P.P.N. (P.G.) College, Kanpur

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UG PHYSICS

COURSE OUTCOMES (COs)

CERTIFICATE IN BASIC PHYSICS & SEMICONDUCTOR DEVICES

FIRST YEAR	SEMESTER - I	**Mathematical Physics & Newtonian Mechanics**	**CODE: B010101T**	**THEORY**	**CREDIT: 04**
		CO 1	Be able to tell scalars, vectors, pseudo-scalars, and pseudo-vectors apart.		
		CO 2	Be familiar with the physical meaning of gradient, divergence, and curl.		
		CO 3	Recognize the distinctions & relationships among cylindrical, spherical, cartesian coordinate systems.		
		CO 4	Be familiar with what 4-vectors, Kronecker delta, and Epsilon (Levi-Civita) tensor mean.		
		CO 5	Research the source of fictitious forces in spinning frames.		
		CO 6	Research how classical systems react to outside forces and how they deform elastically.		
		CO 7	Be familiar with the physics of planetary motion and how the Global Positioning System (GPS).		
		CO 8	Understand the various aspects of wave propagation and Simple Harmonic Motion (SHM).		
		Mechanical Properties of Matter	**CODE: B010102P**	**PRACTICAL**	**CREDIT: 02**
		CO 1	Understand the concept of moment of inertia (MI) and learn to calculate the MI of a flywheel.		
		CO 2	Learn the technique of measuring moment of inertia of an irregular body using an inertia table.		
		CO 3	Understand the principles behind Barton's apparatus and use it to determine the modulus of rigidity by the statical method.		
		CO 4	Learn to use different methods such as sphere, disc, and Maxwell's needle to determine the modulus of rigidity by the dynamical method.		
		CO 5	Learn the concept of Young's modulus and calculate it using the bending of a beam.		
		CO 6	Learn to use a bar pendulum and Kater's pendulum to determine the acceleration due to gravity.		
		CO 7	Use the Sonometer and Melde's Experiment to measure the frequency of AC mains.		
	SEMESTER – II	**Thermal Physics and Semiconductor Devices**	**CODE: B010201T**	**THEORY**	**CREDIT: 04**
		CO 1	Be able to tell reversible processes apart from irreversible ones.		
		CO 2	Recognize the importance of thermodynamical potentials in terms of physics.		
		CO 3	Understand the kinetic model of gases in relation to different gas laws.		
		CO 4	Research how basic radiation rules are put into practise and their limitations.		
		CO 5	AC bridges' usefulness to determine inductance, capacitance and reactance.		
		CO 6	Identify the fundamental parts of electronics.		
		CO 7	Create straightforward electronic circuits.		
		CO 8	Recognize the uses for various electronic instruments.		
		Thermal Properties of Matter & Electronic Circuits	**CODE: B010202P**	**PRACTICAL**	**CREDIT: 02**
		CO 1	Understand the basic operating principles of PN junction diodes and their characteristics.		
		CO 2	Study the characteristics of Zener diodes and their applications in voltage regulation.		

		CO 3	Study the operating principles and characteristics of light-emitting diodes (LEDs) and their applications in lighting and display technology.
		CO 4	Understand the operating principles and characteristics of photodiodes and their applications in sensing and detection.
		CO 5	Measure the value of Stefan's constant experimentally and understand its significance in the study of blackbody radiation.
		CO 6	Develop skills in conducting experiments related to semiconductor devices and fundamental constants, including data collection, analysis, and interpretation.

COURSE OUTCOMES (COs)

DIPLOMA IN APPLIED PHYSICS WITH ELECTRONICS

SECOND YEAR	**SEMESTER - III**	**Electromagnetic Theory & Modern Optics**	**CODE: B010301T**	**THEORY**	**CREDIT: 04**
		CO 1	A better comprehension of everyday electrical and magnetic phenomena.		
		CO 2	To solve straightforward electrical device-related issues.		
		CO 3	Have an understanding of the useful applications of the ballistic galvanometer.		
		CO 4	Research the underlying physics of light refraction and reflection (electromagnetic waves).		
		CO 5	Research the operation and uses of Fabry-Perot and Michelson interferometers.		
		CO 6	Be able to distinguish between Fraunhofer's and Fresnel's classes of diffraction.		
		CO 7	Understand how polarimeters are used.		
		CO 8	Research the properties and applications of lasers.		
		Demonstrative Aspects of Electricity & Magnetism	**CODE: B010103P**	**PRACTICAL**	**CREDIT: 02**
		CO 1	Develop an understanding of the variation of the magnetic field along the axis of a circular coil.		
		CO 2	Learn how to calculate the impedance of an LCR circuit.		
		CO 3	Develop an understanding of resistance per unit length and low resistance using Carey Foster Bridge.		
		CO 4	Develop the ability to measure the resistance of a galvanometer using a post office box.		
		CO 5	Learn to convert a galvanometer into a voltmeter.		
		CO 6	Learn to convert a galvanometer into an ammeter.		
	SEMESTER - IV	**Perspectives of Modern Physics & Basic Electronics**	**CODE: B010401T**	**THEORY**	**CREDIT: 04**
		CO 1	Understand the differences between Newtonian and relativistic mechanics' descriptions of the organization of space and time.		
		CO 2	Recognize the physical meaning of Lorentz transformation equation implications.		
		CO 3	Understand the duality of waves and particles.		
		CO 4	Get knowledge of the fundamental principles of quantum mechanics.		
		CO 5	Research the comparison of different biassing approaches.		
		CO 6	Learn how amplifiers are categorized.		
		CO 7	Understand how oscillators and feedback are used.		
		CO 8	Understand the theory behind how optical fibers function as well as how they are used.		
		Basic Electronics Instrumentation	**CODE: B010102P**	**PRACTICAL**	**CREDIT: 02**

		CO 1	Investigate the characteristics of the transistor in the common base and Common emitter configuration.
		CO 2	Measure the frequency response of a single-stage RC-coupled amplifier, and determine its bandwidth, gain, and phase shift characteristics.
		CO 3	Measure the frequency response of a single-stage transformer-coupled amplifier, and determine its bandwidth, gain, and phase shift characteristics.
		CO 4	Observe how negative feedback affects the frequency response of a single-stage RC-coupled amplifier, and compare its characteristics to the original amplifier.
		CO 5	Understand the functionality of a Hartley oscillator circuit, and measure its frequency of oscillation.
		CO 6	Measurement of Planck's Constant: Measure Planck's constant using the photoelectric effect, and validate the relationship between the stopping potential and the frequency of incident light.

COURSE OUTCOMES (COs)

DEGREE IN BACHELOR OF SCIENCE

THIRD YEAR	**SEMESTER - V**	**Classical & Statistical Mechanics**	**CODE: B010501T**	**THEORY**	**CREDIT: 04**
		CO 1	Be familiar with the D'Alembert's principle and generalized coordinates ideas.		
		CO 2	Recognize the significance of cyclic coordinates and Lagrangian dynamics.		
		CO 3	Recognize the distinction between Hamiltonian and Lagrangian dynamics.		
		CO 4	Research the core force's key characteristics and how they apply to Kepler's conundrum.		
		CO 5	Understand how macro-state and microstate differ from one another.		
		CO 6	Understanding the idea of ensembles.		
		CO 7	Recognize the laws of statistical distribution, including classical and quantum.		
		CO 8	Research the ways in which statistical distribution laws are used.		
		Quantum Mechanics & Spectroscopy	**CODE: B010502T**	**THEORY**	**CREDIT: 04**
		CO 1	Recognize the role that operator formalism plays in quantum physics.		
		CO 2	Research the expectation value and eigen techniques.		
		CO 3	Recognize the origins and use of the uncertainty concept.		
		CO 4	Learn how to solve 1D and 3D issues using the Schrodinger equation.		
		CO 5	Recognize the Vector atomic model's accomplishments in the theory of Atomic Spectra.		
		CO 6	Examine the many facets of the spectra of Group I and Group II elements.		
		CO 7	Research the creation and uses of X-rays.		
		CO 8	Gain knowledge of molecular spectra's fundamental components.		
		Demonstrative Aspects of Optics & Lasers	**CODE: B010503P**	**PRACTICAL**	**CREDIT: 02**
		CO 1	Understand Newton's Rings experiment and use it to measure the wavelength of sodium light.		
		CO 2	Learn about the resolving power of a telescope and measure it experimentally.		
		CO 3	Understand the principles of plane diffraction grating and use it to obtain spectrum of mercury light.		
		CO 4	Understand the working principles of a polarimeter and use it to measure the specific rotation of a sugar solution.		

		CO 5	Understand the principles of a plane diffraction grating and use it to determine the wavelength of laser light.			
		CO 6	Determine the focal length of the combination of lenses separated by a distance using a nodal slide and verify the formula.			
	SEMESTER - VI	**Solid State & Nuclear Physics**		**CODE: B010601T**	**THEORY**	**CREDIT:04**
		CO 1	Develop an understanding of the relationship between crystal geometry and symmetry operations.			
		CO 2	Gain an understanding of the concept of reciprocal lattice and the significance of X-ray diffraction.			
		CO 3	Explore various crystal binding properties and their implications.			
		CO 4	Recognize the significance of Free Electron and Band theories in explaining crystal properties.			
		CO 5	Analyze the characteristics of nuclear forces and radioactive decay processes.			
		CO 6	Develop an understanding of the significance of nuclear models and reactions in explaining nuclear phenomena.			
		CO 7	Evaluate the applications and mechanisms of nuclear accelerators and detectors.			
		CO 8	Develop an understanding of the properties and classification of the fundamental building blocks of nature.			
		Analog & Digital Principles & Applications		**CODE: B010602T**	**THEORY**	**CREDIT:04**
		CO 1	Analyze the behavior of charge carriers in a semiconductor with respect to drift and diffusion.			
		CO 2	Develop an understanding of the Two-Port model of transistors.			
		CO 3	Explore the properties, functions, and applications of FETs.			
		CO 4	Evaluate the design and operational principles of SCRs and UJTs.			
		CO 5	Examine various number systems and binary codes.			
		CO 6	Develop proficiency in binary arithmetic.			
		CO 7	Explore the properties and mechanisms of various logic gates.			
		CO 8	Evaluate the design of combinational and sequential circuits.			
		Analog & Digital Circuits		**CODE: B010603P**	**PRACTICAL**	**CREDIT:02**
		CO 1	Develop an understanding of the energy band gap of semiconductors using the reverse saturation current method and its implications in electronic device design.			
		CO 2	Analyse the characteristics of tunnel diodes and their applications in electronic devices.			
		CO 3	Evaluate the hybrid parameters of transistors and their significance in electronic circuits.			
		CO 4	Explore the properties and characteristics of FETs and MOSFETs and their applications in electronic devices.			
		CO 5	Evaluate the characteristics and applications of SCRs and UJTs in electronic circuits.			
		CO 6	Develop proficiency in using TTL ICs to design and verify the behaviour of logic gates and their applications in electronic circuits.			
		CO 7	Verification of the Logic Gates (AND, OR, NAND, NOR, NOT, Ex-OR) experimentally.			