

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2026
(Second Semester)

Branch – PHYSICS

THERMAL AND 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	The thermocouple thermometer works on the principle of ____ a) Seebeck effect b) Peltier effect c) Thomson effect d) Joule effect	K1	CO1
	2	The temperature at which both Celsius and Fahrenheit readings are the same is ____ a) -32° b) 0° c) -273° d) -40°	K2	CO1
2	3	The process of converting a gas into a liquid is known as ____ a) Vaporization b) Condensation c) Liquefaction d) Sublimation	K1	CO2
	4	Liquefaction of helium is difficult because it has ____ a) very low molecular weight b) very low critical temperature c) very high critical pressure d) chemically inert	K2	CO2
3	5	The rate of heat transfer by conduction through a solid rod depends on ____ a) Temperature difference only b) Length of the rod only c) Cross-sectional area only d) Temperature difference, length, area, and thermal conductivity	K1	CO3
	6	The unit of Stefan's constant σ is ____ a) $\text{W m}^{-2} \text{K}^{-1}$ b) $\text{W m}^{-2} \text{K}^4$ c) $\text{J m}^{-2} \text{K}^{-4}$ d) W m K	K2	CO3
4	7	For a reversible process, the change in entropy is ____ a) Constant b) Minimum c) Maximum d) Zero	K1	CO4
	8	The Zeroth Law of Thermodynamics defines ____ a) Internal energy b) Heat capacity c) Temperature d) Work	K2	CO4
5	9	Examples of Bose particles are ____ a) Electrons and positrons b) Photons and helium-4 atoms c) Protons and neutrons d) Electrons and protons	K1	CO5
	10	The Fermi energy of a system corresponds to ____ a) The average energy at any temperature b) The minimum energy of electrons c) The highest occupied energy level at absolute zero d) The total energy of all particles	K2	CO5

Cont...

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.	The resistance of a platinum wire at 0°C, 100°C and 444.6°C is found to be 5.5, 7.5 and 14.5 ohms respectively. The resistance of a wire at a temperature t°C is given by the equation $R_t = R_0(1 + \alpha t + \beta t^2)$. Find the values of α and β .	K3	CO1
		(OR)		
	11.b.	Illustrate the Seebeck effect.		
2	12.a.	Explain Andrew's experiment on Carbon Dioxide.	K4	CO2
		(OR)		
	12.b.	Examine the liquefaction of hydrogen with neat diagram.		
3	13.a.	Assess the significance of the Wiedemann–Franz law.	K5	CO3
		(OR)		
	13.b.	Explain Wein's displacement law and Rayleigh-Jean's law.		
4	14.a.	Calculate the work done during isothermal process.	K3	CO4
		(OR)		
	14.b.	Find the expression for the efficiency of a reversible Carnot's engine with help of T-S diagram.		
5	15.a.	Examine the Fermi Dirac distribution law.	K4	CO5
		(OR)		
	15.b.	Explain the need for introducing 'quantum statics'.		

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	Explain in detail, the construction and working of thermoelectric thermometer with neat diagram.	K4	CO1
2	17	Analyze how the porous plug experiment validates the concept of Joule–Thomson effect.	K4	CO2
3	18	Examine the thermal conductivity of bad conductor by using Lee's disc method	K4	CO3
4	19	Evaluate the efficiency of a Carnot heat engine with neat diagram.	K5	CO4
5	20	Compare the basic postulates of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics.	K5	CO5