

Teaching Plan (Session 2022-23)

Class- B.Sc. II (Sem III&IV)

Teacher Name - Sunita Saini

Subject-Physics

Period No. 5

Name of Paper -Statistical physics and thermodynamics, Optics and lasers

Sr. No.	Date/Weekly	Topics to be covered
1.	01/09/2022- 05/09/2022	Basic ideas of statistical physics, Scope of statistical physics, Basic ideas about probability, distribution of four distinguishable particles in two compartment of equal size. Discussion
2.	07/09/2022- 12/09/2022	Concept of macro states, microstates, thermodynamic probability, Effects of constraints on the system.
3.	14/09/2022- 19/09/2022	Presentation by students and discussion
4.	21/09/2022- 26/09/2022	Distribution of n particles in two compartments, Deviation from the state of maximum probability, equilibrium state of dynamic system.
5.	28/09/2022- 03/10/2022	Distribution of distinguishable n particles in k compartments of unequal sizes. Phase space and its division into elementary cells.
6.	05/10/2022- 10/10/2022	Three kinds of statistics. The basic approach in the three statistics, Maxwell Boltzman (MB) statistics applied to an ideal gas in equilibrium.
7.	12/10/2022- 17/10/2022	Experimental verification of Maxwell Boltzman law of distribution of molecular speeds, Need for quantum statistics- Bose-Einstein (B.E.) statistics, Derivation of Planck's law of radiation Deduction of Wien's displacement law and Stefan's law from Planck's law.
8.	26/10/2022- 31/10/2022	Fermi-Dirac (F.D.) statistics, Comparison of M.B, B.E. and F.D statistics. Interference: Concept of coherence, Spatial and temporal coherence. Class test

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9.	02/11/2022-07/11/2022	Coherence time, Coherence length, Area of coherence, Conditions for observing interference fringes, Interference by wave front division and amplitude division, Michelson's interferometer-working, Principle and nature of fringes. Assignment given o students
10.	08/11/2022-14/11/2022	Interference in thin films, Role of interference in anti-reflection and high reflection dielectric coatings. Multiple beam interference, Fabry-Perot interferometer, Nature of fringes, Newton Rings. Discussion
11.	16/11/2022-21/11/2022	MST EXAMS
12.	23/11/2022-03/12/2022	Revision
13.	6/2/2023-11/2/23	Statistical definition of entropy, Change of entropy of a system, Additive nature of entropy, Law of increase of entropy, Reversible and irreversible process and their examples. Work done in a reversible process. Examples of increase of entorpy in natural processes, Entropy and disorder,
14.	13/2/23-18/2/23	Brief review of terms and laws of thermodynamics, Carnot's cycle, Entropy changes in Carnot cycle. Applications of thermodynamics to thermoelectric effect. Change of entropy along a reversible path in a P.V diagram,
15.	20/2/23-25/2/23	Entropy of a perfect gas, Equation of state of an ideal gas from simple statistical consideration, Heat death of the universe. Derivation of Maxwell's thermo dynamical relations, Cooling produced by adiabatic stretching.
16.	27/2/23-4/3/23	Adiabatic compression, Change of internal energy with volume, specific heat at constant pressure and constant volume, Expression for $C_p - C_v$, Change of state and Clayperon Equation.
17.	6/3/23-11/3/23	Thermo dynamical treatment of Joule-Thomson effect, Use of Joule-Thomson effect.
18.	13/3/23-18/3/23	liquefiction of helium, Production of very low temperature by adiabatic demagnetization. Laser Fundamentals.
19.	20/3/23-25/3/23	Derivation of Einstein's relations. Concept of stimulated emission and population inversion. Broadening of spectral lines, natural,

20.	27/4/23-1/4/23	collision and Doppler broadening Line width.Line profile, Absorption and amplification of a parallel beam of light passing through a medium.
21.	3/4/23-8/4/23	Threshold condition, Introduction of three level and four level laser schemes, elementary theory of optical cavity, Longitudinal and transverse modes.
22.	10/4/23-15/4/23	MST EXAMS
23.	17/4/23-22/4/23	Revision
24.	24/4/23-29/4/23	Revision

Principal

Signature of teacher