SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
M.Sc. Physics - END SEMESTER EXAMINATIONS APRIL - 2024
SEMESTER - III
22PPHCT3008 - Statistical Mechanics

Total Duration : 2 Hrs. 30 Mins.   Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks$)$

1. What are ensembles? Explain their types.

2. Derive Nernst heat theorem.

3. Give an account on vibrational partition function.

4. Applying Bose-Einstein statistics to photon gas, obtain the Planck's radiation law.

5. Describe Ising model.

6. Prepare a note on Molecular Partition functions.

7. Give the application of Fermi - Dirac statistics and derive Ideal Fermi gas.

8. State and Explain Brownian motion.

Section C

I - Answer any **TWO** questions $(2 \times 10 = 20$ Marks$)$

9. Illustrate the following thermodynamic quantities in terms of partition function:
   (i) Entropy
   (ii) Entropy of mixing
   (iii) Gibb's paradox

10. What is Ising model? Derive the solution for one dimensional Ising model.

11. Solve Bose-Einstein statistics and give its application.

12. Discuss the Landau's theory of super fluidity of helium II.

II - Compulsory question $(1 \times 10 = 10$ Marks$)$

13. What is Entropy of mixing? Derive and hence deduce Gibb's paradox.

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