

Roll No. .... /  
800 -/30/20

JS-246

**July 2016**  
**M. Sc. IInd Semester Examination**

**PHYSICS**  
**Paper II : Statistical Mechanics**

Time 3 Hours]

[Max. Marks : Regular 85 / Private 100

**Note :** This question paper is meant for all Regular and Private students. Answer all five questions. All questions carry equal marks. The blind candidates will be given 60 minutes extra time.

1. Explain Microcanonical, Canonical and Grand Canonical Ensembles. Compare these three types of ensembles.

OR

What do you mean by Partition Function ? Express Helmholtz free energy and entropy in terms of partition function. <http://www.davvonline.com>

2. Describe the Law of Distribution of Energy for a particle according Maxwell-Boltzmann Statistics.

OR

Deduce the Boltzmann-Transport Equation and discuss collision term.

3. Explain Cluster Expansion for a Classical Gas in brief.

OR

What are the phase transitions of first and second kind ? Discuss Ising Model for phase transition of second kind.

4. What is Thermodynamic Fluctuations ? Explain the fluctuations for energy and pressure.

OR

Describe Onsager Reciprocal Relation.

5. Write short notes on any two of the following :

- (a) Gibbs Paradox.
- (b) Brownian Motion.
- (c) Phase Space.
- (d) Electron Gas in Metal.