SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with A+ Grade by NAAC)
Chromepet, Chennai — 600 044.
M.Sc. END SEMESTER EXAMINATION APRIL/NOV - 2021
SEMESTER - III
08PPHCT3008 - Statistical Mechanics

Total Duration : 3 Hrs		**Total Marks : 75**	
MCQ	: 30 Mins	MCQ	: 15
Descriptive	: 2 Hrs.30 Mins	Descriptive	: 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Discuss Landuae theory of phase transition in detail.
2. State the principle of equipartition of energy. Deduce the expression for the same. Discuss with one example.
3. What is an ensemble? Explain various types in detail.
4. State and prove Liouvilles theorem.
5. Distinguish between Maxwell-Boltzmann statistics, Fermi-Dirac statistics and Bose-Einstein statistics.
6. What are fluctuations? Obtain expression for fluctuations in energy.
7. Discuss phase transition of second order. Explain one dimensional Ising model.
8. Derive a relation connecting partition function with Entropy.

Section C

Part A

Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Derive an expression for partition function, Helmholtz free energy and entropy of a perfect monoatomic gas in canonical ensemble.
10. Explain in detail Ehrenfests classifications.
11. Discuss Brownian movement. Derive Fokker-Planck equation.
12. Derive Plancks radiation formula.

Part B

Compulsory question $(1 \times 10 = 10$ Marks)

13. Obtain the expression for Fermi-Dirac distribution law. Using it, derive an expression for the Fermi energy of an electron in a metal.