B.Sc Honours(CBCS) in Physics

Programme Specific Outcome (PSO)

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

- Apply the basic principles of Physics to the events occurring around us and also in the world.
- This programme helps to develop critical thinking, creativity, analytical and problem solving skills among the students.
- Explain any physical phenomenon numerically as well as graphically.
- The students will be able to engage themselves in independent thinking and lifelong learning in the present context of scientific and technological advancement.
- Communicate scientific information in a clear and concise manner both orally and in writing or through audio video presentations
- 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, technical jobs at research institutes or as school teacher through SSC.
- 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.
- The students will acquire a fair amount of computational skill using open source software packages such as Gnuplot, Python, Numpy, Scipy, Matplotlib, Matlab, LaTex , Arduino IDE etc. in both Linux and Windows platform. This will not only prepare them for higher studies or research in any branch of Physics but also make them ready for various kind of job in IT sector and other industries.
- The students will learn effective communication skill to present their knowledge of physics from basic concepts to specific advanced areas in the form of preparation of laboratory note book, project work, seminar presentation, poster presentation, wall magazines, models and other modes.

Course Outcome (CO)

Semester	Paper/Course	Name of the Paper/Course	Course Outcome
Semester-I	CC-1	Mathematical Physics-I	Mathematics is the language of Physics. Students will be able to write detailed solutions using appropriate mathematical language The student has knowledge of central concepts in multivariable analysis, including space curves; directional derivative; gradient; multiple integrals; line and surface integrals; vector fields; divergence, curl and flux; the theorems of Green and Stokes, and the divergence theorem. Student view 2 dimensional and 3 dimensional problems as independent concept rather than one being a special case of other to able to student.
	CC-2	Mechanics	Mechinics is the grammer of physics so, Students will know about Reference frames, projectile motion. Students will learn about Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames Students will learn about Angular momentum of a particle and system of particles. Student will learn about some basic properties such as Gravitation, Elasticity and flow dynamics that will help to understand physical phenomenon.
	GE-I	Mechanics, Oscillation and electromagnetism	Through this syllabus student will gain brief knowledge about whole of the topics which will increase the skill in their honors subject. Also increase mathematical skill of a student through

			Physics.
Semester-II	CC3	Electricity and Magnetism	It gives an opportunity for the students to learn about one of the fundamental interactions of electricity and magnetism, both as separate phenomena and as a singular electromagnetic force. Students will know about Electric Field and Electric Potential, Dielectric Properties, Magnetic Properties of Matter and able to solve problems related to this
	CC4	Waves and Optics	This course will help the learner to learn about concept of superposition Principle for equal frequencies and different frequencies (Beats). They will learn about Graphical and Analytical Methods in Lissajous Figures and their uses to solve various numerical problems. The Students can learn about the Plane and Spherical Waves and also learn what will be Longitudinal, Transverse Waves and Plane Progressive (Travelling) Waves. They can find out the Particle and Wave Velocities by this Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave.
	GE-2	Thermal Physics and Statistical Mechanics	Through this syllabus student will gain brief knowledge about whole of the topics which will increase the skill in their honors subject.
Semester-III	CC5	Mathematical physics	The students would learn mathematical methods to solve the various problems in physics. The topics include the Fourier Series that helps to understand about periodic function and their application in others problem, special functions that helps to understand singular point of

			second order linear differential equation and some basic function. Special Integrals that helps to understand beta and Gamma function and relation between them, Variational Calculas that will be helpful to understand basic idea of diff function as well as Legendre transformation. Partial differential equations where Student can calculate partial differential equation using separation of variables,
	CC6	Thermal Physics	The course makes the students able to understand the basic physics of heat and temperature and their relation with energy, work, radiation and matter. The students also learn how laws of thermodynamics are used in a heat engine to transform heat into work. The course contains the study of laws of thermodynamics, thermodynamic description of systems, thermodynamic potentials, kinetic theory of gases.
	CC7	Digital Systems and Applications	Students will know about Integrated Circuits and different type of gates. The process how the De Morgan's Theorems and Boolean Laws are applicable for Simplification of Logic Circuit. The Students will learn about Half and Full Adders. Half & Full Substractors, 4-bit binary Adder/Substractor. Sequential Circuits which will help to learn about Computer memory, Memory organization & addressing. Memory Interfacing.
	SEC-I	Electrical Circuits and Network Skills	The deep understanding about the working mechanism of electronics and how to simplify difficult circuit network can be understood here.

Semester-IV	CC8	Mathematical Physics III	To gain a deep understanding of the physical world and develop skill in mathematical modeling, problem solving and critical thinking.
	CC9	Elements of Modern Physics	In this course students would be able to understand Basic experiments of modern physics such as: Determination of Plank's and Boltzmann's constants, Determination of ionization potential, Wavelength of H-spectrum, They learn about Planck's quantum, interference experiment, One Dimensional infinitely Rigid Box, Radioactivity and Fission and fusion. All these topics will be helpful to understand the fundamental concepts in modern physics.
	CC10	Analog Systems and Applications	Students will know about Conductivity and Mobility, Concept of Drift velocity, PN Junction Fabrication etc. They also know about the Principle and structures of (1) LEDs, (2)Photodiode and (3) Solar Cell. The Students will learn about n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations and learn aboutTransistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers. Student will learn about Op-Amps applications.
	SEC-2	Applied Optics	The deep understanding about Laser, Holography and Fiber Optics and their application in real life industries.

Semester-V	CC11	Quantum Mechanics and Applications	This is the one of the most important subject in undergraduate course. Students solve various various quantum mechanical features by solving various potentials: example, Finite and infinite well, Harmonic oscillator. Students can learn Quantum theory of Hydrogen atoms, solution of Schrodinger equation under central force, Orbital angular momentum and spin angular momentum Electron's magnetic moment, Energy of a magnetic dipole, Stern-Garlach experiment. To study Fine structure of hydrogen atoms, atoms in presence of electric and magnetic fields application of Quantum mechanics for atomic systems and learn Many electron atoms, identical particles, Pauli principle.
	CC12	Solid State Physics	Students will know about Amorphous and Crystalline Materials, Lattice Vibrations and Phonons. The students will learn about Dia-, Para-, Ferri- and Ferromagnetic Materials, about Dielectric Properties of Materials. Students will learn about superconducting behaviour of materials and Kronig Penny model.
	DSE-I	Classical Dynamics	Students will understand calculus of variation; learn about small oscillations, rigid body motion and non-linear dynamics.
	DSE-II	Nuclear & Particle Physics	Students can understand the ideas of basics of nucleus and their energy. They understand the procedures for nuclear fission and fusion. the properties of positive rays, experimental proof by frank - hertz method. They can understand the relationship between various types of couplings, properties of x-ray and fundamental conservation laws and symmetries to judge the viability of

			production and decay processes for nuclei and elementary particles. Students can build ability to have insight into the interplay between theory, models, and data from modern experiments and into how the major open questions are being addressed. A basic understanding of nuclear properties and models that describe the quantum structure, decay, and reactions of nuclei. They can understand basic knowledge about the Standard Model of elementary particles and interactions the basic knowledge about the quark-gluon plasma the roles of nuclear and particle physics in energy production, medicine, and astrophysics - for example how to search for dark matter and how to understand the origin of the elements in the universe.
Semester-VI	CC-13	Electromagnetic Theory	The students can learn Maxwell's equations, gauge transformations, Pyonting vector, Electromagnetic field energy density, momentum density etc. and Propagation of electromagnetic wave through different medium and Polarization of electromagnetic waves
	CC-14	Statistical Mechanics	Student will get insight about macrostate and microstate phase space, entropy and thermodynamic probability. They can understand backbody radiation, kirchhoff' s law , StefanBoltzmann law . wien' sdisplaecement law , wien's distribution law and Saha's ionization formula. · Student can explain radiation as a photon gas and thermodynamics function of photo gas. They can understand Bose derivation of planck' s law and F.D distribution law. Student can explain thermodynamic function of a

			completely and strongly degenerate Fermi gas, fermi energy . Student can understand specific heat of metals.
	DSE-III	Communication Electronics	Students can identify, formulate and solve complex problems to achieve demonstrated conclusions using mathematical principles and sciences. The can get research based knowledge to design and conduct experiments, analyze, synthesize and interpret the data pertaining to Electronics and Communication Engineering problems and arrive at valid conclusions
	DSE-IV	Digital Signal Processing	Students can get insight about basic discrete-time signal and system types, convolution sum, impulse and frequency response concepts for linear, time-invariant (LTI) systems, difference equation realization of LTI systems and discrete-time Fourier transform and basic properties of these. They also understands periodic sampling of analog signals and the relation between Fourier transforms of the sampled analog signal and the resulting discrete-time signal.