

Semester	V
Course	Physics (Minor)
Paper Code	B3PH230511T
Paper Title	General Physics and Modern Physics
No. of Credits	4
Theory / Practical / Composite	Theory
Minimum No. of preparatory hours per week a student has to devote	4
Number of Modules	2
Syllabus	Group A: General Physics Mathematical Methods: Scalar and vector fields, gradient, divergence & curl. Integral theorems, Statements of Stokes' & Gauss's divergence theorem, polar coordinates, spherical polar coordinates. [6 Lectures] Mechanics: Conservative force fields: concept of potential Systems of particles, centre of mass, conservation principles. Central Force: reduced mass, types of orbits under central forces (qualitative), Rotational kinematics and dynamics – kinetic energy of a rotating body, conservation of angular momentum. Moment of inertia – physical significance, radius of gyration, parallel and perpendicular axis theorem for laminar body (applications: rectangular bar, annular disc, sphere, cylinder). [10 Lectures] General Properties of Matter: Torsion of a cylinder, bending moment equation, cantilever, bending of beam supported at ends with a concentrated load at the centre. Surface tension, surface energy, angle of contact, capillary phenomena. Newton's law of viscous force, Poiseuille's equation. [8 Lectures] Module B: Modern Physics Special theory of relativity – Postulates, Lorentz transformation, length contraction, time dilation, simultaneity, velocity addition, relativistic momentum, mass-energy equivalence. [10 Lectures] Quantum Physics: Planck's quantum hypothesis, Compton effect, Wave particle duality, De-Broglie's wave, Heisenberg's uncertainty principle. Davisson-Germer's Experiment. [4 Lectures]

	Wave function, probabilistic interpretations, Schrodinger's equation, particle in one dimensional infinite potential well, energy eigenvalues. [6 Lectures] Lasers: Existence of Metastable states, Spontaneous and Stimulated Emission, Population Inversion, Principle of He-Ne Laser. [4 Lectures]	
Learning Outcomes	1. Applications of the foundations of classical physics. 2. Basic understanding of relativistic and quantum phenomena. 3. Exposure to Lasers	
Reading/Reference Lists	1. Vector Analysis, Murray Spiegel, Seymour Lipschutz, Dennis Spellman 2. Classical Mechanics and General Properties of Matter, Satyendra Nath Maiti, Debi Prasad Raychaudhuri, New Age International. 3. Handbook of Degree Physics, C.R. Dasgupta Vol 1 and 2, Kolkata Book Syndicate. 4. Concepts of Modern Physics, Arthur Beiser, McGraw Hill.	
Evaluation	CIA 30 + End Sem 70	
Paper Structure for Theory Semester Exam	For Each Group: (5/7) x 3 marks + (2/3) x 10 marks	