Lesson Plan 2025-26

Teacher Name-: ANUJ

Name of the Class -: B.Sc. HONS. 1ST YEAR

Name of the Subject -: Mechanics

Month	Topic
July to August	Unit 1: Basics of Mechanics: Mechanics of single and system of particles, Conservation law of linear momentum, Angular momentum and mechanical energy for a particle and a system of particles, Centre of Mass and equation of motion, Constrained Motion. Work and Kinetic Energy Theorem. Conservative and non-conservative forces
August to September	Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy. Unit 2: Generalized Notations: Degrees of freedom and Generalized coordinates, Transformation equations, Generalized Displacement, Velocity, Acceleration, Momentum, Force and Potential, Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems. Hamilton's variational principle, Lagrange's equation of motion from Hamilton's principle, Linear Harmonic oscillator, Simple pendulum, Atwood's machine
September to October	Unit 3: Rotational Dynamics: Rotation of Rigid body, moment of inertia, torque, angular momentum, kinetic energy of rotation. Theorems of perpendicular and parallel axes with proof. Moment of inertia of solid sphere, hollow sphere, spherical shell, solid cylinder, hollow cylinder and solid bar of rectangular cross-section. Acceleration of a body rolling down on an inclined plane. Fly wheel, Torsion pendulum. Kinetic energy of rotation. Motion involving both translation and rotation. Unit 4: Special Theory of Relativity: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications.
October to November	Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum

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Lesson Plan 2025-26

Teacher Name-: ANUJ

Name of the Class -: B.Sc. HONS. 1ST YEAR

Name of the Subject -: Electricity & Magnetism

Month	Topic
July to August	Unit 1: Electric Field and Electric Potential Electric field: Conservative nature of Electrostatic Field. Electrostatic Potential. Derivation of electric field E from potential as gradient. Laplace's and Poisson equations. The Uniqueness Theorem. Gauss's Law, Differential form of Gauss's law and applications of Gauss's law. Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field.
August to September	Surface charge and Mechanical force on a conductor. Energy per unit volume. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Methods of images and its-application to simple electrostatic problems, plane infinite sheet and sphere. Unit 2: Magnetic Field: Biot-Savart's Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of B: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field.
September to October	Unit 3: Magnetic Properties of Matter: Force on a dipole in an external field, Electric currents in Atoms, Electron spin and Magnetic moment, types of magnetic materials, Magnetization vector (M), Magnetic Intensity (H), Magnetic Susceptibility and permeability, Relation between B, H and M, Electronic theory of dia and Para-magnetism, Domain theory of ferromagnetism (Langevin's theory), Cycle of Magnetization- B-H curve and hysteresis loop: Energy dissipation, Hysteresis loss and importance of Hysteresis Curve. Unit 4: DC current Circuits: Electric current and current density, Electrical conductivity and Ohm's law (Review), Kirchhoff's laws for D.C. networks, Network theorems: Thevenin's theorem, Norton theorem, Superposition theorem. Reciprocity theorem, Maximum Power Transfer theorem
October to November	Applications to dc circuits. Growth and decay of current in a circuit with (a) Capacitance and resistance (b) resistance and inductance (c) Capacitance and inductance (d) Capacitance resistance and inductance. Alternating Current Circuits: A resonance circuit, Phasor, Complex Reactance and Impedance, Analysis for RL, RC and LC Circuits, Series LCR Circuit: (1) Resonance, (2) Power Dissipation (3) Quality Factor and (4) Band Width, Parallel LCR Circuit.

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Lesson Plan 2025-26

Teacher Name-: ANUJ

Name of the Class -: B.Sc. HONS. 2nd YEAR

Name of the Subject -: Vibrations and Wave Optics

Month	Topic
July to August	Unit 1: 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
August to September	Unit 2: Wave equation. Traveling waves, Plane and spherical waves. Superposition of two harmonic waves. Standing waves on a string. Superposition of N harmonic waves. Pulses and wave packets. Introduction to different models, light waves, electromagnetic nature of light waves. Coherence and Interference: Interaction of independent light sources. Classification in terms of division of amplitude and division of wave front. Young's double slit experiment. Unit 3: Lloyd's mirror and Fresnel's biprism. Interference in thin films parallel and wedgeshaped films. Fringes of equal inclination (Haidinger fringes) and fringes of equal thickness (Fizeau fringes). Michelson's interferometer: Theory, form of fringes (mention only), applications, visibility of fringes
September to October	Theory of partial coherence. Coherence time and coherence length, i.e., temporal and spatial coherence. Fabry-Perot interferometer: Theory, Airy's formula, sharpness of fringes, finesse, visibility of fringes. Unit 4: Fraunhofer diffraction: Single slit, rectangular and circular aperture. Multiple slits. Plane diffraction grating. Resolving power and dispersive power of a plane diffraction grating. Fresnel diffraction: Fresnel's integrals, Cornu's spiral, Fresnel diffraction pattern at a straight edge, a slit and a wire (qualitatively using Cornu's spiral).
October to November	Holography: Principle of holography, recording and reconstruction method and its theory as interference between two plane waves

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Lesson Plan 2025-26

Teacher Name-: ANUJ

Name of the Class -: B.Sc. HONS. 3rd YEAR

Name of the Subject -: Statistical Physics-I

Month	Topic
July to August	Unit- I : Classical Statistics Entropy and thermodynamic probability. Maxwell Boltzmann distribution law. Partition function. Thermodynamic functions of finite number of energy levels.
August to September	Thermodynamic functions of an ideal gas. Classical entropy expression, Gibbs paradox. Law of equipartition of energy – applications to specific heat and its limitations. Unit -II : Classical Theory of Radiation Properties of thermal radiation, Kirchhoff's law, Stefan-Boltzmann law and Wien's displacement law Quantum Theory of Radiation.
September to October	Planck's law of black-body radiation. Deduction of Wien's radiation formula, Rayleigh- Jeans law. Stefan-Boltzmann law and Wien's displacement law from Planck's law
October to November	Laser: working principle, thermal equilibrium of radiation, principle of detailed balance, Einstein's A and B coefficients, population inversion. Two-level and three-level systems.

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Lesson Plan 2025-26

Teacher Name-: ANUJ

Name of the Class -: B.Sc. HONS. 3rd YEAR

Name of the Subject -: Electronics Devices: Physics and Application -I

Month	Topic
July to August	Unit I Mesh analysis for d.c. and a.c. circuits: Nodal analysis duallty in networks. To Equivalent of a four terminal network. Thevenin and Norton theorem. Maximum power tranfer, superposition and reciprocity theorems. Z, Y, H parameters.
August to September	Basic semiconductor physics – p and n type semiconductors, energy level diagram, conductivity and mobility, pn junction fabrication 9simple idea). Barrier formation in pn junction diode, current flow mechanism in forward and reverse biased diode (recombination, drift and saturation of drift velocity)
September to October	Unit II Single pn junction devices (physical explanation, current voltage characteristics and one or two applications0 Two terminal devices-rectifier diode, Zener diode, photo diode, LED, solar cell and varactor diode. Three-terminal devices-junction field effect transistor (FET), unijunction transistor (UJT) and their equivalent circuits
October to November	Two junction devices p-n-p and n-p-n transistors, physical mechanism of current flow, active, cutoff and saturation regions. Transistor in active region and equivalent circuit.

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