



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

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

**FIRST SEMESTER – APRIL 2019**

**PH 1806– 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. Draw the phase diagram of a harmonic oscillator.
2. Sketch Maxwell's velocity distribution.
3. Why is the transition from He I to He II known as lambda transition?
4. Define the term Fermi energy.
5. Write down the equations of hydrodynamics.
6. Distinguish between binary collision and collision with a fixed scatterer.
7. Define mean square deviation.
8. Why do small particles immersed in a fluid show Brownian motion?

**PART - B**

Answer any **THREE** questions

(3×20=60)

9. State and prove Liouville's theorem.
10. Obtain the canonical partition function of a system with rotational, vibrational and electronic degrees of freedom.
11. Briefly discuss and obtain an expression for non-equilibrium distribution function and its time evolution.
12. Calculate the entropy of an ideal Boltzmann gas using microcanonical ensemble.
13. Study the specific heat capacity variation of an ideal Fermi gas with temperature when the temperature is very small compared to its Fermi temperature.
14. On the basis of symmetry consideration of the wave function classify the statistics as MB, BE and FD.

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