M 27250

Reg. No. : .....

Name : .....

II Semester M.A./M.Sc./M.Com. Degree (Reg./Sup./Imp.) Examination, March 2015
(2014 Admn. Onwards)
PHYSICS
PHY2C08 : Statistical Mechanics

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer **both** questions (Either **a** or **b**). **Each** question carries **12** marks.

1. a) Derive Liouville's theorem and explain its consequences.

   b) State and prove equi partition theorem. Establish it for an one dimensional harmonic oscillator.

2. a) Describe the thermodynamic behaviour of an ideal Bose gas and derive the condition for the onset of Bose-Einstein condensation.

   b) Give an exact treatment one dimensional Ising model.

SECTION – B

Answer **any four**. **1** mark for section **a**, **3** marks for section **b** and **5** marks for section **c**.

3. a) State the postulate of equal a priori probability.

   b) Define the intensive parameters of thermodynamics.

   c) Obtain Maxwell's thermodynamic relations.

P.T.O.

4. a) What are the parameters which describe a microstate ?

   b) Show that in a steady state probability density is independent of the coordinates of phase space.

   c) Two states with energy difference 4.83×10^{-17} J occurs with relative probability of e^2. Calculate the temperature of the system ($k = 1.38 \times 10^{-23}$ J/K).

5. a) What is meant by canonical ensemble ?

   b) Explain the term phase space of a classical system.

   c) Find the phase trajectory of a linear harmonic oscillator.

6. a) What is meant by an ideal gas ?

   b) What is the basis for the classification of systems into M B, B E and F D ?

   c) Find an expression for the entropy of a system obeying F D distribution law.

7. a) Define Fermi temperature.

   b) Find the number of ways in which three identical spin ½ fermions can be distributed in 2 non degenerate distinct energy levels.

   c) Discuss the Pauli's theory of paramagnetism.

8. a) What is meant by lattice gas ?

   b) What is the difference between simple and uni-axial ferromagnets ?

   c) Discuss the Landau theory of second order phase transition.
