

# Question Paper Code : 5663

M.Sc. (Semester-II) Examination, 2018

(Regular/Back Paper/Improvement)

**PHYSICS**

[ Module-PHYC-202 ]

( Statistical Mechanics )

Time : Three Hours]

[Maximum Marks : 70

**Note :** Answer **five** questions in **all**. **Question No. 1** is **compulsory**. and carries **30 (= 3x10)** marks. In addition attempt **one** question (carrying **10** marks) from each unit.

1. Discuss the following in brief :
  - (a) Postulate of equal a priori probability.
  - (b) Orbit of a linear harmonic oscillator in phase space.
  - (c) What are the symmetry requirements in B-E and F-D statistics ?
  - (d) Gibb's phase rule with an example.
  - (e) Chandra Shekhar limit.

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[P.T.O.]

- (f) Thermodynamics of irreversible processes.
- (g) Principle of minimum entropy production.
- (h) Onsagar reciprocal relations.
- (i) Second order phase transition.
- (j) Application of statistical mechanics to rotating bodies.

#### UNIT-I

2. Describe Bose-Einstein distribution law using grand partition function.
3. Discuss :
  - (a) Condition of statistical equilibrium
  - (b) A problem of random walk

#### UNIT-II

4. Explain the behaviour of liquid He II at low temperatures. What is second sound ?
5. What is the energy  $E_0$  and pressure  $P_0$  of the Fermi gas at absolute zero ? How are  $P_0$  and  $E_0$  related with Fermi energy  $E_f$  ?

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#### UNIT-III

6. Discuss the application of Fermi Dirac distribution to White Dwarf.
7. Define Grand Canonical Ensemble and derive expressions for thermodynamic functions in terms of the grand partition functions.

#### UNIT-IV

8. State and explain Nyquist theorem.
9. What are fluctuation ? Discuss concentration fluctuation in a grand canonical ensemble.

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