

DEPARTMENT OF PHYSICS

PROGRAMME SPECIFIC OUTCOMES & COURSE OUTCOMES

PROGRAMME: B.Sc. PHYSICS (Hons) OR B.Sc. PHYSICS (Hons With Research)

PROGRAMME OUTCOMES

PO-1 Students are intended to develop a conceptual understanding of physics principles. They will be able to demonstrate concepts in Classical Mechanics, Electromagnetism, Thermodynamics, Spectroscopy, Solid State Physics, Nuclear Physics and Quantum mechanics.

PO-2 Graduates should be able to transfer and apply the acquired concept and principles to study different branches of physics.

PO-3 Demonstrate the ability to translate a physical description to a mathematical equation and conversely explain the physical meaning of the mathematics, represent key aspects of physics through graphs, circuits, diagrams and use geometric arguments in problem-solving.

PO-4 Demonstrate the ability to justify and explain their thinking or approach both written and oral.

PO-5 Make measurements on physical systems understanding the limitation of the measurements and the limitations of models. Complete an experimental work, and report to the faculty by tabulating the readings and present the outcome of the experimental work.

PO-6 Development of the ability to appear for the competitive exams.

PROGRAMME SPECIFIC OUTCOMES

PSO-1 Students are expected to acquire core knowledge in physics, including the major areas of classical mechanics, quantum mechanics, electromagnetism, optics, electronics, modern physics and Electronics including digital electronics.

PSO-2 Students will develop the proficiency in the acquisition of data using a variety of laboratory instruments and in the analysis and interpretation of such data.

PSO-3 Students will show that they have learned laboratory skills enabling them to take measurements in a physics laboratory and analyze the measurements to draw valid conclusion.

PSO-4 Students will be capable of oral and written scientific communication and will prove that they can think critically and work independently.

PSO-5 Students will realize and develop an understanding of the impact of physics and science on society and their day to day life.

PSO-6 Discover of physics concepts in other disciplines such as mathematics, computer science, chemistry, geology and etc.

COURSE OUTCOMES:

➤ Mathematical Physics

Students will have understanding of various techniques to solve differential equations. How to use vector calculus in various physics problems. Students will be able to use advanced mathematical methods and theories on various mathematical and physical problems. Understand matrix and partial differential equations.

➤ Classical Mechanics

Students will be able to articulate and describe relative motion. Inertial and non-inertial reference frames. Parameters defining the motion of mechanical systems Study of the interaction of forces between solids in mechanical systems. Centre of mass of mechanical systems. Laws of motion and conservation principles. Lagrangian and Hamiltonian formulation.

➤ Electricity and Magnetism

Students will be able to understand the relationship between electrical charge, electrical field, electrical potential, and magnetism. Solve numerical problems involving topics covered. Define the magnetic field and magnetic flux, solve technical problems. Calculate the magnitude and direction of the magnetic field for symmetric current distributions using the Law of Biot-Savart and Ampere's Law. Principles of Electric Fields, Gauss's Law, Electric Potential, Capacitance and Dielectrics, Current and Resistance, Direct Current Circuits, Magnetic Fields, Sources of Magnetic Fields, Faraday's Law, Inductance, Alternating Current Circuits, and Electromagnetic Waves. Solve mathematical problems involving electric and magnetic forces, fields, and various electro-magnetic devices and electric circuits.

➤ Waves and Optics

Students will be able to understand the role of the wave equation and appreciate the universal nature of wave motion. Understand superposition of harmonic waves. Understand interference and diffraction (Fraunhofer and Fresnel diffraction). Understand optical phenomena such as polarization. Through the lab course, understand the principles of measurement and error analysis and develop skills in experimental design.

➤ Statistical and Thermal Physics

Completion of this course will enable the students to know the basics of thermal physics. Make use of different problem solving techniques in the field. Understand the kinetic theory of gases: Maxwell –Boltzmann distribution law, Brownian motion etc. Understand the behavior of real gases. Understand how statistics of the microscopic world can be used to explain the thermal features of the macroscopic world. Use thermal and statistical principles in a wide range of applications. Learn a variety of mathematical techniques. Understand Bose-Einstein and Fermi Dirac statistics.

➤ Digital Electronics and Applications

Completion of this course will enable the students to understand the logical behavior of digital circuits. Understand the advantages and disadvantages of programmable logic devices Know how to describe digital hardware using a software-style language Understand how a basic digital circuit can be built from standard building blocks.

➤ **Electromagnetic Theory**

Completion of this course will enable the students to apply vector calculus to understand the behavior of static electric and magnetic fields in standard configurations. Describe and analyze electromagnetic wave propagation in free-space. Describe and analyze transmission lines, and understand the basic of fiber optics.

➤ **Solid State Physics**

Students will have understanding of structures in solids and their determination using XRD. Behavior of electrons in solids including the concept of energy bands and effect of the same on material properties. Magnetic and dielectric properties of solids. Practice problem solving by using selected problems in solid state physics.

➤ **Quantum Mechanics**

Completion of this course will enable the students to understanding of importance of quantum mechanics compared to classical mechanics at microscopic level. Understand various tools to calculate Eigen values and total angular momentum of particles. Understand Schrodinger's equation for spherical symmetric potential, complete solution of hydrogen atom. Understand atoms in external electric and magnetic field. Learn the mathematical tools needed to solve quantum mechanics problems. This will include complex functions and Hilbert spaces, and the theory of operator algebra. Solutions of ordinary and partial differential equations that arise in quantum mechanics will also be studied.

➤ **Nuclear and Particle Physics**

Upon completion of the course Students will have understanding of basic properties of nucleus and nuclear models to study the nuclear structure properties. Various aspects of nuclear reactions will give idea how nuclear power can be generated. Nuclear fission and fusion. Basic of elementary particles.

➤ **Spectroscopy**

Completion of this course will enable the students to understanding of importance of atoms and molecular structure and their behavior of rotation, vibration and their interatomic distances through spectroscopy.

➤ **Electronics**

Completion of this course will enable the students to understanding of importance of electronic circuits and their working phenomenon. How to get DC from AC. Behaviour of rectification circuits from diodes. Behaviour of Transistors and amplifiers and their working modes. Importance of Feedback circuits. To obtain oscillators to generate desired frequency.

➤ **Modern Physics**

Completion of this course will enable the students to understanding of importance of modern physics concepts. Einsteins relativity phenomena different from Newtonian Mechanics. Know about the behavior of Plasma, a fourth state of matter and their behavior in electric and magnetic fields. Medical instruments working on the concepts of physics laws. About the sun and its atmosphere.