Physics Department

Course Outcomes

(2022-23)

Class	Course Code	Nomenclature	Course Outcomes
BSc Sem I	PH-101	Classical Mechanics & Theory of Relativity	1. Learn the concept of conservation of energy, momentum, angular momentum and apply them to understand the basic problems in physics. 2. Understand and explain the Hamilton's variational principle, derive Lagrange's equation of motion from Hamilton's principle and be able to apply these principles to derive the Lagrangian and Hamiltonian for various simple mechanical systems such as Linear Harmonic oscillator, Simple pendulum, Atwood's machine. 3. Differentiate between inertial and Non-inertial frame of references and Describe how fictitious forces arise in a non-inertial frame. Understand the importance of Michelson Morley's experiment in reference to special theory of relativity. 4. Describe special relativistic effects and their effects on the mass and energy of a moving object and appreciate the nuances and important outcomes of Special Theory of Relativity.
BSc Sem 1	PH-102	Electricity, Magnetism and Electromagnetic theory	1. Explain and differentiate the vector and scalar formalisms of electrostatics. Also be able to Apply Gauss's law of electrostatics to solve a variety of problems. 2. Describe the important properties of magnetic field. Understand the properties and theories of dia-, para- & ferromagnetic materials. 3. Derive Maxwell equations and understand the role of

			displacement current, scalar and vector potentials and boundary conditions at the interface between different media. The students will also be able to have basic idea about the propagation of electromagnetic waves.
BSc Sem II	PH-201	Properties of matter and Kinetic theory of gases	1. Understand the application of both translational and rotational dynamics motions simultaneously in analyzing rolling with slipping. Write the expression for the moment of inertia about the given axis of symmetry for different uniform mass distributions. 2. Understand the principles and basic terms related to elasticity through the study of Young Modulus and modulus of rigidity. 3. Explain the phenomena of simple harmonic motion and the properties of systems executing such motions. 4. Appreciate the concepts and Applications of surface tension and also be able to understand simple principles of fluid flow and different equations governing fluid dynamics.
BSc Sem II	PH-202	Semiconductor Devices	1. Understand the complex electrical networks analysis using different network theorems. 2. Understand the basic concepts and different applications of PN junction diode in different type of rectifiers, voltage regulators, solar cell, LED's etc. 3. Describe the basic structure, working principle and characteristics of Bipolar Junction transistors. 4. Understand and explain the classification of Amplifiers and the various coupling & feedback methods in BJT amplifiers.
Bsc Sem II	PH-203	Practical	1. Hands on experience with different instruments and appreciate the beauty of different concepts and related experiments in Physics.

			2. Verify some fundamental principles, effects and concepts of physics through Experiments. 3. perform experiments related to mechanics (compound pendulum), rotational dynamics (Flywheel), elastic properties (Young Modulus and Modulus of Rigidity) and fluid dynamics (verification of Stokes law, Searle method) etc. 4. Learn to present observations, results and analysis in suitable and presentable form. 5. Understand the complex electrical networks analysis using different network theorems. 6. Understand the basic concepts and different applications of PN junction diode in different type of rectifiers, voltage regulators, solar cell, LED's etc. 7. Describe the basic structure, working principle and characteristics of Bipolar Junction transistors. 8. Understand and explain the classification of Amplifiers and the various coupling & feedback methods in BJT amplifiers.
BSc Sem III	PH-301	Thermodynamics and computer programmimg	1. Learn about Kinetic interpretation of Temperature, the real gas equations, Van der Waal equation of state and Brownian motion. 2. Learn the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equitation of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion. 3. Understand the basic concepts of thermodynamics, the first and the second law of thermodynamics, JouleThomson effect, Joule Thomson experiment, the concept of entropy and the theorems, calculationsof entropyofreversible& irreversibleprocess,T-Sdiagram and Nernstheatlaw.
BSc Sem III	PH-302	Wave and Optics-1	1. Have understanding of Interference - by Division of

			Wave front, by Division of Amplitude and Interference due to transmitted light & reflected light. 2. Learn about Huygens-Fresnel's theory, diffraction at a straight edge and at a circular aperture, diffraction due to a narrow slit and due to a narrow wire. 3. Understand and explain the Fraunhoffer diffraction, dispersive power of grating, Rayleigh's criterion and resolving power of telescope& grating. .
BSc Sem IV	PH-401	Statistical Physics	1. Understand the concepts of microstate, macrostate, thermodynamic probability and also understand the studies of particles with their distinguishably or indistinguishably nature and conditions which lead to the three different distribution laws e.g. Maxwell-Boltzmann distribution, Bose-Einstein distribution and Fermi-Dirac distribution laws of particles. 2. Learn the basic Postulates of statistical physics, Phase space, Division of Phase space into cells and be able to derive the expression for average speed, r.m.s. speed, average velocity, r. m. s. velocity, most probable energy & mean energy for Maxwellian distribution. 3. Understand the need and application of QuantumStatistics:Bose-Einstein&Fermi-Dirac statistics and be able to articulate the connection as well as dichotomy between classical statistical mechanics and quantum statistical mechanics. 4. Learn and understand the different law's and theory of specific heat of solids and their significance.
	PH-402	Wave and Optics -2	1. Learn the Fourier analysis of periodic functions and their applications in physical problems. 2. Acquire knowledge of methods to solve partial differential equations with the examples of

			important partial differential equations in Physics. 3. Understand the theories and laws of polarization along with understanding of the production and detection of (i)Planepolarizedlight (ii)Circularly Polarizedlightand (iii)Ellipticallypolarizedlight
	PH-403	Practical	1. Have understanding of Interference - by Division of Wave front, by Division of Amplitude and Interference due to transmitted light & reflected light. 2. Learn about Huygens-Fresnel's theory, diffraction at a straight edge and at a circular aperture, diffraction due to a narrow slit and due to a narrow wire. 3. Understand and explain the Fraunhoffer diffraction, dispersive powerofgrating, Rayleigh's criterion and resolvingpower of telescope& grating..
BSc Sem V	PH-501	Quantum and Laser Physics	1. Know main aspects of the inadequacies of classical mechanics and understand historical development of quantum mechanics and understand the theory of quantum measurements, wave packets and uncertainty principle. 2. Understand the central concepts of quantum mechanics: wave functions, Interpretation of Wave Function, momentum and energy operator, expectation values, the Schrodinger equation, time dependent and time independent cases, probability density, the normalization techniques, Eigen functions, Eigen values and their significance. 3. Understanding the behavior of quantum particle encountering a i) barrier & ii) potential. 4. Solve Schrodinger equation for ground state energy and wave functions of various simple quantum mechanical one dimensional and three dimensional potentials. 5. Familiar with optical phenomena and different

			concepts related laser physics. 6. Qualitative understanding of basic lasing mechanism, types of Lasers, characteristics of Laser Light, types of Lasers. 7. Understand and appreciate the applications of Lasers in developing LED, Holography, in materials processing, in Medicine, Industry and Military.
	PH-502	Nuclear Physics	1. Learn about nuclear composition & nuclear properties like nuclear size, spin,parity, statistics, magnetic dipole moment, quadruple moment and also be able to understand the basics of experimental techniques/methods to determine the mass and size of nuclei. 2. Learn about the emission of alpha, beta and gamma rays, outlines of theory of alpha decay and Pauli's theory of beta decay with the neutrino hypothesis. Compton scattering and pair production, energy loss due to ionization. 3. Understand the principles and basic constructions of particle accelerators and the detectors of nuclear radiations. 4. Learn the basic aspects of nuclear reactions, the Q-value of such reaction & its derivation from conservation laws and understand the Principle, construction, working and uses of Nuclear fission and fusion reactors.
BSc Sem VI	PH-601	Solid state and Nanophysics	1. Have brief idea about crystalline and amorphous substances, about lattice, unit cell, primitive cell, miller indices, Bravais lattices in two & three dimensions and crystal structures of Zinc Sulphide, Sodium Chloride and Diamond. 2. Acquire knowledge about X-ray diffraction, Bragg's Law and experimental X-ray diffraction methods and about the reciprocal lattice to a simple cubic lattice, b.c.c.

			and f.c.c. lattice. 3. Acquire knowledge about the electronic properties like electrical conductivity, resistivity, thermal conductivity, heat capacity etc. of metallic solids. 4. Understand the basic idea about superconductors, their classifications and practical applications.
	PH-602	Atomic and Molecular Spectroscopy	1. Acquire knowledge about the historical background and developments of atomic spectroscopy through the study of spectral series in Hydrogen atom, effect of nuclear motion on line spectra (correction of finite nuclear mass), short comings of Bohr's theory, Wilson sommerfeld quantization rule, Sommerfeld's extension of Bohr's model, Sommerfeld relativistic correction, Short comings of Bohr-Sommerfeld theory and finally Vector atom model. 2. Understand and explain the vector atom model, various coupling schemes and atomic spectra of one and two electron atoms. 3. Explain the influence on the spectra of atoms in the presence of external applied electric and magnetic field i.e. Zeeman effect, Paschen-Back effect, Stark effect.
	PH-603	Practical	1. Hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment, Fresnel Biprism etc. and resolving power of optical equipment. 2. Understand various optical phenomena, principles, workings and applications optical instruments through Experiments. 3. Learn to present observations, results and analysis in suitable and presentable form.