20000977

20000977

Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, NOVEMBER 2020

Second Semester

Faculty of Science

Branch II : Physics–A–Pure Physics

PH2C07—THERMODYNAMICS AND STATISTICAL MECHANICS

(2012—2018 Admissions)

Time : Three Hours Maximum Weight : 30

Part A

Short answer type questions.
Answer any **six** *questions.*
Each question carries weight 1.

1. How entropy is related to temperature variations ?
2. Explain the law of increase of entropy.
3. Distinguish between classical and statistical probabilities.
4. What is an ensemble ? Explain.
5. What is meant by antisymmetric wave functions ? Illustrate.
6. What are the characteristics of identical particles ?
7. State the merits and demerits of Einstein's model.
8. What are the thermodynamic properties of a Fermi gas ?
9. Explain first order phase transition.
10. What are critical exponents ? Explain.

(6 × 1= 6)

Part B

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

11. Obtain the equivalence of the absolute scale and the perfect gas scale of temperature.
12. Discuss the axioms of probability theory and its application to thermodynamics.

Turn over

13. Bring out the statistics of identical particles.

14. Describe Maxwell's distribution for classical gas.

15. Obtain the partition function for grand canonical ensemble.

16. Discuss Landau theory for phase transitions.

(4 × 2 = 8)

Part C

Answer **all** *questions.*

Each question carries weight 4.

17. (a) Derive the Maxwell's relations for thermodynamic functions.

Or

(b) Bring out the relation between the second law of thermodynamics and Carnot's cycle of operations.

18. (a) Discuss canonical ensemble and arrive the expression for partition function.

Or

(b) Obtain the thermodynamic quantities from partition function in the case of canonical ensemble.

19. (a) Discuss Einstein model and arrive at the merits of the model.

Or

(b) Obtain Debye model for specific heat of solids. Suggest modifications.

20. (a) Investigate on bosons and fermions for a comparison.

Or

(b) Bring out the pros and corns of Ising model approach.

(4 × 4 = 16)