

**FACULTY OF SCIENCE**

**M.Sc. II-Semester Examination, May / June 2016**

**Subject : Physics and Applied Electronics**

**Paper - II  
Statistical Mechanics**

**Time : 3 hours**

**Max. Marks : 80**

**Note : Answer all questions from Part-A and Part-B. Each question carries 4 marks in Part-A and 12 marks in Part-B.**

**PART – A (8 x 4 = 32 Marks)  
(Short Answer Type)**

- 1 Discuss the relation between thermodynamics and statistical mechanics.
- 2 What is Gibbs paradox? Explain.
- 3 State and explain equipartition theorem.
- 4 Distinguish between Bose-Einstein and Fermi-Dirac statistics.
- 5 Comment on phonons and Rotons.
- 6 Explain about thermionic emission.
- 7 Explain order disorder transition.
- 8 Define fluctuations.

**PART – B (4 x 12 = 48 Marks)  
(Essay Answer Type)**

- 9 a) Define ensemble. State and prove Liouville's theorem in phase space.  
**OR**  
b) Obtain the conditions for thermal, mechanical and concentration equilibrium for an ensemble.
- 10 a) Explain the salient features of canonical ensemble and obtain an expression for entropy of a perfect gas using canonical ensemble.  
**OR**  
b) Deduce an expression for translational partition function and compute the specific heat.
- 11 a) Derive an expression for pressure of ideal Bose-Einstein gas.  
**OR**  
b) Comment on i) two fluid model of liquid helium ii) electronic specific heat.
- 12 a) Apply Bragg-William's approximation to Ferromagnetic system.  
**OR**  
b) Derive the expressions for energy and volume fluctuations.

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