No. .....

41191

B. Sc. (Pass Course) 4th Semester Examination – May, 2019

PHYSICS-I (STATISTICAL MECHANICS)

Paper : PHY-401

Time : Three Hours] *[Maximum Marks : 80*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting at least ***one*** question from each Unit.

UNIT – I

1. Describe the probability consideration of tossing coins with specific reference to 3 coins being unlike and similar coins. What happens in case of tossing of any number of coins ? Find out the maximum and minimum probability. 9

2. (i) Describe the distribution of N molecules in two halves of a box and determine the probabilities of most probable and least probable distributions. Find out the probability of least probable distribution in case of 12 particles distributed randomly between two boxes A and B. 4.5

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(ii) Twelve similar coins are tossed for a large number of times. Calculate : 4.5

(a) the probability of getting the heads of 7 coins uppermost

(b) the probability of most probable distribution

(c) the probability of least probable distribution

UNIT – II

3. Explain phase space and density of phase points, Describe cellular nature of phase space and prove conservation of density in phase space. 9

4. (i) Describe the Maxwell-Boltzmann statistics for systems of non-interacting particles. 4.5

(ii) A system obeying quantum statistics starts following the approximately the laws of classical statistics. Deduce the necessary conditions. 4.5

5. Derive the most probable distribution in case of particles obeying Bose-Einstein statistics. Apply the results to deduce the Planck's radiation law. 9

UNIT – III

6. Obtain the expression for specific heat of a Bose gas and discuss its variation with temperature. Use it to explain the phenomenon of B-E condensation. 9

7. Derive the most probable distribution for
Discuss the results as compared to MB
Explain and derive the necessary relation
pressure exerted by a degenerate Fermi gas.

8. Write short notes on the following :

(i) Zero point energy

(ii) Electron gas in metals

(iii) Statistical fluctuations