Government College For Women, Mahendergarh

Department Of PHYSICS - Session : 2025-26

Name Of The Assistant Professor : DEVENDER KUMAR

Class : B.Sc.2ND YEAR- Semester III

Lesson Plan

Week 01
INTRODUCTION
Thermodynamic-systems, variables and equation of state, thermal equilibrium, Zeroth law of thermodynamics; Concept of heat, work and its sign (work done- by the system on the system) & its path dependence,

Week 02
First law of thermodynamics- its significance and limitations, internal energy as a state function, different types of process-isochoric process, isobaric process, adiabatic process, isothermal process, cyclic process, Reversible and irreversible process, First law and cyclic process,

Week 03
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 explanationan

Week 04
alytical 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),

Week 05
Liquefaction of gases, (oxygen, air, hydrogen and helium) solidification of helium below 4K, Cooling by adiabatic demagnetization,

Week 06
THERMODYNAMICS-II 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 thermo dynamical relations,

Week 07
Thermo dynamical functions: Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G) and the relations between them, derivation of Maxwell thermodynamical relations from thermodynamical functions,

Week 08
Application of Maxwell relations: relations between two specific heats 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.,

Week 09
Statistical Physics-I Distribution of N (for N= 2, 3, 4) distinguishable and indistinguishable particles in two boxes of equal size, microstates and macro states, thermo dynamical probability, constraints and accessible states, statistical fluctuations,

Week 10
general distribution of distinguishable particles in compartments of different sizes, β-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,

Week 11
Maxwell-Boltzmann statistics applied to an ideal gas in equilibrium-energy distribution law, Maxwell's distribution of speed & velocity, most probable speed, average and r.m.s. speed, mean energy for Maxwellian distribution,

Week 12
Statistical Physics-II
Dulong and Petit Law, derivation of Dulong and Petit law from classical physics; Need of Quantum statistics- classical versus quantum statistics

Week 12
Bose-Einstein energy distribution Law, Application of B. E. Statistics to Planck's radiation law, degeneracy and B. E. condensation;

Week 13
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 0 K) of electron gas

Week 14
Revision

Week 15
Revision

Government College For Women, Mahendergarh

Department Of PHYSICS - Session : 2025-26

Name Of The Assistant Professor : DEVENDER KUMAR

Class : B.Sc.3RD YEAR- Semester V

Lesson Plan

Week 01
INTRODUCTION
SOLID STATE PHYSICS UNIT 1ST – , Crystalline and glassy forms, Liquid crystals, Crystal translational vectors and axes

Week 02
Periodicity, Unit cell and primitive cell, Winger Seitz primitive Cell, symmetry operations for a two dimensional crystal, Point group, Bravais lattices in three dimensions

Week 03
UNIT 2ND-
Crystal planes, Miller indices, Interplanner spacing, Packing fraction, Hexagonal closed pack structure

Week 04
Diamond structure, NaCl structure, X-ray diffraction, Bragg's Law, Experimental x-ray diffraction methods-
Laue method

Week 05
Experimental x-ray diffraction methods-
Rotating crystal method, Powder method, Determination of crystal structure using Bragg's law, k-space

Week 06
UNIT 3RD –
Reciprocal lattice and its physical significance, Reciprocal lattice vectors for crystal axes, Construction and properties of reciprocal lattice, Reciprocal lattice to a simple cubic lattice, b.c.c, Reciprocal lattice to f.c.c

Week 07
Specific heat of solids, Einstein's theory of specific heat, Debye model of specific heat of solids

Week 08
QUANTUM PHYSICS UNIT 1ST –
Failure of (Classical) E.M. Theory. quantum theory of radiation, Photoelectric effect Compton effect, Dual nature of matter: De Broglie wavelength, Davisson and Germer experiment and G.P. Thomson experiment, Phase velocity, Group velocity

Week 09
Relation b/w gp velocity and particle velocity, Heisenberg's uncertainty principle, Experimental verification of uncertainty principle, Example of time energy uncertainty, Application of uncertainty principle

Week 10
UNIT 2^{ND} –
Derivation of time dependent Schrodinger wave equation, Derivation of time independent Schrodinger wave equation

Week 11
Eigen values, eigen functions, Wave functions and its significance. Normalization of wave function, Concept of observable and operator., Probability current density: Particle flux

Week 12
One dimensional linear harmonic oscillator
UNIT 3^{RD} - Free particle in one dimensional box

Week 13
Free particle in one dimensional box
Potential step (E >Vo)
Potential step or single step barrier (E <Vo)

Week 14
One dimensional potential barrier,

Week 15
Revision