



**DE-2907**

**B. Sc. (Sem. I) Examination**

**March / April – 2016**

**Physics for Electroncis : Paper - II**

Time : 2 Hours]

[Total Marks : 50

**Instructions :**

(1)

નીચે દર્શાવેલ નિશાનીયાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<b>B. Sc. (SEM. 1)</b>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<b>PHYSICS FOR ELECTRONCIS - 2</b>	<input type="text"/>
Subject Code No. : <input type="text"/> 2 <input type="text"/> 9 <input type="text"/> 0 <input type="text"/> 7	Section No. (1, 2,.....): <input type="text"/> 1,2,3
	Student's Signature

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

**Q. 1 to 12 Multiple choice questions : (1 mark)**

**Q. 13 to 22 Multiple Choice 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 back side of provided O.M.R. Sheet.*

- 1 The fractional refractive index change is expressed as 1
- (A)  $\Delta = (n_2 n_1) / n_2$
- (B)  $\Delta = (n_1 - n_2) / (n_1 + n_2)$
- (C)  $\Delta = (n_2 - n_1) / n_2$
- (D)  $\Delta = (n_1 - n_2) / n_2$
- 2 The material of permanent magnet has 1
- (A) Low retentivity, low coercivity
- (B) High retentivity, high coercivity
- (C) High retentivity, low coercivity
- (D) Low retentivity, high coercivity
- 3 Which is incorrect ? 1
- (A) In an isothermal process,  $\Delta T = 0$
- (B) In an isothermal process,  $\Delta Q = 0$
- (C) In an isobaric process,  $\Delta P = 0$
- (D) In an isochoric process,  $\Delta W = 0$
- 4 Optical fibre is a cylindrical wave guide made of 1
- (A) Wood
- (B) Rubber
- (C) Metal
- (D) Transparent dielectric

- 5 The magnetism of magnet is due to 1
- (A) Pressure of big magnet inside the earth
  - (B) Cosmic rays
  - (C) The spin motion of electron
  - (D) Earth
- 6 The velocity of heat radiation in vacuum is 1
- (A) Greater than that of light
  - (B) Equal to that of sound
  - (C) Equal to that of light
  - (D) Less than that of light
- 7 The temp of a substance increases by  $27^{\circ}\text{C}$  . On the Kelvin scale 1  
this increase is equal to
- (A) 27 K
  - (B) 7 K
  - (C) 300 K
  - (D) 2.46 K
- 8 Write unit of refractive index. 1
- (A) unit less
  - (B)  $\text{m}^2$
  - (C)  $\text{cm}^{-1}$
  - (D)  $\text{cm}^2$

- 9 If the diamagnetic substance is brought near North or South pole of a bar magnet it is : 1
- (A) Repelled by the north pole and attracted by the south pole
  - (B) Attracted by the north pole and repelled by the south pole
  - (C) Attracted by the poles
  - (D) Repelled by the poles
- 10 The propagation of light in an optical fibre from one end to the other is based on the principle of 1
- (A) Total internal reflection
  - (B) Total internal refraction
  - (C) Polarisation
  - (D) Interference
- 11 When the rarer medium is air then Snell's law for critical angle can be written 1
- (A)  $\sin \theta_c = \mu_1 / \mu_2$
  - (B)  $\sin \theta_c = \mu_2 \sin \theta_2$
  - (C)  $\sin \theta_c = 1/\mu$
  - (D)  $\sin \theta_c = \mu$
- 12 The innermost region of optical fibre is known as 1
- (A) Sheath
  - (B) Core
  - (C) Cladding
  - (D) Buffer

- 13 An optical fibre refractive indices of core and cladding are 1.53 and 1.42 respectively, then the critical angle is 2
- (A)  $61.52^\circ$   
 (B)  $63.28^\circ$   
 (C)  $57.12^\circ$   
 (D)  $68.14^\circ$
- 14 A bar magnet having a magnetic moment of  $2 \times 10^4 \text{ JT}^{-1}$  is free to rotate in a horizontal plane. A horizontal magnetic field  $B = 6 \times 10^{-4} \text{ T}$  exists in the space. The work done in taking the magnet slowly from a direction parallel to the field to a direction  $60^\circ$  from the field is 2
- (A) 6 J  
 (B) 2 J  
 (C) 0.6 J  
 (D) 12 J
- 15 Work done per mol gas system in an isothermal change is 2
- (A)  $RT \log_e (V_2/V_1)$   
 (B)  $RT \log_e (V_1/V_2)$   
 (C)  $RT \log_{10} (V_2/V_1)$   
 (D)  $RT \log_{10} (V_1/V_2)$
- 16 A Carnot engine having efficiency of  $\eta = 1/10$  as heat engine is used as a refrigerator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temp is ..... 2
- (A) 1 J  
 (B) 100 J  
 (C) 90 J  
 (D) 99 J
- 17 Relative permeability of iron is 5500, then its magnetic susceptibility will be 2
- (A) 5501  
 (B) 5499  
 (C)  $5500 \times 10^7$   
 (D)  $5500 \times 10^{-7}$

- 18 For an isothermal expansion of a perfect gas the value of  $\Delta P/P$  is equal to .....
- (A)  $-\gamma(\Delta V/V)$
- (B)  $-\gamma^2(\Delta V/V)$
- (C)  $-\gamma^3 \cdot (\Delta V/V)$
- (D)  $-(\Delta V/V)$
- 19 The instantaneous value of current in an A.C. circuit is  $I = 2\sin(100\pi t + \pi/3)A$ . The current will be maximum for the first time at
- (A)  $t = (1/400) s$
- (B)  $t = (1/600) s$
- (C)  $t = (1/100) s$
- (D)  $t = (1/200) s$
- 20 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 J
- (B) 30 KJ
- (C) 40 KJ
- (D) 20 KJ
- 21 A fibre cable has an acceptance angle of  $30^\circ$  and a core index of refraction of 1.4, then the value of refractive index of cladding is
- (A) 1.413
- (B) 1.555
- (C) 1.233
- (D) 1.308
- 22 Same current is flowing in two alternating circuits. The first circuit contains only inductor and the other contains only capacitor. If the frequency of the em.f. of a.c. is increased, the effect on the value of the current will be
- (A) Decreases in the both circuits
- (B) Decreases in the first circuits and Increases in the other
- (C) Increases in the first circuit and decreases in the other
- (D) Increases in the both circuits

- 23** A solenoid has core of material with relative permeability 500 and its winding carry a current of 1 A. The number of turns of the solenoid is 500 per metre. The magnetization of the material is nearly **3**
- (A)  $2.0 \times 10^3 \text{ Am}^{-1}$   
(B)  $2.0 \times 10^5 \text{ Am}^{-1}$   
(C)  $2.5 \times 10^3 \text{ Am}^{-1}$   
(D)  $2.5 \times 10^5 \text{ Am}^{-1}$
- 24** Let 1 kg of liquid water at  $100^\circ \text{ C}$  be converted into steam at  $100^\circ \text{ C}$  by boiling at  $1.01 \times 10^5 \text{ Pa}$  pressure in a isolated system. The volume of that water changes from an initial volume of  $1 \times 10^{-3} \text{ m}^3$  as a liquid to  $1.671 \text{ m}^3$  as steam. (i) How much work done? (ii) How much energy transferred ? ( $L_v = 2256 \text{ KJ/kg}$ ) **3**
- (A) 169 KJ and 1356 KJ  
(B) 169 KJ and 2256 KJ  
(C) 169 KJ and 1258 KJ  
(D) 258 KJ and 1258 KJ
- 25** A step index fibre has a core refractive index of 1.44 and cladding refractive index of 1.41, then the numerical aperture and acceptance angle are **3**
- (A) 0.292 and  $33.96^\circ$   
(B) 0.184 and  $18.72^\circ$   
(C) 0.133 and  $37.92^\circ$   
(D) 0.281 and  $28.13^\circ$

- 26 A capacitor of  $1 \mu\text{F}$  is charged to a potential of  $2 \text{ V}$  and is allowed to leak through a resistance  $10 \Omega$ . What is the charge on the capacitor after it has discharge for 50 minutes? 3
- (A)  $1.9 \times 10^{-8} \text{ C}$
- (B)  $3.5 \times 10^{-7} \text{ C}$
- (C)  $1.5 \times 10^{-8} \text{ C}$
- (D)  $2.3 \times 10^{-8} \text{ C}$
- 27 Two thin convex lenses of focal lengths  $20 \text{ cm}$  and  $10 \text{ cm}$  are kept coaxially separated by distance of  $8 \text{ cm}$  then the positions of two principle points of the combination are 3
- (A)  $5.23 \text{ cm}$  and  $-3.1 \text{ cm}$
- (B)  $4.23 \text{ cm}$  and  $-1.7 \text{ cm}$
- (C)  $8.53 \text{ cm}$  and  $-6.7 \text{ cm}$
- (D)  $7.27 \text{ cm}$  and  $-3.63 \text{ cm}$
- 28 The molar mass  $m$  of oxygen is  $0.032 \text{ kg/mol}$ , (i) What is the average speed  $V_{\text{avg}}$  of oxygen gas molecules at  $T=300 \text{ k}$  and (ii) What is the rms speed  $V_{\text{rms}}$  at  $T=300 \text{ k}$  ? ( $R=8.31 \text{ J/mol.k}$ ) 3
- (A)  $365 \text{ m/s}$  and  $389 \text{ m/s}$
- (B)  $445 \text{ m/s}$  and  $483 \text{ m/s}$
- (C)  $256 \text{ m/s}$  and  $269 \text{ m/s}$
- (D)  $133 \text{ m/s}$  and  $156 \text{ m/s}$