B.Sc. General in Physics

Programme Specific Outcome (PSO)

Student with B. Sc. General in Physics can be:

- Formulate, analyze and solve complex and diverse problem through analytical and computational techniques and apply them to other disciplines when appropriate.
- Understand the basic concepts of methodology of science and the fundamentals of mechanics, properties of matter and electrodynamics
- Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological challenges.
- Understand the theoretical basis of quantum mechanics, relativistic physics, nuclear physics, optics, spectroscopy, solid state physics, statistical physics, photonics and thermodynamics.
- Analyses, test, and interpret technical arguments, and form independent judgments.
- Gather and organize relevant qualitative and quantitative information such as related problems, examples, and counterexamples.
- Communicate physical ideas via extended, clear, and well-organized written presentations.
- The degree with physics will prepare students for careers in the corporate sector, tech-industry, and government agencies

Course Outcome (CO)

Semester	Paper/ Course	Name of the Paper /Course	Course Outcome
Semester-I	DSC-1A	Mechanics	***Vectors***: Student can learn about the vector. It will help to understand the mathematical operation of vector quantity. ***Ordinary Differential Equations***: It is the fundamental mathematical tools to understand any physical phenomenon. ***Laws of Motion***: Students will know about Reference frames. Inertial frames; Newton's Laws of Motion, Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum and able to solve problem related to this. ***Momentum and Energy***: Students will learn about Work and Kinetic Energy Theorem and will be able to find Stable and unstable equilibrium condition. ***Rotational Motion***: Students will learn about Angular momentum of a particle and system of particles, Students will learn about Principle of conservation of angular momentum ***Gravitation***: Students will learn aboutLaw of gravitation. Gravitational potential energy and able to solve problems related to gravitation. ***Oscillations:*** Students will learn about Simple Harmonic Oscillations. Differential equation of SHM and its solution. They also calculate Kinetic energy, potential energy, total energy and their time-average values ***Elasticity:*** Students will learn about Relation between Elastic constants. Twisting torque on a Cylinder or Wire. ***Special Theory of Relativity:*** Student can

			understand about Einstein theory relativity, length contraction and time dilation.
Semester-II	DSC-1B	Electricity and Magnetism	Students will know about Electric Field and Electric Potential and able to solve problems related to this. They also know about Dielectric Properties of Matter. Students will learn about Magnetic Properties of Matter, Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem Student will able to solve problems related to magnetism.
Semester-III	DSC-1C	Thermal Physics and Statistical Mechanics	Students will know about First Law , 2nd law of thermodynamics and able to solve problems based on this. Students will know about the Concept of Entropy, Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy, Maxwell-Boltzmann Law of Distribution and able to calculate problems based on this. Students will know about Maxwell-Boltzmann law, distribution of velocity, Quantum statistics - Fermi- Dirac distribution law, Bose-Einstein distribution law, comparison of three statistics. They learn about Behavior of Real Gases and Deviations from the Ideal Gas Equation
	SEC-1	Physics Workshop Skill	Students will learn principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance, Students will get clear idea on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. They also get brief idea for testing, specifications. Distortion factor meter, wave analysis.

		Computational Physics	Students will able learn about Concept of flowchart, symbols, guidelines, types. Examples: Cartesian to Spherical Polar Coordinates and can calculate of sin (x) as a series, algorithm for plotting (1) lissajous figures and (2) trajectory of a projectile thrown at an angle with the horizontal, Students can understand about basic elements of FORTRAN: Character Set, Constants and their types, Variables and their types, Keywords, Variable Declaration and concept of instruction and program. Operators: Arithmetic, Relational, Logical and assignment Operators. Expressions: Arithmetic, Relational, Logical, Character and Assignment Expressions
Semester-IV	DSC-1D	Waves and Optics	Students will learn about transverse waves on a string. Travelling and standing waves on a string and Normal Modes of a string and also Group velocity, Phase velocity. Students will know the Plane waves. Spherical waves and Wave intensity, Surface Tension, Viscosity and Rate flow of liquid in capillary tube and also Poiseuille's formula by which they can determinant of coefficient of viscosity of a liquid Students will learn about the simple harmonic motion - forced vibrations and resonance. Electromagnetic nature of light. Definition and Properties of wave front also can be learned. They will get insight about Interference and Diffraction.
	SEC-II	Electrical Circuits and Network Skills	Students will know about Integrated Circuits and different type of gates. They will know about De Morgan's Theorems. Boolean Laws and Simplification of Logic Circuit using Boolean Algebra. Students will learn about Half and Full Adders. Half & Full Substractors, 4-bit

			binary Adder/Subtractor. Sequential Circuits. Students will learn about Computer memory. Memory organization & addressing. Memory Interfacing and learn about Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in- Serial-out and Parallel-in-Parallel-out Shift Registers. Students will know about Conductivity and Mobility, Concept of Drift velocity, PN Junction Fabrication etc.
		Basic Instrumentation Skill	Students will able to make block diagram of bridge and then they can understand working principles of basic (balancing type) RLC bridge. Students will learn about specifications of RLC bridge, block diagram & working principles of a Q- Meter. Digital LCR bridges.
Semester-V	DSE-1A	Elements of Modern Physics	***Planck's quantum:*** Student will be able to understand the concept of photon, able to explain photoelectric effect, Compton scattering, De Broglie wavelength and matter waves ***Problems with Rutherford model***: Student will be able to understand Bohr's quantization rule and atomic stability, can calculate the energy levels for hydrogen like atoms and their spectra. ***Position measurement:*** Student can understand about Gamma ray microscope thought experiment, can relate about Wave-particle duality and Heisenberg uncertainty principle. ***Two slit interference experiment:*** Student can solve Schrodinger equation for non-relativistic particle, will know the relation about Momentum and Energy operator. They can obtain the basic concept stationary states; physical interpretation of wave function. ***One Dimensional infinitely Rigid Box:***

			Student can calculate energy eigenvalues and Eigen functions, normalization constant.They can understand Quantum mechanical scattering and tunneling in one dimension - across a step potential and across a rectangular potential barrier. ***Radioactivity***: Student will be able to calculate Law of radioactive decay. Student can calculate Mean life and half-life; decay. ***Fission and fusion:*** Student can calculate Mass deficit, relativity and generation of energy; They will understand Fission - nature of fragments and emission of neutrons
	SEC-3	Renewable Energy and Energy Harvesting	Students will learn about Fossil fuels and Nuclear Energy, their limitation, need of renewable energy, non-conventional energy sources. They will learn about Solar energy, its importance, storage of solar energy, solar pond, non convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. . Students will learn about Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies. They will know the Plane waves. Spherical waves and Wave intensity. Students will learn about the Hydropower resources, hydropower technologies, environmental impact of hydro power sources Students will learn about the simple harmonic motion - forced vibrations and resonance.
Semester-VI	DSE-1B	Electricity and Magnetism	Students will know about Electric Field and Electric Potential and able to solve problems related to this. They also know about Dielectric Properties of Matter. Students will learn about Magnetic

			Properties of Matter, Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem Student will able to solve problems related to magnetism.
	SEC-4	Weather Forecasting	Students will learn about elementary idea of atmosphere and physical structure and composition; compositional layering of the atmosphere. They will learn about Wind; forces acting to produce wind; wind speed direction: units, its direction; measuring wind speed and direction; humidity, clouds and rainfall. Students will know the Global wind systems; air masses and fronts: classifications; jet streams; local thunderstorms; tropical cyclones: classification; tornadoes; hurricanes. Students will learn Climate: its classification; causes of climate change. They will learn about Weather forecasting: analysis and its historical background; need of measuring weather and types of weather forecasting; weather forecasting.
		Applied Optics	***Sources and Detectors:*** Students will learn fundamental idea on Lasers, Spontaneous and stimulated emissions, Theory of laser action, Einstein's coefficients, light amplification, Characterization of laser beam, He-Ne laser, and Semiconductor lasers. ***Fourier Optics***: Students will able to understand concept of spatial frequency filtering, Fourier transforming property of a thin lens Fourier Transform Spectroscopy (FTS) is a powerful method for measuring emission and absorption spectra, with wide application in atmospheric remote sensing, NMR spectrometry ***Holography:*** Students will get a brief idea on

			basic principle and theory: coherence, resolution, Types of holograms, white light reflection hologram application of holography in microscopy, interferometry, and character recognition. ***Fibre Optics:*** Students will learn about optical fibers and their properties, Principal of light propagation through a fibre, The numerical aperture, Attenuation in optical fibre and attenuation limit, Single mode and multimode fibres, Fibre optic sensors: Fibre Bragg Grating