

Roll No.

(09/20-I)

5217

B. Sc. EXAMINATION

(For Re-appear Candidates Only)

(Fourth Semester)

PHYSICS

Paper-VII

Statistical Physics

Time : Three Hours

Maximum Marks : 40

Note : Q. No. 1 is compulsory. Attempt *one* question from each Unit. Use of scientific (non-programmable) calculator is allowed. In all *five* questions have to be attempted.

1. (a) Calculate the number of ways by selecting two objects at a time, if there are only four objects a, b, c and d. 2

- (b) Find out the probability of getting at least one head, if three coins are tossed simultaneously. 2
- (c) Define phase space with its dimensionality. 1
- (d) What do you mean by Fermi energy of a metal ? 1
- (e) What are Fermions ? Give three examples. 1
- (f) State Dulong's and Petit's law for specific heat of solids. 1

Unit I

- 2. Define microstate, macrostate and thermodynamic probability of a system of particles with their inter-relation. 8
- 3. State and prove Boltzmann theorem for entropy and probability. 8

Unit II

- 4. What are different kinds of statistics ? Explain them with some examples. 8

- 5. Derive expressions for average speed and root mean square speed for Maxwellian distribution. 8

Unit III

- 6. What are identical particles ? Derive Planck's radiation law by applying Bose-Einstein statistics. 8
- 7. What do you mean by specific heat anomaly of metals and give solution of this anomaly ? 8

Unit IV

- 8. (a) Determine Einstein frequency corresponding to Einstein temperature (Q_E) 236 K. Where $K_B = 14.4 \times 10^{-33} \text{ JK}^{-1}$, $h = 6.6 \times 10^{-34} \text{ J sec}$. 4
- (b) Explain specific heat at low temperature with the help of diagram. 4
- 9. What is Debye model of specific heat of solids ? Derive number of modes of vibration lying between ν and $\nu + d\nu$ frequency range. 8