Name of Assistant/Associate Professor:- Mr. Amit

Class:- B.Sc. 2nd   **Subject:- Physics**

Paper:- Statistical Physics (Paper I and II)

Period of Lesson Plan:- 16 weeks (Feb 2024 to May 2024)

Week 1 **Chapter 1 : Prerequisites** **Assignments** • Microscopic and macroscopic system, • events-mutually exclusive, dependent and independent • statistical Probability. A priori probability and relations • Addition theorem of probability • Multiplication theorem of probability • Combinations possessing maximum probability
Week 2 **Chapter 1 : Prerequisites** **Assignments** • Combinations possessing minimum probability • Tossing of 2,3 and any number of coins • Concept of permutation and combination • Distribution of N distinguishable and indistinguishable particle in boxes of equal size • Micro and macro states • Thermodynamical probability • Constraints and accessible states
Week 3 **Chapter 1 and 2 :Prerequisites** **Assignments** • Statistical fluctuations • General distribution of distinguishable particles in compartment of different size • Condition of equilibirium between two system in thermal contact-β parameter • Relation between Entropy and probability • Postulates of statistical physics • Phase space • Division of phase space into cells
Week 4 **Chapter 2 :Prerequisites** **Assignments** • Three kinds of statistics • M.B statistics applied to ideal gas • Energy distribution law • Speed distribution law

Week 5
Chapter 2 :Prerequisites
Assignments
• Velocity distribution law
• Expression for av. Speed ,r.m.s speed
• Expression for r.m.s velocity, most probable velocity
• Mean energy for Maxwellian distribution
• Unit test- chapter 2
• Need for quantum statistics
Week 6
Chapter 3 :Prerequisites
Assignments
• Bose Einstein energy distribution law
• Applications of B.E statistics to plank radiation law, B.E gas
• Degeneracy and B.E condensation
• F.D energy distribution law, F.D gas and degeneracy
Week 7
Chapter 3 : Prerequisites
Assignments
• Fermi energy and Fermi temperature
• F.D statistics for electron gas in metals
• Zero point energy, Zero point pressure, Av. Speed of electrons at 0 K
• Specific heat anomaly of metal and its solution
Week 8
Chapter 3 and 4 : Prerequisites
Assignments
• M.B Distribution as a limiting case of B.E and F.D statistics
• Comparison of 3 statistics, Dulong and petit law
• Derivation of Dulong and petit law from classical physics
• Specific heat at low temperature
Week 9
Chapter 4 : Prerequisites
Assignments
• Einstein theory of specific heat, Criticism of Einstein theory
• Debye model of Specific heat of solid
• Shortcoming of Debye model
• Comparison of Einstein and Debye theory
• Unit test-chapter 3 & 4
Week 10 Paper-2
Chapter 1 :- Prerequisites
Assignments
• Polarization by Reflection, Refraction and Scattering
• Mauls law, Brewster law and Nicol Prism
• Huygens wave theory of double refraction
• Quarter and Half wave plates and analysis of polarized light
• Production and detection of (i) Plane polarized light
• (ii) Circularly polarized light (iii) Elliptically polarized light

Week 11
Chapter 1 and 2 :- Prerequisites
Assignments
- Optical Activity and Specific Rotation
- Fresnel's theory of optical rotation
- Half shade polarimeter, Bi-Quartz polarimeter
- Fourier Theorem And Its Analysis, Evaluation of Fourier Coefficients
- Unit test

Week 12
Chapter 2 :- Prerequisites
Assignments
- Importance and Limitations of Fourier Theorem
- Even And Odd Function, Complex Form Of the Fourier Series
- Fourier Series Expansion, Fourier Series between (i) 0-2π (ii) $-\pi$ to π (iii) $-L$ to L
- Application of Fourier Theorem for Analysis of Complex Waves
- Fourier Theorem for Triangular and Rectangular Waves

Week 13
Chapter 2 and 3:- Prerequisites
Assignments
- Fourier Theorem For Rectifiers
- Parseval identity for Fourier Series, Fourier Integrals, Fourier Transforms
- Properties of FourierTransforms, Fourier Transform For Evaluation of Integrals
- Fourier Transform for Solution Of Ordinary Differential Equations
- Fourier Transform for (i) $f(x) = e^{-x2/2}$ (ii) $f(x) = 1$ if $x < a$ and 0 if $x > a$

Week 14
Chapter 3 and 4 :- Prerequisites
Assignments
- Matrix Methods in Paraxial optics
- Effects of Translation and Refraction
- Derivation of thin and thick lens formula
- Unit plane and Nodal plane
- System of thin lens, Aberration, Chromatic Aberration
- Spherical aberration and its remedies

Week 15
Chapter 4 :- Prerequisites
Assignments
- Coma aberration and its remedies, Astigmatism and remedies
- Distortion aberration and its remedies, Optical fibres
- Structure of optical fibre and mode of its propagation
- Critical angle of propagation

Week1 6
Chapter 4 :- Prerequisites
Assignments
- Acceptance angle, Numerical aperture
- Fractional refractive index, normalized frequency
- Types of Optical fibre, Pulse dispersion, Attenuation
- Fibre optics Communication, Applications of Optical fibres
- Unit test