SYLLABUS

Unit-I. Basic Ideas of Statistical Physics, Scope of Statistical Physics, basic ideas about probability, distribution of four distinguishable particles in two compartment of equal size. Concept of macrostates, microstates, thermodynamic probability, effects of constraints on the system, distribution of n particles in two compartments, deviation from the state of maximum probability, equilibrium state of dynamic system, distribution of distinguishable n particles in k compartments of unequal sizes.

Unit-II. Phase space and its division into elementary cells, three kinds of statistics. The basic approach in the three statistics. Maxwell-Boltzman statistics applied to an ideal gas in equilibrium, experimental verification of Maxwell-Boltzman's law of distribution of molecular speeds. Need of quantum statistics. B.E. statistics, derivation of Planck's law of radiation, deduction of Wien's displacement law and Stefan's law from Planck's law. F.D. statistics. Comparison of M.B.B.E. and F.D. statics.

Unit-III. Statistical definition of entropy, change of entropy of a system, additive nature of entropy, law of increase of entropy, reversible and irreversible and examples. Work done in a reversible process. Examples of increase of entropy in natural process. Entropy and disorder. Brief review of the terms and Laws of thermodynamics, Carnot's Cycle. Entropy changes in Carnot' Cycle. Application of thermodynamics to thermoelectric effect, change of entropy along a reversible path in a P.V. diagram, entropy of a perfect gas, Equation of state of ideal gas from simple statistical consideration. Heat death of the universe.

Unit IV. Derivation of Maxwell's thermodynamical relations, cooling produced by adiabatic stretching, adiabatic compression, change of internal energy with volume. Expression for (Cp–Cv), change of state and Clayperon equation. Thermodynamical treatment of Joule-Thomson effect. Use of Joule-Thomson effect for liquefaction of helium. Production of very low temperature by adiabatic demagnetisation.