Department of Physics

G.D.College, Begusarai

Physics

Program Outcomes (PO)

B.Sc. (Honours)

PSO 1 : Students develop their conceptual ideas of principles and applications of the special theory of relativity, classical mechanics, quantum mechanics, statistical mechanics, heat & thermodynamics, mechanical, thermal & electrical properties of Matter, waves & oscillation, electrostatics, current electricity, magnetism, electrodynamics, solid state physics, electronics and atomic & nuclear physics.

PSO 2: Students acquire their practical skills and gain expertise to perform experiments in Physics laboratory. They are very much familiar with different instruments and measurements and learn importance of error calculations.

PSO 3: Students acquire skills in handling sophisticated optical instruments. They develop theoretical and laboratory skills which should enable them to perform advanced level experiments related to optics.

PSO 4: Students develop research-oriented skills with critical thinking, systematic analysis of problems and draw logical conclusions. They get equipped to handle scientific study and research in various disciplines.

PSO 5: Students learn to use their knowledge of mathematics, physics and computerprogramming in computational and simulation methods.

PSO 6: Students become eligible to pursue a master's degree in Physical Science, apply for various professional courses, work in theoretical and experimental research-related fields and apply for several competitive examinations to get engaged in government and private sectors.

PSO 7: Students become conscious of their moral & ethical values and become responsible educated

citizens.

Course Outcome

Paper - I

CO 1/I: Students have to visualize a basic conceptual knowledge of transition from Newtonian mechanics to Einsteinian mechanics. They have to understand about theoretical and practical knowledge of special theory of relativity and its applications. They learn to apply and appreciate the applications and consequences of Lorentz transformation equations. They understand relativistic mass, length and time also relativistic addition of velocities.

CO 2/I: Students conceptually become sound to associate an observer with a frame of reference and also know the meaning of 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 the basic concept of gravitational potential and field and their applications, motion of bodies under the influence of the central force field and Kepler's laws of planetary motion.

CO4/I: Students know the conceptual meaning of elasticity and surface tension with their applications.

CO 5/I: Students study the significance of wave function and wave equations, damped and forced oscillations, vibrations, properties of sound and the acoustics of buildings with proper concept of reverberations.

Paper - II

CO 1/II: Students learn about the Kinetic theory to have the concept of Maxwell-Boltzman distribution law, equipartition of energy, mean free path, viscosity, thermal conductivity, diffusion on the basis of transport phenomena and also Brownian motion.

CO 2/II: Students understand the rectilinear flow of heat, perfect &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 with coefficient of performance. They learn about the conceptual development of entropy, their changes in various processes with reference to reversible & irreversible 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

CO1/1/P: Students gain demonstration skills and competencies to conduct experiments related to the properties of matter like viscosity & elasticity, heat and thermodynamics, waves and vibration and resonance.

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

CO3/1/P: Students know the technique how to analyze the experimental data and present their results graphically.

CO 4/1/P: Students make understanding 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 - II

Paper – III

CO 1/III: Students develop the conceptual knowledge of wave nature of light and understanding about the phenomenon of interference and their applications.

CO2/III: Students are able to explain diffraction and polarization phenomena and the applications related to them.

CO3/III: Students know the knowledge about different optical instruments like bi -prism, interferometer, diffraction grating, telescope, and microscope and its utilization for various applications.

CO4/III: Students have comprehended Maxwell equations by knowing the conceptual knowledge of E.M waves, Poynting vector, electro-magnetic momentum, etc.

CO5/III: Students make understanding propagation of electromagnetic waves, dispersion theory, and scattering by free and bound charges.

Paper – IV

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

CO 2/IV: Students learn the conceptual knowledge of Peltier effect, See beck effect, Thomson effect. They have learnt the fundamentals of alternating current circuits, alternating current bridges, and transformers and their applications.

CO 3/IV: Students get the 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 the basic idea of natural and artificial radioactivity. They are able to evaluate the decay rates and half-life of radioactive decays with examples.

CO5/IV: Students learn about particle nature of light and 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, Bi-prism, and grating.

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

CO3/2/P: Students are able to get fine measurements of the wavelength of light using Newton's ring, Plane Transmission Grating, and Fresnel's Bi-prism.

CO 4/2/P: Students get the practical knowledge of the temperature variation of electrical resistance, experimentally verify the characteristics of semiconductor diodes and determine the angle of dip by the instrument dip circle.

B.Sc. (Honours): Part - III

Paper – V

CO1/V: Students make understanding about the basic concept 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 know the complex variables and its utilization in various applications in vector calculus and in diverse branches of Physics.

CO2/V: Students become familiar with Hamilton's principle, Euler-Lagrange equation of motion, and conservation theorems with applications. They understand the role of Hamiltonian dynamics, the laws of motion, and concept of moment of inertia.

CO3/V: Students get understanding about Euler's equation of motion and able to solve problems related to simple systems. They learn basic concepts of canonical transformation and Hamilton-Jacobi equation.

CO4/V: Students acquaint themselves with quantum formulation and they are very much familiar for 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.

CO5/V: Students are able to learn and solve the Schrödinger wave equation for different forms of potential in one and three dimensions.

Paper - VI

CO1/VI: Students gain conceptual knowledge of statistical mechanics. They learn probability distributions, partition functions, ensembles, and other related theories.

CO 2/VI: Students are able to learn and analyse the Boltzman, Bose-Einstein, Fermi-Dirac distributions and know their applications. They get conceptual idea of phase transitions and fluctuations.

CO 3/VI: Students get knowledge to analyze the characteristics of coupled LCR circuits by getting basic idea of electronic devices. They are capable to analyze the network theorems, two port network, filters and attenuators with their applications.

CO 4/VI: Students know the conceptual knowledge of semiconductor devices, BJT and FET circuits. They make understanding above various rectifiers, amplifiers, oscillators, and multivibrators. They

learn amplitude modulation and its detection.

CO 5/VI: Students get familiar with conceptual idea of 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 of Plasma Physics. They are able to describe Plasma oscillations, Debye's potential, Ionospheric reflection, Pinch effect, etc. Students make understanding 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 know the conceptual idea of about atomic spectra and their application of selection rules. They are able to explain the underlying theory of the Zeeman effect and Paschen back effect. They explain very well the rotational and vibrational spectra and able to differentiate the difference between NMR and ESR.

CO3/VII: Students develop idea about nuclear mass, size, charge, binding energy, etc. They make understanding about nuclear models like Liquid drop model and Shell model.

CO 4/VII: Students develop deep-seated knowledge of different types of crystal structure with the help of X- ray diffraction, computed on the basis of Bragg’s equation. They become acquainted with reciprocal lattice, types of crystal binding, cohesive energy, and Modeling energy.

CO 5/VII: Students become familiar with 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 nature of conductivity in solid materials and further interpret the properties of semiconductors and their applications.

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

CO1/VIII: Students get knowledge to perform experiments related to electronics, polarization, current electricity, and solid-state Physics.

CO2/VIII: Students identify different electronic circuit components, demonstrate their uses and limitations.

CO3/VIII: Students verify experimentally Child-Langmuir, Brewster's laws. They perform experiment and measure E.M.F Hall co-efficient, and Planck's constant.

CO4/VIII: Students are able to study the characteristics of the P-N junction diode, Zener diode, BJT, and FET using simple electronic circuits.

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