06/04/2026
Morning

Aakash
Medical | IIT-JEE | Foundations

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Memory Based
Answers & Solutions

Time : 3 hrs. M.M. : 300

for

JEE (Main)-2026 (Online) Phase-2

(Physics, Chemistry and Mathematics)

PHYSICS

SECTION - A

Multiple Choice Questions: This section contains 20 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4), out of which **ONLY ONE** is correct.

Choose the correct answer:

1. In AC series circuit supply voltage $V_{(rms)}$ = 100 volts; R = 80 Ω; X_L = 80 Ω and source frequency is f = 50 Hz. Find the power factor

(1) $\frac{1}{\sqrt{2}}$ (2) $\frac{1}{2}$

(3) $\frac{3}{4}$ (4) $\frac{\sqrt{3}}{2}$

Answer (1)

Sol. $z=\sqrt{R^2+X_L^2}=80\sqrt{2}$

$\cos\theta=\frac{R}{z}=\frac{1}{\sqrt{2}}$

2. An expression of potential energy $=\frac{A\sqrt{x}}{B+x}$ is given. Then dimensions of ($A\cdot B$) will be. (x is position here)

(1) MLT^{-1} (2) $M^{1/2}L^{2/3}T^{-2}$

(3) $ML^{3.5}T^{-2}$ (4) $ML^{1/2}T^{-2}$

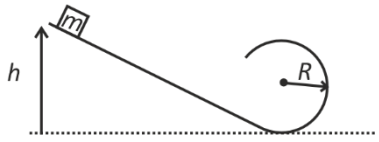
Answer (3)

Sol. $[B]=[L]$

$A\sqrt{L}=UL$

$[A]=ML^2T^{-2}\frac{L}{L^{1/2}}=[ML^{2.5}T^{-2}]$

3. A block of mass m is released from height h on smooth plane. If normal force on top of the circular part is $3mg$. Find h.

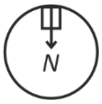


(1) $5R$ (2) $4R$

(3) $3.5R$ (4) $3R$

Answer (2)

Sol.



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

$v^2=4gR$

$mg(h-2R)=\frac{1}{2}m\times 4gR$

$h-2R=2R$

$h=4R$

4. Electric field at centre of semi-circular ring of radius 10 cm is 100 v/m. Find charge on the ring if charge distribution is uniform.

(1) $4\varepsilon_0$

(2) $20\varepsilon_0$

(3) $25\varepsilon_0$

(4) $30\varepsilon_0$

Answer (2)

Sol. $E=\frac{\lambda}{2\pi\varepsilon_0 R}$

$=\frac{Q}{2\pi\varepsilon_0 R\cdot\pi R}$

$Q=E\,2\pi^2R^2\varepsilon_0$

$= 100\times 2\times 10\times 10^{-2}\varepsilon_0$

$= 20\,\varepsilon_0$

5. A point charge particle Q = 3C is placed at point $A(0, -2, -5)$ and taken to point $B(2, 1, 3)$ in the electric field $\vec{E} = \left(2x\hat{i} + 3y^2\hat{j} + 4\hat{k}\right)$. Find work done by electric field.

(1) 75 Joule (2) 135 Joule

(3) 89 Joule (4) 105 Joule

Answer (2)

Sol. So $\Delta w = \int q\bar{E}\cdot\bar{dr}$

$\Rightarrow \Delta w = q\int\left(2x\hat{i} + 3y^2\hat{j} + 4\hat{k}\right).\left(dx\hat{i} + dy\hat{j} + dz\hat{k}\right)$

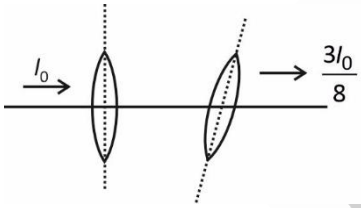
$\Rightarrow \Delta w = q\int\left(2xdx + 3y^2dy + 4dz\right)$

$\Rightarrow \Delta w = q\int x^2 + y^3 + 4z\Big|_{x_1y_1z_1}^{x_2y_2z_2}$

$\Rightarrow \Delta w = 3\left[(4+1+12) - (0-8-20)\right]$

$\Rightarrow \Delta w = 3(45) = 135\ \text{J}$

6. Unpolarized light with intensity I_0 incident on polariser. Find angle between axis of polariser and analyser, so that intensity of emergent light is $\frac{3I_0}{8}$



(1) 45° (2) 60°

(3) 37° (4) 30°

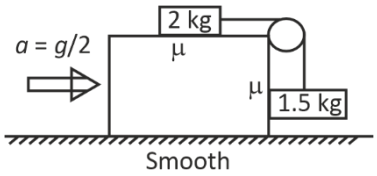
Answer (4)

Sol. $I_{out} = \frac{I_0}{2}\cos^2\theta$

$\cos^2\theta = \frac{3}{4}$

$\cos\theta = \frac{\sqrt{3}}{2}$

7. Find the least value of μ such that system move together without slipping.

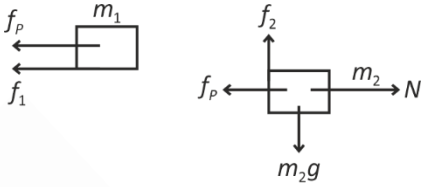


(1) $\frac{2}{11}$ (2) $\frac{3}{2}$

(3) $\frac{1}{7}$ (4) $\frac{5}{7}$

Answer (1)

Sol.



$m_2g = \mu\frac{m_2g}{2} + \frac{m_1g}{2} + \mu m_1g$

$1.5 = \mu\times 0.75 + 1 + \mu\times 2$

$0.5 = 2.75\mu$

$\mu = \frac{0.5}{2.75} = \frac{2}{11}$

8. A small cubical region of side 1 mm is placed at the center of current I = 1A carrying circular loop of radius a = 1 m. Find magnetic energy stored is the cube.

(1) $\pi\times 10^{-15}$ Joule (2) $\Delta u = \frac{\pi}{2}\times 10^{-16}$ Joule

(3) $2\pi\times 10^{-16}$ Joule (4) $\Delta u = 2\pi\times 10^{-15}$ Joule

Answer (2)

Sol. Energy density = $\frac{\beta^2}{2\mu_0}$

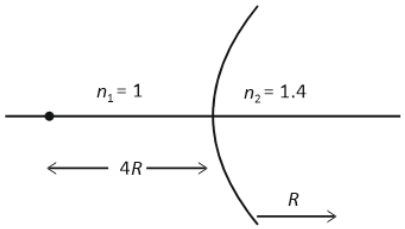
Here $\beta = \frac{\mu_0 I}{2a}$

So $\Delta u = \left(\frac{\mu_0 I}{2a}\right)^2\cdot\frac{1}{2\mu_0}\cdot 1\times 10^{-9}$

$$\Rightarrow \quad \Delta u = \frac{1\times10^{-9}}{4\times2}\frac{\mu_0^2}{\mu_0} = \frac{4\pi\times10^{-7}\times10^{-9}}{8}$$

$$\Rightarrow \quad \Delta u = \frac{\pi}{2}\times10^{-16} \text{ Joule}$$

9. A spherical refracting surface separating the media with refractive index $n_1 = 1$ and $n_2 = 1.4$ as shown. Object is placed at $4R$ from surface and R is curvature radius as shown.



Find magnitude of magnification.

(1) $|m| = \frac{5}{3}$ (2) $|m| = \frac{4}{3}$

(3) $|m| = \frac{3}{5}$ (4) $|m| = \frac{3}{4}$

Answer (1)

Sol. $\frac{n_2}{v} - \frac{n}{u} = \frac{(n_2 - n_1)}{R}$

$$\Rightarrow \frac{1.4}{v} + \frac{1}{4R} = \frac{0.4}{R}$$

$$\Rightarrow \frac{1.4}{v} = \frac{1}{R}\left(\frac{2}{5} - \frac{1}{4}\right) = \frac{3}{20R}$$

$$\Rightarrow v = \frac{1.4\times20R}{3}$$

So $|m| = \left|\frac{n_1 v}{n_2 u}\right| = \frac{1\times1.4\times20R}{3\times1\cdot4\times4R}$

$(m) = \frac{5}{3}$

10. Ratio of wavelengths of 1st and 2nd line of Balmer series in hydrogen atom spectra is

(1) $\frac{11}{13}$ (2) $\frac{15}{28}$

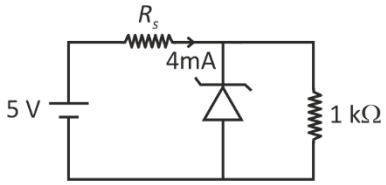
(3) $\frac{20}{27}$ (4) $\frac{13}{17}$

Answer (3)

Sol. $\frac{\lambda_2}{\lambda_1} = \frac{\left\{\frac{1}{4} - \frac{1}{9}\right\}}{\frac{1}{4} - \frac{1}{16}} = \frac{5\times64}{36\times12}$

$$= \frac{5\times4}{9\times3} = \frac{20}{27}$$

11. Power drawn by resistance 1 kΩ is 4mW. Find value of R_S.



(1) 2 kΩ (2) 500 Ω

(3) 1 kΩ (4) 750 Ω

Answer (4)

Sol. $i_L = 2$ mA

$V_L = 2 \times 1 = 2$ Volt

$R_s = \frac{3}{3\,\text{mA}} = 750\ \Omega$

12. Two wires (A & B) of same area are subjected to equal tensile forces gets elongated by same amount. The ratio of young's modulus of two material is $\frac{Y_A}{Y_B} = \frac{20}{11}$.

Find the ratio of lengths of the wire $\frac{l_A}{l_B}$?

(1) $\frac{10}{11}$ (2) $\frac{20}{11}$

(3) $\frac{11}{10}$ (4) $\frac{11}{20}$

Answer (2)

Sol. $\frac{Fl}{A\Delta l} = Y$

$$\Rightarrow \quad l = \frac{AY\Delta l}{F}$$

So, $\frac{l_A}{l_B} = \left(\frac{Y_A}{Y_B}\right).\left(\frac{\Delta l_A}{\Delta l_B}\right)$

$$\Rightarrow \quad \frac{l_A}{l_B} = \frac{20}{11}$$

13. In YDSE, path difference for two points *P* and *Q* are $\frac{\lambda}{3}$ and $\frac{\lambda}{6}$ respectively. Ratio of intensities at *P* and *Q* is

(1) $\frac{1}{4}$ (2) $\frac{1}{3}$

(3) 4 (4) 2

Answer (2)

Sol. $\Delta\theta_1 = \frac{2\pi}{\lambda}\frac{\lambda}{3} = 120°$,

$\Delta\theta_2 = \frac{2\pi}{\lambda}\times\frac{\lambda}{6} = 60$

Ratio = $\frac{\cos^2 60}{\cos^2 30} = \frac{1}{3}$

14. A one mole sample of gas undergoes an isothermal process in which volume changes from 3 litre to 1 litre. Find work done on the gas if initial pressure was 3×10^7 Pa.

(1) 270 ln3 (2) 900 ln3

(3) 3000 ln3 (4) 9000 ln3

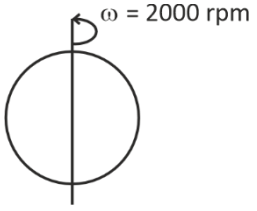
Answer (4)

Sol. $w = nRT \ln 3$

$= 3 \times 10^7 \times 3 \times 10^{-3} \ln 3$

$= 9 \times 10^4 \ln 3$

15. A solid uniform sphere of mass *m* and radius *R* initially rotating with angular speed of ω = 2000 rpm. If it stops in 10 sec when subjected to some constant retarding torque, then find number of revolutions and magnitude of torque.



(1) $200; \frac{8\pi}{3}mR^2$ (2) $500; \frac{10\pi}{3}mR^2$

(3) $\frac{500}{3}; \frac{8\pi}{3}mR^2$ (4) $400; \frac{10\pi}{3}mR^2$

Answer (3)

Sol. $\omega_i = 2000 \text{ rpm} = 2000 \times \frac{2\pi}{60} \text{ rad/sec}$

$= \frac{200}{3}\pi \text{ rad/sec}$

$\alpha = \frac{\Delta\omega}{\Delta t} = \frac{200\pi}{3\times 10} = \frac{20\pi}{3} \text{ rad/sec}$

So, $|\tau| = I\alpha = \frac{2}{5}mR^2 \times \frac{20}{3}\pi = \frac{8}{3}\pi mR^2$

Number of revolution = $\frac{1}{2}\alpha\frac{t^2}{2\pi}$

$\Rightarrow N = \frac{1}{2}\times\frac{20\pi}{3}\times\frac{10\times 10}{2\pi} = \frac{500}{3}$

16. Consider nuclear reaction,

$P + {}^{7}_{3}Li \rightarrow 2{}^{4}_{2}He$

Energy absorbed in the process is

($m_p = 1.0080u$, $m_{L_1} = 7.0173\,u$

$m_{He} = 4.0201\,u$)

(1) 14 MeV (2) 24 MeV

(3) 18 MeV (4) 11 MeV

Answer (1)

Sol. $\Delta E = C^2\Delta m = 0.01486 \times 931.5$

17. Shortest wavelength of Lyman series is λ_0 longest wavelength of Balmer series is λ. Find value of $\frac{\lambda}{\lambda_0}$.

(1) $\frac{36}{5}$ (2) $\frac{18}{5}$

(3) $\frac{4}{9}$ (4) $\frac{3}{7}$

Answer (1)

Sol. $\lambda_0 = \frac{hC}{E_0}$ $\lambda = \frac{36hC}{5E_0}$

$E = E_0\left(\frac{1}{4} - \frac{1}{9}\right)$ $\frac{5\lambda}{\lambda_0} = 36$

$E = \frac{5}{36} = E_0$

18.

19.

20.

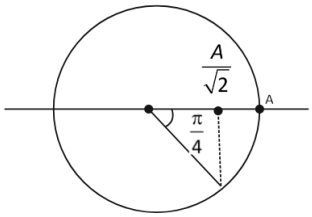
SECTION - B

Numerical Value Type Questions: This section contains 5 Numerical based questions. The answer to each question should be rounded-off to the nearest integer.

21. Time period of SHM of a particle is 16 sec. Find minimum time to move from $x = A$ to $x = \frac{A}{\sqrt{2}}$.

Answer (2)

Sol.



$T = \frac{\frac{\pi}{4}}{2\pi}T = \frac{T}{8}$

$T = 2$ sec

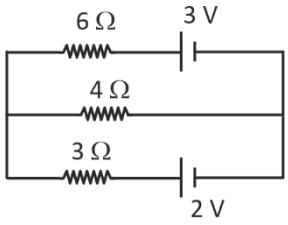
22. Mass and radius of a solid sphere is measured with uncertainty of 1% and 2% respectively uncertainty (in percent) in calculation of density is

Answer (7)

Sol. $\rho = \frac{m}{\frac{4}{3}\pi r^3}$

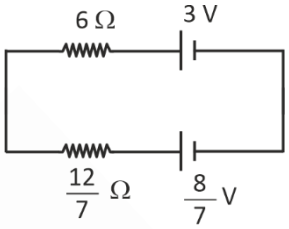
$\frac{\Delta\rho}{\rho} = \frac{\Delta m}{m} + \frac{3\Delta r}{r} = 1 + 6 = 7$

23. Heat dissipation in 6 Ω resistance in 54 sec is $\frac{\alpha}{9}$ J then α is



Answer (169)

Sol.



$i = \frac{3 - \frac{8}{7}}{6 + \frac{12}{7}} = \frac{13}{54}$

$H = Pt = \frac{13}{54} \times \frac{13}{54} \times 6 \times 54 = \frac{169}{9}$

24. A mass of m = 1 kg starts falling with zero initial speed. By the time it falls a height of h = 10 m its speed becomes v = 10 m/s. Find the magnitude of work done (in Joule) by resistive force.

Answer (50)

Sol. $\Delta KE = \Delta w_{gr} + \Delta w_R$

$\frac{1}{2}(1) \times 100 = (1 \times 10 \times 10) + \Delta w_R$

$\Rightarrow \quad \Delta w_R = -50$ Joule

$|\Delta w_R| = 50$ Joule

25.