

sTotal Marks: 200

PAPER - I (Marks: 100)

Course Outline

Mechanics:

Vectors – Dots, Cross and triple products, Gradient, divergence and applications.

Newtonian laws of motion; conservation law of energy; conservation of linear and angular momentum;

Dynamics of rigid body; spin and precession; gyroscope; Gravitation; planetary motion including satellite.

Special theory of relativity, Michelson—Morley experiment and Einstein's postulates; Lorentz transformation; time dilation and length contraction; equivalence of mass and energy.

Fluid Mechanics:

Surface tension; Viscosity; Elasticity; fluid motion and Bernoulli's theorem.

Waves and Oscillation:

Free oscillation with one and two degrees of freedom; forced and damped oscillations and phenomenon of resonance. Travelling waves and transmission of energy; Phase and Group velocity; standing waves.

Reflection, Refraction, Interference, Diffraction and Polarization of waves; interferometer and Newton's rings; Diffraction Gratings and their resolving power; spectro-meters. Electromagnetic wave equation: normal and anomalous dispersion; coherence, laser and its application.

Heat and Thermodynamics:

Perfect gas and Van der Waals equation; Three Laws of Thermodynamics, Thermal properties of Simple system production and measurement of low temperatures; kinetic theory of gases; Maxwellian distribution of molecular velocities; Brownian motion: Transport phenomena.

Classical Maxwell-Boltzmann Statistics and its application: Quantum Bose—Einstein and Fermi-Dirac Statistics.

PAPER - II (Marks: 100)

Electricity and Magnetism:

Electric field due to point charges, Gauss' law Electric potential and Poisson and Laplace's equation Dielectric medium and Polarization:

Capacitance; Moving charges and magnetic field Ampere's law; Vector potential; Magnetic properties of matter; Transient current: Faraday's law of electromagnetic induction; Alternating current and LCR circuit. Maxwell's equations; Poynting theorem and Poynting Vector.

Electronics:

Thermionic emission; Space charge: Diode. Triode Tetrode; Pentode and their static and dynamic characteristics; Amplitude modulation and demodulation or detection. Various basic circuits for rectification, amplification modulation and detection connected with radio receivers and transmission; n and p type semiconductors; Biasing; Transistors; Common base and common emitter configurations.

Atomic Physics:

Bohr theory and quantum numbers including electron spin; Pauli's exclusion principle; Spectra of simple systems with one or two valence electrons. Photo electric effect Compton scattering; pair production; Lande's g factor and Zeeman effect. Raman effect; Waves and particles and De Broglie's Hypothesis; Schrodinger wave equation and its application to one dimensional harmonic oscillator. Heisenberg's uncertainty principle.

Nuclear Physics:

Structure of Nuclei; Radioactivity alpha, beta and gamma decay. Methods of detection, Mass Spectrometer. Accelerators. Phenomenon of fission; reactor and nuclear power, nuclear fusion and its application. Elementary particles and their properties.

Suggested Books

	Title	Author
1	Prospectives of Modern Physics	A. Beiser
2	Fundamentals of Physics	Halliday & Resnick
3	Introduction to Electromagnetic Fields and Waves	D. Corson & P. Lorrain

4	Engineering Electronics	J.D. Ryder
5	Semiconductor Electronics	J.F. Gibbons
6	Physics Course	Barkeley
7	Heat and Thermodynamics	W. Zemanasky
8	Nuclear Physics	W.E. Burcham
9	Nuclear Physics	Kaplan