SYLLABUS FOR THE SUBJECT OF PHYSICS
Paper -1

Total Marks: 100

Mechanics

Vectors -Dots, Cross and triple products, Gradient, divergence and applications. Curl of a vector field; Gauss's Theorem; Stokes theorem

Newtonian laws of motion; motion of charged particles in electric and magnetic fields; Motion in a circle, Law of conservation of energy; Conservation of linear and angular momentum; Dynamics of rigid body; spin and precession; gyroscope; Gravitation; planetary motion including satellite work energy theorem.

Special theory of relativity. Mischelson - Morley experiment, Einstein's postulates; Lorentz transformation; time dilation, 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; free and forced oscillations, Lissagous figure, Coupled oscillations, Travelling waves and transmission of energy; Phase and Group velocity; Standing waves Longitudinal waves.

Reflection, Refraction, Interference, Diffraction and Polarization of waves; interferometer and Newton's rings; Diffraction Gratings and their resolving power; Spectrometers. Electromagnetic wave equation; Normal and anamolous dispersion; Coherence, lasers and its application.

Heat and Thermodynamics

Perfect gas and Vander Waals equation; Three Laws of Thermodynamics; Entropy, entropy of an ideal gas; Helmbroltz function, Gibbs function; Maxwell's equations; Enthalpy, 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 applications, Quantum Bose-Einstein and Fermi-Dirac Statistics.

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 LRO 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; Biased function; Transistors; Common base, common emitter and common collector configurations OP Amplifier; characteristics, modes of operation, applications number systems: decimal, octal and Hexadecimal; Binary code, Binary arithmetic, BCD code, and parity logic gates Boolean identities; De Morgan's theorems: logic simplification; Combinational logic circuits: decoders, parity generator and checker circuits, flip flops:RS, JK and D-type.

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; Waves and particles and De Broglie's Hypothesis; Schrodinger wave equation and its application to one dimensional harmonic oscillator. Heisenberg's uncertainly principle.

Nuclear Physics

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

SUGGESTED READINGS

1. *Perspectives of Modem 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. Berkley.*

7. *Heat and Thermodynamics. W. Zemanasky.*

8. *Nuclear Physics, W.E. Burcham.*

9. *Nuclear Physcis, Kaplan*

10. *Fundamentals of digital electronics, Floyd*

11. *Waves & Vibrations, Pain*