PSO, PO, CO

Department of Physics

Programme Specific Outcome of BSc Physics Programme

- **PSO1:** Understand and apply the principles of Classical mechanics, Thermodynamics and Electrodynamics.
- **PSO 2:** Understand and apply the principles of Mathematical Physics and Computational Physics and do Error analysis in measurements.
- **PSO 3:** Understandthe basic knowledge of python programming and application in quantum mechanics.

These program-specific outcomes aim to equip Physics Honors students with a strong foundation in theoretical and experimental physics, as well as critical thinking and research skills necessary for further studies or careers in academia, industry, or other scientific fields.

Programme Outcomes (PO)

- PO1: Demonstrate a comprehensive understanding of fundamental principles and theories in classical mechanics, Statistical Mechanics, electromagnetism, thermodynamics, quantum mechanics, and relativity, Nanomaterials, Electronics and communication.
- PO2: Design and conduct sophisticated experiments, utilizing a range of laboratory equipment and techniques, to investigate physical phenomena and validate theoretical models and effectively communicate the results through oral presentations and written reports.
- PO3: Demonstrate proficiency in using computer programming languages and numerical simulation tools to model physical systems and simulate experimental outcomes.
- PO4: Apply critical thinking and problem-solving skills to identify, analyse, and solve complex physics problems, both independently and collaboratively, using appropriate theoretical frameworks and experimental techniques.
- PO5: Develop a deep understanding of the interconnections between different branches of physics and their applications in other scientific disciplines and real-world contexts.
- PO 6: Demonstrate knowledge of current research trends and recent advancements in physics, and critically evaluate scientific literature to stay abreast of developments in the field
- PO 7:Exhibit ethical conduct in scientific research, including responsible data handling, adherence to safety protocols, and consideration of the societal impact of physics research and technology.
- PO 8: Cultivate effective communication and teamwork skills by actively participating in group projects, discussions, and scientific presentations, and engaging with diverse perspectives within the field of physics.

Courses Outcomes (COs)

Semester-I		
Course Name	**Topic**	**Course Outcome**
Major-1 (PHSHMJ101) (Course 1)	UNIT – I: Preliminary Math. Methods	**CO 1.1:** This is a very important course to Develop the knowledge of vector **CO 1.2:**Understand the concept of Calculus. **CO 1.3:**Understand the Probability theory and apply it in physical problem. **CO 1.4:** Develop the concept of Curvilinear coordinate system.
	UNIT – II: Introduction to Thermodynamics	**CO 1.5:**Thermal Physics is a course that combines the principles of thermal physics. This course Analyse the fundamental principles of thermodynamics, including the laws of thermodynamics and their applications to various physical systems. **CO 1.6:** This course also covers topics such as laws of thermodynamics, concept of entropy, kinetic theory of gases, heat transfer mechanisms etc.
SEC-1 (PHSSEC01) (Course 2)	Introduction to Python programming and Graph Plotting	**CO 2.1:**Understand the fundamentals of Python programming language, including variables, data types, control structures, functions, and object-oriented programming concepts. **CO 2.2:**Demonstrate proficiency in writing Python programs to solve various computational problems, manipulate data structures, and implement algorithms efficiently. **CO 2.3:**Utilize Python libraries such as NumPy, SciPy, and Pandas for numerical computations, scientific computing, and data analysis tasks.
Minor-1 (PHSMI01) (Course 3)	Mathematical Physics and Mechanics	**CO 3.1:**This a very basic course where students gain some basic knowledge about vector and application of vector calculus and differential equation. **CO 3.2:**This course will help students to analyse fundamental mechanics and its application to gravitation, rotational motion, central force etc.
Semester-II		
Course Name	**Topic**	**Course Outcome**
Major-2 (PHSHMJ102) (Course 4)	UNIT – I: Preliminary Classical Mechanics	**CO 4.1:** Demonstrate a comprehensive understanding of fundamental concepts in classical mechanics, including Newton's laws of motion, conservation of energy, conservation of momentum, and rotational motion. **CO 4.2:** Analyse and interpret the motion of particles and systems of particles in one, two, and three dimensions, including the motion under various forces and constraints.

	UNIT – II: Basic Electricity & Magnetism	**CO 4.3:**Electricity and Magnetism is an introductory and a very important course that explores the fundamental principles and applications of electromagnetic phenomena. Through theoretical study, mathematical analysis, laboratory experiments, and problem-solving exercises, students will develop a strong mathematical and analytical skills, as well as experimental and problem-solving abilities in the context of electricity and magnetism. **CO 4.4:**Students gain an appropriate knowledge for the practical applications of electromagnetic principles in various scientific and engineering disciplines.
SEC-2 (PHSSEC02) (Course 5)	Basic Instrumentation	**CO 5.1:** This is a very important course for the students where they can demonstrate proficiency in using a variety of basic laboratory instruments and equipment commonly employed in physics experiments, including resistors, analog and digital ammeters, oscilloscopes, multimeters, power supplies etc. **CO 5.2:** In this course students will be able to Design and conduct basic physics experiments to investigate physical phenomena, test theoretical models, and verify fundamental principles, utilizing appropriate instrumentation and experimental techniques.
Minor-2 (PHSMI01) (Course 6)	Thermal Physics and Statistical Mechanics	**CO 6.1:**Thermal Physics and Statistical Mechanics is a special course that combines the principles of thermal physics with the concepts of statistical mechanics. This course covers topics such as laws of thermodynamics, kinetic theory of gases, heat transfer mechanisms, statistical distributions, and equilibrium statistical mechanics. **CO 6.2:**Through theoretical study, mathematical analysis, and problem-solving exercises, students will develop a comprehensive understanding of the behaviour of thermal systems at both macroscopic and microscopic levels.