Department Of Physics

W.e.f: 1-8-2025

Session:2025-2026

LESSON PLAN

B.Sc-3rd Year

SEMESTER-V

Paper-1st-PHY-501

Name of Faculty Member: Dr. Satya Parkash

Month	Syllabus
August	**Unit-1** Crystalline and gallssy forms, liquid crystals. Crystal structure, periodicity, lattice and basis, crystal translational vectors and axes. Unit cell and primitive cell, Winger Seitz primitive Cell,symmetry operations for a two dimensional crystal,Bravais Lattices in two and three dimensions.
September	**Unit-2** crystal planes and Miller indices, Interplanner spacing, Crystal structures of Zinc sulphide, Sodium Chloride and diamond,X-ray diffraction,Bragg's Law and experimental x-ray diffraction methods, K-space.
October + November	**Unit-3** Reciprocal lattice and its physical significance,reciprocal lattice vectors,reciprocal lattice to a simple cubic lattice, b.c.c and f.c.c. Specific heat:Specific heat of solids,Einstein's theory of specific heat,Debye model of specific heat of solids.

References:

1. IntroductiontosolidstatePhysics(5thEd.)bykittel,Wileyeastern Limited

(Dr. Satya Parkash)

Department Of Physics W.e.f: 1-8-2025

LESSON PLAN Session:2025-2026

B.Sc-3rd Year

SEMESTER-V

Paper-2nd-PHY-502

Name of Faculty Member: Dr. Satya Parkash

Month	Syllabus
August	**Unit-1** Failure of (Classical) E.M. Theory. quantum theory of radiatio (old quantum theory), Photon, photoelectric effect and Einsteins photoelectric equation compton effect (theory and result). Inadequancy 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-partice duality). Gamma Ray Maciroscope, Electron diffraction from a slit.
September	**Unit-2** 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 harmomic oscillator ground states and excited states.
October + November	**Unit-3** 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 barrie E>V0 (Reflection and Transmission coefficient. ii) ii) One-dimensional potential barrier, E>V0 (Reflection Coefficient, penetration of leakage coefficient, penetration depth).

References : 1. Quantum Mechanics by L.I. Schiff, McGraw Hill Book Company, Inc.

2. Quantum Mechanics by B. Crasemand and J.D. Powel (Addison Wesley.

3. Quantum Mechanics by A.P. Messiah.

(Dr. Satya Parkash)

GOVERNMENT COLLEGE FOR GIRLS ,UNHANI

LESSON PLAN FOR ACADEMIC SESSION

Name - Dinesh Kumar **Department- Physics**

Class-B.Sc. 1st year (1st Semester) **Session: 2025-26 (01.08.2025 onwards)**

Sr. No./Week	Day/ Month/Year	Topic to be covered
1	04th August-09th August	**Fundamentals of Dynamics:** Rigid body, Moment of Inertia, Radius of Gyration, Theorems of perpendicular and parallel axis (with proof).
2	11th August-16th August	Moment of Inertia of rod, ring, Disc, Angular Disc, Solid cylinder, Solid sphere, Hollow sphere, rectangular plate, square plate, Solid cone, Triangular plate, Torque, Rotational Kinetic Energy, Angular momentum.
3	18th August-23th August	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. Written & Oral Test
4	25th August-30th August	**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, Assignment-1
5	1st September-6th September	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.
6	8th September-13th September	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.
7	15th September-20th September	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. Written & Oral Test
8	22th September-27th September	**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.
9	29th September-4th October	Time dilation, Relativistic transformation of velocity, relativistic addition of velocities, variation of mass-energy equivalence. Written & Oral Test
10	6th October-11th October	relativistic Doppler effect, relativistic kinematics, transformation of energy and momentum, transformation of force, Problems of relativistic dynamics. Written & Oral Test
11	13th October-18th October	**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.
12	20th October-25th October	**Diwali Vacation as per Academic Calendar (2024-2025) IGU Meerpur**
13	27th October-1st November	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.
14	3rd November- 8th November	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).
15	10th November-15th November	Revision of Fundamentals of Dynamics, Written & Oral Test
16	17th November-22th November	Revision of Elasticity, Written & Oral Test
17	24th November-29th November	Revision of Special Theory of Relativity, Written & Oral Test
18	01.12.2025 onwards…	Revision of Gravitation and central force motion, Written & Oral Test
19	02.12.2025 onwards…	Semester End examinations as per University Academic Calendar

References books as per university

1. Mechanics "Berkeley Physics Course Vol.I", Charles Kittel, Tata McGraw-Hill
2. Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000
3. Elements of Properties of Matter, D.S. Mathur, S. Chand & Com. Pt. Ltd., New Delhi
4. Physics, Resnick, Halliday &Walker, Wiley
5. Physics for scientists and Engineers with Modern Phys., J.W. Jewett, R.A. Serway, 2010, Cengage Learning
6. An introduction to mechanics, D. Kleppner, R.J. Kolenkow,1973, McGraw-Hill.
7. Properties of Matter, R. Murgeshan, S. Chand & Com. Pt. Ltd., New Delhi
8. Classical Mechanics, J.C. Upadhyaya, Himalaya Publishing House.
9. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi
10. Advanced Level Practical Physics, M. Nelkon and Ogborn, Henemann Education Books Ltd., New Delhi
11. Practical Physics, S.S. Srivastava and M.K. Gupta, Atma Ram &Sons, Delhi
12. Practical Physics, S.L. Gupta and V. Kumar, Pragati Prakashan Meerut
13. Modern Approach to Practical Physics, R.K. Singla, Modern Publishers, Jalandhar
14. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, Asia Publishing House.
15. B.Sc. Practical Physics, Geeta Sanon

Dinesh Kumar
Assistant Professor
Department of Physics

GOVERNMENT COLLEGE FOR GIRLS ,UNHANI

LESSON PLAN FOR ACADEMIC SESSION

Name - Dinesh Kumar **Department- Physics**

Class-B.Sc. 2nd year (3rd Semester) **Session: 2025-26 (01.08.2025 onwards)**

Sr. No./Week	Day/ Month/Year	Topic to be covered
1	04th August-09th August	**THERMODYNAMICS-I** 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, First law of thermodynamics- its significance and limitations
2	11th August-16th August	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; Second law of thermodynamics and its significance
3	18th August-23th August	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
4	25th August-30th August	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
5	1st September-6th September	**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 thermodynamical relations
6	8th September-13th September	Thermodynamical 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
7	15th September-20th September	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
8	22th September-27th September	**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, thermodynamical probability, constraints and accessible

		states, statistical fluctuations, general distribution of distinguishable particles in compartments of different sizes
9	29th September-4th October	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
10	6th October-11th October	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.
11	13th October-18th October	**Statistical Physics-II** Dulong and Petit Law, derivation of Dulong and Petit law from classical physics; Need of Quantum statistics- classical versus quantum statistics
12	20th October-25th October	**Diwali Vacation as per Academic Calendar (2024-2025) IGU Meerpur**
13	27th October-1st November	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
14	3rd November- 8th November	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
15	10th November-15th November	Revision of THERMODYNAMICS-I, Written & Oral Test
16	17th November-22th November	Revision of THERMODYNAMICS-II, Written & Oral Test
17	24th November-29th November	Revision of Statistical Physics-I, Written & Oral Test
18	01.12.2025 onwards…	Revision of Statistical Physics-I I, Written & Oral Test
19	02.12.2025 onwards…	Semester End examinations as per University Academic Calendar

References books as per university

1.Thermal Physics and Statistical Mechanics, S.K. Roy, New Age International Publishers, New Delhi
2. Thermodynamics and statistical Physics, J.K.Sharma and K.K.Sarkar, Himalaya Publishing House, Bombay
3. Introduction to Thermodynamics and its Applications, Stowe Keith, University Press (India) Pvt. Ltd, Hyderabad
4. Introductory Thermodynamics, Pierre Infelta, Brown Walker Press, Boca Ratan, Florida
5. Fundamentals of Thermodynamics, J.K. Johnson, University of Pittsburgh 2009
6. Thermo dynamics and Its Applications, JeffersonTester,Michael Modell,3rdEdition
7. Thermo dynamics, Statistical Thermodynamics &Kinetics, Thomas Engel, PhilipReid,2ndEdition
8. Advanced Practical Physics for students,B.L. Flint &H.T.Worsnop,1971,AsiaPublishing House.
9. Advanced level Physics Practicals, Michael Nelson and JonM. Ogborn,4thEdition, reprinted 1985, Heinemann Educational Publishers
10. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11thEdition, 2011,Kitab Mahal, New Delhi.
11. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal, 1985,Vani Publication.

Dinesh Kumar
Assistant Professor
Department of Physics