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Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, JUNE 2018

Second Semester

Faculty of Science

Branch II : Physics–A–Pure Physics

PH 2C 07—THERMODYNAMICS AND STATISTICAL MECHANICS

(2012 Admission onwards)

Time : Three Hours Maximum Weight : 30

Part A (Short Answer Type Questions)

Answer any **six** *questions.*
Each question carries weight 1.

1. What is enthalpy ? How is it different from entropy ?
2. Differentiate between classical and statistical probabilities.
3. How entropy is related to probable number of microstates ?
4. What is meant by partition function ?
5. Define ensemble.
6. What is the importance of chemical potential ?
7. Write down the features of grand canonical ensemble.
8. What are order - disorder parameters ?
9. What is meant by non-interacting Bose gas ?
10. Briefly explain the phase separation in mixtures.

(6 × 1 = 6)

Part B

Answer any **four** *questions.*
Each question carries weight 2.

11. Prove the equivalence of the absolute and perfect gas scales of temperature.
12. Obtain the axioms of statistical probability.

Turn over

13. State and prove the equipartition theorem.

14. Determine the number of single particle density of states of a free particle in two dimensions.

15. Derive the expression for grand potential.

16. Deduce Clausius -Clapeyron latent heat equation with Gibbs potential.

(4 × 2 = 8)

Part C

Answer **all** *questions.*
Each question carries weight 4.

17. (a) Discuss heat death as a consequence of entropy. Establish the increase of entropy in irreversible processes.

Or

(b) Make out the foundations of statistics and various distributions

18. (a) Release the thermodynamics of a canonical ensemble from partition function.

Or

(b) Bring out the statistics of identical particles.

19. (a) Discuss the Einstein model for vibrations in solids.

Or

(b) Discuss grand canonical ensemble for grand partition function.

20. (a) Bring out the thermodynamics of a Fermi system.

Or

(b) Discuss Landau theory along with critical exponents.

(4 × 4 = 16)