Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 07

B.Sc.(CS) (2013 & Onwards)   (Sem.–3)
STATISTICAL PHYSICS & THERMODYNAMICS
Subject Code : BCS-304
M.Code : 71776

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTION TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and a student has to attempt any FOUR questions.**

SECTION-A

1. **Answer briefly :**

    (a) Calculate the probability in tossing a coin 6 times, we get 4 heads and 2 tails.

    (b) How do you define the most probable macrostate?

    (c) What is dimensionality of phase space?

    (d) Find the number of ways in which three fermions may be distributed in four cells.

    (e) Define Fermi energy.

    (f) Discuss additive nature of entropy.

    (g) "*Entropy of universe always increases*". Why?

    (h) Explain why Carnot's engine cannot be realized in actual practice?

    (i) Define critical temperature of a gas.

    (j) Give physical interpretation of Helmholtz free energy.

SECTION-B

2. Taking the case of *n* particles distributed in *n* compartments with equal a priori probability, discuss the variation of probability of a microstate on account of small deviation from the state of maximum probability. Show that when *n* is very large, even small deviation from most probable state is highly improbable.

3. Define Phase space and momentum space. Determine the number of phase space cells in the momentum interval p and p+dp. What is the minimum size of phase space cell in classical and quantum statistics?

4. What is photon gas? Starting from Bose-Einstein energy distribution law derive Planck's law of black body radiation.

5. A gas has two specific heats whereas a liquid has only one. Explain. Explain why the specific heat of a gas at constant pressure is greater than at constant volume.

6. Discuss Carnot's reversible heat engine. What is Carnot's cycle? Show how the work done in each operation is represented on a pressure volume diagram.

7. What is Joule-Thomson effect? Obtain expression for change in temperature during Joule- Thomson effect. Why is it zero for a perfect gas?

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.