CBSE - 2008 (Pre)

PHYSICS — SET-B

151. If the lattice parameter for a crystalline structure is 3.6 Å, then the atomic radius in *fcc* crystal is

(1) 1.81 Å (2) 2.10 Å (3) 2.92 Å (4) 1.27 Å

Sol: Ans [4]

$4r = 3.6\sqrt{2} \Rightarrow r = 1.27$ Å

152. If the error in the measurement of radius of a sphere is 2%, then the error in the determination of volume of the sphere will be

(1) 4% (2) 6% (3) 8% (4) 2%

Sol: Ans [2]

$$\frac{\partial V}{V} = 3\frac{\partial r}{r} = 3 \times 2\% = 6\%$$

153. The electric potential at a point in free space due to a charge Q coulomb is $Q \times 10^{11}$ volts. The electric field at that point is

(1) $4\pi\varepsilon_0 Q \times 10^{22}$ volt/m (2) $12\pi\varepsilon_0 Q \times 10^{20}$ volt/m

(3) $4\pi\varepsilon_0 Q \times 10^{20}$ volt/m (4) $12\pi\varepsilon_0 Q \times 10^{22}$ volt/m

Sol: Ans [1]

$$V = \frac{KQ}{r}$$

$$Q \times 10^{11} = \frac{KQ}{r}$$

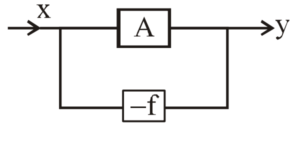
$$\Rightarrow \quad r = \frac{KQ}{Q \times 10^{11}}$$

$$\therefore \quad E = \frac{KQ}{r^2} = \frac{U}{r} = \frac{Q \times 10^{11}}{KQ} \times Q \times 10^{11} = 4\pi \in_0 Q \times 10^{22}$$

154. The voltage gain of an amplifier with 9% negative feedback is 10. The voltage gain without feedback will be

(1) 90 (2) 10 (3) 1.25 (4) 100

Sol: Ans [4]



$(x - fy)A = y$

$Ax = y(1 + fA)$

$$\frac{y}{x}=\frac{A}{1+Af} \Rightarrow 10=\frac{A}{1+0.09A}$$

$A = 100$

155. The energy required to charge a parallel plate condenser of plate separation *d* and plate area of cross-section *A* such that the uniform electric field between the plates is *E*, is

(1) $\frac{1}{2}\varepsilon_0 E^2 / A.d$ (2) $\varepsilon_0 E^2 / Ad$

(3) $\varepsilon_0 E^2 Ad$ (4) $\frac{1}{2}\varepsilon_0 E^2 A.d$

Sol: Ans [3]

Since charging is 50% efficient thus energy given for charging will be = $2[1/2\, e_0 E^2 Ad] = \varepsilon_0 E^2 Ad$.

156. A roller coaster is designed such that riders experience "weightlessness" as they go round the top of a hill whose radius of curvature is 20 m. The speed of the car at the top of the hill is between

(1) 14 m/s and 15 m/s (2) 15 m/s and 16 m/s (3) 16 m/s and 17 m/s (4) 13 m/s and 14 m/s

Sol: Ans [1]

$$mg=\frac{mv^2}{R}$$

$$\Rightarrow v=\sqrt{Rg}$$

$$v=\sqrt{20\times 10}=14.1\text{m/s}$$

157. The ratio of the radii of gyration of a circular disc to that of a circular ring, each of same mass and radius, around their respective axes is

(1) $\sqrt{3}:\sqrt{2}$ (2) $1:\sqrt{2}$ (3) $\sqrt{2}:1$ (4) $\sqrt{2}:\sqrt{3}$

Sol: Ans [2]

$$mk_d^2=\frac{mR^2}{2}$$

$$mk_r^2=mR^2$$

$$\therefore \frac{k_d}{k_r}=\frac{1}{\sqrt{2}}$$

158. The work function of a surface of a photosensitive material is 6.2 eV. The wavelength of the incident radiation for which the stopping potential is 5 V lies in the

(1) ultraviolet region (2) visible region (3) infrared region (4) X-ray region

Sol: Ans [1]

Energy = (6.2 + 5) eV = 11.2 eV, $\lambda_{(\text{Å})}=\frac{12375}{11.2}\cong 1000\ \text{Å}$

this wavelength belongs to ultraviolet region.

159. The ground state energy of hydrogen atom is –13.6 eV. When its electron is in the first excited state, its excitation energy is

(1) 3.4 eV (2) 6.8 eV (3) 10.2 eV (4) 0

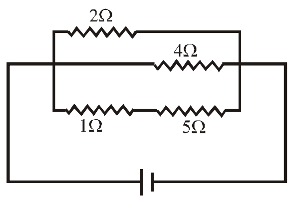
Sol: Ans [3]

$$E_1 + \text{Excitation} = E_2$$

$$-13.6 + \text{Excitation} = \frac{-13.6}{2^2}$$

$\therefore$ Excitation = 10.2 eV.

160. A current of 3 amp flows through the 2Ω resistor shown in the circuit. The power dissipated in the 5Ω resistor is



(1) 4 watt (2) 2 watt (3) 1 watt (4) 5 watt

Sol: Ans [4]

Potential drop is same

$\therefore$ 2 × 3 = 6 × I

I = 1A

$\therefore$ $P = 1^2 \times 5 = 5$ watt.

161. A *p*-*n* photodiode is made of a material with a band gap of 2.0 eV. The minimum frequency of the radiation that can be absorbed by the material is nearly

(1) 10×10^{14} Hz (2) 5×10^{14} Hz (3) 1×10^{14} Hz (4) 20×10^{14} Hz

Sol: Ans [2]

$h\nu = 2 \times 1.6 \times 10^{-19}$

$$\nu = \frac{3.2\times10^{-19}}{6.6\times10^{-34}} \simeq 0.5\times10^{15} \simeq 5\times10^{14} \text{ Hz}$$

162. Water falls from a height of 60 m at the rate of 15 kg/s to operate a turbine. The losses due to frictional forces are 10% of energy. How much power is generated by the turbine ? (g = 10 m/s^2)

(1) 8.1 kW (2) 10.2 kW (3) 12.3 kW (4) 7.0 kW

Sol: Ans [1]

P = 0.9 × (60 × 10 × 15) = 8100 W = 8.1 kW

163. On a new scale of temperature (which is linear) and called the W scale, the freezing and boiling points of water are 39º W and 239º W respectively. What will be the temperature on the new scale, corresponding to a temperature of 39ºC on the Celsius scale ?

(1) 78º W (2) 117º W (3) 200º W (4) 139º W

Sol: Ans [2]

$$\frac{C-0}{100-0} = \frac{W-39}{239-39}, \text{ for } C = 39,\ W = 117^\circ$$

164. If Q, E and W denote respectively the heat added, change in internal energy and the work done in a closed cycle process, then

(1) W = 0 (2) Q = W = 0 (3) E = 0 (4) Q = 0

Sol: Ans [3]

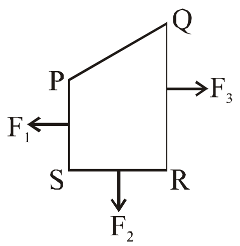
For cyclic process $E = 0$

165. Two Simple Harmonic Motions of angular frequency 100 and 1000 rad s^{-1} have the same displacement amplitude. The ratio of their maximum acceleration is

(1) 1 : 10 (2) 1 : 10^2 (3) 1 : 10^3 (4) 1 : 10^4

Sol: Ans [2]

$$\frac{a_1}{a_2} = \frac{\omega_1^2 A}{\omega_2^2 A} = \frac{(2\pi 100)^2}{(2\pi \times 1000)^2} = \frac{1}{100}$$

166. 

A closed loop *PQRS* carrying current is placed in a uniform magnetic field. If the magnetic forces on segments *PS*, *SR* and *RQ* are F_1, F_2 and F_3 respectively and are in the plane of the paper and along the directions shown, the force on the segment *QP* is

(1) $F_3 - F_1 - F_2$ (2) $\sqrt{(F_3 - F_1)^2 + F_2^2}$ (3) $\sqrt{(F_3 - F_1)^2 - F_2^2}$ (4) $F_3 - F_1 + F_2$

Sol: Ans [2]

$$\vec{F}_{PQ} + \vec{F}_{QR} + \vec{F}_{RS} + \vec{F}_{SP} = 0,\ \vec{F}_{PQ} = -(\vec{F}_{QR} + \vec{F}_{RS} + \vec{F}_{SP}) \Rightarrow F_{QS} = \sqrt{F_2^2 + (F_3 - F_1)^2}$$

167. Two radioactive materials X_1 and X_2 have decay constants 5λ and λ respectively. If initially they have the same number of nuclei, then the ratio of the number of nuclei of X_1 to that of X_2 will be $\frac{1}{e}$ after a time

(1) λ (2) $\frac{1}{2}\lambda$ (3) $\frac{1}{4\lambda}$ (4) $1/\lambda$

Sol: Ans [3]

$$\frac{N_1}{N_2} = \frac{N_0 e^{-5\lambda t}}{N_0 e^{-\lambda t}} \Rightarrow \frac{N_1}{N_2} = e^{-4\lambda t}$$

$$e^{-1} = e^{-4\lambda t} \Rightarrow t = \frac{1}{4\lambda}$$

168. Two thin lenses of focal lengths f_1 and f_2 are in contact and coaxial. The power of the combination is

(1) $\sqrt{\dfrac{f_1}{f_2}}$ (2) $\sqrt{\dfrac{f_2}{f_1}}$ (3) $\dfrac{f_1+f_2}{2}$ (4) $\dfrac{f_1+f_2}{f_1 f_2}$

Sol: Ans [4]

$$\frac{1}{F}=\frac{1}{f_1}+\frac{1}{f_2}$$

$$P=\frac{1}{f_1}+\frac{1}{f_2}=\frac{f_1+f_2}{f_1 f_2}$$

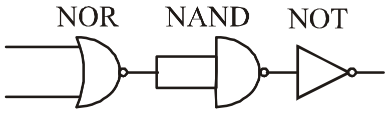
169. The distance travelled by a particle starting from rest and moving with an acceleration $\frac{4}{3}$ ms^{-2}, in the third second is

(1) 6 m (2) 4 m (3) $\frac{10}{3}$m (4) $\frac{19}{3}$m

Sol: Ans [3]

$$S_n=0+\frac{1}{2}\left(\frac{4}{3}\right)(2\times 3-1)=\frac{2}{3}\times S=\frac{10}{3}\text{m}$$

170. The circuit



is equivalent to

(1) AND gate (2) NAND gate (3) NOR gate (4) OR gate

Sol: Ans [3]

NOR $\xrightarrow{\text{NAND}}$ OR $\xrightarrow{\text{NOT}}$ NOR

171. A particle of mass *m*, charge *Q* and kinetic energy *T* enters a transverse uniform magnetic field of induction $\vec{B}$. After 3 seconds the kinetic energy of the particle will be

(1) 3 T (2) 2 T (3) T (4) 4 T

Sol: Ans [3]

Magnetic field does not change kinetic energy of charged particles.

172. A wire of a certain material is stretched slowly by ten per cent. Its new resistance and specific resistance become respectively

(1) 1.2 times, 1.1 times (2) 1.21 times, same

(3) both remain the same (4) 1.1 times, 1.1 times

Sol: Ans [2]

ρ is independent of size and shape.

$$R_1 = \rho \frac{l}{A}$$

$$\frac{\Delta R}{R} = 0 + \frac{\Delta l}{l} - \frac{\Delta A}{A} = (10\%) - (-10\%) = 20\%.$$

173. An electric kettle takes 4 A current at 220 V. How much time will it take to boil 1 kg of water from temperature 20ºC? The temperature of boiling water is 100ºC.

(1) 6.3 min (2) 8.4 min (3) 12.6 min (4) 4.2 min

Sol: Ans [1]

$220 \times 4 \times t \times 60 = 1 \times 4200 \times 80$

$\Rightarrow$ $t = 6.3$ min.

174. In the phenomenon of electric discharge through gases at low pressure, the coloured glow in the tube appears as a result of

(1) excitation of electrons in the atoms

(2) collision between the atoms of the gas

(3) collisions between the charged particles emitted from the cathode and the atoms of the gas

(4) collision between different electrons of the atoms of the gas

Sol: Ans [1]

Factual

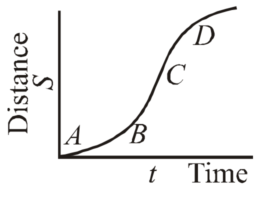
175. A particle of mass 1 mg has the same wavelength as an electron moving with a velocity of 3×10^6 ms^{-1}. The velocity of the particle is

(1) 2.7×10^{-18} ms^{-1} (2) 9×10^{-2} ms^{-1} (3) 3×10^{-31} ms^{-1} (4) 2.7×10^{-21} ms^{-1}

Sol: Ans [1]

$$\frac{h}{mv} = \frac{h}{m_e v_e}$$

$$v = \frac{m_e v_e}{m} = \frac{9.1 \times 10^{-31} \times 3 \times 10^6}{1 \times 10^{-6}} = 2.7 \times 10^{-18} \text{ ms}^{-1}$$

176. 

A particle shows distance-time curve as given in this figure. The maximum instantaneous velocity of the particle is around the point

(1) B (2) C (3) D (4) A

Sol: Ans [1]

at v_{max}, slope is maximum for distance-time graph.

177. A cell can be balanced against 110 cm and 100 cm of potentiometer wire, respectively with and without being short circuited through a resistance of 10Ω. Its internal resistance is

(1) 1.0 ohm (2) 0.5 ohm (3) 2.0 ohm (4) zero

Sol: Ans [1]

$\varepsilon = k.110$

$\varepsilon - Ir = k\ 100$

$$I = \frac{\varepsilon}{10 + r}$$

$\Rightarrow \quad r = 1\Omega.$

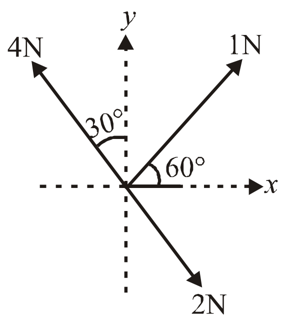
178. If M(A; Z), M_p and M_n denote the masses of the nucleus ${}^{A}_{Z}X$, proton and neutron respectively in units of u(1u = 931.5 MeV/C^2) and BE represents its bounding energy in MeV, then

(1) $M(A, Z) = ZM_p + (A - Z)M_n - BE/C^2$ (2) $M(A, Z) = ZM_p + (A - Z)M_n + BE$

(3) $M(A, Z) = ZM_p + (A - Z)M_n - BE$ (4) $M(A, Z) = ZM_p + (A - Z)M_n + BE/C^2$

Sol: Ans [1]

$BE = [ZM_p + (A - Z)\ M_N - M_{(A,\ Z)}]\ C^2$

179. 

Three forces acting on a body are shown in the figure. To have the resultant force only along the *y*-direction, the magnitude of the minimum additional force needed is

(1) 0.5 N (2) 1.5 N (3) $\frac{\sqrt{3}}{4}$ N (4) $\sqrt{3}$ N

Sol: Ans [1]

$F + 1\cos 60^\circ + 2\cos 60^\circ - 4\sin 30^\circ = 0$

$$F = 2 - 1 - \frac{1}{2} = 0.5\ \text{N}$$

180. Two periodic waves of intensities I_1 and I_2 pass through a region at the same time in the same direction. The sum of the maximum and minimum intensities are

(1) $I_1 + I_2$ (2) $\left(\sqrt{I_1} + \sqrt{I_2}\right)^2$ (3) $\left(\sqrt{I_1} - \sqrt{I_2}\right)^2$ (4) $2(I_1 + I_2)$

Sol: Ans [4]

$$I_{\max} = I_1 + I_2 + 2\sqrt{I_1 I_2}$$

$$I_{\min} = I_1 + I_2 - 2\sqrt{I_1 I_2}$$

$$I_{\max} + I_{\min} = 2(I_1 + I_2)$$

181. A shell of mass 200 gm is ejected from a gun of mass 4 kg by an explosion that generates 1.05 kJ of energy. The initial velocity of the shell is

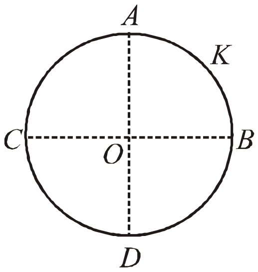
(1) 100 ms^{-1} (2) 80 ms^{-1} (3) 40 ms^{-1} (4) 120 ms^{-1}

Sol: Ans [1]

$0.2\ V_1 + 4\ V_2 = 0$ ....(*i*)

$$\frac{1}{2}\times 0.2V_1^2 + \frac{1}{2}\times 4\times V_2^2 = 1050 \quad ...(ii)$$

Solving V_1 = 100 m/sec

182. 

A thin conducting ring of radius *R* is given a charge +*Q*. The electric field at the centre *O* of the ring due to the charge on the part *AKB* of the ring is *E*. The electric field at the centre due to the charge on the part *ACDB* of the ring is

(1) 3 *E* along *KO* (2) *E* along *OK* (3) *E* along *KO* (4) 3*E* along *OK*

Sol: Ans [2]

Electric field of part *AC* and *BD* will cancel each other. Net electric field will be due to part *CD* only i.e. *E* along *OK*.

183. The velocity of electromagnetic radiation in a medium of permittivity ε_0 and permeability μ_0 is given by

(1) $\sqrt{\frac{\varepsilon_0}{\mu_0}}$ (2) $\sqrt{\mu_0\varepsilon_0}$ (3) $\frac{1}{\sqrt{\mu_0\varepsilon_0}}$ (4) $\sqrt{\frac{\mu_0}{\varepsilon_0}}$

Sol: Ans [3]

$$c = \frac{1}{\sqrt{\mu_0\varepsilon_0}}$$

184. A point performs simple harmonic oscillation of period T and the equation of motion is given by $x = a \sin(\omega t + \pi/6)$. After the elapse of what fraction of the time period the velocity of the point will be equal to half of its maximum velocity ?

(1) T/8 (2) T/6 (3) T/3 (4) T/12

Sol: Ans [4]

$$v = \frac{dx}{dt} = a\omega\cos(\omega t + \pi/6)$$

given, $\frac{a\omega}{2} = a\omega\cos(\omega t + \pi/6)$

or $\cos(\omega t + \pi/6) = \frac{1}{2}$

solving, $t = \frac{T}{12}$

185. A long solenoid has 500 turns. When a current of 2 ampere is passed through it, the resulting magnetic flux linked with each turn of the solenoid is 4×10^{-3} ωb. The self-inductance of the solenoid is

(1) 2.5 henry (2) 2.0 henry (3) 1.0 henry (4) 4.0 henry

Sol: Ans [3]

Total flux, $\phi = 4 \times 10^{-3} \times 500$

$$L \Rightarrow \frac{\phi}{i} = \frac{500 \times 4 \times 10^{-3}}{2} = 1.0 \text{ henry}$$

186. A boy is trying to start a fire by focussing Sunlight on a piece of paper using an equiconvex lens of focal length 10 cm. The diameter of the sun is 1.39×10^{9} m and its mean distance from the earth is 1.5×10^{11} m. What is the diameter of the Sun's image on the paper ?

(1) 9.2×10^{-4} m (2) 6.5×10^{-4} m (3) 6.5×10^{-5} m (4) 12.4×10^{-4} m

Sol: Ans [1]

Let actual diameter of sun is D and on paper is D'

$$\Rightarrow \quad \frac{D}{r} = \frac{D'}{f}$$

$$\Rightarrow \quad D' = \frac{1.39 \times 10^{9} \times 0.1}{1.5 \times 10^{11}} = 9.2 \times 10^{-4} \text{m}$$

187. In an a.c. circuit the e.m.f. (e) and the current (i) at any instant are given respectively by

$e = E_0 \sin \omega t$

$i = I_0 \sin(\omega t - \phi)$

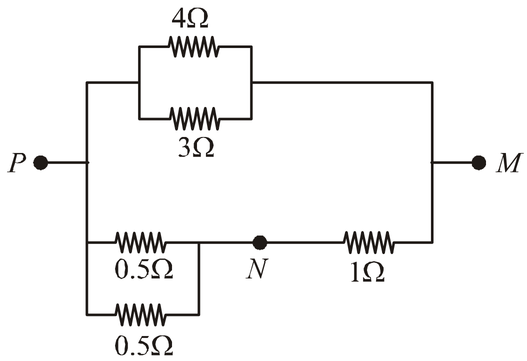
The average power in the circuit over one cycle of a.c. is

(1) $\frac{E_0 I_0}{2}$ (2) $\frac{E_0 I_2}{2}\sin\phi$ (3) $\frac{E_0 I_0}{2}\cos\phi$ (4) $E_0 I_0$

Sol: Ans [3]

$$P_{\text{average}} = V_{\text{rms}} \cdot I_{\text{rms}} \cos\phi = \frac{E_0}{\sqrt{2}}\frac{I_0}{\sqrt{2}}\cos\phi = \frac{E_0 I_0}{2}\cos\phi$$

188.



In the circuit shown, the current through the 4-Ω resistor is 1 amp when the points *P* and *M* are connected to a d.c. voltage source. The potential difference between the points *M* and *N* is

(1) 1.5 volt (2) 1.0 volt (3) 0.5 volt (4) 3.2 volt

Sol: Ans [4]

Potential difference across branch *PM* = 4 × 1 = 4 volt.

Potential difference across *MN* = $\frac{1}{1+\frac{0.5}{2}} \times 4 = 3.2$ volt

189. A particle moves in a straight line with a constant acceleration. It changes its velocity from 10 ms^{-1} to 20 ms^{-1} while passing through a distance 135 m in *t* second. The value of *t* is

(1) 10 (2) 1.8 (3) 12 (4) 9

Sol: Ans [4]

20 = 10 + *at* ...(*i*)

$$135 = 10t + \frac{1}{2} \times at^2 = t\left(10 + \frac{at}{2}\right)$$

$$\Rightarrow \quad t = \frac{135}{10 + \frac{10}{2}} = 9 \text{ sec.} \qquad \text{[using } (i)\text{]}$$

190. A thin rod of length *L* and mass *M* is bent at its mid point into two halves so that the angle between them is 90°. The moment of inertia of the bent rod about an axis passing through the bending point and perpendicular to the plane defined by the two halves of the rod is

(1) $\frac{ML^2}{24}$ (2) $\frac{ML^2}{12}$ (3) $\frac{ML^2}{6}$ (4) $\frac{\sqrt{2}ML^2}{24}$

Sol: Ans [2]

$$I = \frac{\frac{m}{2}\left(\frac{L}{2}\right)^2}{3} \times 2 = \frac{ML^2}{12}$$

191. A circular disc of radius 0.2 meter is placed in a uniform magnetic field of induction $\frac{1}{\pi}\left(\omega b/_{m^2}\right)$ in such a way that its axis makes an angle of 60° with $\vec{B}$. The magnetic flux linked with the disc is

(1) 0.02 ωb (2) 0.06 ωb (3) 0.08 ωb (4) 0.01 ωb

Sol: Ans [1]

$$\phi = BA \cos\theta = \frac{1}{\pi} \times \pi(0.2)^2 \times \cos 60 = 0.02\ \omega b$$

192. A particle of mass m is projected with velocity v making an angle of 45° with the horizontal. When the particle lands on the level ground the magnitude of the change in its momentum will be

(1) $2\,mv$ (2) $mv/\sqrt{2}$ (3) $mv\sqrt{2}$ (4) zero

Sol: Ans [3]

Change in momentum = $2 \times mv \sin 45° = \sqrt{2}\,mv$

193. Two points are located at a distance of 10 m and 15 m from the source of oscillation. The period of oscillation is 0.05 sec and the velocity of the wave is 300 m/sec. What is the phase difference between the oscillations of two points ?

(1) $\pi/3$ (2) $2\pi/3$ (3) π (4) $\pi/6$

Sol: Ans [2]

$\lambda = 300 \times 0.05 = 15$ m

$$\phi = \frac{2\pi}{15} \times (15-10) = 2\pi/3$$

194. Two nuclei have their mass numbers in the ratio of 1 : 3. The ratio of their nuclear densities would be

(1) 1 : 3 (2) 3 : 1 (3) $(3)^{1/3} : 1$ (4) 1 : 1

Sol: Ans [4]

Density of nucleus is independent of A.

195. Sand is being dropped on a conveyor belt at the rate of M Kg/s. The force necessary to keep the belt moving with a constant velocity of v m/s will be

(1) Mv newton (2) 2Mv newton (3) $\frac{Mv}{2}$ newton (4) zero

Sol: Ans [1]

Impulse imported by sand on belt = $u_{\text{rel}} \frac{dm}{dt} = (vM)$ newton

196. The wave described by $y = 0.5 \sin(10\,\pi x - 2\,\pi t)$, where x and y are in meters and t in seconds, is a wave travelling along the

(1) –ve x direction with frequency 1 Hz

(2) +ve x direction with frequency π Hz and wavelength $\lambda = 0.2$ m

(3) +ve x direction with frequency 1 Hz and wavelength $\lambda = 0.2$ m

(4) –ve x direction with amplitude 0.25 m and wavelength $\lambda = 0.2$ m

Sol: Ans [3]

Comparing with $y = A \sin(kx - \omega t)$

direction of propagation is +ve x axis

$$f = \frac{2\pi}{2\pi} = 1 \text{ Hz}$$

$$\lambda = \frac{2\pi}{10\pi} = 0.2 \text{ m}$$

197. Curie temperature is the temperature above which

(1) ferromagnetic material becomes paramagnetic material

(2) paramagnetic material becomes diamagnetic material

(3) paramagnetic material becomes ferromagnetic material

(4) ferromagnetic material becomes diamagnetic material

Sol: Ans [1] Factual

198. At 10ºC the value of the density of a fixed mass of an ideal gas divided by its pressure is x. At 110ºC this ratio is

(1) x (2) $\frac{383}{283}x$ (3) $\frac{10}{110}x$ (4) $\frac{283}{383}x$

Sol: Ans [4]

$$p = \frac{\rho}{M}RT$$

$$\frac{\rho}{p} \propto \frac{1}{T}$$

$$\Rightarrow \quad \frac{x}{x'} = \frac{110+273}{10+273} \qquad \Rightarrow \quad x' = \frac{283}{383}x$$

199. Which two of the following five physical parameters have the same dimensions ?

(a) energy density (b) refractive index (c) dielectric constant (d) Young's modulus

(e) magnetic field

(1) (b) and (c) (2) (c) and (e) (3) (a) and (d) (4) (a) and (e)

Sol: Ans [3]

Energy density = $\frac{ML^2T^{-2}}{L^3} = ML^{-1}T^{-2}$

$$Y = \frac{F}{A}.\frac{L}{\Delta L} = ML^{-1}T^{-2}$$

200. A galvanometer of resistance 50Ω is connected to a battery of 3V alongwith a resistance of 2950Ω in series. A full scale deflection of 30 divisions is obtained in the galvanometer. In order to reduce this deflection to 20 divisions, the resistance in series should be

(1) 5050 Ω (2) 5550 Ω (3) 6050 Ω (4) 4450 Ω

Sol: Ans [4]

Voltage across galvanometer for deflection of 30 divisions = $\frac{50}{3000} \times 3 = 0.05$ volt

Voltage across galvanometer for deflection of 20 divisions = $\frac{0.05}{30} \times 20 = \frac{0.1}{3}$ volt

$$\Rightarrow \quad \frac{\frac{0.1}{3}}{50} = \frac{3 - \frac{0.1}{3}}{R}$$

Solving $R = 4450\ \Omega$