B.Sc. (Honours) Physics

PROGRAM OUTCOME (PO)

Upon completion of the programme, the students will attain the ability to:

PO1: Demonstrate, solve and an understanding of major concepts in all disciplines of Physics.

PO2: Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of Physics experiments.

PO3: Create an awareness of impact of Physics on the society and develop scientific temperament beyond the scientific community.

PO4: Inculcate the scientific temperament in the students of different disciplines.

PO5: Research fields of Physics and pursue higher education.

PROGRAM SPECIFIC OUTCOMES (PSO)

Upon completion of the programme, the students will attain the ability to:

PSO1: Acquire fundamental knowledge in physics, including the major premises of classical mechanics, quantum mechanics, electromagnetic theory, electronics, optics, special theory of relativity and modern physics.

PSO2: Develop a written and oral communication skill in communicating physics-related topics.

PSO3: Design and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes. Not only that they are expected to have an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data.

PSO4: Learn the applications of numerical techniques for modelling physical systems for which analytical methods are inappropriate or of limited utility.

PSO5: Develop an understanding of the impact of physics and science on society**.**

PSO6: Apply conceptual understanding of the physics to general real-world situations. Also, discover of physics concepts in other disciplines such as mathematics, computer science, engineering, and chemistry.

COURSE OUTCOMES (CO)

Semester I: Core Courses

PHYCC101. Mathematical Physics I

After completion of the course, the students will be able to:

CO1: A study of mathematical techniques used in Physical problems.

CO2: The tutorials involve the applications of Gauss's divergence theorem, Green's theorem, Stokes theorem and Dirac Delta function.

CO3: The knowledge of different coordinate systems, depending on the symmetry of the system.

CO4: To develop the concept of divergence, gradient and curl and their physical significance & Dirac delta function and its applications.

PHYCC102. Mechanics

After completion of the course, the students will be able to:

CO1: Understand the terminology and basic concepts used in Mechanics.

CO2: Differentiate between the inertial and noninertial frames and their respective equations of motion.

CO3: Analysis the Centre of mass and Laboratory frames of reference and their use in explaining elastic and inelastic collisions.

CO4: Understand the Planetary motions and motions of satellites using the principles of gravitation and Kepler's laws. Getting an idea of postulates of special theory of relativity and their implications.

Semester I: Generic Elective

PHYGE 101: Mechanics

After completion of the course, the students will be able to:

CO1: Understand the terminology and basic concepts used in Mechanics.

CO2: Differentiate between the inertial and noninertial frames and their respective equations of motion.

CO3: Analysis the Centre of mass and Laboratory frames of reference and their use in explaining elastic and inelastic collisions.

CO4: Understand the Planetary motions and motions of satellites using the principles of gravitation and Kepler's laws. Getting an idea of postulates of special theory of relativity and their implications.

Semester II: Core Course

PHYCC203: Electricity and Magnetism

After completion of the course, the students will be able to:

CO1: Enhance the knowledge of electricity and its relation with magnetic effects.

CO2: Explore important connections between theory, experiment and current applications. Transformer and its applications in real world.

CO3: Understand Gauss's law in Electrostatics and its applications and Laplace' and Poisson's equations, origin of magnetic field and study the magnetic properties of materials and their implications.

CO4: Analysis the concept of mutual inductance and Faraday's law of electromagnetic induction and acquire knowledge in the content areas of A. C. circuit focusing on the concepts that are commonly use in this area.

CO5: Understand the relation between R, L and C and learn to use complex methods for calculating current and voltage.

PHYCC204: Waves and Optics

After completion of the course, the students will be able to:

CO1: Understand the wave concept of light and its interpretations.

CO2: Comprehend the interference effects and diffraction effects due to different light sources & theory and working of interferometers.

CO3: Develop a practical aptitude of optics experiments demonstrating different phenomenon.

CO4: Analysis the study of wave motion and explore the physical behaviour in different problems.

Semester II: Generic Elective

PHYGE202: Electricity and Magnetism

After completion of the course, the students will be able to:

CO1: Enhance the knowledge of electricity and its relation with magnetic effects and have a clear understanding of Gauss's law in Electrostatics and its applications & Laplace' and Poisson's equations.

CO2: Understand the origin of magnetic field and study the magnetic properties of materials and their implications.

CO3: Analysis the Concept of mutual inductance and Faraday's law of electromagnetic induction.

CO4: Understand the relation between R,L and C and Transformer and its applications in real world.

Semester III : Core Course

PHYCC305: Mathematical Physics-II

After completion of the course, the students will be able to:

CO1: Explore a mathematical basis underlying the physical problems, study and practice the numerical problems involving different method of problem solving.

CO2: Understand Periodic functions and their analysis using Fourier's theorem.

CO3: Apply Methods of problem solving in Partial differential equations and study of special functions and integrals.

CO4: Analysis and demonstrate the different errors in experiments and their propagation.

PHYCC306: Thermal Physics

After completion of the course, the students will be able to:

CO1: Understand the Laws of thermodynamics, which form the basis of Thermal Physics.

CO2: Analysis the study of Carnot's cycle and Carnot's theorem.

CO3: Comprehend the Concept of entropy and its effect in systems and study the Van der waals equation of state

CO4: Understand the Maxwell's equations using the concept of thermodynamic potentials.

CC307: Digital system and Application

After completion of the course, the students will be able to:

CO1: To understand number systems and Boolean algebra and the difference between analog and digital electronics.

CO2: To have an understanding of arithmetic circuits' realization and their truth tables.

CO3: Explore the different network theorems and their applications to circuits.

CO4: To understand the different types of modulation and basics of communication theory.

Semester III: Generic Elective

PHYGE303: Thermal Physics and Electronics

After completion of the course, the students will be able to:

CO1: Understand the Laws of thermodynamics, which form the basis of Thermal Physics.

CO2: Analysis the study of Carnot's cycle and Carnot's theorem and having concept of entropy and its effect in systems.

CO3: Understand the Maxwell's equations using the concept of thermodynamic potentials.

CO4: Study the van der waals equation of state, number systems, boolean algebra, logic gates and their inter-conversions

Semester IV :Core Course

PHY CC408: Analog system and Applications

After completion of the course, the students will be able to:

CO1: Develop an insight into concepts of Analog electronics

CO2: Set up circuits and analyze their working and study the semiconductor devices which are of significance.

CO3: Analysis the Knowledge of Transistor, biasing and applications, amplifier and its uses.

CO4: Understand the detailed study of feedback circuits and their applications and know the theory and practical uses of oscillator.

PHYCC409: Mathematical Physics III

After completion of the course, the students will be able to:

CO1: Develop an understanding of mathematical tools for problem solving

CO2: Analysis the study of complex analysis and functions of complex variables

CO3: Understand the study of analytic functions and calculation of residue.

CO4: Comprehend the theory and solve numerical problems involving Fourier and Laplace transforms.

PHYCC410: Modern Physics

After completion of the course, the students will be able to:

CO1: Understand the fundamentals of early quantum theory.

CO2: Analysis the study of nucleus and its properties.

CO3: Develop the knowledge of laws of Radioactivity and its numerical implications.

CO4: Understand the theory behind laser and learn about the different types of Lasers.

PHYSEC402: Physics Workshop Skills

After completion of the course, the students will be able to:

CO1: Solve the problem and also think methodically, independently and draw a logical conclusions.

CO2: Use modern techniques, decent equipments and scientific softwares. Develop the following experimental tools: Numerically model simple physical systems using Euler's method, curve fitting, and error analysis.

CO3: Describe the methodology of science and the relationship between observation and theory & learn to minimize contributing variables and recognize the limitations of equipment.

CO4: Develop the proficiency in the acquisition of data using a variety of laboratory instruments and in the analysis and interpretation of such data.

Semester IV: Generic Elective

PHYGE404: Modern Physics

After completion of the course, the students will be able to:

CO1: Understand the Fundamentals of early quantum theory.

CO2: Study of nucleus and its properties.

CO3: Understanding of laws of Radioactivity and its numerical implications

CO4: Understand the theory behind laser and learn about the different types of Lasers.

Semester V :Core Course

PHYCC511. Quantum Mechanics

After completion of the course, the students will be able to:

CO1: Learn the mathematical tools needed to solve quantum mechanics problems which include complex functions and Hilbert spaces, and the theory of operator algebra.

CO2: Apply Solutions of ordinary and partial differential equations that arise in quantum mechanics

CO3: Develop problem solving methods that will include mathematical as well as numerical computations and solutions.

CO4: Build connections between mathematical development and conceptual understanding.

PHYCC512. Electromagnetic Theory

After completion of the course, the students will be able to:

CO1: Understand the time varying electric and magnetic fields and their relations.

CO2: Analysis the Wave propagation in conducting and dielectric media.

CO3: Comprehend the concepts of electromagnetic theory and boundary conditions.

CO4: Employ conceptual understanding to make predictions and then approach the problem mathematically.

Discipline Specific Elective (DSE) I:

PHYDSE 501: Classical Dynamics

After completion of the course, the students will be able to:

CO1: Understand the terminology used in Classical Mechanics.

CO2: Understand the important connections between theory and experiment.

CO3: Connect concepts and mathematical rigor in order to enhance understanding.

CO4: Study of retarded potentials and concepts of Plasma.

Discipline Specific Elective (DSE) II:

PHYDSE502: Nanomaterials and Applications

After completion of the course, the students will be able to:

CO1: Acquire knowledge in the content areas of nanotechnology.

CO2: To learn different methods to synthesize Nanomaterials

CO3: The applications of nanotechnology in day to day life and its importance.

CO4: Connect concept and everyday problems in order to enhance understanding.

Semester VI: Core Course

PHYCC613.Solid State Physics

After completion of the course, the students will be able to:

CO1: Understand crystal structure of different solids.

CO2: Calculate band gap and analyse the characteristics of solid.

CO3: Differentiation between Ferro, Ferri and Antiferro, Dia, para magnetic materials based on their crystal structure

CO4: Analysis the study of Bloch's theorem and K.P.Model

PHYCC614. Statistical Mechanics

After completion of the course, the students will be able to:

CO1: Understand the terminology used in Statistical Mechanics.

CO2: Employ conceptual understanding to make predictions, and then approach the problem mathematically

CO3: Understand the difference between Classical and Quantum Statistics.

CO4: Study the theory of radiation and its implications.

Discipline Specific Elective (DSE) III

PHYDSE603: Nuclear and Particle Physics

After completion of the course, the students will be able to:

CO1: Develop insight into nuclear physics and its correlation with Particle Physics.

CO2: Understand the different nuclear models and understand the different fundamental forces in nature

CO3: Comprehend the study of the particles quarks, baryons and leptons

CO4: Learn the study of radioactive decay and nuclear detections.

Discipline Specific Elective (DSE) IV:

PHYDSE 604: Bio Physics

After completion of the course, the students will be able to:

CO1: Understand the introduction to the field of Biophysics.

CO2: Comprehend the study of heat transfer in biomaterials.

CO3: Develop knowledge on study of chemical thermodynamics

CO4: Visualize the important connection between theory and experiment.