

FACULTY OF SCIENCE

M.Sc. II – Semester (New)(CBCS / Non-CBCS) Examination, April / May 2014

**Subject: Physics & Applied Electronics
Paper – II: Statistical Mechanics**

Time: 3 Hours

Max.Marks: 80

Note: Answer all questions from Part - A and Part - B. Each question carries 4 marks in Part - A and 12 marks in Part - B.

**PART – A (8 x 4 = 32 Marks)
[Short Answer Type]**

- 1 Explain the phase space of a system.
- 2 What is an ensemble? Compare the three types of ensembles.
- 3 Distinguish between classical and quantum statistical mechanics.
- 4 What is a partition function? Explain its significance.
- 5 discuss the concept of super fluidity.
- 6 Write a note on white dwarfs.
- 7 Comment on the fluctuations in energy.
- 8 Explain one dimensional Ising model.

**PART – B (4 x 12 = 48 Marks)
[Essay Answer Type]**

- 9 (a) Show that the density distribution around any selected phase point is a constant in time.
OR
(b) Explain Gibb's paradox. How is it resolved?
- 10 (a) Obtain expressions for mean, peak and RMS velocities of Maxwell - Boltzmann gas.
OR
(b) Derive an expression for rotational partition function of a diatomic molecule.
- 11 (a) Discuss the properties of Bose - Einstein gas. What is Bose - Einstein condensation?
OR
(b) Discuss the application of Fermi - Dirac statistics to thermionic emission in metals.
- 12 (a) Discuss the concentration fluctuations. Explain phase transitions for first and second kind.
OR
(b) Explain in detail the phenomena of Brownian motion.
