

B.Sc. Physics

Program Outcomes, Program Specific Outcomes and Course Outcomes

❖ Program Outcomes

PO1: - Mechanics: The students would learn about the behavior of physical bodies it provides the basic concepts related to the motion of all the objects around us in our daily life. The course builds a foundation of various applied field in science and technology; especially in the field of mechanical engineering. The course comprises of the study vectors, laws of motion, momentum, energy, rotational motion, gravitation, fluids, elasticity and special relativity.

PO2: - Electricity and Magnetism: It gives an opportunity for the students to learn about one of the fundamental interactions of electricity and magnetism, both as separate phenomena and as a singular electromagnetic force. The course contains vector analysis, electrostatics, magnetism, electromagnetic induction and Maxwell's equations. The course is very useful for the students in almost every branch of science and engineering.

PO3: - Thermal Physics and Statistical Mechanics: 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 in 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.

PO4: - Wave and Optics: The course comprises of the study of superposition of harmonic oscillations, waves motion (general), oscillators, sound, wave optics, interference, diffraction, polarization. The course is important for the students to make their career in various branches of science and engineering, especially in the field of photonic engineering.

PO5: - Quantum Mechanics: Quantum mechanics provides a platform for the physicists to describe the behaviour of matter and energy at atomic and subatomic level. The course plays a fundamental role in explaining how things happen beyond

our normal observations. The course includes the study of Schrodinger equations, particle in one dimension potential, quantum theory of H like atoms, atoms/molecules in electric and magnetic fields.

PO6: - Solid State Physics: Students would be able to understand various types of crystal structures and symmetries and understand the relationship between the real and reciprocal space and learn the Bragg's X-ray diffraction in crystals. Would also learn about phonons and lattice.

❖ **PROGRAMME SPECIFIC OUTCOMES:**

This undergraduate course in Physics Would provide the opportunity to the students:

PSO1 • To understand the basic laws and explore the fundamental concepts of physics

PSO2 • To understand the concepts and significance of the various physical phenomena.

PSO3 • To carry out experiments to understand the laws and concepts of Physics.

PSO4 • To apply the theories learnt and the skills acquired to solve real time problems.

PSO5 • To acquire a wide range of problem-solving skills, both analytical and technical and to apply them.

PSO6 • To enhance the student's academic abilities, personal qualities and transferable skills this will give them an opportunity to develop as responsible citizens.

PSO7 • To produce graduates who excel in the competencies and values required for leadership to serve a rapidly evolving global community.

PSO8 • To motivate the students to pursue PG courses in reputed institutions.

PSO9 • This course introduces students to the methods of experimental physics. Emphasis will be given on laboratory techniques specially the importance of accuracy of measurements.

PSO10 • Providing a hands-on learning experience such as in measuring the basic concepts in properties of matter, heat, optics, electricity and electronics.

❖ Course Outcomes

MECHANICS AND RELATIVITY

CO1: Understand the motion of objects in different frame of references.

CO2: Understand laws of motion, reference frames, and its applications i.e. projectile motion, simple harmonic oscillator, Rocket motion, elastic and inelastic collisions.

CO3: Understand the application of central force to the stability of circular orbits, Kepler's laws of planetary motion.

CO4: Develop understanding of special theory of relativity and its applications to understand length contraction, time dilation and mass energy relation.

VECTORS, ELECTRICITY & MAGNETISM

CO1: Understand basics of vector calculus.

CO2: Understand divergence, gradient and curl and their physical interpretation.

CO3: Understand divergence theorem, Green's theorem, Stokes' theorem and appreciate its applications.

CO4: Understand the basic concepts of electric and magnetic fields.

CO5: Understand the concept of conductors, dielectrics, inductance and capacitance.

CO6: Gain knowledge on the nature of magnetic materials.

CO7: Understand the concept of static and time varying fields.

CO8: Gain knowledge on electromagnetic induction and its applications

CO9: Gain knowledge on EM waves, propagation and their properties.

CO10: Ability to use Maxwell's equations in calculations featuring: both free and stationary electromagnetic waves.

OPTICS

CO1: Understand phenomenon based on light and related theories.

CO2: Get skills to identify and apply formulas of optics and wave physics.

CO3: Understand the event like reflection, refraction, interference, diffraction etc.

CO4: Understand the applications of diffraction and polarization.

CO5: Understand the applications of interference in design and working of interferometers.

CO6: Understand the resolving power of different optical instruments.

CO7: Understand working of optical fiber and their applications in communication.

QUANTUM MECHANICS

CO1: Understand the origins of quantum mechanics.

CO2: Understand and explain the differences between classical and quantum mechanics.

CO3: Understand the idea of wave function.

CO4: Understand the uncertainty relations.

CO5: Understand the Schrodinger wave mechanics and operator formalism.

CO6: Solve the Schrödinger equation for simple 1D time-independent potentials.

CO7: Appreciate the importance and develop an understanding of angular momentum.

SOLID STATE PHYSICS

CO1: Understanding of diffraction experiment and reciprocal lattice

CO2: Understand crystal vibrations: phonon heat capacity and thermal conductivity

CO3: Understand free electron Fermi gas: density of states, Fermi level, and electrical conductivity

CO4: Understand the properties of semi-conductors

CO5: Understand the relationship between semiconductor devices and understand the applications of semiconductor devices

LAB OUTCOMES;

LO1: - Students would perform basic experiments related to mechanics and also get familiar with various measuring instruments would learn the importance of accuracy of measurements.

LO2: - Students would gain practical knowledge about electricity and magnetism and measurements such as: Resistance, Voltage, current etc.

LO3: - The practical knowledge of wave motion doing experiments: Tuning fork, electric vibrations. They would also learn optical phenomena such as interference, diffraction and dispersion and do experiments related to optical devices: Prism, grating, spectrometers.

LO4: - Student will practices the different electronic experiments in the lab.