

PD-369-S.E.-CV-19
M.Sc. PHYSICS (3rd Semester)
Examination, Dec.-2020
Paper-II
STATISTICAL MECHANICS

Time : Three Hours]

[Maximum Marks : 80

[Minimum Pass Marks : 29

Note : Answer from both the Sections as directed. The figures in the right-hand margin indicate marks.

Section-A

1. Answer the following questions:-

1x10=10

- (a) What is called ideal gas?
- (b) What are Fermions?
- (c) Define Fermi energy.
- (d) Which statistical distribution is applicable for photons.
- (e) What is meant by fluctuations in thermo dynamics.
- (f) What is spin of Boson particle.
- (g) Define phase space.
- (h) What do you mean by density matrix.
- (i) What are four basic coordinates of any thermodynamic system.
- (j) What is amount of change in entropy for a cyclic system.

2. Answer the following questions:-

2x5=10

- (a) What do you mean by Gibb's paradox?
- (b) What is ensemble in statistical mechanics?
- (c) Write factors which affects Brownian motion.
- (d) What do you understand by term cluster expansion.
- (e) Define partition function.

Section-B

15x4=60

Answer the following questions.

3. Discuss about micro canonical, canonical and grand canonical ensembles. Calculate entropy of perfect gas.

OR

What are statistical basic of thermodynamics? Obtain relation between probability and entropy.

4. What is indistinguishability of particles and its consequences? Derive an expression for F-D statistics.

OR

What do you mean by Bose-Einstein condensation? Calculate the critical temperature at which the condensation will start.

5. Explain Ising model in 3 dimension with suitable example.

OR

Describe in detail about cluster expansion for a classical gas.

6. Discuss about one dimensional random walk and explain Brownian motion..

OR

Deduce an expression for fluctuation in energy and pressure for any thermodynamics system.