PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025
(Second Semester)

Branch - **PHYSICS**

THERMAL & STATISTICAL PHYSICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	What is the Principle of a liquid thermometer? a) Expansion of gas b) Conduction of heat c) Expansion of liquid d) Radiation of heat	K1	CO1
	2	What is the effect of pressure on a liquid thermometer? a) Increases accuracy b) Decreases accuracy c) No effect d) Increase temperature reading	K2	CO1
2	3	What does 'a' represent in the Van der walls equation? a) Volume of gas molecules b) Attractive forces between molecules c) Repulsive forces between molecules d) Gas constant	K1	CO2
	4	Which of the following is a limitation of Van der walls equations? a) Assume spherical gas molecules b) Ignores molecular polarity c) Fails at high pressure d) All of the above	K2	CO2
3	5	Which material has the highest thermal conductivity? a) Copper b) Silver c) Diamond d) Aluminum	K1	CO3
	6	Which equations related thermal conductivity to mean free path? a) Fourier's law b) Wiedemann – Franz law c) Eucken's law d) Kinetic theory equation	K2	CO3
4	7	What is the Carnot cycle? a) Reversible thermodynamic cycle b) Irreversible thermodynamic cycle c) Heat transfer process d) Energy conversion process	K1	CO4
	8	What is the assumption made in the Carnot cycle? a) Irreversible process b) Reversible process c) Isothermal process d) Adiabatic process	K2	CO4
5	9	What type of particle obey Fermi-Dirac statistics? a) Bosons b) Fermions c) Leptons d) Hadrons	K1	CO5
	10	Which of the particle do not obey Fermi-Dirac statistics? a) Electrons b) Protons c) Photons d) All of the above	K2	CO5

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SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain the construction and working of a thermometer.	K2	CO1
		(OR)		
	11.b.	Distinguish between the liquid thermometer and clinical thermometer.		
2	12.a.	Describe the Porous plug experiment. What conclusions have been drawn from it. What is inversion temperature?	K2	CO2
		(OR)		
	12.b.	Explain cooling due to adiabatic demagnetization.		
3	13.a.	State and explain Kirchhoff's law. Give its application.	K2	CO3
		(OR)		
	13.b.	State Stefan-Boltzmann law of radiation. Deduce this law on thermodynamic considerations.		
4	14.a.	Efficiency of a Carnot's cycle changes from 1/6 to 1/3 when source temperature is raised by 100k, calculate the temperature of the sink.	K4	CO4
		(OR)		
	14.b.	Explain enthalpy, Helmholtz and Gibbs functions in thermodynamics. Derive Gibbs Helmholtz equation.		
5	15.a.	Give the comparison of three statistics.	K2	CO5
		(OR)		
	15.b.	Discuss the free electron gas model for metals. Obtain the distribution law for the electron gas in a metal at absolute zero.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Describe a Platinum resistance thermometer. How would you calibrate and use it for measuring the temperature of a body? Mention its advantages.	K2	CO1
2	17	Derive and discuss the Van der wall's equation of state of a gas. Mention its defects.	K3	CO2
3	18	Determine of the thermal conductivity of a bad conduction material by Lee's disc method.	K4	CO3
4	19	Derive Maxwell's thermodynamics relations.	K5	CO4
5	20	Discuss Maxwell-Boltzmann distribution law in terms of temperature.	K4	CO5

Z-Z-Z END