Lesson Plan (2025-26)

Name of the Assistant/Associate Professor: **Dr. REKHA BAI**

Class: **B.Sc. III (5th Sem)**

Subject: **Physics**

Month	Topics
August 2025	**(20UPHY501A) (Solid State Physics)** **Unit – I** Crystal Structure: Crystalline And Amorphous Solids, Liquid Crystals, Crystal Structure, Periodicity, Lattice and Basis, Crystal Translational Vectors and Axes, Unit Cell and Primitive Cell, Wigner Seitz Primitive Cell, Symmetry Operations For a Two-Dimensional Crystal, Bravias Lattice in two and three Dimensions, Crystal Planes and Miller Indices, Crystal Structures of Sodium Chloride and Diamond. **Unit – II** Crystal Structure: X-Ray Diffraction, Bragg's Law and Experimental X-Ray Diffraction Methods, K-Space and Reciprocal Lattice and its Physical Significance, Reciprocal Lattice Vectors, Reciprocal Lattice to a Simple Cubic Lattice, BCC and FCC.
September 2025	**Unit – III** Free Electron Theory: Free Electron Gas Models and its Failures, Sommerfeld Quantum Theory, Hall Effect, Lattice Vibrations: Lattice Vibration and Concept of Phonon, Specific Heat of Solids, Dulong and Petit's Law, Einstein and Debye Theories of Specific Heat of Solids. **Unit – IV** Magnetic Properties of Matter: Dia, Para, Ferri and Ferromagnetic Materials, Classical Langevin Theory of Dia and Paramagnetic Domains, Curie's Law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Superconductivity: Historical Introduction, Survey of Superconductivity, Superconducting Systems.
October 2025	**(20UPHY502A) (Statistical Physics)** **Unit – I** Probability, Some Probability Considerations, Basic Idea of Permutations and Combinations, Combinations Possessing Maximum Probability, Combinations Possessing Minimum Probability, Distribution of Molecules in Two Boxes, Case with Weightage (General). Phase Space, Microstates and Macrostates, Statistical Fluctuations Constraints and Accessible States, Entropy and Thermodynamic Probability, Concept of Ensembles and Type of Ensembles. **Unit – II** Postulates of Statistical Physics, Phase Space and Application to One Dimensional Harmonic Oscillator and Free Particle, Division of Phase Space into Cells, Basic Approach in Three Statistics, Maxwell-Boltzmann Distribution Law, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox, Condition of Equilibrium Between Two Systems in Thermal Contact, Entropy and Probability.
November 2025	**Unit – III** Bose-Einstein Statistics, Thermodynamic Relations of a Completely Degenerate Bose Gas, Bose-Einstein Condensation, Liquid He (Qualitative Description), Photon Gas, Application of B-E Statistics to Planck's Radiation Law. **Unit – IV** Fermi-Dirac Statistics, Thermodynamic Relations of a Completely Degenerate Fermi Gas, Fermi Energy, Electron Gas in a Metal, Zero Point Energy, Specific Heat of Metals, Thermionic Emission, White Dwarf Stars, Chandrashekhar Mass Limit, Comparison of Three Statistics M-B, B-E and F-D.

Lesson Plan (2025-26)

Name of the Assistant/Associate Professor: **Dr. REKHA BAI**

Class: **B.Sc. 1st (1st Sem)**

Subject: **Physics (24-UN-PHY-101) (Mechanics)**

Month	Topics
August 2025	**Unit – I (Fundamentals of Dynamics)** 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, Fly wheel, Moment of Inertia of an irregular body.
September 2025	**Unit – II (Elasticity)** Deforming force, Elastic limit, stress, strain and their types, Hooke's law, Modulus of rigidity, 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, Elastic Constants and their relations. 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 (loaded by a weight W at its free end), weight of cantilever uniformly distributed over its entire length. Dispersion of a centrally loaded beam supported at its ends, determination of elastic constants for material of wire by Searle's method.
October 2025	**Unit – III (Special Theory of Relativity)** Michelson's Morley experiment and its outcomes, Postulates of special theory of relativity, Lorentz Transformations, 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, Problems of relativistic dynamics.
November 2025	**Unit – IV (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 body 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 (m_o joined together with spring of spring constant k).

Lesson Plan (2025-26)

Name of the Assistant/Associate Professor: **Dr. REKHA BAI**

Class: **B.Sc. 1st (1st Sem) (Medical)**

Subject: **Physics (24-UN-PHY-103) (Elementary Mechanics) (Minor)**

Month	Topics
August 2025	**Unit – I (Fundamentals of Dynamics)** 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.
September 2025	**Unit – II (Elasticity)** Deforming force, Elastic limit, stress, strain and their types, Hooks law, Module of elasticity Relation between shear angle and angle of twist, Poisson's ratio and its limiting value. Torque required for twisting cylinder.
October 2025	**Unit – III (Special Theory of Relativity)** Michelson's Morley experiment and its outcomes, Postulates of special theory of relativity, Lorentz Transformations, Lorentz contraction, Time dilation, Relativistic transformation of velocity, relativistic addition of velocities, variation of mass-energy equivalence.
November 2025	**Unit – IV (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, 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 (m_o joined together with spring of spring constant k).