

Lesson Plan 2024-25 (Odd Semester)

(July 2024 to November 2025)

Subjects: 1. Solid State Physics and 2. Quantum Mechanics

Class: B.Sc (Non-Medical) (Sem:- Vth)

Name: Dr. Neha Aggarwal

Department: Physics

MONTH	TOPICS TO BE COVERED
JULY	Quantum Mechanics: Failure of (Classical) E.M. Theory. quantum theory of radiation (old quantum theory), Photon, photoelectric effect and Einstein's photoelectric equation.
AUGUST	Compton Effect, Inadequacy of old quantum theory, de-Broglie hypothesis. Davisson and Germer experiment. G.P. Thomson experiment. Phase velocity group velocity, Heisenberg's uncertainty principle. Time-energy and angular momentum, position uncertainty Uncertainty principle from de-Broglie wave, (wave-particle duality). Gamma Ray Microscope, Electron diffraction from a slit. Derivation of time dependent Schrodinger wave equation, eigen values, eigen functions, wave functions and its significance. Normalization of wave function, concept of observable and operator. Solution of Schrodinger Equation for harmonic oscillator ground states and excited states.
SEPTEMBER	Application of Schrodinger equation in the solution of the following one-dimensional problems: Free particle in one dimensional box (solution of Schrodinger wave equation, eigen function, eigen values, quantization of energy and momentum, nodes and antinodes, zero-point energy). i) One-dimensional potential barrier $E > V_0$ (Reflection and Transmission coefficient. ii) One-dimensional potential barrier, $E > V_0$ (Reflection Coefficient, penetration of leakage coefficient, penetration depth). Solid State Physics: Crystalline and glassy forms, liquid crystal. Crystal structure, periodicity, lattice and basis, crystal translational vectors and axes. Unit cell and primitive cell, Wigner-Seitz primitive cell.
OCTOBER	Bravais lattices in two and three dimensions. Crystal planes and Miller indices, Inter-planar spacing, crystal structures of Zinc Sulphide, Sodium Chloride and Diamond, X-ray diffraction, Bragg's law and experimental X-ray diffraction methods, K-space. Reciprocal lattice and its physical significance, reciprocal lattice vectors, reciprocal lattice to a simple cubic lattice, bcc and fcc.
NOVEMBER	Specific heat: Specific heat of solids, Einstein's theory of specific heat, Debye model of specific heat of solids. Revision.

Lesson Plan 2024-25 (Odd Semester)

(July 2024 to November 2025)

Subject: Computer Programming and Thermodynamics

Class: B.Sc (Non-Medical) (Sem:- IIIrd)

Name: Dr. Neha Aggarwal

Department: Physics

MONTH	TOPICS TO BE COVERED
JULY	Computer Programming: Computer organisation, Binary representation, Algorithm development, flow charts and their interpretation.
AUGUST	Fortran Preliminaries; Integer and floating point arithmetic expression, built in functions executable and non-executable statements, input and output statements, Formats, I.F. DO and GO TO statements, Dimension arrays statement function and function subprogram. Thermodynamics-I: Second law of thermodynamics, Carnot theorem.
SEPTEMBER	Absolute scale of temperature, Absolute Zero, Entropy, show that $dQ/T=0$, T-S diagram, Nernst heat law, Joule's free expansion, Joule Thomson (Porous plug) experiment. Joule - Thomson effect. Liquefaction of gases. Air pollution due to internal combustion Engine.
OCTOBER	Thermodynamics-II: Derivation of Clausius - Claperyron latent heat equation. Phase diagram and triple point of a substance. Development of Maxwell thermodynamical relations. Application of Maxwell relations in the derivation of relations between entropy, specific heats and thermodynamic variables.
NOVEMBER	Thermodynamic functions: Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G) and the relations between them. Revision.