**Indira Gandhi National College Ladwa**
**Lesson Plan**

Name of Teacher: Dr. Neetu Semester: Ist Class: B.Sc. I

Paper: Mechanics Course Code: B23-PHY101

Session: 2026-27

| SNo | Period | Topics to be Covered | Academic Activity to be Organized |
|---|---|---|---|
| 1. | AUGUST | **Fundamental of Dynamics Unit-I:** Rigid Body, Moment of Inertia, Radius of Gyration, Theorems of Perpendicular and Parallel axis(with proof), Moment of inertia of ring, Disc, Angular disc, Solid Cylinder, Solid Sphere, Hollow Sphere, Rectangular Plate, Square Plate, Solid Cone, Triangular Plate, Torque, Rotational Kinetic Energy, Angular Momentum, Law of Conservation of Angular Momentum, Rolling Motion, Condition for Pure rolling, Acceleration of Body Rolling Down an Inclined Plane, Flywheel, Moment of Inertia of an Irregular Body. | Introduction of Syllabus& course Outcomes |
| 2 | SEPTEMBER | **Elasticity:** Deforming force, Elastic limit, stress, strain and their types, Hooks law, Moduli of elasticity relation between shear angle and angle of twist, elastic energy stored/ volume in an elastic body, elongation produced in heavy rod due to its own weight and elastic potential energy stored in it, tension in rotating rod, Poisson's ratio and its limiting value, relation between young modulus, Bulk modulus and poisson's ratio. Derive the relation between young modulus, bulk modulus and modulus of rigidity. Torque required for twisting cylinder, hollow shaft is stiffer than solid one. Bending of beam, bending moment and its magnitude, Flexural rigidity, geometrical moment of inertia for beam of rectangular cross-section and circular cross-section, Bending of Cantilever, weight of cantilever uniformly distributed over its entire length, depression of a centrally loaded beam | Class Assignments |

| | | | |
|---|---|---|---|
| | | supported at its ends, determination of elastic constants for material of wire by Searle's method | |
| **3.** | **OCTOBER** | **Special theory of Relativity :** Michelson Morley experiment and its outcome, Postulate of special theory of relativity, Lorentz transformation, Simultaneity and order of events, Lorentz contraction, time dilation, Relativistic transformation of velocity, Relativistic addition of velocities, Variation of mass-energy equivalence, Relativistic Doppler effect, Relativistic kinematics, transformation of energy and momentum, Transformation of force, Four vectors, Problems of relativistic dynamics, Acceleration of charge particle by constant electric field, Transverse electric field. | Class Assignments and discussion on assignments, class presentations |
| **4.** | **NOVEMBER** | **Gravitation and Central force motion:** Law of gravitation, Potential and field due to spherical shell and solid sphere, Motion of a particle under central force field, Two body problem and its reduction to one boby problem and its solution, Compound pendulum or physical pendulum in form of elliptical lamina and expression of time period, Determination of g by means of bar pendulum, Normal coordinates and normal modes, Normal modes of vibration for given spring mass system, Possible angular frequencies of oscillation of two identical simple pendulums of length (l) and small bob of mass (m0) joined together with spring of spring constant(k) | Quiz, class test, class presentations |
| **5.** | **DECEMBER** | REVISION | Class<br><br>tests |

**Indira Gandhi National College Ladwa**
**Lesson Plan**

Name of Teacher: Dr. Neetu Semester: II Class: B.Sc. I

Paper: Electricity, Magnetism and EM Theory Course Code: B23-PHY-201

Session: 2026-27

| SNo | Period | TopicstobeCovered | Academic Activity to be Organized |
|---|---|---|---|
| 1. | JANUARY | **Vector Background and Electric Field (Unit 1st):** Gradient of a scalar and its physical significance, line, surface and volume integrals of a vector and their physical significance, gauss's divergence theorem, Stoke's theorem, Conservation nature of electrostatic field, electrostatic potential , potential as line integral of field, potential difference derivation of electric field E from potential as gradient. Derivation of laplace and poisson equations, electric flux, Gauss's Law, differential form of Gauss's law and applications of Gauss's law. Mechnical force of charged surface, Energy per unit volume. (Unit-1st) | Introduction of Syllabus& course Outcomes |
| 2 | FEBRUARY | **Magnetic Field (Unit-II):** Biot-Savart law and its simple applications: straight wire and circular loop as a Magnetic Dipole and its Dipole Moment, Ampere's Circuital Law and its applications to (1) Solenoid and (2) Toriod, Properties of B:curl and divergence. Magnetic Properties of Matter :Force on a dipole in a external field, electric currents in atoms, Electron spin and Magnetic moments, 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 paramagnetic. 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 | Class Assignments |

| | | | |
|---|---|---|---|
| **3.** | **MARCH** | **Time Varying Electromagnetic fields Unit-III:** Electromagnetic induction Faraday's laws of induction and Lenz's Law, Self-inductance, Mutual inductance, Energy stored in a magnetic field, Derivation of Maxwell's equation, Displacement Current, Maxwell's equations in differential and integral form and their physical signifance<br>**Electromagnetic Waves:** Electromagnetic Waves, Transverse nature of electromagnetic wave, energy transported by electromagnetic waves, Poynting vector, Poynting theorem, Propagation of plane electromagnetic waves in free space & Dielectrics | Class Assignments and discussion on assignments, class presentations |
| **4.** | **APRIL** | **Alternating Current Circuits and Network theorems :** (Unit IV) Electric current and current density, electrical- conductivity and Ohm's law (Review), Kirchhof's laws for D.C networks, Network theorems : Thevenin's Theorem, Norton theorem, Superposition theorem<br>Alte**rnating 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. | Quiz, class test, class presentations |
| **5.** | **MAY** | REVISION | Class<br>tests |

**Indira Gandhi National College Ladwa**
**Lesson Plan**

Name of Teacher: Dr. Neetu Semester: III Class: B.Sc. II

Paper: Thermodynamics and Statistical Physics

Course Code: B23-PHY301 Session: 2026-27

| SNo | Period | Topics to be Covered | Academic Activity to be Organized |
|---|---|---|---|
| 1. | AUGUST | **Thermodynamics:-I (Unit-Ist)** : thermodynamic system, variables and equation of state, thermal equilibrium, zeroth law of thermodynamics; concept of heat, work and its sign, first law of thermodynamics-its significance and limitations, internal energy as a state function, different types of processes isochoric process, isobaric process, adiabatic process, isothermal process, cyclic process, reversible and irreversible process, first law and cyclic process; Second law of thermodynamics and its significance Carnot theorem; absolute scale of temperature, absolute zero and magnitude of each division on work scale and perfect gas scale, joule's free expansion, joule Thomson effect, Joule-Thomson (porous plug) experiment, conclusions and explanation, analytical treatment of Joule Thomson effect, Entropy, calculations of entropy of reversible and irreversible process, T-S diagram, entropy of a perfect gas, Nernst heat law (third law of thermodynamics); Liquefaction of gases (oxygen, air, hydrogen and helium) solidification of helium below 4K, Cooling by adiabatic demagnetization. | Introduction of Syllabus& course Outcomes |
| 2 | SEPTEMBER | **Thermodynamics:-II (Unit-IInd):** Derivation of Clausius- Clapeyron and Clausius latent heat equations and their significance, specific heat of saturated vapours, phase diagram and triple point of a substance, development of Maxwell thermodynamics relations, thermodynamics functions: Internal | Class Assignments |

| | | | |
|---|---|---|---|
| | | energy(u), Helmholtz function (F), Enthalpy (H), Gibbs function (G) and the relations between them, derivation of Maxwell thermodynamics relations from thermodynamical functions, Application of Maxwell relation: relations between two specific heat of gas, derivation of Clausius Clapeyron and Clausius equation, variation of intrinsic energy with volume for (i) perfect gas (ii) vander wall gas (iii) solids and liquids, derivation of Stefan's law, adiabatic compression and expansion of gas & deduction of theory of Joule Thomson effect. | |
| **3.** | **OCTOBER** | **Statistical Physics-I Unit- III:** Distribution of N (for N=2,3,4) distinguishable and indistinguishable particles in two boxes of equal size, microstates, macrostates, thermodynamical probability, constraints and accessible states, statistical fluctuations, general distribution of distinguishable particles in compartments of different sizes, beta parameter, Entropy and Probability; concept of phase space, division of phase space into cells, Postulates of statistical mechanics; Classical and Quantum statistics, basic approach to these statistics, Maxwell-Boltzmann statistics applied to an ideal gas in equilibrium-energy distribution law, Maxwell's distribution of speed & velocity (derivation required), most probable speed, average and r.m.s speed, mean energy for Maxwellian distribution. | Class Assignments and discussion on assignments, class presentations |
| **4.** | **NOVEMBER** | **Statistical Physics-II Unit- IV:** Dulong and Petit Law, derivation of Dulong Petit law from Classical Physics; need of Quantum statistics-classical versus quantum statistics, Bose-Einstein energy distribution law, application of B.E. statistics to Planck's radiation law, degeneracy and B.E. condensation; Fermi-Dirac energy distribution law, F.D. gas and degeneracy, Fermi energy and Fermi temperature; F.D. energy distribution law for electron gas in metals, zero point energy, average speed (at 0K) of electron gas. | Quiz, class test, class presentations |
| **5.** | **DECEMBER** | REVISION | Class<br><br>tests |

**Indira Gandhi National College Ladwa**
**Lesson Plan**

Name of Teacher: Dr. Neetu Semester: IV Class: B.Sc.- II

Paper: Waves and optics Course Code: B23-PHY-401

Session: 2026-27

| SNo | Period | Topics to be Covered | Academic Activity to be Organized |
|---|---|---|---|
| 1. | JANUARY | **Interference (Unit-1st):** Interference by Division of Wave front: Young's double slit experiment, Coherence, Conditions of interference, Fresnel's biprism and its applications to determine the wavelength of sodium light and thickness of a mica sheet, phase change on reflection<br>Interference by division of Amplitude : Plane parallel thin film, production of colours in thin flims, classification of fringes in films, interfernece due to transmitted light and reflected light, wedge shaped film, Newton's rings | Introduction of Syllabus& course Outcomes |
| 2 | FEBRUARY | **Diffraction (Unit-II):** Fresnel's diffraction: Huygens-Fresnel's theory, Fresnel's assumptions, rectilinear propagation of light, diffraction at a straight edge, rectangular slit and diffraction at a circular aperture. Diffraction due to a narrow slit, diffraction due to a narrow wire.<br>**Fraunhoffer diffraction:** Single slit diffraction, double slit diffraction, plane transmission grating spectrum, dispersive power of grating, limit of resolution, Rayleigh's criterion, resolving power of telescope and a grating. | Class Assignments |
| 3. | MARCH | **Polarization (UNIT- III):** Polarization by reflection, refraction and scattering, Malus Law, Phenomenon of double refraction, Huygen's wave theory of double refraction (Normal and oblique incidence) Analysis of polarized light, Nicol prism, Quarter wave plate and half wave plate, production and detection of (i) Plane polarized light (ii) | Class Assignments and discussion on assignments, class presentations |

| | | | |
|---|---|---|---|
| | | Circularly polarized light and (iii) Elliptically Polarized light. Optical activity, Fresnel's theory of optical rotation, specific rotation, Polarimeters (half shade and Biquartz) | |
| **4.** | **APRIL** | **Lasers and fiber optics (Unit IV):**Basic Concept of absorption and emission of radiations, amplification and population inversion; Main Components of lasers: (i) Active Medium (ii) Pumping (iii) Optical Resonator; Properties of laser beam: Monochromaticity, Directionality, intensity, Coherence (Spatial & Temporal Coherence); Metastable state, Excitation mechanism and types of Lasers (He-Ne Laser & Ruby Laser), Applications<br><br>**Fibre optics :** Optical Fibres and their properties, Principal of light propagation througha optical fibre, Acceptance angle and numerical aperature, types of optical fibres: single mode and multimode fibres, Advantages and Disadvantages of optical fibres, Applications of optical fibres, fibre optic sensors: Fibre Bragg Grating | Quiz, class test, class presentations |
| **5.** | **MAY** | REVISION | Class<br><br>tests |

**Indira Gandhi National College Ladwa**
**Lesson Plan**

Name of Teacher: Dr. Neetu Semester: V Class: B.Sc. III

Paper: Modern Physics Course Code: B23-PHY-501

Session: 2026-27

| SNo | Period | Topics to be Covered | Academic Activity to be Organized |
|---|---|---|---|
| **1.** | **AUGUST** | **Introductory Quantum Mechanics (Unit Ist)** :Need of Quantum Mechanics, Planck's quantum hypothesis and radiation formula, Quantization of EM radiation and photoelectric effect, Compton effect, de Broglie hypothesis, de-Broglie wave, wave- packet, phase and group velocities, Time-dependent and time-independent Schrodinger equations, Properties of wave function, Probability current density, linear momentum and energy operators, commutator of position and linear momentum operator, expectation values of position and linear momentum, particle confined in a one dimensional infinite box: energy eigen functions and eigen values. Heisenberg's Uncertainty Principle and its applications. | Introduction of Syllabus& course Outcomes |
| **2** | **SEPTEMBER** | **Solid State Physics (Unit-II)** : Crystalline state, crystal lattice, basis, lattice translation vectors, primitive and non- primitive unit cell, symmetry operations, Bravais lattices in two and three dimensional, Miller indices, Crystallographic planes, interplanar spacing, simple crystal structures: Nacl ,Cscl, HCP, Zinc Blende, Diamond diffraction of waves by crystal, bragg's law, idea of Reciprocal Lattice: Reciprocal lattice to SC, BCC and FCC lattice, non-crystalline solids (introduction only) | Class Assignments |

| | | | |
|---|---|---|---|
| **3.** | **OCTOBER** | **Atomic and Molecular Physics (Unit-III)** : Sommerfeld theory (qualitative), Relativistic Correction, fine structure of He line, Lamb shift, Larmor's theorem (qualitative), Vector atom model, Electron spin, Space quantization, Spin-Orbit Interaction Energy, LS and jj coupling, Spectral terms of equivalent and non-equivalent electrons, Anomalous Zeeman effect, Lande's g-factor, splitting od D1 and D2 lines in weak magnetic field, Raman Effect, Stoke and Anti-Stoke lines. | Class Assignments and discussion on assignments, class presentations |
| **4.** | **NOVEMBER** | **Nuclear and Particle Physics (Unit-IV)** : Composition of nucleus, Stability of nucleus, nuclear properties, nuclear size, spin, parity, magnetic moment, quadrupole moment, Nuclear Models, Liquid Drop Model and Semi-Empirical Mass formula, Nuclear Shell Model and Magic numbers (qualitative idea only), classification of fundamental particles, Quark and Lepton Quantum numbers, Hadrons, Baryons and Mesons, Different type of interaction and their Properties. | Quiz, class test, class presentations |
| **5.** | **DECEMBER** | REVISION | Class tests |

**Indira Gandhi National College Ladwa**
**Lesson Plan**

Name of Teacher: Dr. Neetu Semester: VI Class: B.Sc. III

Paper: Electronics Course Code: B23-PHY-601

Session: 2026-27

| SNo | Period | Topics to be Covered | Academic Activity to be Organized |
|---|---|---|---|
| **1.** | **JANUARY** | Unit –Ist **Semiconductor diodes:** Intrinsic and Extrinsic, P-N junction diode and its V-I characteristics, ideal diode, Zener and Avalanche breakdown, Zener Diode and its application as voltage regulator, Photo- diode, Light Emitting Diode, Solar Cell.<br>P-N junction as Half wave and full wave Rectifiers: Efficiency and Ripple Factor, Comparison of Rectifiers, Clipping and Clamping circuits, Voltage Multiplier Circuits, Doubler and Tripler. | Introduction of Syllabus& course Outcomes |
| **2** | **FEBRUARY** | Unit –IInd **Bipolar Transistor:** Bipolar Junction Transistor, Transistor Action and working (PNP and NPN Transistor), Transistor Circuit configuration: Common Base (CB), Common Emitter(CE) and Common Collector (CC) configuration, Current amplification and relationship between them, comparison of characteristics of Transistor in different configuration.<br>**Amplifiers:** CB, CC and CE amplifiers, Transistor Biasing: Selection of operating point, load line analysis and operating point. Methods of transistor biasing and stabilization (fixed Base Bias, Bias with emitter resistor and voltage divider circuit). | Class Assignments |

| | | | |
|---|---|---|---|
| **3.** | **MARCH** | Unit –IIIrd **Multistage Transistor Amplifiers:** RC Coupled amplifier (two-stage, concept of bandwidth, no derivation). Classification of amplifiers: Class A, B, AB and C amplifiers.<br>**Feedback in Amplifiers:** Principle, Types of feedback, Voltage Gain, Advantages of Negative Feedback: Stabilization of gain, reduction in frequency distortion, reduction in non-linear distortions, reduction in noise. Effect of negative feedback on input impedance, output impedance and bandwidth, emitter follower circuit. | Class Assignments and discussion on assignments, class presentations |
| **4.** | **APRIL** | Unit –IVth **Oscillators:** Damped and Undamped Oscillators, Oscillatory circuit, Principle of Oscillation, Condition for self-sustained Oscillations: Barkhausen Criteria for sustained Oscillators, Essentials of Transistor Oscillators, Selection of an Oscillators, Classification of Oscillators, LC Oscillators, Tuned Collector, Tuned Base, Hartley Oscillator, Colpitt's Oscillator, RC Oscillators: Phase Shift and Wein Bridge Oscillators. | Quiz, class test, class presentations |
| **5.** | **MAY** | REVISION | Class tests |