

DEPARTMENT OF PHYSICS

B.Sc. Physics

Program Outcomes:

1. Understand the core concept of Physics subjects
2. Acquire analytical and logical skill for higher Education.
3. Excel in Experimental and Theoretical Physics.
4. Trained to take up jobs in allied fields.
5. Confident to take up competitive exams.

Course outcomes

B.Sc. Part I

Paper I: Mechanics, oscillations and properties of matters

Mechanics: This course provides the basic concepts related to the motion of all the objects around us in our daily life and builds a foundation of various applied field in science and technology. The course covers the study of vectors, laws of motion, momentum, energy, rotational motion, gravitation, fluids, elasticity and special relativity.

Oscillations and rigid body motion: This course comprises the fundamentals of harmonic oscillator model, including damped and forced oscillators and grasps the significance of terms like quality factor and damping coefficient.

Superposition of harmonic motions: After study this theory students wonder that our eardrums vibrate under a complex combination of harmonic vibrations and the resultant effect is given by the principle of superposition.

Motion of charged particles in electronic and magnetic fields: Recognize the motion of the charged particle in electromagnetic field.

Properties of matters: This course comprises the basics of properties of matter, i.e., how Young's modulus and rigidity modulus are defined and how they are evaluated for different shapes of practical relevance.

Paper II: electricity, magnetism and electromagnetic theory

Mathematical Background: The knowledge of mathematical physics would be valuable, to understand the essential mathematical methods for solving the advanced problems in physics and to develop the ability to apply the mathematical concepts and techniques to solve the problems in theoretical and experimental physics.

Electrostatics: By studying the electrostatics students emphasizes its applications in the **real** world. One of its applications is in printers and photocopiers where static electric charges attract the ink, or toner, to the paper. Other uses include paint sprayers, air filters, and dust removal.

Dielectrics, steady and alternating currents: The study of dielectric properties concerns storage and dissipation of electric and magnetic energy in materials. They are important for explaining various phenomena in electronics, optics, solid-state physics, and cell biophysics.

Magnetostatics: Magnetostatics is the study of static magnetic fields. It is a good approximation even when the currents are not static as long as the currents do not alternate rapidly.

Time varying fields and electromagnetic waves: This study make us capable to understand that the electric and the magnetic *fields* induce each other and such laws will complete the system of Maxwell equations. The most dramatic consequence of this mutual induction will be the existence and propagation of the *electromagnetic waves*.

Practical: Basic experiments related to mechanics would perform by the students to get familiar with various measuring instruments and would learn the importance of accuracy of measurements.

B.Sc. Part II

Paper I: thermodynamics, kinetic theory and statistical physics

The laws of thermodynamics: Become familiar with various thermodynamic process and work done in each of these process and have a clear understanding about Reversible and irreversible process and also working of a Carnot engine, and knowledge of calculating change in entropy for various process.

Thermodynamic relationships: Thermodynamic relationship is needed to relate the changes in the fundamental and derived properties in terms of the measured properties that are directly accessible from laboratory measurements.

Kinematics of gases: These studies are important for clarifying the capture process of particles by the diffusion mechanism. According to this theory, gas is composed of a large number of small-sized molecules compared with the distances between them.

The statistical basis of thermodynamics: The course makes the students able to understand the basic physics of heat and temperature and their relation with energy, work, radiation and matter. The students also learn how laws of thermodynamics are used

a heat engine to transform heat into work. The course contains the study of laws of thermodynamics, thermodynamic description of systems, thermodynamic potentials, kinetic theory of gases, theory of radiation and statistical mechanics.

Statistics: This includes the study of Basic postulates, application of classical distribution to ideal gases, imperfect gases, quantum statistics and black body radiation. This course helps the students to understand the dynamics of the bulk material in macroscopic as well as microscopic levels and the relation between microscopic and macroscopic systems.

Paper II: waves, acoustics and optics

Waves in media: This course includes the study of superposition of harmonic oscillations, wave's motion, oscillators, sound, wave optics, interference, diffraction, polarization.

Optical instruments: Optical instruments are the devices which process light wave to enhance an image for a more clear view.

Interference of light: Calculate wavelength difference and fringe width from the interference pattern.

Diffraction gratings: A grating disperses light of different wavelengths to give, for any wavelength, a narrow fringe. This allows precise spectroscopy.

Laser system: In This course the students would gain the knowledge basic principles and their applications in science and technology.

Practical: Students would gain practical knowledge by performing various experiments of Optics and Radiation.

B.Sc. Part III

Paper I: Relativity, Quantum mechanics, atomic, molecular and nuclear physics

Relativity: Grasped the fundamentals of different types of frames of references and transformation laws; both the Galilean and the Lorentz transformation.

Quantum theory and quantum mechanics: Students would learn basic postulates and formulations of quantum Mechanics. This area of physics plays an important role in explaining the behavior of all physical systems in the universe. The course includes the study of a brief review of foundations of quantum mechanics, matrix formulation of quantum mechanics, symmetry in quantum mechanics and approximation methods for bound states.

Atomic and molecular spectra: This includes atomic and molecular spectroscopy. As per the course structure, basics concepts of spectroscopic principles, rules and techniques

in spectroscopy to know about their applications, will learn by the students.

Nuclear physics: In this course students would know about the general properties of nuclei, nuclear forces and detectors, radioactive decay and nuclear reactions. The course magnifies the knowledge of students in prospect of various applications of nuclear physics.

Paper II: solid state physics, solid state devices and electronics

Crystal structure: this will help the students to develop an understanding of the lattice, different types of crystal structures, symmetries. Using X-ray diffraction in crystals, the student would gain understanding about the interior of the substances.

Band structure and motion of electrons: The course includes the study of defects in crystals, magnetism, energy bands and dielectric and electrical properties of insulators. And this course have vast importance for those students, who seeking R & D opportunities in the field of theoretical condensed matter physics, material science, device fabrication, nanoscience and nanotechnology etc.

Semiconductor devices: This comprises of basics understanding of power amplifiers, feedback amplifiers, operational amplifiers and optoelectronic devices. These are helpful for the students to find opportunities, in research and developments.

Computational physics: To provides an opportunity to the students, to learn about the fundamentals of computer applications in solving the problems in different branches of Physics and Mathematics, basics of C-programming is included in this course, which can be useful in their future carrier in the field of research and technology.

Practical: In This Course students would gain the practical knowledge by performing various experiments related to different field in physics, especially electronics.