

Code No. 4180 / CBCS / NONCBCS / N

FACULTY OF SCIENCE**M.Sc. II-Semester (CBCS/NON-CBCS) (New) Examination, May / June 2015****Subject : Physics and 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 Obtain the conditions for thermal equilibrium.
- 2 Explain the meaning of the terms 'phase space', 'ensemble' and 'ensemble average'.
- 3 Define partition function. How is it related to different thermodynamic functions.
- 4 Explain the basic postulates of quantum statistical mechanics.
- 5 Write a short note on white dwarfs.
- 6 Explain super fluidity of Helium.
- 7 Describe second order phase transition with an example.
- 8 Write a note on Brownian motion.

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

- 9 a) Obtain an expression for the entropy of an ideal gas in a micro canonical ensemble. What is Gibb's paradox. How is it resolved?
OR
b) Distinguish between canonical and grand canonical ensembles. State and prove the conservation principle of density distribution in phase space.
- 10 a) Derive Maxwell-Boltzman distribution for molecular velocities. State and prove the equipartition theorem.
OR
b) Obtain an expression for rotational partition function of a diatomic molecule and calculate its specific heat.
- 11 a) What are the properties of ideal Bose-Einstein gas? Obtain an expression for the energy and pressure of this gas.
OR
b) What are the properties of ideal Fermi-Dirac gas? Obtain an expression for the energy and pressure of this gas.
- 12 a) Describe essential features of Ising model. Discuss Bragg-William approximation.
OR
b) Give the classification of phase transitions. Write a note on phase transitions of first and second kind.
