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
20PPHCT3008 - 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. State and prove Gibb's phase rule.
2. Discuss fundamental postulates of statistics.
3. Define Ensemble. Differentiate between Canonical, micro canonical and grand canonical ensemble.
4. What do you mean by partition function? Express Gibb's free energy and entropy in terms of the partition function.
5. Discuss mean field theory of Ising model.
6. Bring out the correlations between space-time fluctuations.
7. Explain the thermodynamics behind grand-canonical ensemble.
8. State and prove Liouvillie's theorem.

Section C

Part A

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

9. Discuss Fermi-Dirac distribution and obtain an expression for Fermi energy.
10. Explain in detail Einstein's theory of translational Brownian motion.
11. Write the importance of fluctuations in studying thermo dynamical quantities. Derive an expression for fluctuations in pressure and volume.
12. Describe mean field theory of Ising model in three dimensions.

Part B

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

13. Discuss gas degeneracy of a Bose-Einstein gas and arrive at the expression for Bose- Einstein condensation.