LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **PHYSICS**

FIRST SEMESTER – **APRIL 2019**

PH 1810–STATISTICAL MECHANICS

Date:04-04-2019 Dept. No. Max. : 100 Marks

Time:01:00-04:00

PART - A

Answer any **FOUR** questions (4×10=40)

1. Define a stationary ensemble.
2. Define the term 'equal-a-priori-probability'.
3. Sketch Maxwell's velocity distribution.
4. Why rotons do not contribute to specific heat at temperature below 1K?
5. Distinguish between Bosons and Fermions.
6. Is nuclear matter degenerate or not? Justify your answer
7. Define mean square deviation.
8. Define the correlation function for a randomly fluctuating quantity.

PART - B

Answer any **THREE** questions (3×20=60)

9. Derive Planck's formula for the energy density of black body radiation using the Bose-Einstein statistics.
10. Outline the theory of quantum Hall effect.
11. State and prove equipartition theorem.
12. State and prove Liouville's theorem. Use it to arrive at the principle of conservation of density in phase space.
13. Explain the theory for the specific heat capacity of liquid helium below transition temperature.
14. Derive the Boltzmann transport equation. Use it to find the distribution function in the absence of collisions.

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