DEPARTMENT OF PHYSICS
Teaching Plan

Session: 2022-2023 (January–June)

Name of the teacher: Himanshu Bora
Programme Name: B.Sc. Physics (CBCS)

Semester: 2nd Semester (CBCS)
Paper Name and Code:
1. Waves and Optics (PHY-HC-2026)
2. Electricity and Magnetism (PHY-HG/RC-2016)

1. Waves and Optics (PHY-HC-2026)

Week / Month	Unit / Topic	No. of Classes	Learning Resources & Teaching Methods	Evaluating Modes
January - February 2023	**Unit I: Superposition of Collinear Harmonic Oscillations** • Linearity and Superposition Principle. • Superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (Beats). • Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and (2) equal frequency differences.	4	**Learning Materials:** • Recommended Textbooks • Lecture Notes • Video Lectures **Teaching Methods:** • Chalk and Talk • Digital Demonstration • Classroom Discussion • Problem Solving Methodologies	• Class Test • Assignment
	Unit II: Superposition of Two Perpendicular Harmonic Oscillations • Graphical and Analytical Methods. • Lissajous Figures with equal an unequal frequency and their uses.	3		
	Unit III: Wave Motion • Plane and Spherical Waves. • Longitudinal and Transverse Waves. • Plane Progressive (Travelling) Waves. • Wave Equation. • Particle and Wave Velocities. Differential Equation. • Pressure of a Longitudinal Wave. Energy Transport. • Intensity of Wave. Water Waves: Ripple and Gravity Waves. •	6		

Week / Month	Unit / Topic	No. of Classes	Learning Resources & Teaching Methods	Evaluating Modes
March 2023	**Unit IV: Velocity of Waves** • Velocity of Transverse Vibrations of Stretched Strings. • Velocity of Longitudinal Waves in a Fluid in a Pipe. • Newton's Formula for Velocity of Sound. Laplace's Correction.	5	**Learning Materials:** • Recommended Textbooks • Lecture Notes • Video Lectures **Teaching Methods:** • Chalk and Talk • Digital Demonstration • Classroom Discussion • Problem Solving Methodologies	• Class Test • Assignment
	Unit V: Superposition of Two Harmonic Waves • Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. • Phase and Group Velocities. • Changes with respect to Position and Time. • Energy of Vibrating String. Transfer of Energy. • Normal Modes of Stretched Strings. Plucked and Struck Strings. • Melde's Experiment. • Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves.	5	**Learning Materials:** • Recommended Textbooks • Lecture Notes • Video Lectures **Teaching Methods:** • Chalk and Talk • Digital Demonstration • Classroom Discussion • Problem Solving Methodologies	• Class Test
June 2023	**End Semester Examination**			

2. Electricity and Magnetism (PHY-HC-2016)

Week / Month	Unit / Topic	No. of Classes	Learning Resources & Teaching Methods	Evaluating Modes
January-February 2023	**Unit I : Vector Analysis** • Review of vector algebra (Scalar and Vector product), • Gradient, divergence, Curl and their significance, • Vector Integration, Line, surface and volume integrals of Vector fields, • Gauss-divergence theorem and Stoke's theorem of vectors (statement only).	8	**Learning Materials:** • Recommended Textbooks • Lecture Notes • Video Lectures **Teaching Methods:** • Chalk and Talk • Digital Demonstration • Classroom Discussion • Problem Solving Methodologies	• Class Test • Assignment

Week / Month	Unit / Topic	No. of Classes	Learning Resources & Teaching Methods	Evaluating Modes
March 2023	**Unit II : Electrostatics** • Electrostatic Field, electric flux, Gauss's theorem of electrostatics. • Applications of Gauss theorem – Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. • Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. • Calculation of electric field from potential.	8	**Learning Materials:** • Recommended Textbooks • Lecture Notes • Video Lectures **Teaching Methods:** • Chalk and Talk • Classroom Discussion • Problem Solving Methodologies	• Class Test • Assignment
April 2023	**Unit II : Electrostatics** • Capacitance of an isolated spherical conductor. • Parallel plate, spherical and cylindrical condenser. • Energy per unit volume inelectrostatic field. • Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. • Parallel plate capacitor completely filled with dielectric.	5	**Learning Materials:** • Recommended Textbooks • Lecture Notes **Teaching Methods:** • Chalk and Talk • Classroom Discussion • Problem Solving Methodologies	• Class Test
June 2023	**End Semester Examination**			