Department of Physics Programe outcome and Course outcome

The Department has formulated three broad educational goals for the undergraduate degree programs:

Physics knowledge: To provide students with the basic foundation in physics theory and experiment, and to motivate scientific enthusiasm and curiosity and the joy of learning.

Problem solving skills: To provide students with the tools needed to analyse problems, apply mathematical formalism and experimentation, and synthesize ideas.

Employment and technical skills: To provide the students with technical skills necessary for successful careers in physics and related or alternative careers for which a physics foundation can be very useful. These include mathematics, computers, electronics and devices, and communication skills (oral and written).

Program Outcomes

After completing B.Sc. Physics Programme students will be able to:

PO1: Transfer and apply the acquired fundamental knowledge of physics, including basic concepts and principles of 1) classical mechanics, electrodynamics, quantum mechanics, Statistical Mechanics and thermodynamics; (2) mathematical (analytic and numerical) methods and experimental methods for physics to study different branches of physics

PO2: 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 and diagrams, and use geometric arguments in problem-solving.

PO3: Apply and demonstrate knowledge of concepts of physics, to analyze a variety of physical phenomena

PO4: Demonstrate the learned laboratory skills, enabling them to take measurements in a physics laboratory and analyse the measurements to draw valid conclusions

PO5: Capable of oral and written scientific communication, and will prove that they can think critically and work independently.

PO6: Communicate effectively using graphical techniques, reports and presentations within a scientific environment.

PO7: Use and apply professional software for scientific data analysis and presentation

Course Outcomes

Semester-I		
Paper-PH-101	**Unit-I: Vectors, Mechanics**	The students will gain knowledge about vector algebra and will also know the physical concept of gradient, divergence and curl and their corresponding relations. Students will also acquire basic knowledge of Rotational mechanics, Lagrange's and Hamilton's equations and their applications and will understand how to apply the conservation of rotational motion in different parts of physics in everyday life.
	Unit-II: Gravitation, Elasticity and Fluid	After successfully completing this course, the student will be able to find the Gravitational potential and intensity in different cases, determination of g by Kater's Pendulum, Apply the concepts of elasticity to real world problems. List fundamental forces in nature, applications and factors affecting surface tension. Demonstrate different applications of Bernoulli's theorem, laws of elasticity, surface tension. Define and conceptualize different laws of fluid mechanics and related quantities like steady, turbulent flow and concept of Reynolds number
	Unit-III: Thermodynamics and Radiation	To understand the basic principle and laws of thermodynamics and also the concepts of Entropy, Different Engine, Porus plug experiment, Joule Thomson effect, different aspects of Radiation including Kirchhoff's law
	Unit-IV: Optics	After successful completion of the course the student will be able to: Describe the geometrical formation of images by thin lenses, lens equation and lens makers formula using fundamental laws of geometrical optics. Use mathematical analysis to calculate properties of image, formed by combination of lenses and applies theory of optics to calculate the cardinal points of an optical system and design optical devices Describe optical aberrations produced in image by lenses and methods of their removal. Describe the construction and operation of optical devices, including, eyepieces, compound microscope, grating, polarisers etc. Use mathematical analysis to find bright and dark fringes in an interference pattern of thin and wedge shaped film and find a wavelength of light using newton's rings

		Interpret a diffraction pattern to determine resolution of an optical system Geometrical determination of polarization of light and concept and determine a polarisation state of light by interpreting polarizer.
Semester-II		
PH-201A (Theory)	**Unit-I: Acoustic**	Students will gain a thorough knowledge about Composition of SHMs, Lissajou's figure, Damped and Forced vibrations. Will gain knowledge about propagation of different types of waves together with their characteristic and also learn about the acoustics of a hall.
	Unit-II: Electrostatics, Magneto statics, Magnetic effect of Current	Will gain knowledge about the electric field, electrostatic energy, dielectrics, Capacitor Acquire basic knowledge of magnetic properties. Able to calculate Magnetic field produced due to current carrying conductor indifferent cases
PH-201 B (Practical)	**Practical Part**	After doing this practical experiments, students will be able to learn the determination of different elastic modulus, acceleration due to gravity, Unknown frequency of a tuning fork, refractive index of a liquid, determination of coefficient of viscosity of any liquid, focal length of a unknown lens.
Semester-III		
PH-301-A Theory	**Unit-I: Current Electricity I:**	Students will get the knowledge about *Thermoelectricity,* direct current and varying and its application in electrical circuits, self induction and mutual induction
	Current Electricity II and Atomic Theory	Will gain knowledge about the Transformer, alternating current and different circuit related to alternating current To provide a detailed study of atom and also to learn the impact of magnetic fields in spectra. Students will also get the knowledge about X-Ray diffraction, about crystal structure, Compton effect and calculation of Compton shift.
PH-301B Practical	**Practical Part**	Will learn to determine different electrical related quantities using Meter Bridge, determination of magnetic field and magnetic moment, Potentiometer and its uses, Suspended coil Galvanometer, Spectrometer basics
Semester-IV		
PH-401 A (Theory)	**Unit-I: Electronics**	To motivate the students to apply the principles of electronics in their day-to-day life. It deals with both analog and digital electronics. After learning this unit, they will gain knowledge about Diode and it's use as rectifier,

		Zener diode and its use as voltage regulator, Transistor, FET and their uses OPAMP and its uses Different network theorem
	Unit-II: Relativity and Nuclear Physics	Will gain negation of ether concept and also about the geometry of space-time and space-time interval. To acquire knowledge and apply it to study the structure of nucleus. Know the formation of nucleus and their binding energy. To motivate the students and analyze the energy released by the nucleus during the fission and fusion process.
PH-401B Practical	**Practical Part**	Will acquired practical knowledge about Diode, Zener diode, Transistor, FET and Gate
Semester-V		
PH-501A Theory	**Unit-I Electromagnetic Theory and Laser & computer science, programming and digital electronics**	Thorough knowledge of electromagnetic nature of wave will be gained together with the proof of basic laws of reflection and refraction. Explain the interaction of radiation with matter, Quantum behaviour of light, thermal equilibrium and population inversion. Illustrate the absorption, spontaneous and stimulated emission with appropriate diagrams. Derive the Einstein's relation, conditions for large stimulated emission and light amplification. Distinguish between ordinary light and laser light. Define the characteristics of laser light. After learning computer science part student will be able to know the some basic terms of computer
	Unit-II Quantum mechanics-1 & Qunatum mechanics-II	After successful completion of the course the student will be able to: CO1: outline the historical aspects of development of quantum mechanics; CO2: explain the differences between classical and quantum mechanics; CO3: describe matter waves, wave function and uncertainty principle; CO4: describe Schrodinger's equation and its steady state form; CO5: solve Schrodinger's steady state equation for simple potentials to obtain eigen functions and eigen values CO6: apply Schrodinger's steady state equation for spherically symmetric potentials obtain eigen functions and eigen values; CO7: interpret quantum numbers in atomic system; CO8: discuss operator algebra in quantum mechanics.

PH-501B Practical	**Computer program**	On successful completion of this subject the students have the programming ability in BASIC Language to deal with physics problems.
Semester-VI		
PH-601 Project	After successful completion of the course the student will be able to CO1: design and test hypothesis CO2: Describe the underlying theory of experiments in the course. CO3: Perform derivations of theoretical models of relevance for the experiments in the course. CO4: Document their results, using correct procedures and protocols. CO5: Perform a quantitative analysis of experimental data including the use of computational and statistical methods where relevant. CO6: Interpret relationships in graphed data and develop an intuition for alternative plotting methods and communicate results from laboratory experiments, orally or in a written laboratory report. CO7: write a project report with literature review. CO8: defend the outcome of project work in scientific manner.	