

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2019 – 2020)

SUBJECT CODE : 19PH/PC/SM14

M.Sc., DEGREE EXAMINATION NOVEMBER 2019
PHYSICS
FIRST SEMESTER

COURSE : CORE
PAPER : STATISTICAL MECHANICS
TIME : 3 HOURS

MAX. MARKS : 100

SECTION - A

ANSWER ALL QUESTIONS:

(10x3=30)

1. What are phase space and phase cells?
2. Write note on ensemble and its types.
3. Define partition function. Mention its use.
4. What is classical ideal gas?
5. Write the expression and importance of entropy of a perfect gas.
6. Write short note on most probable distribution.
7. What is phonon? Write any two of its properties.
8. What is degenerate state? Brief the behaviour of Fermi gas at strong degenerate state.
9. Differentiate between bosons and fermions.
10. What is a white dwarf? Write the limiting value of its mass.

SECTION – B

ANSWER ANY FIVE QUESTIONS:

(5x5=25)

11. What is Gibb's paradox? How it can be resolved?
12. Derive the expression for free energy and enthalpy in terms of statistical parameters.
13. What is meant by negative temperature? Write the conditions to be satisfied for attaining negative temperature.
14. Brief symmetric and antisymmetric wave functions.
15. Explain fluidity and conductivity properties of Helium II.
16. Briefly explain black body radiation based on quantum statistics.
17. Discuss the dependence of magnetic susceptibility of fermions on temperature.

SECTION – C

ANSWER ANY THREE QUESTIONS:

(3x15=45)

18. State and prove Liouville's theorem.
19. State and prove equipartition theorem from canonical distribution.
20. Explain density matrix and its variation with time.
21. With a suitable graph, explain Debye's theory of specific heat of solids.
22. What are fermions? Explain how they are distributed among various energy levels.
