Syllabus for Entrance Examination – M. Sc. in Physics (Material Science)

2024-25

a) **Classical Mechanics**: Newton's laws of motion, rotating co-ordinate systems, central force problem, basic fluid dynamics, Lagrange's equations, rigid body dynamics.

b) **Statistical Physics**: Statistical approach to a system, Ensemble theory, thermal and adiabatic interactions, laws of thermodynamics, Maxwell-Boltzmann speed distributions, quantum statistics.

c) **Solid State Physics**: Electrical properties of metals, Fermi distribution, band theory of solids, superconductivity, magnetic properties of matter, semiconductor physics.

d) **Quantum Mechanics**: Postulates of Quantum Mechanics, wave-particle duality, Heisenberg's Uncertainty principle, operators and eigenvalues and Eigen functions, Schrodinger's equation and simple applications in one dimension.

e) **Electronics**: Transistors, Thyristors, Amplifiers, Timers, logic circuits, flip-flops, power supplies, optoelectronics, communication techniques.

f) **Atomic, Molecular and Nuclear Physics**: Schrodinger's equation for simple harmonic oscillator and Hydrogen atom, coupling schemes for spin and orbital angular momenta, effect of electric and magnetic field on atoms.

Molecular spectra, Raman effect. Static properties of nuclei, alpha, beta and gamma emission. Nuclear models and basic ideas of fission.

g) **Special theory of relativity**: Relativistic kinematics & dynamics. Relativity and electromagnetism, elements of cosmology.

h) **Electrodynamics**: Gauss law, Poisson and Laplace equations, Dielectrics, Amperes and Faradays laws, magnetostatics and magnetic susceptibility and permeability. Maxwell's equations and continuity equation. Poynting's theorem and wave propagation in media.