

Curriculum plan of Prof. Rachana Kumar

For Even Session 2024-25
B.Sc. (H) III Year
Paper- Statistical mechanics

3 periods per week

Content	Allocation of Lectures	Schedule to be followed
Unit - I Classical Statistics: Phase space, Macrostates and microstates, entropy and thermodynamic probability, concept of ensemble - Introduction to three types, Maxwell-Boltzmann distribution law, partition function, thermodynamic functions of an ideal gas, Gibbs paradox, Sackur-Tetrode equation	12 lectures	3 Jan-End of Jan Syllabus Reference books Question pattern discussion Derivations and Numericals
Saha's ionization formula, Law of equipartition of energy (with proof) – Applications to specific heat of gases (monoatomic and diatomic), solids and its Page 2 of 47 limitations, thermodynamic functions of a finite level system, negative temperature.	10 lectures	Start of Feb- Middle of Feb Derivations and Numericals Class test on unit end Discussion of Important questions

Unit – III Bose-Einstein Statistics: Bose-Einstein distribution law, thermodynamic functions of a strongly degenerate Bose gas (non- relativistic), Bose-Einstein condensation, properties of liquid He (qualitative description), Radiation as a photon gas and thermodynamic functions of photon gas. Bose derivation of Planck’s law	9 Lectures	Feb- Beginning of March Assignment for IA Derivations and Numerical
Unit – IV Fermi-Dirac Statistics: Fermi-Dirac distribution law, thermodynamic functions of a completely and strongly degenerate fermions (non-relativistic), specific heat of metals, relativistic Fermi gas, white dwarf stars, Chandrasekhar mass limit.	9 lectures	Beginning of March- End of March Derivations and Numericals Based on problem set and model paper
Unit – II Radiation: Blackbody radiation and its spectral distribution. Kirchhoff law (No Proof), Planck’s quantum postulates, Planck’s law of blackbody radiation, deduction of Wien’s distribution law, Rayleigh-Jeans law, Stefan-Boltzmann law and Wien’s displacement law from Planck’s law, ultraviolet catastrophe.	5 lectures	March-April till dispersal of classes Derivations, Class Work Previous year papers discussion and Concepts ICT presentations