M.Sc. DEGREE EXAMINATION,APRIL 2020
II Year III Semester
Statistical Mechanics

Time : 3 Hours   **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. What is a phase diagram?
2. State Nernst heat theorem.
3. Define phase space.
4. What is thermo dynamical probability?
5. Calculate the probability that the speed of oxygen molecule lies between 100 and 101 meter/sec, at 200 K.
6. What are Gibbs canonical ensembles?
7. Give the importance of partition function.
8. Define density matrix.
9. What is Maxwell Boltzmann distribution law?
10. Define ideal Bose gas.
11. What is Brownian movement?
12. What is the significance of fluctuation in energy?

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Explain phase transition and Gibbs phase rule.
14. Describe entropy using second law of thermodynamics.
15. Obtain the relation between statistical and thermo dynamical quantities.
16. Compare MB, BE and FD statistics.
17. Derive Planck's black body radiation formula using the concept of Bose Einstein statistics.
18. Explain Canonical ensemble and its probability density?
19. Derive the expression for partition function from Maxwell Boltzmann distribution.
20. Discuss the fluctuations of the thermo dynamical quantity pressure.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

21. Discuss the Landau theory of phase transition and use it to explain the thermodynamic quantities of liquid helium at different temperature.

22. For the perfect gas in micro canonical ensemble obtain the relation between thermo dynamical quantities.

23. State and prove Liouville's theorem.

24. Discuss the degeneracy of ideal Fermi gas?

25. Describe phase transition in ferromagnetic substance using one dimensional Ising model and obtain the energy value.

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