

Session: 2022-2023 (Even Semester)

Lesson Plan

Name of the Teacher: Mrs Nidhi Sharma , ASSISTANT PROFESSOR

Subject: PHYSICS (Theory) **Class:** B. Sc. 4th Sem.

Physics Paper: I (Statistical Physics)

Paper's Code: NPH04(I)

Max. Marks: 50(External Assessment: 40 Marks, Internal Assessment: 10 Marks)

Contact Hours Per Week: 5

Physics Paper: II (Wave and Optics-II)

Paper's Code: NPH04(II)

Max. Marks: 50(External Assessment: 40 Marks, Internal Assessment: 10 Marks)

Contact Hours Per Week: 5

Sr. No.	Week	Dates	Topic
1	1st	20-02-2023 to 25-02-2023	Microscopic and Macroscopic systems, events-mutually exclusive, dependent and independent. Probability, statistical probability, A-priori Probability and relation between them, probability theorems, some probability considerations, combinations possessing maximum probability, combination possessing minimum probability,
2	2nd	27-02-2023 to 04-03-2023	Tossing of 2,3 and any number of Coins, Permutations and combinations, distributions of N (for N= 2,3,4) distinguishable and indistinguishable particles in two boxes of equal size, Micro and Macro states, Thermodynamical probability, Constraints and Accessible states, Statistical fluctuations, general distribution of distinguishable particles in compartments of different sizes
3	3rd	06-03-2023 to 11-03-2023	Condition of equilibrium between two systems in thermal contact— β parameter, Entropy and Probability (Boltzmann's relation). Postulates of statistical physics, Phase space, Division of Phase space into cells, three kinds of statistics, basic approach in three statistics. M. B. statistics applied to an ideal gas in equilibrium- energy distribution law (including evaluation of σ and β),
4	4th	13-03-2023 to 18-03-2023	Speed distribution law & velocity distribution law. Expression for Average speed, r.m.s. speed, average velocity, r. m. s. velocity, most probable energy & mean energy for Maxwellian distribution. Need for Quantum Statistics: Bose-Einstein energy distribution law, Application of B.E. statistics to Planck's radiation law B.E. gas, Degeneracy and B.E. Condensation, Class test
5	5th	20-03-2023 to 25-03-2023	Fermi-Dirac energy distribution law, F.D. gas and Degeneracy, Fermi energy and Fermi temperature, Fermi Dirac energy distribution law, Fermi Dirac gas and degeneracy, Specific heat anomaly of metals and its solution. M.B. distribution as a limiting case of B.E. and F.D. distributions, Comparison of three statistics.
6	6th	27-03-2023 to 01-04-2023	Dulong and Petit law. Derivation of Dulong and Petit law from classical physics. Specific heat at low temperature,
Sr. No.	Week	Dates	Topic

7	7th	03-04-2023 to 08-04-2023	Einstein theory of specific heat, Criticism of Einstein theory Debye model of specific heat of solids, success and shortcomings of Debye theory, comparison of Einstein and Debye theories.
8	8th	10-04-2023 to 15-04-2023	Polarization: Polarisation by reflection, refraction and scattering, Malus Law, Phenomenon of double refraction, Huygen's wave theory of double refraction (Normal and oblique incidence), Class test
9	9th	17-04-2023 to 22-04-2023	Analysis of polarized Light. Nicol prism, Quarter wave plate and half wave plate, production and detection of (i) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically polarized light. Optical activity, Fresnel's theory of optical rotation, Specific rotation, Polarimeters (half shade and Biquartz).
10	10th	24-04-2023 to 29-04-2023	Fourier theorem and Fourier series, evaluation of Fourier coefficient, importance and limitations of Fourier theorem, even and odd functions, Fourier series of functions $f(x)$ between (i) 0 to 2π , (ii) $-\pi$ to π , (iii) 0 to π , (iv) $-L$ to L , complex form of Fourier series Class test
11	11th	01-05-2023 to 06-05-2023	Application of Fourier theorem for analysis of complex waves: solution of triangular and rectangular waves, half and full wave rectifier outputs, Parseval identity for Fourier Series, Fourier integrals.
12	12th	08-05-2023 to 13-05-2023	Fourier transforms and its properties, Application of Fourier transform (i) for evaluation of integrals, (ii) for solution of ordinary differential equations, (iii) to the following functions: 1. $f(x) = e^{-x^2/2}$ 2. $f(x) = 1 \quad x < a$ and $= 0 \quad x > a$ Matrix methods in paraxial optics, effects of translation and refraction, derivation of thin lens and thick lens formulae, unit plane, nodal planes, system of thin lenses.
13	13th	15-05-2023 to 19-05-2023	Chromatic, spherical, coma, astigmatism and distortion aberrations and their remedies, Optical fiber, Critical angle of propagation, Mode of Propagation, Acceptance angle, Fractional refractive index change, Numerical aperture, Types of optics fiber, Normalized frequency, Pulse dispersion, Attenuation, Applications, Fiber optic communication, Advantages Class Test
14	14th	20-05-2023 onwards	Revision