

(201PHY17)

M.Sc. DEGREE EXAMINATION, APRIL 2018.

SECOND SEMESTER

Branch – Physics

STATISTICAL MECHANICS

(New syllabus for batch 2017)

Time : 3 Hours

Max. Marks : 70

PART – A

(Short Answer type)

Answer any FOUR of the following. All question carry equal marks.

(Marks :  $4 \times 5$  marks = 20 marks)

1. Define Phase space and explain.
2. Define ensemble and distinguish between different ensembles.
3. What are the properties of partition functions?
4. What are the applications of rotational partition function?
5. State Planck's radiation law. Mention its significance.
6. Write a brief note on super fluid phase of  $^3\text{He}$ .
7. What is Brownian motion and explain.
8. Write the significant characteristics of white dwarfs.

PART—B

Answer ALL questions. All question carry equal marks.

(Marks :  $4 \times 12\frac{1}{2}$  marks = 50 marks)

9. (a) State and prove Liouville's theorem. Explain Gibb's paradox and how it is resolved?  
Or  
(b) Define canonical ensemble. Explain the entropy and probability of an ideal gas in canonical ensemble.
10. (a) Distinguish between canonical, molecular, translational and rotational partition functions.  
Or  
(b) Define electronic and nuclear partition functions. What are the applications of vibrational partition function?

[P.T.O]

11. (a) What are the characteristics of particles obeying Bose-Einstein statistics? Obtain equation for Bose-Einstein distribution function.

Or

(b) Explain Debye's theory of specific heat of solids. Compare it with Einstein's theory.

12. (a) What are the characteristics of particles obeying Fermi-Dirac statistics? Obtain equation for Fermi-Dirac distribution function.

Or

(b) Discuss about Onsager's one dimensional and reciprocal rotations.

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Time

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

9.

10.

(2019)