FACULTY OF SCIENCE
M.Sc. II-Semester Examination, May / June 2016
Subject: Physics and Applied Electronics
Paper - II
Statistical Mechanics

Time : 3 hours\hspace{1cm} 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 Lionville’s theorem in phase space.
   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.
     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.
     b) Comment on i) two fluid model of liquid helium ii) electronic specific heat.

12. a) Apply Bragg-William’s approximation to Ferromagnetic system.
     b) Derive the expressions for energy and volume fluctuations.

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