B.Sc. Physics (Hon's)

PROGRAME OUTCOME	COURSE NAME	COURSE CODE	COURSE OUTCOME
❖ Evaluate hypotheses, theories, methods and evidence within their proper contexts. ❖ Critically interpret data, write reports and apply the basics of rules of evidence. ❖ Select, interpret and critically evaluate information from a range of sources that include books, scientific reports, journals, case studies and the internet. ❖ Develop proficiency in the analysis of complex physical problems and the use of mathematical or other appropriate techniques to solve them. ❖ Demonstrate skills in the use of computers for control, data acquisition, and data analysis in experimental investigations. ❖ Recognize the need to engage in lifelong learning through continuing education and research.	1. MATHEMATICAL PHYSICS-I	BSC-H-PHY-101	❖ Solve differential equations of different order by using the concept of integrating factor and particular integration method.
			❖ Solve the partial differential equations encountered in physical problems and draw inferences from solutions.
			❖ Apply basic knowledge of vector algebra and introduced scalar & vector fields, geometrical representation of div., curl.
			❖ Expressed Divergence, Curl, and Gradient in various coordinates systems and their physical interpretations.
			❖ Introduced Dirac delta function with suitable examples.
			❖ In vector integration, apply various theorems (Gauss, Green and Stoke) to solve different physical problems.
	2. MECHANICS AND WAVE MOTIN	BSC-H-PHY-102	❖ Learner will understand basic theorems and concepts of basic physics.
			❖ To understand the dynamics of different types of pendulum and to determine 'g'
			❖ To understand the elastic properties of matter and expression of bending beam with its application as a cantilever.
			❖ To understand concept of surface tension and its relation with excess pressure and radius of curvature.
			❖ To acquire basic knowledge about dynamics, work and energy, elasticity, gravitation and central force motion.
			❖ To understand concept of fluid flow and pressure energy in fluids.
	3. ELECTRICITY AND MAGNETISM	BSC-H-PHY-201	❖ To understand basic concept of current and current density vector.

❖ Solve complex problems by critical understanding, analysis and synthesis. ❖ Demonstrate engagement with current research and developments in the subject.			❖ To understand Kirchhoff's law by loop analysis.
			❖ To understand and illustrate Network theorem including Thevenin's theorem, Norton's theorem and Maximum power theorem.
			❖ To determine Time constant of L-R and C-R circuit and its physical significances.
			❖ To understand the concept of magnetism and magnetic properties of materials such as Ferromagnetic, Anti ferromagnetic and Ferrimagnetic.
	4. **KINETIC THEORY**	BSC-H-PHY-202	❖ Learner will understand the gas consists of very small particles known as molecules.
			❖ Understand the average velocity of the ideal gas particles.
			❖ Know about the mass of these particles.
			❖ Describe The average kinetic energy of the gas particles.
			❖ To understand concept of Liquefaction of gases.
			❖ To acquire basic knowledge about transport phenomena in gases.
	5. **MATHEMATICAL PHYSICS-II**	BSC-H-PHY-301	❖ To understand the uses of mathematical formulations, analysis and models to obtain insight in specialized areas of Physics.
			❖ To understand concept of mechanics and discrete mathematics.
			❖ To understand the knowledge they have gained to solve real problems.
			❖ Understand graphs, their types and its applications in study of shortest path algorithms.
			❖ The students are to be examined entirely on the basis of problems, seen and unseen.
			❖ Identify different special mathematical functions.
	6. **THERMO DYNAMICS**	BSC-H-PHY-302	❖ To understand basic concept of thermodynamics and to distinguish between work done due to Adiabatic and isothermal changes.
			❖ To understand Concept of thermodynamic process.

			❖ To state laws of thermodynamics and concept of internal energy.
			❖ To understand Carnot's ideal heats engine, Carnot cycle and its efficiency, Carnot's theorem, Otto and Diesel engines with their efficiencies.
			❖ To state first and Second latent heat equations.
			❖ To understand Concept of entropy, Change of entropy in Reversible process and Irreversible process, T-S diagram.
	7. **Digital Systems And Applications**	BSC-H-PHY-303	❖ To understand the application of digital circuit.
			❖ To solve problems associated with energy crisis by means of photo thermal conversion and photovoltaic conversion.
			❖ To demonstrate construction and working of flat-plate collector, liquid flat plate collector, Basic photovoltaic system and solar modules for power generation.
			❖ To understand Laser, its types, applications - Ruby LASER, He-Ne LASER.
			❖ To verify experimentally of discrete atomic energy levels and correspondence principle.
			❖ To understand the concept of Karnaugh Map.
	8. **BASIC INSTRUMENTATION SKILLS**	BSC-H-PHY-305s	❖ To understand standards of measurements and calibration.
			❖ To learn measurement of temperature using: Non - electrical, Electrical and Radiation Methods.
			❖ To learn measurement of pressure using McLaudGuage (b) Pirani Gauge.
			❖ To learn Measurement of flow using: Venturi tube, Pitot tube and Rotameter.
			❖ To understand characteristics of sound and to know typical sound measuring system.
			❖ To learn Measurement of magnetic field by using search coil method and Hall gauge meter.
	9. **MATHEMATICAL PHYSICS-IV**	BSC-H-PHY-401	❖ To understand Cartesian (X, Y, Z), Spherical polar (r,θ,φ) and Cylindrical (ρ,φ,z) co-ordinate systems and their transformation equations.

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			❖ To understand expression for gradient, divergence, curl and Laplacian in curvilinear, spherical polar and cylindrical co-ordinate systems.
			❖ Solve partial differential equations with appropriate initial or boundary conditions with Green function techniques.
			❖ Have confidence in solving mathematical problems arising in physics by a variety of mathematical techniques.
			❖ To understand special relativity theory and to solve Lorent'z transformation equations, Length contraction, time dilation.
			❖ Know the knowledge they have gained to solve real problems.
	10. **Elements Of Modern Physics**	BSC-H-PHY-402	❖ To solve problems associated with energy crisis by means of photo thermal conversion and photovoltaic conversion.
			❖ To demonstrate construction and working of flat-plate collector, liquid flat plate collector, Basic photovoltaic system and solar modules for power generation.
			❖ To understand Laser, its types, applications - Ruby LASER, He-Ne LASER.
			❖ To verify experimentally of discrete atomic energy levels and correspondence principle.
			❖ To understand atomic spectra and distinguish classical planetary model and Bohr's theory of hydrogen atom and quantum mechanical Bohr's Somerfield model.
			❖ To derive energy Eigen value and Eigen functions particle in a box and 1-D harmonic oscillator.
	11. **Analog Systems And Applications**	BSC-H-PHY-403	❖ To understand and learn the Mechanical Properties, Thermal Properties, Electrical Properties, and Magnetic Properties of materials.
			❖ To understand the basic concept of Dislocations and Plastic Deformation.
			❖ To understand Atomic Diffusions and its Mechanism.
			❖ To verify experimentally of discrete atomic energy levels and correspondence princ.

			❖ To state Fick's Law (Ist and IInd Law). To understand basics of phase diagram, its classifications, and its interpretation.
12. **Renewable Energy And Energy Harvesting**	BSC-H-PHY-405S		❖ To understand the Fossil fuels and Alternate Sources of energy.
			❖ To solve problems associated Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits.
			❖ To demonstrate fundamentals of Wind energy.
			❖ To understand Ocean Energy Potential against Wind and Solar.
			❖ To understand Geothermal Resources, Geothermal Technologies.
			❖ To understand power consumption, Environmental issues and Renewable sources of energy, sustainability.
13. **MATHEMATICAL PHYSICS**	BSC-H-PHY-501A		❖ Solve differential equations like Divergence, Curl, Gradient, Legendre and Hermite that are common in physical sciences.
			❖ Learn about special type of matrices that are relevant in Physics and then learn about tensor.
			❖ Solve transfer functions in Instrumentation using Laplace transforms.
			❖ Get introduced to special functions like gamma function, delta function, Bessel function and their recurrence relations.
			❖ Learn the fundamentals and their application Fourier series and Laplace transforms, their inverse transform.
			❖ Apply the knowledge of Tensors to understand phenomenon like stress and strain.
14. **Solid State Physics**	BSC-H-PHY-502		❖ Be able to account for interatomic forces and bonds.
			❖ Have a basic knowledge of crystal systems and spatial symmetries.
			❖ Be able to account for how crystalline materials are studied using diffraction, including concepts like the Ewald sphere,

			form factor, structure factor, and scattering amplitude.
			❖ Be able to perform structure determination of simple structures.
			❖ Understand the concept of reciprocal space and be able to use it as a tool know the significance of Brillouin zones.
			❖ Know what phonons are, and be able to perform estimates of their dispersive and thermal properties.
15. Nanoscience and Nanotechnology	BSC-H-PHY-503C		❖ Demonstrate the understanding of length scales concepts, nanostructures and nanotechnology.
			❖ Identify the principles of processing, manufacturing and characterization of nanomaterials and nanostructures.
			❖ Apply the electronic microscopy, scanning probe microscopy and nanoindentation techniques to characterize the nanomaterials and nanostructures.
			❖ Evaluate and analyze the mechanical properties of bulk nanostructured metals and alloys, nanocomposites and carbon nanotubes.
			❖ Bring knowledge about thin film deposition techniques.
16. Solid State Physics	B.Sc-H-601B		❖ Students have gained the knowledge of crystal structure of solid.
			❖ Students have understood the influence of lattice vibration on thermal behaviour.
			❖ Students have understood the concept of Dia, Para and Ferromagnetism.
			❖ Students have understood the concept of motion of electron in electric and magnetic fields.
			❖ After studied solid state physics, student implemented mini projects based on concept of solid state physics.
17. Electromagnetic Theory	BSC-H-PHY-601		❖ To understand basic concept of current and current density vector.
			❖ To understand Kirchhoff's law by loop analysis.

			❖ To understand and illustrate Network theorem including Thevenin's theorem, Norton's theorem and Maximum power theorem.
			❖ To determine Time constant of L-R and C-R circuit and its physical significances
			❖ To understand the concept of magnetism and and magnetic properties of materials such as Ferromagnetic, Antiferromagnetic and Ferrimagnetic.
	18. Statistical Mechanics	BSC-H-PHY-602	❖ To understand basic concepts of probability and probability distribution.
			❖ To solve Random walk problem in one dimension and Gaussian probability distribution.
			❖ To understand specification of the state of the system (Classical & Quantum).
			❖ To state Basic postulate of equal a priori probability.
			❖ To understand Statistical Ensembles and Calculation of microstates of an ideal monatomic gas.
	19. CLASSICAL DYNAMICS	BSC-H-PHY-603 B	❖ Solve differential equations of different order by using the concept of integrating factor and particular integration method.
			❖ Define and understand basic mechanical concepts related to discrete and continuous Mechanical systems.
			❖ Describe and understand the vibrations of discrete and continuous mechanical systems.
			❖ Describe and understand planar and spatial motion of a rigid body.
			❖ Describe and understand the motion of a mechanical system using Lagrange-Hamilton formalism.
			❖ Describe and understanding the kepler's law using variation methods.