Department of Physics
A.N. College, Patna

PHYSICS

Course Outcome(CO)

B.Sc. (Honours) : Part - 1

Paper - I

CO 1/I : Students learn fundamental concepts and applications of the special theory of relativity. They learn and visualize a transition from Newtonian mechanics to Einsteinian mechanics. They learn to apply and appreciate the application and consequences of Lorentz transformation equations. They understand relativistic mass, length, time and energy.

CO 2/I : Students learn to associate an observer with a frame of reference and get to know centrifugal force, coriolis force, generalized co-ordinates, D'Alembert's principle, formulation and simple applications of Lagrangian and Hamiltonian equations of motion.

CO 3/I : Students learn about gravitational potential and field, motion of bodies under the influence of the central force field, and Kepler's laws of planetary motion.

CO 4/I : Students understand and learn elasticity and surface tension.

CO 5/I : Students acquire a comprehensive knowledge of wave equations, damped and forced oscillations, vibration, properties of sound, and the acoustics of buildings.

Paper - II

CO 1/II : Students learn about the Maxwell-Boltzman distribution law, equipartition of energy, mean free path, viscosity, thermal conductivity, diffusion, and Brownian motion.

CO 2/II : Students understand the rectilinear flow of heat, real gas equations, and the Van der Waal equation of state.

CO 3/II : Students develop concepts related to laws of thermodynamics and their application.

CO 4/II : Students develop a clear understanding of the efficiency of Carnot's engine and refrigerator. They learn reversible & irreversible processes and entropy changes in various processes.

CO 5/II : Students become familiar with the thermodynamic potentials and their physical interpretations, low temperature physics, black body radiation and the laws associated with it.

Practical : B.Sc. (Honours) Part - 1

CO 1/1/P : Students gain demonstration skills and competencies to conduct experiments related to the properties of matter, heat and thermodynamics, waves and vibration.

CO 2/1/P : Students develop expertise in handling equipments essential for conducting experiments involving the properties of matter, heat, thermodynamics, waves, and vibration.

CO 3/1/P : Students learn how to analyze the experimental data and present the results graphically.

CO 4/1/P : Students learn to determine and analyze various properties of matter using different models and methods. They become aware of the constraints of measurements as well as model limitations.

B.Sc. (Honours) : Part - 2

Paper - III

CO 1/III : Students develop understanding of the phenomenon of interference and their applications.

CO 2/III : Students are able to explain diffraction and polarisation phenomena and learn applications related to it.

CO 3/III : Students gain knowledge about different optical instruments like biprism, interferometer, diffraction grating, telescope, and microscope.

CO 4/III : Students comprehend Maxwell's equations, poynting vector, electro-magnetic momemtum, etc.

CO 5/III : Students learn propagation of electromagnetic waves, dispersion theory, and scattering by free and bound charges.

Paper - IV

CO 1/IV : Students develop basic knowledge of electricity and magnetism. They are able to understand magnetic properties of matter, magnetic circuits and their applications, and solve potential problems in electrostatics.

CO 2/IV : Students learn Peltier effect, Seebeck effect, Thompson effect. They learn the fundamentals of alternating current circuits, alternating current bridges, and transformers.

CO 3/IV : Students acquire elementary knowledge of nucleus and its structures. They become acquainted with nuclear fission reactors, aston's mass spectrographs, cyclotrons, and betatrons.

CO 4/IV : Students learn natural and artificial radioactivity. They are able to calculate the decay rates and half life of radioactive decays.

CO 5/IV : Students learn to explain photoelectric emission, compton effect, Bragg's law, cosmic rays. They learn about cathode ray oscilloscope and its uses.

Practical : B.Sc. (Honours) Part - 2

CO 1/2/P : Students gain hands-on experience of using optical instruments like spectrometer, biprism, and grating.

CO 2/2/P : Students are able to determine the magnifying and resolving power of optical

instruments.

CO 3/2/P : Students are able to get finer measurements of the wavelength of light using Newton's ring, plane transmission grating, and Fresnel's Biprism.

CO 4/2/P : Students are able to realise the temperature variation of electrical resistance, experimentally verify the characteristics of semiconductor diodes and determine the angle of dip by dip circle.

B.Sc. (Honours) : Part - 3

Paper - V

CO 1/V : Students learn to solve differential equations, Laplace equation, wave equation, and Poisson's equation. They learn to apply the acquired concepts in different co- ordinate systems. They learn complex variables and vector calculus and their applications in diverse branches of physics.

CO 2/V : Students become familiar with Hamilton's principal, Euler-Lagrange equation of motion, and conservation theorems. They understand the role of Hamiltonian dynamics, the laws of motion, and concept of moment of inertia.

CO 3/V : Students learn Euler's equation of motion and solve them for simple systems. They learn basic concepts of canonical transformation and Hamilton-Jacobi equation.

CO 4/V : Students acquaint themselves with quantum formulation and appreciate it comparing with classical formulation of an event. They acquire thorough knowledge of the postulates of quantum mechanics, operators, the importance of uncertainty relations and angular momentum.

CO 5/V : Students are able to learn and solve the Schrödinger wave equation for different forms of potential in one and three dimensions

Paper - VI

CO 1/VI : Students gain fundamental knowledge of statistical mechanics. They learn probability distributions, partition functions, ensembles, and other related theories.

CO 2/VI : Students learn and analyse Boltzman, Bose-Einstein, Fermi-Dirac distributions and know their applications. They acquire a clear idea of phase transitions and fluctions.

CO 3/VI : Students are able to analyze the characteristics of coupled LCR circuits. They familiarize, learn and apply network theorems, two port network, filters and attenuators.

CO 4/VI : Students gather a comprehensive knowledge of semiconductor devices, BJT and FET circuits. They develop deep understanding of various rectifiers, amplifiers, oscillators, and multivibrators. They learn amplitude modulation and its detection.

CO 5/VI : Students get familiar with basic components and terminologies of computer. They learn to write algorithms and flow charts for computer programming. They are able to solve mathematical problems using Basic and Fortran languages.

Paper - VII

CO 1/VII : Students acquire fundamental knowledge related to plasma physics. They are able to describe Plasma oscillations, Debye's potential, Ionospheric reflection, Pinch effect, etc. Students understand and learn different aspects of electrodynamics like field and potential due to oscillating current element, uniformly moving charge, oscillating dipole, covariance of Maxwell's equation, and electromagnetic fields.

CO 2/VII : Students learn about atomic spectra and the application of selection rules. They are able to explain the underlying theory of the Zeeman effect and Paschen back effect. They are able to explain rotational and vibrational spectra, the difference between NMR and ESR.

CO 3/VII : Students gather knowledge related to nuclear mass, size, charge, binding energy, etc. They learn Liquid drop model and Shell model.

CO 4/VII : Students develop an in-depth knowledge of different types of crystal structure and x-ray diffraction. They become familiar with reciprocal lattice, types of crystal binding, cohesive energy, and Madelung energy.

CO 5/VII : Students know the importance and limitations of different theories related to solid state physics like free electron theory of metals, Sommerfeld theory of electrical conductivity, Band theory of solid, etc. They understand the classifications of matter on the basis of conductivity, properties of semiconductors, and their applications.

Practical : B.Sc. (Honours) Part - 3 : Paper - VIII A & B

CO 1/VIII : Students comprehend and know to conduct experiments related to electronics, polarisation, current electricity, and solid state physics.

CO 2/VIII : Students identify different circuit components, demonstrate their uses and limitations.

CO 3/VIII : Students verify experimentally Child-Langmuir, Brewster's laws. They conduct experiment and measure e/m, hall co-efficient, and Plank’s constant.

CO 4/VIII : Students are able to study the characteristics of the junction diode, zener diode, BJT, and FET using simple electric circuits.

CO 5/VIII : Students verify experimentally the properties of amplifiers, oscillators, and rectifiers.