

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**BSc DEGREE EXAMINATION MAY 2019
(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 x 1 = 10)

- 1 In platinum resistance thermometer, there is
 - (i) change of temperature with volume
 - (ii) change of temperature with pressure
 - (iii) change of resistance with change in temperature
 - (iv) change in melting point with change in temperature

- 2 The name of the scientist who discovered that on increasing the temperature of the hot junction to 570°C, the current through the circuit is reversed is
 - (i) Einstein
 - (ii) Seebeck
 - (iii) Cumming
 - (iv) Newton

- 3 The correction for pressure in vanderwalls equation of state is
 - (i) $-\frac{a}{v^2}$
 - (ii) $\frac{a}{v^2}$
 - (iii) b
 - (iv) -b

- 4 The shape of specific heat-temperature graph of liquid helium is
 - (i) lambda
 - (ii) pi
 - (iii) sigma
 - (iv) eta

- 5 An object which absorbs all wavelengths of radiations falling on it is called
 - (i) Thermosflask
 - (ii) Concave mirror
 - (iii) Black body
 - (iv) Spherical mirror

- 6 The energy distribution in thermal spectrum according to Rayleigh is given by
 - (i) $E_{\lambda} = \frac{8\pi KT}{\lambda^4}$
 - (ii) $E_{\lambda} = \frac{8\pi KT}{\lambda^2}$
 - (iii) $E_{\lambda} = \frac{8\pi hc}{\lambda^5 \left[e^{\frac{b\pi}{\lambda KT}} - 1 \right]}$
 - (iv) $E_{\lambda} = \frac{8\pi K}{\lambda}$

- 7 Isochoric process is one in which
 - (i) temperature remains constant
 - (ii) volume remains constant
 - (iii) pressure remains constant
 - (iv) all the quantities change

- 8 A Entropy is a measure of
 - (i) disorderliness of a system
 - (ii) orderliness of a system
 - (iii) order of the system remains invariant
 - (iv) None of the above

- 9 Bose Einstein distribution law is applied to a system of
 - (i) identical particles only
 - (ii) indistinguishable particles only
 - (iii) distinguishable particles only
 - (iv) both (i) & (ii)

- 10 Fermions have spin
 (i) $\frac{1}{2}$ (ii) zero
 (iii) integral multiple of one (iv) $\frac{1}{4}$

SECTION - B (35 Marks)

Answer **ALL** Questions

ALL Questions Carry EQUAL Marks (5 x 7 = 35)

- 11 a Write the construction and measurement of temperature using Platinum resistance thermometer.
 OR
 b Explain the effect due to seeback with the help of a simple experiment.
- 12 a Compare the properties of Liquid Helium I with that of Liquid Helium II.
 OR
 b Explain with a neat sketch, the behaviour of gases using porous plug experiment.
- 13 a Determine the absolute conductivity 'K' of metals using Forbe's experiment theoretically.
 OR
 b State and derive kirchoff's laws of Heat radiation.
- 14 a Explain the working of carnot's refrigerator and obtain an expression for coefficient of performance.
 OR
 b Calculate the change in entropy in a reversible and irreversible process for a Carnot's cycle.
- 15 a Compare MB, BE and FermiDirac Statistics.
 OR
 b Define Statistical mechanics and explain statistical equilibrium.

SECTION - C (30 Marks)

Answer any **THREE** Questions

ALL Questions Carry EQUAL Marks (3 x 10 = 30)

- 16 Explain the construction, working of constant volume thermometer with a neat diagram.
- 17 Derive Vanderwaals equation by considering the correction of pressure and volume of the perfect gas.
- 18 Derive and verify experimentally Stefan's law of heat radiation.
- 19 Derive any four Maxwell's thermodynamical relations.
- 20 Obtain an expression for energy density of wavelength λ in the spectrum of black body with respect to a photon gas.

Z-Z-Z

END