

Department of Physics

PROGRAMME OUTCOMES (PO), PROGRAM SPECIFIC OUTCOMES (PSO) and COURSE OUTCOMES (CO):

Programme : B.Sc. (Hons.)

Program Outcomes (PO) :

B.Sc.(Hons.) (Bachelor of Science) Programme offers theoretical as well as practical knowledge about different subject areas of basic science and social science. These subject areas include Physics, Chemistry, Mathematics, Botany, Zoology, Computer Science, Statistics, Psychology and Economics depending on the Honours subject a student opts. This programme is most beneficial for students who have a strong interest and background in Science and Mathematics. The programme is also beneficial for students who wish to pursue multi and inter-disciplinary science careers in future. A well planned study programme is followed for holistic development of the students. Apart from imparting in depth knowledge over the respective subject the aim of the programme is to make the students responsible citizens with good moral and ethical values.

Following are the various programme outcomes:

PO1. This programme helps to develop scientific aptitude and thus can prove to be highly beneficial for the society as the scientific developments can make a nation or society to grow at a rapid pace.

PO2. This programme also helps to develop critical thinking, creativity, analytical and problem solving skills among the students.

PO3. After completion of this programme the students will be able to pursue higher studies in basic sciences or social sciences (M.Sc.) in different Universities, IIT's, IISER's, NIT's and other reputed institutes of higher learning in India and abroad, and then choose research career for the welfare of mankind and society. Students have also the option to enroll themselves for different applied science/ technical courses, B.Ed. and some other professional job oriented courses such as BCA, MCA, MBA, Marketing etc.

PO4. Students after completion of this programme have the eligibility to join jobs in Indian Civil Services as IAS, IFS, IPS etc., WBCS, UPSC, Banking Sector, Railways, Airlines etc., technical jobs at research institutes or as school teacher through SSC.

PO5. Science graduates will be ready to serve in industries or may opt for establishing their own business or industrial unit.

PO6. After completion of the B.Sc. degree there are various other options available for the science students. Often, they are recruited by big MNC's and different reputed companies in IT sector. Many students are directly recruited by some reputed companies through campus recruitment drive every year.

Programme Specific Outcomes (PSO) : B.Sc. (Hons.) in Physics (1+1+1 pattern):

PSO1. The students will acquire a scientific knowledge of the fundamental principles of Physics through study of Classical Mechanics, Electromagnetic Theory, Optics, Heat and Thermodynamics, Statistical Mechanics, Solid State Physics, Nuclear Physics, Modern Physics, Quantum Mechanics and other areas of Physics.

PSO2. The students will learn use of appropriate level of technology for : a) experimental design and implementation, b) analysis of experimental data, and c) numerical and mathematical methods in problem solving, d) different computational techniques and apply them for experimental data analysis and solving theoretical problems.

PSO3. The students will learn effective communication skill to present their knowledge of physics from basic concepts to specific advanced areas through a variety of oral, written, seminar, poster presentation, wall magazines, models, ppt presentation and other modes.

PSO4. Students will get academic exposure through the various Internships offered by reputed National Research Institutes during their UG tenure. They will be able to utilize the small summer/ winter recesses through their involvement in small projects under careful guidance of reputed faculties and may get the flavor of the current trend of research.

PSO5. The student will acquire a purposeful knowledge of scientific literature and ethical issues related to physics.

Course Outcome (CO) – PHYSICS (Hons.) (1+1+1 pattern)

Name of the Programme	Year of Introduction	Course Code	Course Name	Course Outcome
B.Sc. PHYSICS (Honours)	2010	Part-I : PHSA Paper-I (100 Marks)	Mathematical Methods-I & Mathematical Methods-II Waves and Optics – I Electronics-I	This course will acquaint the students with mathematical tools required to study theoretical and experimental physics. The role of mathematics in physics is primarily to provide mathematical models for describing physical reality. The students learn the basic tools like vectors, matrices, how to solve the differential equations, expansion of functions in Fourier Series which are applied in almost all branches of Physics. Students will gain basic knowledge about vibration, wave motion and wave theory of light. Study of classical harmonic oscillator and wave propagation in material media is important for progress to more advanced topics of Physics. Electronics-I course builds the foundation of the fascinating world of electronics which has application in every sphere of modern civilization. We can't think of a world without electronics. It is

				everywhere from television to mobile phone to space ship. Study of this course is very important to understand basic principles of electronics.
		Part-I: PHSA Paper-IIA (50 Marks)	Classical Mechanics-I Thermal Physics-I	<p>This is the first course on Classical Mechanics in UG level; this paves the way to understand the single particle kinematics and dynamics through the prescriptions of Newton.</p> <p>The study of nature through different conservation principles are introduced with detailed treatment. The Physics of rotational motion of a rigid body with the basic features are also introduced.</p> <p>The students learn the basic distribution laws which are obeyed by the molecules in the Thermal Physics part and the application to explain the basic laws of ideal gas. The limitation to explain different observed phenomena with ideal gas prescription leads the study of real gas physics in this course. This part covers other very important aspects related to academic importance and also to industrial applications.</p> <p>The introduction of radiation and inadequacy to explain the features with classical physics is effectively the doorstep of Quantum Theory.</p>
		Part-I: PHSA Paper-IIB (50 Marks)	Laboratory	<p>The students will learn basic experimental skills and techniques in this course.</p> <p>The experiments with the spectrometers grow interest among the students as they will be able to determine some well known physical quantities like refractive index etc. by performing laboratory work.</p> <p>The students will start the preliminary experiments on Electronics in this course.</p>

		Part-II : PHSA Paper-III (100 Marks)	Electronics-II	<p>This course is very important from academic point of view and also from applications in different spheres. The course is a good extension of the previous courses particularly the introduction of amplifiers, oscillators, digital logics in the Electronics part helps the students to get an entry in the modern digital world.</p>
			Electricity and Magnetism	<p>This course will give students an understanding of the phenomena of electricity and magnetism which is extremely essential for higher studies in physics and also important for various engineering applications.</p>
			Electrostatics	<p>Students will learn fundamental properties of charged particles and electric fields in this course. This course builds the basis of further studies of electricity and magnetism.</p>
		PHSA Paper-IVA (50 Marks)	Wave Optics-II	<p>This course will help the students to explain different optical phenomena on the basis of wave theory of light.</p>
			Quantum Mechanics-I	<p>Students will be introduced to the fascinating world of quantum physics in this course. One cannot have any other tool except this branch to probe the physics in the micro world. The students become familiar with the mathematical tools and their physical implications and have a good practice in solving problems using those tools.</p>
			Thermal Physics-II	<p>Thermodynamics is introduced in this course and this covers fundamental laws of nature. Problems related to conversion of heat into work or the vice versa give rise to thermodynamics. Students will learn the principle of operation of engines and refrigerators in this course.</p>
		Paper-IVB (50 Marks)	Laboratory	<p>The students will strengthen their skill of experimental work in this course. They will be able to perform experiments on various topics of electricity, magnetism and optics in this course. They will also learn to analyze experimental data.</p>
		Part-III : PHSA Paper-V (100 Marks)	Classical Mechanics-II	<p>The students will learn advanced topics of classical mechanics in this course. The students will be able to study the behavior of a system under constraint forces following the Lagrangian and Hamiltonian approaches. This course is</p>

			Special theory of Relativity	extremely essential for higher studies in physics. The students will be acquainted with revolutionary concept of special relativity which is extremely essential for understanding fundamental concepts of physics.
			Quantum Mechanics-II	The already introduced Quantum Mechanics finds application in this course and hence this is the appropriate course to introduce Atomic Physics so that the students get continuity in their progress.
			Atomic Physics	The students will learn the fundamental principles of atomic structure, atomic and molecular spectra and LASER in this course.
		PHSA Paper-VI (100 Marks)	Nuclear Physics-I & II	In this course the students will learn fundamental and some advanced topics of nuclear physics and its application. This has a good impact for pursuing research work in renowned institutions in India and abroad.
			Solid State Physics – I & II	The study of the solid state encompasses the understanding of the structural, mechanical, magnetic and electrical properties of the substance as well as the forces that bind the units into the solid state. By far the most important subfield of solid state physics in the 20th century is the study of semiconductors, superconductors and solid state electronics.
		PHSA Paper-VIIA (50 Marks)	Statistical Mechanics	This course provides two very important aspects especially from academic point of view. Statistical Mechanics provides a general approach to an ensemble and can reproduce the fundamental laws of thermodynamics from theoretical approach.
			Electromagnetic Theory	The students go through a very important training in the other part of the course, i.e. Electromagnetic Theory which is a fundamental platform of classical physics.
		PHSA Paper-VIIB (50 Marks)	Laboratory	The students become more familiar and learn how to handle the optical instruments like spectrometers, bi-prism etc. judiciously. They perform

		PHSA Paper-VIIIA (50 Marks)	Laboratory	<p>experiments to verify the basic laws of physical optics in more detail.</p> <p>The electrical part offers experiment to investigate the ferromagnetic properties of soft iron and another experiment to verify Fourier's theorem – an important theorem which is applied in many branches of physics. The objective is to motivate the students to build their career in experimental physics.</p> <p>The students go through this laboratory work very extensively and become familiar with the electronic experiments. The course is exhaustive, the student learn and develop a good command to handle the electronic components, CRO and their applications. A number of experiments on analogue and digital electronics are incorporated in this practical course.</p> <p>Electronic applications in various fields are growing every day and are expected to reach the peak in future, the course work paves the way to understand the proper route in this branch.</p>
		PHSA Paper-VIIIB (50 Marks)	Laboratory	<p>This is a very useful course of learning one computer language: FORTRAN/ C.</p> <p>This has wide applications in academics, computational work, industry. Various numerical analysis (like Simpsons 1/3rd rule and trapezoidal rule etc) using Fortran/C would be useful for doing various type of integration numerically.</p>