UNIVERSITY OF THE PUNJAB

Seventh Semester – 2019

Examination: B.S. 4 Years Program

Roll No. in Fig. .....

Roll No. in Words. .....

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Signature of Supdt.:

PAPER: Statistical Mechanics **MAX. TIME: 15 Min.**

Course Code: PHY-401 Part–I (Compulsory) **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.
Please encircle the correct option. Division of marks is given in front of each question.
This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the right answer, cutting and overwriting is not allowed. (1x10=10)

(i) The probability of finding a system in one of its micro states is

(a) zero (b) equal (c) unequal (d) negative

(ii) In Bose-Einstein condensate the number of particles in ground state is

(a) zero (b) very large (c) half of that of first excited state (d) very small but non zero

(iii) Bose Einstein condensate is formed at

(a) very high temperature (b) room temperature (c) very low temperature (d) all temperatures.

(iv) The chemical potential of photon is

(a) 1 (b) 0 (c) undefined (d) negative

(v) The number of particles and energy both are exchanged in

(a) microcanonical ensemble (b) grand canonical ensemble (c) canonical enesemble (d) both a and b

(vi) In canonical ensemble, the fluctuation occurs in

(a) Energy (b) temperature (c) concentration (d) All of these

(vii) U- PV equals to

(a) enthalpy (b) Helmholtz free energy (c) entropy (c) None of these

(viii) Electrons in a metal obey

(a) Maxwell-Boltzmann Statistics(b) Bose-Einstein Statistics (c)) Fermi-Dirac Statistics (d) None of these

(ix) The particles with integral spin are described by

(a) Fermi-Dirac Statistics (b) Maxwell-Boltzmann Statistics (c) Bose-Einstein Statistics (d) All of these

(x) The orbit in phase space for harmonic oscillator is

(a) a circle (b) an ellipse (c) a straight line (d) a hyperbola

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Seventh Semester – 2019

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Roll No. .....

PAPER: Statistical Mechanics
Course Code: PHY-401 Part – II

MAX. TIME: 2 Hrs. 45 Min.
MAX. MARKS: 50

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2. Give short answers of the following questions. (5x4=20)

- Define deviation and mean square deviation of a quantity x.
- Give Physical interpretation of Livioulle's theorem.
- Write down three properties of entropy.
- Define (a) Helmholtz free energy (b) Fugacity
- Write down Stirling approximation. Also mention its importance.

Q.No. 3 Define the Statistical Entropy and assuming the entropy of a closed system in statistical equilibrium is maximum, derive the condition for the Thermal Equilibrium. (10)

Q.No.4 Describe heat capacities of diatomic gases in detail. Also discuss ortho and para hydrogen. (10 marks)

Q.No.5 (a) Discuss black body radiation in terms of photon gas. Also derive Planck's radiation law. (6 marks)

(b) Derive Raleigh-Jeans law from Planck's radiation law. (4 marks)