Impedance and Transformer coupled amplifier, Power amplifiers,

**Feed back Amplifiers:** principle of feed back amplifiers, advantages and disadvantages of negative feed back amplifiers, Types of feed back amplifiers: Voltage series and shunt feed back amplifiers, Current series and shunt feed back amplifiers.

Amplifiers (Voltage and Current)

**Operational Amplifier:** Characteristics of an Ideal Op-Amp (IC 741), Open-loop & Closed-loop Gain. CMRR, concept of Virtual ground. Applications of Op-Amps: (1) Inverting and Non-inverting Amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator.

### Reference Books:

1. Text Book of Electronic devices and Circuits, R S Sedha, S Chand
2. Hand Book of Electronics, Gupta Kumar, Pragati Parakashan, Meerut
3. Solid State Electronics, Agrawal & Agrawal, Pragati Prakashan Meerut.

### Paper-II: Mathematical Physics

**Vectors:** Product of two vectors, Triple product of vectors, simple application of vectors, Differentiation & partial differentiation, scalar and vector fields, Gradient of scalar field, line, surface and volume integrals of vector field, Divergence and curl and their applications, Gauss divergence and Stoke's theorems

**Tensor:** n-dimensional space, identical and summation conventions, dummy and real indices, Kronecker delta symbol, Covariant and contravariant tensor, Rank of tensor and Tensors of higher rank Invariant tensor, Addition, subtraction, product and contraction of tensors, Summation, convention, Symmetric and Antisymmetric tensor, fundamental tensors, raising and lowering of indices: associated tensors

**Matrices :** Algebraic operations of matrices: Addition, multiplication, properties of matrix multiplication, sub-matrices, partitioning of matrices, special types of matrices, Transpose, Conjugate and Adjoint of matrices, symmetric and antisymmetric matrices, Hermitian and skew hermitian matrices, determinant of matrices, unitary matrices.

**Laplace and Fourier Transform:** Definition of Laplace transform, condition of existence of Laplace transform, properties of Laplace transform, Laplace transform of derivative  $f(t)$  and derivative of order  $n$ , Laplace transform of integral of  $f(t)$ , Laplace transform of multiplication by  $t$ , Laplace transform of division by  $t$ , Initial and Final value theorems. Fourier integral and its



forms, Fourier theorem and its application to square wave, saw tooth wave and triangular wave

### Reference Books:

1. Mathematical Physics, Satya Prakash, Pragati Prakashan, Meerut
2. Mathematical Physics, Dass and Verma, S Chand & company
3. Mathematical physics, B S Rajput,

### Practicals List:

1. Characteristics of PN junction diode
2. Characteristics of Zener diode
3. Characteristics of NPN / PNP Transistors (CE, CB and CC configuration)
4. Characteristics of Tunnel diode study of ripple factor of power supply using L and  $\pi$ -section filters.
5. Study of Half wave and full wave rectifiers
6. Study of regulated power supply
7. Study of VR tube
8. Single stage RC coupled amplifier
9. Single stage Transistor coupled amplifier
10. Study of RC coupled amplifier with negative feedback
11. Band gap of semiconductor using PN junction diode
12. OP - Amplifier: Add, Sub, Diff and Intg

**Practical Books:** Practical Physics, Gupta & Kumar, Pragati Prakashan, Meerut

## SEMESTER-VI

### Paper I : Quantum Mechanics

**Time dependent Schrödinger equation:** Concept of wave function, Time dependent Schrödinger equation and dynamical evolution of a quantum state; Properties of Wave Function. Interpretation of wave function Probability and probability current densities, Conditions for Physical acceptability of Wave Functions. Normalization. Linearity and Superposition Principles. Eigenvalues and Eigenfunctions. Position, momentum & Energy operators and commutation relations; Expectation values of position and momentum and energy.



**Time independent Schrödinger equation**-Hamiltonian, stationary states and energy eigenvalues; expansion of an arbitrary wavefunction as a linear combination of energy eigenfunctions; General solution of the time dependent Schrödinger equation in terms of linear combinations of stationary states; Application to the spread of Gaussian wave packet for a free particle in one dimension; wave packets, Fourier transforms and momentum space wave function.

**Application of Schrödinger wave equation in one dimension:** Particle in one dimensional box, quantization of momentum and energy, continuity of wave function, boundary condition and emergence of discrete energy levels; Potential step and potential barrier, Tunneling effect, one dimensional harmonic oscillator: energy levels and eigen functions.

**Quantum theory of hydrogen-like atoms:** Time independent Schrödinger equation in spherical polar coordinates; separation of variables for the second order partial differential equation; Radial wave functions, magnetic and orbital quantum numbers, spherical harmonics, radial Wave functions, energy levels, significance of quantum numbers,  $n$ ,  $l$ , and  $m$ .

#### Reference Books:

1. A Text book of Quantum Mechanics, P.M.Mathews & K.Venkatesan, 2<sup>nd</sup> Ed., 2010, McGraw Hill
2. Quantum Mechanics, E. Merzbacher, 2004, John Wiley and Sons,
3. Quantum Mechanics, Satya Prakash, Pragati Prakashan, Meerut
4. Quantum Mechanics, Bransden & Joachain, Pearson Education publications

#### Paper-II : Digital and optoelectronics

**Number Systems, Codes and Boolean Algebra:** Binary, Decimal, Octal and Hexa decimal number systems & inter conversion, BCD, Gray, 8421, excess-3 codes, Laws of Boolean algebra, De Morgan's theorems

**Digital Circuits:** Difference between Analog and digital circuits, Logic gates (AND, OR, NOT, AND, NAND, XOR & XNOR) with circuits, NAND and NOR Gates as Universal Gates. Half adder and full adders.

#### IC Technology:

Basic idea of IC technology, IC 555 Pin diagram and its application, Monolithic ICs, IC components(Integrated, Diffused, Thin Film), MOS Capacitors, Inductors, Thin film technology

**Optoelectronics and Laser:** Optical fiber, Graded index, step index fibers, refractive index, propagation of optical beams in fibers, fibers mode characteristics and cut off conditions, losses in fibers. Principle of Laser, Ruby laser, He Ne laser, Solid state laser.

#### Books:

1. Digital Electronics, Malvino, TMH publications
2. Digital electronics: Principle and practice, Kapoor and Maheswari, Mackmillan publ.



3. Text book of electronics, D-C Tayal, Kedar Nath Ram Nath Publications.

**Practicals List :**

1. Study of Logic Gates(OR, AND, NOR , NAND, XOR)
2. Verification of De Morgan's theorems
3. Study of Half adder
4. Study of full adder
5. Study of 555 timer
6. Study of Characteristics of LED
7. Study of Characteristics of UJT
8. Study of Characteristics of JFET
9. Study of Characteristics of MOSFET
10. Study of Characteristics of SCR
11. Study of Electron Spin Resonance (ESR)- determine magnetic field as a function of the resonance frequency
12. To determine the wavelength of Laser light using Diffraction of Single Slit.

**Practical Books:**

1. Practical Physics, Gupta & Kumar, Pragati prakashan Meerut
2. Advanced practical physics, SP singh, Pragati prakasan Meerut.



SCHEME OF EXAMINATION

AND

COURSE OF STUDY

of

**Mathematics**

For

**B.Sc. (PCM & PGM)**

(w. e. f. Session 2019–2020)

(Yearly - System)



DEPARTMENT OF MATHEMATICS

**SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI  
GARHWAL, UTTARAKHAND**

**B.A./B.Sc. I Year**

S.N.	Paper	Paper code	Maximum Marks
1.	Differential Calculus	BM101	65
2.	Integral Calculus and Trigonometry	BM102	65
3.	Algebra and Matrices	BM103	70

**B.A./B.Sc. II Year**

S.N.	Paper	Paper code	Maximum Marks
1.	Differential Equations	BM201	65
2.	Real Analysis	BM202	65
3.	Advanced Algebra	BM203	70

**B.A./B.Sc. III Year**

S.N.	Paper	Paper code	Maximum Marks
1.	Linear Algebra & Linear programming Problems	BM301	65
2.	Complex Analysis	BM302	65
3.	Numerical Analysis	BM303	70

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**SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI  
GARHWAL, UTTARAKHAND**

NAME OF THE DEPARTMENT: MATHEMATICS

B.Sc. Semester: I<sup>st</sup>

Subject Code: BM-101

Course Title: DIFFERENTIAL CALCULUS

Paper -1

Examination Duration: 2:30Hours

Max. Marks: 65

**NOTE:** The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 4. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

- I. Successive Differentiation, Leibnitz's theorem, Indeterminate form.
- II. Partial Differentiation, Euler's theorem, Homogeneous Functions, Jacobian.
- III. Tangents and Normal, Curvature, Asymptotes.
- IV. Singular Points, Maxima and Minima.
- V. Curve Tracing (Cartesian, Parametric, Polar).

**Books Recommended:**

1. M.Ray : Differential Calculus, Shiva Lal Agarwal and Co., Agra.
2. Gorakh Prasad : Differential Calculus, Pothishala publication, Allahabad

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**SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI  
GARHWAL, UTTARAKHAND**

NAME OF THE DEPARTMENT: MATHEMATICS

B.Sc. Semester: I<sup>st</sup>

Subject Code: BM-102

Course Title: INTEGRAL CALCULUS & TRIGONOMETRY Paper -II

Examination Duration: 2:30Hours

Max. Marks: 65


**NOTE:** The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 4. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

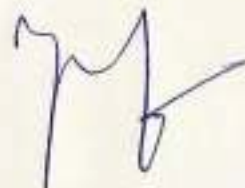
- I. Properties of Definite Integrals, Beta- Gamma functions.
- II. Rectification, Quadrature.
- III. Volumes and surfaces of solids of revolution, Double and triple integrals.
- IV. Separation into real and imaginary parts, Logarithmic of complex quantities, Hyperbolic functions with their inverses.
- V. Gregory's series, Summation of trigonometric series.

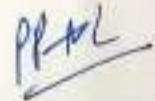
**Books Recommended**

1. G.B. Thomas and R.L. Finney, *Calculus*, 9th Ed., Pearson Education, Delhi, 2005.
2. H. Anton, I. Bivens and S. Davis, *Calculus*, John Wiley and Sons (Asia) P. Ltd., 2002.
3. S.L.Loney: *Plane Trigonometry (Part I, II)*, Arihant Publications.
4. M.D.Raisinghania, H.C.Sexena & H. K.Dass : *Trigonometry*, S. Chand & Company Pvt. Ltd. 2002.









**SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI  
GARHWAL, UTTARAKHAND**

NAME OF THE DEPARTMENT: MATHEMATICS

B.Sc. Semester: I<sup>st</sup>

Course Title: ALGEBRA AND MATRICES

Examination Duration: 2:30Hours

Subject Code: BM-103

Paper -III

Max. Marks: 70

**NOTE:** The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 5. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

- I. Sets, Operations on sets, Relations, Equivalence relations and partition Functions, Algebraic structures, Group, Example of groups, Subgroups, Permutation group.
- II. Order of an element, Cyclic -group, Coset- decomposition, Lagrange's theorem and its consequences.
- III. Quotient group, Homomorphism, Isomorphism.
- IV. Rank of a matrix. Invariance of rank under elementary transformations, Adjoint of matrices, Inverse of matrices, Reduction to normal form.
- V. Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns upto four, Solutions of a system of linear equations using matrices, Eigen values, Eigen vectors and Characteristic equation, Cayley Hamilton theorem and its Applications.

**Books Recommended**

1. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
2. Joseph A Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1999.
3. A.I. Kostrikin, Introduction to Algebra, Springer Verlag, 1984.
4. Richard Bronson, Theory and Problems of Matrix Operations, Tata McGraw Hill, 1989.



**SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI  
GARHWAL, UTTARAKHAND**

NAME OF THE DEPARTMENT: MATHEMATICS

B.Sc. Semester: II<sup>nd</sup>

Course Title: DIFFERENTIAL EQUATIONS

Examination Duration: 2:30Hours

Subject Code: BM-201

Paper -I

Max. Marks: 65

**NOTE:** The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 4. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

- I. First order exact differential equations, Integrating factors, Rules to find an integrating factor, First order higher degree equations solvable for x, y, p, methods for solving higher-order differential equations.
- II. Basic theory of linear differential equations, Wronskian, and its properties, Solving a differential equation by reducing its order.
- III. Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters.
- IV. The Cauchy-Euler equation, Simultaneous differential equations, Total differential equations.
- V. Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations, Linear partial differential equation of first order, Lagrange's method, Charpit's method.

Books Recommended:

1. MShepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.
2. I. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, International Edition, 1967.



**SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI  
GARHWAL, UTTARAKHAND**

NAME OF THE DEPARTMENT: MATHEMATICS

B.Sc. Semester: II<sup>nd</sup>

Course Title: REAL ANALYSIS

Examination Duration: 2:30Hours

Subject Code: BM-202

Paper -II

Max. Marks: 65

**NOTE:** The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 4. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

- i. Finite and infinite sets, Examples of countable and uncountable sets, Real line, Bounded sets, Suprema and infima, Completeness property of  $\mathbb{R}$ , Archimedean property of  $\mathbb{R}$ , Intervals, Concept of cluster points and statement of Bolzano-Weierstrass theorem.
- ii. Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences, Cauchy's theorem on limits, Order preservation and squeeze theorem, Monotone sequences and their convergence, Monotone convergence theorem without proof.
- iii. Infinite series, Cauchy convergence criterion for series, Positive term series, Geometric series, Comparison test, Convergence of p-series, Root test, Ratio test, Alternating series, Leibnitz's test (Tests of convergence without proof), Definition and examples of absolute and conditional convergence.
- iv. Rolle's theorem, Mean Value theorems, Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Taylor's series, Maclaurin's series of  $\sin x$ ,  $\cos x$ ,  $e^x$ ,  $\log(1+x)$ ,  $(1+x)^m$ .
- v. Sequences and series of functions, Point wise and uniform convergence, Mn-test, M-test, Statements of the results about uniform convergence and integrability and differentiability of functions, Power series and radius of convergence.

**Books Recommended**

1. T. M. Apostol, *Calculus* (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.
2. R.G. Bartle and D. R. Sherbert, *Introduction to Real Analysis*, John Wiley and Sons (Asia), P. Ltd., 2000.
3. K.A. Ross, *Elementary Analysis- The Theory of Calculus Series-* Undergraduate Texts in Mathematics, Springer Verlag, 2003.
4. Texts in Mathematics, Springer Verlag, 2003

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**SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI  
GARHWAL, UTTARAKHAND**

NAME OF THE DEPARTMENT: MATHEMATICS

B.Sc. Semester: II<sup>nd</sup>

Course Title: ADVANCED ALGEBRA

Examination Duration: 2:30Hours

Subject Code: BM-203

Paper -III

Max. Marks: 70

**NOTE:** The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 5. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

- I. Cayley's theorem, Normalizer and center of a group.
- II. Normal subgroups and their properties, Simple group.
- III. Rings, various types of rings, Subrings, Properties of rings.
- IV. Ideals, Principal ideal ring, Quotient rings, Characteristics of a ring.
- V. Integral domain, Field, Skew field; Examples and its characterizations.

**Books Recommended**

1. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
2. Joseph A Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1999.
3. Khanna & Bhambhari, A course in Abstract Algebra, 4th ED, Vikash Publication 2006.

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**SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL,  
TEHRI GARHWAL, UTTARAKHAND**

NAME OF THE DEPARTMENT: MATHEMATICS

B.Sc. Semester: III<sup>rd</sup>

Course Title: LINEAR ALGEBRA & LPP

Examination Duration: 2:30Hours

Subject Code: BM-301

Paper-I

Max. Marks: 65

**NOTE:** The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions; in which 5 to be answered, each of marks 4. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

- i. Vector spaces, Subspaces, Algebra of subspaces, Quotient spaces, Linear combination of vectors, Linear span, Linear independence, Basis and dimension, Dimension of subspaces, Linear transformations, Null space, Range, Rank and nullity of a linear transformation, Matrix representation of a linear transformation, Algebra of linear transformations.
- ii. Dual Space, Dual basis, Double dual, Characteristic polynomial, Eigenvalues and eigen vectors, Isomorphisms, Isomorphism theorems, Invertibility and isomorphisms, Change of coordinate matrix.
- iii. Linear programming problems, Graphical approach for solving some LPP, Convex sets, Supporting and separating hyper planes.
- iv. Theory of simplex method, Optimality and unboundedness, The simplex algorithm, Simplex method in tableau format, Introduction to artificial variables.
- v. Two-phase method, Big-M method and their comparison, Duality, formulation of the dual problem, Primal-dual relationships, Economic interpretation of the dual.

**Books Recommended**

1. Stephen H.Friedberg, Arnold J.Insel, Lawrence E.Spence, *Linear Algebra*, 4thEd., Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.
2. David C.Lay, *Linear Algebra and its Applications*, 3rdEd., Pearson Education Asia, Indian Reprint, 2007.
3. S. Lang, *Introduction to Linear Algebra*, 2nd Ed., Springer, 2005
4. F.S.HillierandG.J.Lieberman, *Introduction to Operations Research*, 8thEd., TataMcGrawHill, Singapore, 2004.
5. Handy A. Taha, *Operations Research, An Introduction*, 8th Ed., Prentice-Hall India, 2006.

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**SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL,  
TEHRI GARHWAL, UTTARAKHAND**

NAME OF THE DEPARTMENT: MATHEMATICS

B.Sc. Semester: III<sup>rd</sup>

Subject Code: BM-302

Course Title: COMPLEX ANALYSIS

Paper –II

Examination Duration: 2:30Hours

Max. Marks: 65

**NOTE:** The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 4. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

- I. Complex numbers and basic properties, Geometric representation of complex numbers, Trigonometrical and hyperbolic complex functions, Analytical, Cauchy-Riemann equations, Harmonic functions.
- II. Conformal Mapping: Geometric representations, transformations, Theorems on Conformal mapping, Magnification, The circle, Inverse point w.r.t. a circle, Some elementary Transformations, Bilinear Transformations, Some special Bilinear Transformations, Fixed point and Normal form of a Bilinear Transformations.
- III. Complex integration: Cauchy's Integral Theorem, Cauchy's fundamental theorem of integration, Cauchy's Integral formula, Cauchy's Integral formula for the derivative of Analytic functions, Morera's theorem.
- IV. Cauchy's Inequality, Taylor's theorem, Laurent's series, Liouville's theorem.
- V. Zeros and singularities of Analytic functions.

**Recommended Books**

1. James Ward Brown and Ruel V. Churchill, *Complex Variables and Applications*, 8th Ed., McGraw – Hill International Edition, 2009.
2. G C sharma & M. jain: *Complex Analysis*, Y.K. Publishers.
3. Mark J. Ablowitz & A. S. Fokas: *Complex Variables: Introduction & Applications* Cambridge Univ. Press.









**SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL,  
TEHRI GARHWAL, UTTARAKHAND**

NAME OF THE DEPARTMENT: MATHEMATICS

B.Sc. Semester: III<sup>rd</sup>

Course Title: NUMERICAL ANALYSIS

Examination Duration: 2:30Hours

Subject Code: BM-303

Paper -III

Max. Marks: 70

**NOTE:** The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 5. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

- i. Finite difference, Difference Operator, Factorial notation, Interpolation with equal Intervals.
- ii. Interpolation with unequal intervals, Divided difference, Central differences Stirling and Bessel formula (application only).
- iii. Numerical differentiation and Integration, Simpson's 1/3 and 3/8 rule, weddle's rule Trapezoidal rule and their accuracy.
- iv. Numerical solution of algebraic and transcendental equation, iterative bisection, Regula Falsi, Newton Raphson, Graeffe method.
- v. Numerical solution of differential equation, Picard's Euler, Modified Euler, Runge-Kutta Method.

**Recommended Books**

1. B. Bradie, *A Friendly Introduction to Numerical Analysis*, Pearson Education, India, 2007.
2. M.K.Jain, S.R.K. Iyengar and R.K.Jain, *Numerical Methods for Scientific and Engineering Computation*, 5th Ed., New age International Publisher, India, 2007.

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## **B.Sc.101- Computer Fundamental and Architecture**

Introduction of Computers: Computer hardware components, Disk Storage, Memory, Keyboard, Mouse, Printers, Monitors, CD etc., and their functions, Comparison Based analysis of various hardware components.

Basic Operating System Concepts: MS-DOS, Windows, Functional knowledge of these operating systems, Introduction to Basic Commands of DOS, Managing File and Directories in various operating systems. Introduction to Networking and internet, Basic terms related with internet, TCP/IP.

Element of a Computer Processing System: Hardware, CPU, Storage Devices and media, VDU, Input-output devices, data communication equipment, Software – System software, application software.

Computer Languages: Classification, low level language, assembly language, higher level language, fourth generation languages.

Representation of information & Basic Building Blocks: Number System- Binary, Octal, Hexadecimal, Character Codes (BCD),SCII, EBCDIC and their conversion. Logic gates, Boolean algebra K-map simplification, Half adder, Full adder, Subtractor, Decoder, Encoder, Multiplexer, Demultiplexer.

Basic Organization: Operational flow chart (Fetch, Execute, Instruction Cycle), Organization of Central Processing Unit, Micro programmed control unit, single organization, general register organization, stack, organization, addressing modes, instruction formats, data transfer and manipulation, I/O organization, Bus architecture, Programming registers.

Memory Organization: Memory hierarchy, main memory (RAM/ROM) chips, Auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory Management, magnetic disk and its performance, magnetic tape etc.

I/O Organization: Peripheral Devices, I/O interface, Modes of transfer, Priority interrupt, Direct memory access, Input-Output Processor and Serial Communication, I/O controllers, asynchronous data transfer.

### **References:**

1. Raja Raman V, "Fundamentals of Computers"
2. Sanders D.H., "Computer Today"
3. Willam Stalling, "Computer Organization & Architecture" Pearson Education Asia
4. Mano Mirris, "Computer System Architecture" PHI
5. Zaky & Hamacher, "Computer Organization" McGraw Hill
6. B.Ram, "Computer Fundamental Architecture & Organization" New Age
7. Tannenbaum, "Structured Computer Organization" PHI

## **B.Sc.102- Mathematical Foundation of Computer Science**

Relation: Type and compositions of relations, Pictorial representation of relations, Equivalence relations, Partial ordering relation.

Function: Types, Composition of function, Recursively defined function.

Mathematical Induction: Piano's axioms, Mathematical Induction, Discrete Numeric Functions and Generating functions, Simple Recurrence relation with constant coefficients, Linear recurrence relation without constant coefficients, Asymptotic Behaviour of functions.

Algebraic Structure: Properties, Semi group, monoid, Group, Abelian group properties of group, Subgroup, Cyclic group, Cosets, Permutation groups, Homomorphism, Isomorphism and Automorphism of groups.

Propositional Logic: Preposition, First order logic, Basic logical operations, Tautologies, Contradictions, Algebra of Proposition, Logical implication, Logical equivalence, Normal forms, Inference Theory, Predicates and quantifiers, Posets, Hasse Diagram.

### **References:**

1. Lipschutz, Seymour, "Discrete Mathematics", TMH
2. Trembley, J.P. & R. Manohar, "Discrete mathematical Structure with Application to Computer Science", TMH.
3. Kenneth H. Rosen, "Discrete Mathematics and its applications", TMH.
4. Doerr Alan and Lefvasseur Kenneth, "Applied Discrete Structure for computer Science", Galgotia Publication Pvt. Ltd.
5. Gersting, "Mathematical Structure for Computer Science", WH Freeman and Macmillan.
6. Kumar RAjendra, "Theory of Automata Language and Computation", PPM.
7. Hopcroft J.E., Uliman J.D., "Introduction to Automata Theory, Language and Computation", Narosa Publication House, New Delhi.
8. C.L. Liu, "Elements of Discrete Mathematics", McGraw Hill.
9. Peter Grossman, "Discrete Mathematics for Computer", Palgrave Macmillian.

## **B.Sc.103- Programming in 'C'**

Programming in C: Features of C and its Basic Structure, Simple C programs, Constants, Integer Constants, Real Constants, Character Constants, String Constants, Backslash Character Constants, Concept of an Integer and Variable, Rules for naming Variables and assigning values to variables, Storage classes (automatic, external, register and static), Enumerations, command line parameters, Macros, The C Preprocessor.

Operators: Arithmetic Operators, Unary Operators, Relational and Logical Operators, The Conditional Operator, Library Functions, Bitwise Operators, The Increment and Decrement Operators, The Size of Operator, Precedence of operators.

Data Types and Input/Output Operators: Floating-point Numbers, Converting Integers to Floating-point and vice-versa, Mixed-mode Expressions, The type cast Operator, The type char, Keywords, Character Input and Output, Formatted input and output, The gets() and puts() functions.

Control Statements and Decision Making: The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do..while loop, The for loop, The nesting of for loops, The break statement and continue statement.

Function: Built-in and user-defined, function declaration, definition and function call, parameter passing, call by value, call by reference, recursive functions.

Arrays and String: One Dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings.

Pointers: Basics of Pointers, Pointers and One-dimensional Arrays, Pointer Arithmetic, Pointer Subtraction and Comparison, Similarities between Pointers and One-dimensional Arrays, Null pointers, Pointers and Strings, Pointers and two-dimensional arrays, Arrays of Pointers.

Structures and Unions: Basics of Structures, Arrays of Structures, Pointers to Structures, Self-referential Structures, Unions.

Dynamic Memory Allocation and Linked List: Dynamic Memory Allocation, Allocating Memory with malloc, Allocating Memory with calloc, Freeing Memory, Reallocating Memory Blocks, Pointer Safety, The Concept of linked list, Inserting a node by using Recursive Programs, Sorting and Reversing a Linked List, Deleting the Specified Node in a Singly Linked List.

File Management: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Random Access to Files, Command Line Arguments.

### **References:**

1. V. Rajaraman, "Fundamentals of computers", PHI
2. Pater Norton's "Introduction of Computer", TMH
3. Hahn, "The Internet Complete Reference", TMH
4. Gottfried, "Programming in C", Schaum's Series Tata McGraw Hill