Bachelor of Science in Electrical and Electronic Engineering
0533 11 PHY 1101: Physics
Academic Session: 2024-2025

3 Hours/week, 3 Credits	Examination Duration: 3 Hours

1. **Mechanics**: Linear momentum of a particle, linear momentum of a system of particles, conservation of linear momentum, some applications of the momentum principle; Angular momentum of a particle, angular momentum of a system of particles.

2. **Gravitation and planetary motion**: The law of universal Gravitation, Kepler's law of planetary motion, the motion of planets and satellites.

3. **Oscillations**: Differential equation of a simple harmonic oscillator, total energy and average energy, combination of simple harmonic oscillations.

4. **Acoustics**: Microphones and loud speaker; carbon Microphone, condenser microphone, moving coil electrodynamics microphones, loud speaker. Architectural acoustics; reverberation time, Sabine's formulae, theoretical treatment of reverberation time, live room, dead room.

5. **Physical optics**: Interference of light, analytical treatment of interference, theory of interference fringes, Young's double slit experiment; Diffraction of light, Fresnel and Fraunhofer diffraction, diffraction by single slit, diffraction grating; Polarization, production and Analysis of polarized light, Brewster's law, Malus law, Polarization by double refraction, Nicol prism, optical activity, polarimeters, Polaroid.

6. **Heat and thermodynamics**: System, Processes, State, Thermodynamic Properties, Zeroth Law of thermodynamics and its application, First Law of thermodynamics and its application, reversible and irreversible processes, Second Law of thermodynamics, Third Law of thermodynamics. Carnot cycle, Carnot's theorem; Efficiency of heat engines, entropy and disorder, thermodynamic functions, Maxwell relations, Clausius-Clapeyron Equation.

7. **Special theory of relativity**: Galilean relativity and Einstein's special theory of relativity; Lorentz transformation equations, Length contraction, Time dilation and mass-energy relation.

8. **Wave-particle duality and atomic model**: Photoelectric effect, Compton effect; De Broglie matter waves and its success in explaining Bohrs theory, Pauli's exclusion principle.

9. **Introductory quantum mechanics**: Wave function; Uncertainty principle, postulates, Schrodinger time independent equation, expectation value, Probability, Particle in a zero potential, calculation of energy.

10. **Nuclear physics**: Constituent of atomic nucleus, Nuclear binding energy, Different types of radioactivity, radioactive decay law; Nuclear reactions, nuclear fission, nuclear fusion, atomic power plant.

Books Recommended:

- Fundamentals of Physics – David Halliday, Jearl Walker, and Robert Resnick
- University Physics with Modern Physics – Hugh D. Young, Roger A. Freedman
- Concepts in thermal physics – Stephen J. Blundell, Katherine M. Blundell
- Concepts of modern physics – Arthur Beiser
- Optics – Ajoy Ghatak