

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2023
(Fourth Semester)

Branch - PHYSICS

APPLIED THERMODYNAMICS AND STATISTICAL MECHANICS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 Kinetic energy per unit volume $E =$ _____
(i) - P (ii) 2P
(iii) 3P (iv) 3P / 2
- 2 Liouville's theorem confirms the principle of conservation of
(i) volume (ii) phase-space
(iii) pressure (iv) density
- 3 Bosons have _____ spin.
(i) Integral (ii) half Integral
(iii) zero (iv) clockwise
- 4 The gas degeneracy is a function of
(i) D (ii) 1/D
(iii) 1/D² (iv) D²
- 5 Emissivity of a perfect black body 'e'
(i) >1 (ii) <1
(iii) = 1 (iv) = 0

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a. Define and explain work and energy with respect to thermodynamics.
OR
b. State Carnot's theorem and what is Carnot's cycle?
- 7 a. Compare micro and macro states.
OR
b. Describe phase space.
- 8 a. Distinguish between bosons and fermions.
OR
b. Differentiate M.B and F.D statistics.
- 9 a. Explain the distribution of molecular velocities.
OR
b. Explain the behaviour of monatomic ideal gas in a gravitational field.
- 10 a. Write short notes on negative temperature.
OR
b. Write shortnotes on paramagnetism.

Cont...

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a. What is Gibb's paradox? How it has been resolved?
OR
b. Give a detailed account of Helmholtz free energy.
- 12 a. Compare various ensembles.
OR
b. State and explain Liouville's theorem.
- 13 a. Deduce equation of a state for an ideal gas.
OR
b. Derive Maxwell Boltzmann statistics.
- 14 a. Explain experimental verification of M.B speed distribution.
OR
b. Describe the quantized linear oscillator and obtain an expression for the energy of linear oscillator.
- 15 a. State the postulates of Einstein's theory of specific heat of solid and derive an expression for it.
OR
b. State the modification in the Debye's theory and obtain C_v .

Z-Z-Z

END