

**B.Sc 6<sup>th</sup> Semester (Honours) Examination, 2020****PHYSICS****(STATISTICAL MECHANICS LAB)****Paper-602/C-14/P-14****COURSE ID : 62422****TIME: 1 HOUR****FULL MARKS - 10****1. Answer any five of the following questions:****2 x 5 = 10**

- (a) Why does the blackbody radiation have a continuous spectrum while atomic emission have discrete spectrum?
  - (b) Give the example of micro-canonical, canonical and grand-canonical ensembles.
  - (c) Draw a phase space trajectory of a particle moving in a repulsive central potential  $V(r) = a/r$ , where  $a > 0$ .
  - (d) How do you extract the temperature, if the black body radiation spectrum data are given to you?
  - (e) Explain, under what conditions quantum statistics reduces to classical statistics?
  - (f) Plot FD and BE distribution functions for  $T=0K$  and  $T \neq 0K$ .
  - (g) Plot temperature variation of specific heat of solids according to (i) Einstein theory and (ii) Debye theory.
  - (h) What is the fundamental difference between the Einstein theory and Debye theory of specific heat?
  - (i) Write down the names of three Bosons and three Fermions.
  - (j) Draw Planck's law for black body radiation and compare it with Rayleigh – Jeans Law at high temperature and low temperature.
  - (k) What do you mean by Ultraviolet Catastrophe?
  - (l) What is the difference between Fermi-Dirac and Bose-Einstein distribution in statistical interpretation of entropy?
  - (m) What do you mean by Lennard – Jones potential?
  - (n) Explain how temperature affects the Maxwell velocity distribution curve?
  - (o) What are the limits of the definition of thermodynamic entropy for macroscopic systems which are, or aren't, in thermodynamic equilibrium?
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