

<u>Govt. College for Women, Shahzadpur (Ambala)</u>			
<u>Lesson Plan(2023-24 Even)</u>			
Name of the Teacher:- Sonia Devi		Paper Code: PH- 402, PH-401	
Paper Name- Wave and Optics II & Statistical Physics		Session: 2023-24	
Class : B.SC II		Internal Marks: 10(Each paper)	
Subject: PHYSICS		External Marks: 40(Each paper)	
<u>Course Objectives</u>		It aims at inducing the knowledge about polarisation of wave nature of light after the interference and diffraction nature of light wave,fourier analysis of a wave and working concepts of a optical fibre used in communication. Statstical physics will tell about the arrangement or behaviour of large number of intercatng particle and their energy and three type of statistics based on distinguishable and non-distinguishable particles and the calculation of specific heat on the basis of these types.	
<u>Course Outcome</u>		Students will learn about the various form of polarisation and its application . Fourier transforamation will help to the students for finding the solution of ordinary differential equations .It will make understand the students about advantages of communication through optical fibres over other channels of communication. Statistical branch of physics gives a relation about the microscopic and macroscopic view .	
<u>Lesson Plan from 01.01.2024 to 30.04.2024</u>			
Month	Dates	Topics To be Covered	Assignment/ Test/ others

January	01-23/01/2024	Unit-1: Polarization Polarization: Polarisation by reflection, refraction and scattering, Malus Law, Phenomenon of double refraction, Huygen's wave theory of double refraction (Normal and oblique incidence), 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).	
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	Unit-II: Fourier analysis 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, 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.	
	24-31/01/2024	

February	01-13/02/2024	Unit III: Fourier transforms 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. $f(x) = e^{-x^2/2}$ 1 $X < a$ 2. $f(x) =$ 0 $X > a$ Geometrical Optics I 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.	
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	Unit-IV: Geometrical Optics II Chromatic, spherical, coma, astigmatism and distortion aberrations and their remedies. Fiber Optics 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.	
14-29/02/2024		Assignment 1, Test 1

March	04-14/03/2024	Unit –I: Statistical Physics I 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, 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, Condition of equilibrium between two systems	Assignment 2,Test 2
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	18-28/03/2024	Unit –II: Statistical Physics II 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), 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.	
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April	01-11/04/2024	Unit-III: Quantum Statistics 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, 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, Fermi energy and Fermi temperature, Fermi Dirac energy distribution law for electron gas in metals, Zero point energy, Zero point pressure and average speed (at 0 K) of electron gas, 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.	
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		Unit-IV: Theory of Specific Heat of Solids Dulong and Petit law. Derivation of Dulong and Petit law from classical physics. Specific heat at low temperature, 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. Revision	
	15-30/04/2024		