

**D****DE-2933****B. Sc. (Sem. I) Examination****March / April - 2016****Applied Physics : Paper - II**

Time : 2 Hours]

[Total Marks : 50

Instructions :

(1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of signs on your answer book.

Name of the Examination :
B. Sc. (Sem. 1)

Name of the Subject :
Applied Physics : Paper - 2

Subject Code No. : **2 9 3 3** Section No. (1, 2,.....): **NIL**

Seat No. :
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Student's Signature

- (2) All 28 questions are compulsory.
- (3) Symbols used in the paper have their usual meaning.
- (4) Figures to right indicate full marks.

Q. 1 to 12 Multiple choice questions : (1 mark)**Q. 13 to 22 Multiple Choise Questions : (2 marks)****Q. 23 to 28 Multiple Choice Questions : (3 marks)**

*O.M.R. Sheet ભરવા અંગેની અગત્યની સૂચનાઓ આપેલ
O.M.R. Sheet-ની પાછળ છાપેલ છે.*

*Important instructions to fillup O.M.R. Sheet
is given on back side of the provided O.M.R. Sheet.*

- 1 The average power dissipation in a pure capacitance in ac circuit is :
- (A) CV^2
 - (B) $3CV^2$
 - (C) zero
 - (D) $2CV^2$
- 2 Efficiency of Carnot engine is 100% if :
- (A) $T_2 = 0 \text{ K}$
 - (B) $T_1 = 273 \text{ K}$
 - (C) $T_1 = 0 \text{ K}$
 - (D) $T_2 = 273 \text{ K}$
- 3 Who developed the flexible fiberscope first ?
- (A) Charles kao and George Hochham
 - (B) Brewster and Malus
 - (C) Rayleigh and Jean's
 - (D) Hopkins and Kapany
- 4 An iron rod of length L and magnetic moment M is bent in the form of a semicircle. Now its magnetic moment will be :
- (A) $2M / \Pi$
 - (B) M / Π
 - (C) $M \Pi$
 - (D) M

- 5 The material of permanent magnet has :
- (A) Low retentivity, high coercivity
 - (B) Low retentivity, low coercivity
 - (C) High retentivity, high coercivity
 - (D) High retentivity, low coercivity
- 6 Which is incorrect ?
- (A) In an isochoric process, $\Delta W = 0$
 - (B) In an isothermal process, $\Delta T = 0$
 - (C) In an isothermal process, $\Delta Q = 0$
 - (D) In an isobaric process, $\Delta P = 0$
- 7 The distance between two Nodal points is always equal to the distance Between
- (A) Two Principle points
 - (B) One focal point and one principle point
 - (C) none of the these
 - (D) Two Focal points
- 8 Relative permittivity and permeability of a material are ϵ_r and μ_r respectively. Which of the following values of these quantities are allowed for diamagnetic material :
- (A) $\epsilon_r = 1.5, \mu_r = 1.5$
 - (B) $\epsilon_r = 0.5, \mu_r = 0.5$
 - (C) $\epsilon_r = 0.5, \mu_r = 1.5$
 - (D) $\epsilon_r = 1.5, \mu_r = 0.5$

- 9 The average power dissipated in a pure inductor of inductance L when an ac current is passing through it, is :
- (A) $0.25 LI^2$
 - (B) $2LI^2$
 - (C) zero
 - (D) $0.5 LI^2$
- 10 First Law of thermodynamics is given by :
- (A) $dQ = dU \times PdV$
 - (B) $dQ = (dU + dV) P$
 - (C) $dQ = PdU + dV$
 - (D) $dQ = dU + PdV$
- 1 Optical fibre is a cylindrical wave guide made of :
- (A) Transparent dielectric
 - (B) Wood
 - (C) Rubber
 - (D) Metal
- 12 The magnetism of magnet is due to :
- (A) Earth
 - (B) Pressure of big magnet inside the earth
 - (C) Cosmic rays
 - (D) The spin motion of electron

- 13 100 gm ice at 0°C is placed in 100 gm water at 100°C , the final temp. of the mixture will be (Latent heat of melting ice is 80 cal/gm and specific heat of water is 1 cal/gC°) :
- (A) 15°C
(B) 10°C
(C) 50°C
(D) 30°C
- 14 Calculate the angle of acceptance of a given optical fibre if the refractive index of core and the cladding are 1.563 and 1.498 respectively :
- (A) 20.13°
(B) 18.5°
(C) 29.43°
(D) 26.49°
- 15 The instantaneous value of current in an A.C. circuit is $I = 2 \sin(100\pi t + \pi/3)\text{A}$. The current will be maximum for the first time at :
- (A) $t = (1/200)\text{ s}$
(B) $t = (1/400)\text{ s}$
(C) $t = (1/600)\text{ s}$
(D) $t = (1/100)\text{ s}$
- 16 If a heat engine absorbs 50 KJ heat from a heat source and has efficiency of 40% then the heat released by it in heat sink is...
- (A) 20 KJ
(B) 20 J
(C) 30 KJ
(D) 40 KJ
- 17 If γ is the ratio of specific heats and R is the universal gas constant, then the molar specific heat at constant volume C_v is given by :
- (A) $\gamma R/(\gamma-1)$
(B) γR
(C) $(\gamma-1)R/\gamma$
(D) $R/(\gamma-1)$

- 18 Calculate the fractional index change for a given optical fibre if the refractive indices of core and cladding are 1.563 and 1.498 respectively:
- (A) 0.0454
 - (B) 0.0415
 - (C) 0.0485
 - (D) 0.0316
- 19 The resistance of an R-L circuit is $10\ \Omega$. An e.m.f. E_0 applied across the circuit at $\omega = 20$ rad/s. If the current in the circuit is $I_0/\sqrt{2}$, what is the value of L :
- (A) 2 H
 - (B) 3 H
 - (C) 0.5 H
 - (D) 1 H
- 20 Steam is passed into 22 g of water at 20°C . The mass of water that will be present when the water acquires a temp. of 90°C (Latent heat of steam is 540 cal/g) is :
- (A) 24 g
 - (B) 36.6 g
 - (C) 30 g
 - (D) 24.8 g
- 21 In an optical fibre, the core material, has refractive index 1.43 and refractive index of clad material is 1.4. The propagation angle is :
- (A) 17.3°
 - (B) 11.8°
 - (C) 9.4°
 - (D) 15.5°
- 22 If the angular momentum of an electron is vector J then the magnitude of the magnetic moment will be :
- (A) $(eJ) / (2m)$
 - (B) $eJ2m$
 - (C) $(2m) / (eJ)$
 - (D) eJ / m

23 What is the mean free path λ for Oxygen molecules at temp. $T=300$ k and pressure of 10 atm ? Assume that the molecular diameter is 0.29×10^{-9} m and the gas is ideal.

$$(K = 1.38 \times 10^{-23} \text{ J/k})$$

(A) 1.1×10^{-7} m

(B) 3.4×10^{-7} m

(C) 2.9×10^{-7} m

(D) 2.3×10^{-7} m

24 Two thin convex lenses of focal lengths 20 cm and 10 cm are kept coaxially separated by distance of 8cm then the positions of two principle points of the combination are :

(A) 7.27 cm and -3.63 cm

(B) 5.23 cm and -3.1 cm

(C) 4.23 cm and -1.7 cm

(D) 8.53 cm and -6.7 cm

25 The molar mass m of oxygen is 0.032 kg/mol, (i) What is the average speed V_{avg} of oxygen gas molecules at $T = 300$ k and (ii) What is the rms speed V_{rms} at $T=300$ k ? ($R = 8.31$ J/mol.k) :

(A) 133 m/s and 156 m/s

(B) 365 m/s and 389 m/s

(C) 445 m/s and 483 m/s

(D) 256 m/s and 269 m/s

- 26 Two thin convex lenses of focal lengths 20 cm and 10 cm are kept coaxially separated by distance of 8 cm then the positions of two principle points of the combination are :
- (A) 7.27 cm and -3.63 cm
- (B) 5.23 cm and -3.1 cm
- (C) 4.23 cm and -1.7 cm
- (D) 8.53 cm and -6.7 cm
- 27 A bubble of 5 mol. of helium is submerged at a certain depth in liquid water when the water undergoes a temp. Increase ΔT of 20° at constant pressure. As a result the bubble expands. The helium is monatomic and ideal (i) How much energy is added as heat to the helium during the increase and expansion. (ii) What is the change ΔE_{int} in the internal energy of the helium during the temp. increase ? ($R = 8.31 \text{ J/mol.k}$)
- (A) 2365 J and 1100 J
- (B) 4521 J and 1565 J
- (C) 2077 J and 1246 J
- (D) 1125 J and 256 J
- 28 A coaxial lens system placed in air has two lenses of focal lengths $3F$ and F separated by a distance $2F$ then the positions of the cardinal points are :
- (A) $3F$ and $-2F$
- (B) $3F$ and F
- (C) $3F$ and $-F$
- (D) $2F$ and $-3F$