

B.Sc. (Honours) Physics

PROGRAM OUTCOME (PO)

After the completion of B.Sc. Honours Degree Programme, the students will be able to achieve the following outcomes:

PO1: Professional knowledge: Acquire comprehensive knowledge of major concepts, theoretical principles and experimental findings of various subjects in pure sciences.

PO2: Critical thinking and Cognitive skills: Convey the intricate science information effectively and efficiently, analyze and solve the problems related to plants, animal sciences without relying on assumptions and guesses.

PO3: Environment and sustainability: Understand the impact of the scientific solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO4: Effective Communication: Demonstrate familiarity with and will be able to analyze both verbally and in writing issues and forms of contemporary art with a clear understanding of historical precedents.

PO5: Instruments and Experiments: Acquire the skills in handling scientific instruments, planning and performing in laboratory experiments and drawing logical inferences from the scientific experiments.

PO6: Research and Analysis: Demonstrate analytical skill and proficiency in a range of tools and techniques used in research in science and interdisciplinary programmes.

PO7: Employability and higher Education: Show proficiency in professional, employability and develop soft skills required for higher education and placements.

PO8: Ethics: Imbibe ethical, moral and social values in personal and social life leading to highly cultured and civilized personality in the field of science.

PO9: Science and Society: Apply reasoning acquired by the scientific knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional science practice.

PO10: Interdisciplinary Learning: Integrate academic curriculum with other co-curricular goals, such as career development, life-long learning, develop interdisciplinary learning and opportunity to extend their knowledge across all disciplines.

PO11: Nation Building: Introspect and evolve into dynamic and creative individuals capable of socially productive, constructive actions that positively impact our Nation and the World at large.

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.

PSO7: Acquire awareness towards gender, environment, sustainability, human values, and professional ethics and understand the difference between acting, responding, reacting to various social issues.

Semester I: Core Courses

PHYCC101 Mathematical Physics I

Course Outcomes:

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

CO1: Understand Study of mathematical techniques used in Physical problems.

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

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

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

PHYCC102 Mechanics

Course Outcomes:

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 non-inertial frames and their respective equations of motion.

CO3: Analyse 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

Course Outcomes:

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

Course Outcomes:

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: Analyse 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

Course Outcomes:

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

Semester II: Generic Elective

PHYGE202: Electricity and Magnetism

Course Outcomes:

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

Course Outcomes:

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: Analyse and demonstrate the different errors in experiments and their propagation.

PHYCC306: Thermal Physics

Course Outcomes:

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: Analyse 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

Course Outcomes:

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

- CO1:** Understand number systems and Boolean algebra and the difference between analog and digital electronics.
- CO2:** Have an understanding of arithmetic circuits' realization and their truth tables.
- CO3:** Explore the different network theorems and their applications to circuits.
- CO4:** Understand the different types of modulation and basics of communication theory.

Semester III: Generic Elective

PHYGE303: Thermal Physics and Electronics

Course Outcomes:

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

Course Outcomes:

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: Analyse 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

Course Outcomes:

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

Course Outcomes:

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

Course Outcomes:

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

Course Outcomes:

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

Course Outcomes:

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

Course Outcomes:

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

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

CO2: Analyse 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

Course Outcomes:

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

Course Outcomes:

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

CO1: Acquire knowledge in the content areas of nanotechnology.

CO2: Learn different methods to synthesize Nanomaterials

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

CO4: Understand the introduction to the field of Biophysics.

CO5: Comprehend the study of heat transfer in biomaterials.

Semester VI: Core Course

PHYCC613.Solid State Physics

Course Outcomes:

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

PHYCC614. Statistical Mechanics

Course Outcomes:

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

Course Outcomes:

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: Project/ Dissertation/Internship

Course Outcomes:

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

CO1: Apply experimental approach of various scientific phenomena

CO2: Develop an insight into different research areas of physics and their applications

CO3: Develop knowledge on Augmenting reading habit of research/review articles

CO4: Skilled knowledge on specific project work

SEMESTER – I

ENG AEC101 : English Communication

Course Outcomes:

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

CO1: Communicate effectively using the techniques in the area of spoken as well as written communication.

CO2: Hone their LSRW skills within their communication.

CO3: Design and answer job interview questions

CO4: Demonstrate the ability to craft professional messages that are clear yet courteous.

SEMESTER I

HINAECC101– हिंदी-व्याकरण और सम्प्रेषण

परिणाम - 1. विभिन्न प्रतियोगी परीक्षाओं के लिए तैयार करना |

2. सम्प्रेषण-क्षमता की वृद्धि करना |

3. कार्यालयी-पत्र लेखन की क्षमता विकसित करना |

4. हिंदी के व्याकरणिक एवं सैद्धांतिक स्वरूप की जानकारी हासिल करना ||

SEMESTER-II

EVS AEC 202 : Environmental Science

Course Outcomes:

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

CO1: Understand multidisciplinary nature of environmental studies.

CO2: Understand the concept and types of natural resources and environmental pollution.

CO3: Evaluate the anomalies created due to haphazard population growth and its impact on environment.

CO4: Understand about the organizations, conventions and legislations working on mitigation of environmental issues.

SEMESTER – III

IRS SEC301 : Inter-Religious Studies

Course Outcomes:

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

CO1: Develop Inter-religious harmony & better understanding of other religions.

CO2: Interpret the different religions of the world.

CO3: Identify the common elements that bind different religions together.

CO4: Acquaint with the salient features of different religions.

