16 MPYC-202 (STATISTICAL MECHANICS)

Marks-100

UNIT-I

Classical Statistical Mechanics:

Classical probabilities: Binomial distribution of probability, variance,
mean value; Poisson's distribution, fluctuation, variance, mean value; Gaussian distribution, variance, mean value and applications. Basic principles and application of classical statistical mechanics,Liouville'stheorem,micro canonical ensemble, Review ofthermodynamics , equipartition theorem , classical ideal gas , Gibb'sparadox,Canonical ensemble and energy fluctuation , grand canonical
Ensemble and density fluctuation , Equivalence of Canonical andgrand canonical ensemble.(14 classes)

UNIT-II

Quantum Statistical Mechanics:

The density matrix, ensembles in quantum mechanics, Ideal gas inmicro canonical and grand canonical ensemble ; equation of state forideal Fermi gas, Theory of white dwarf stars. Ideal Bose gas, photonsand planck's law, statistics of photon and phonon gas, Bose-Einsteincondensation.Distribution function for Fermi-Dirac system, Equation of states for idealFermi gas, The theory of White Dwarf star; Landau Diamagnetism; Thequantised Hall effect, Pauli Paramgnetism, The De Haas-Van AlphenEffect.

Ising model: Definition of Ising model, One dimensional Ising model,
application to Ferromagnetism.(**20 classes**)

UNIT-III

Phase Transition: Thermodynamics description of Phase Transitions,
Phase Transitions of second kind,Landau theory of phase transitionbeyond mean field, Gaussian fluctuation and Ginzbergcriteria,Discontinuity of specific heat , change in symmetry in Phase atransition of second kind. (10 classes)

Books:

1. Statistical physics - K. Huang
2. Statistical Physics- B B Laud
3. Statistical physics - R.K. Pathria
4. Statistical physics - F. Mohling
5. Elementary Statistical physics - C.Kittel
6. Statistical physics - Landau and Lifsitz
7. Physics Transitions & Critical Phonomena – H.E. Stanly
8. Fundamental of statistical & Thermal physics- F. Reif