25071

M.Sc. DEGREE EXAMINATION, APRIL 2018.

Physics

SECOND SEMESTER

Paper I — STATISTICAL MECHANICS

Time : Three hours Maximum : 75 marks

(No additional sheet will be supplied)

PART A — (5 × 3 = 15 marks)

Answer any FIVE questions.

Each question carries 3 marks.

Each answer should not exceed 1 page.

1. State the Liouville's theorem.

2. What is Gibb's paradox? How is it resolved?

3. Obtain the partition function in Canonical ensemble.

4. Write short note on vibrational partition function.

5. Explain briefly Bose-Einstein condensation.

6. Discuss the Super fluid phase of ^3He.

7. Derive the Random walk problem.

8. Write short note on Thermionic emission.

PART B — (4 × 15 = 60 marks)

Answer ALL questions.

Each question carries 15 marks.

Each answer should not exceed 6 pages.

9. What is Grand canonical ensemble? Obtain the expression of partition function for Grand Canonical ensemble in ideal gas.

Or

10. Derive energy fluctuations in canonical ensemble.

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11. Distinguish between Electronic and Nuclear partition function. Derive the expression for Electronic partition function.

Or

12. Discuss the Molecular partition function and also mention its properties.

13. Write the expression for distribution of velocities in Maxwell Boltzmann theory.

Or

14. Obtain the derivation of heat capacities in Einstein and Debye's theories.

15. Calculate the Magnetic susceptibility for free electrons.

Or

16. What is thermoelectric? Derive the equation of Onsagar's one dimensional rotation and their applications.

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