

Name of Teacher – Dr. Surender Kumar

Subject – Physics

Paper – Thermodynamics & Statistical Physics

Class: B.Sc. 3rd Semester

Session: 2025-26

Week	Contents
Week 1	UNIT-I: THERMODYNAMICS-I Laws of Thermodynamics: Thermodynamic Description of system: Zeroth Law of thermodynamics. First law of thermodynamics and internal energy, conversion of heat into work
Week 2	Various Thermodynamical Processes, Applications of First Law: Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Coefficient
Week 3	Reversible and irreversible processes, Second law of thermodynamics, Entropy, Carnot's cycle & Carnot's theorem, Entropy changes in reversible and irreversible processes,
Week 4	Entropy-temperature diagrams, Third law of thermodynamics, Unattainability of absolute zero. Revision & Test of Unit I
Week 5	THERMODYNAMICS-II Thermodynamic Potentials: Enthalpy
Week 6	Gibbs, Helmholtz and Internal Energy functions, Maxwell's relations
Week 7	Maxwell's relations and applications - Joule-Thompson Effect, Clausius- Clapeyron Equation.
Week 8	Expression for ($C_p - C_v$), C_p/C_v , TdS equations. Revision and test of Unit-2
Week 9	Statistical Physics-I : Basics idea of probability, Priori probability, Statistical probability, permutation and combination, distinguishable and indistinguishable particles Distribution of N (for N= 2, 3, 4) distinguishable and indistinguishable particles in two boxes of equal size, microstates and macrostates
Week 10	thermodynamical probability, constraints and accessible states, statistical fluctuations, entropy and probability, Concept of phase space, division of phase space into cells, postulates of statistical mechanics: Classical and quantum statistics
Week 11	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)
Week 12	most probable speed, average and r.m.s. speed, mean energy for Maxwellian distribution, Revision & Test of Unit-III
Week 13	Statistical Physics-II Need of Quantum statistics- classical versus quantum statistics, Bose- Einstein energy distribution Law,
Week 14	Application of B. E. Statistics to Planck's radiation law, Fermi-Dirac energy distribution Law
Week 15	Fermi energy and Fermi temperature; F. D. energy distribution Law for electron gas in metals,
Week 16	zero point energy, average speed (at 0 K) of electron gas, Revision & Test of Unit-IV
Week 17	Revision & Test

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Paper – Mechanics

Class: B.Sc. 1st Semester

Subject – Physics

Session: 2025-26

Week	Contents
Week 1	Fundamentals of Dynamics: Rigid body, Moment of Inertia, Radius of Gyration, Theorems of perpendicular and parallel axis (with proof).
Week 2	Moment of Inertia of ring, Disc, Angular Disc, Solid cylinder, Solid sphere, Hollow sphere, Rectangular plate, Square plate.
Week 3	Torque, Rotational Kinetic Energy, Angular momentum
Week 4	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, Numericals
Week 5	Elasticity: Deforming force, Elastic limit, stress, strain and their types, Hooks law, Module of elasticity Relation between shear angle and angle of twist, elastic energy stored/volume in an elastic body
Week 6	Elongation produced in heavy rod due to its own weight and elastic potential energy stored in it, Poisson's ratio and its limiting value, Relation between Young modulus, Bulk modulus and Poisson ratio
Week 7	Derive the Relation between Young's modulus, Bulk modulus and Modulus of rigidity. Torque required for twisting cylinder.
Week 8	Bending of beam, bending moment and its magnitude.
Week 9	Bending of cantilever (loaded by a weight W at its free end), Numericals
Week 10	Special Theory of Relativity: Michelson's Morley experiments and its outcome
Week 11	Postulate of special theory of relativity, Lorentz Transformation, Simultaneity and order of events, Lorentz contraction
Week 12	Time dilation, Relativistic transformation of velocity, relativistic addition of velocities
Week 13	variation of mass-energy equivalence, Numericals
Week 14	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.
Week 15	Two body problem and its reduction to one body problem and its solution, determination of g by means of bar pendulum.
Week 16	Normal coordinates and normal modes, Normal modes of vibration for given spring mass system, Numericals
Week 17	Revision & Test


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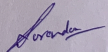
Paper – Modern Physics

Class: B.Sc. 5th Semester

Subject – Physics

Session: 2025-26

Weeks	Contents
Week 1	(Qualitative only). Photoelectric effect, Compton effect, de broglie hypothesis, de-broglie wave, <i>Need of Q. Mech., Planck Quantum Hypothesis and B.B. Radiation (Qualitative only)</i>
Week 2	Wave Packet, Phase and group velocities, Time dependent and time- independent schrodinger equations, Properties of Wave function
Week 3	Particle confined in a one dimensional infinite box, energy eigen functions and eigen values. Heisenberg Principle (Qualitative Idea)
Week 4	Numericals of Unit-I and Conceptual Problems
Week 5	Unit-II Solid State Physics : Crystalline state, crystal lattice, basis, lattice translation vectors, primitive and non primitive unit cells
Week 6	planar spacing
Week 7	Simple Crystal Structure: NaCl, Diffraction of Waves by crystals, Bragg's Law
Week 8	Idea of Reciprocal Lattice, Numericals and conceptual problems
Week 9	Unit III : Atomic & Molecular Physics : Bohr Model, Sommerfeld theory(Qualitative), Larmor's theorem (qualitative), Vector
Week 10	Atom Model, Electron Spin, Space Quantization, Spin-Orbit Interaction energy
Week 11	LS and JJ Coupling, Zeeman Effect, Lande's g factor
Week 12	Numericals and Conceptual Problems
Week 13	Unit- IV : Nuclear and Particle Physics : Composition of nucleus, stability of nucleus,
Week 14	Nuclear Size, Spin, Parity, Magnetic Moment, Quadrupole Moment
Week 15	Particles
Week 16	Quark and Lepton, Hadrons, Baryons, Mesons, Different types of nuclear interactions,
Week 17	Numericals and Conceptual Problems


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