

JEE-Main-02-04-2025 (Memory Based)
[MORNING SHIFT]

Physics

Question: The moment of inertia of a uniform rod of mass m and length l is α when rotated about an axis passing through centre and perpendicular to the length. If the rod is broken into equal halves and arranged as shown, then the moment of inertia about the given axis is



Options:

- (a) 2α
- (b) $\alpha/4$
- (c) 4α
- (d) α

Answer: (b)

Question: The wavefront of a wave is a wave $x + y + z = \text{const.}$ Find the angle which direction of wave of propagation makes with x axis

Options:

- (a) $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$
- (b) $\cos^{-1}\left(\frac{1}{2\sqrt{3}}\right)$
- (c) $\cos^{-1}\left(\frac{1}{\sqrt{2}}\right)$
- (d) $\cos^{-1}\left(\frac{1}{2}\right)$

Answer: (a)

Question: Two point charges q and $9q$ are placed at distance of l from each other. Then the electric field is zero at a

Options:

(a) Distance $\frac{l}{4}$ from charge $9q$

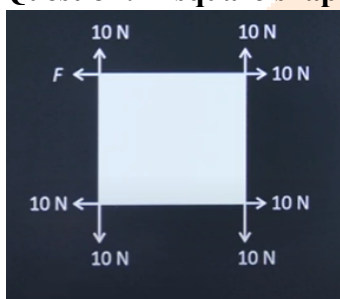
(b) Distance $\frac{3l}{4}$ from charge q

(c) Distance $\frac{l}{3}$ from charge $9q$

(d) Distance $\frac{l}{4}$ from charge q

Answer (d)

Question: A square shape lamina of mass M kg is at rest. Find value of F (in N).



Options:

(a) 10 N

(b) 15 N

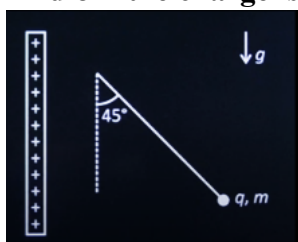
(c) 20 N

(d) 30 N

Answer: (a)

Question: The figure shows a infinite plane having uniform charge density σ and a small charged particle having charge q and mass m suspended by a light insulating thread.

Find σ if the charge is in equilibrium.



Options:

(a) $\frac{2\epsilon_0 mg}{q}$

(b) $\frac{\epsilon_0 mg}{2q}$

(c) $\frac{2q}{\epsilon_0 mg}$

(d) $\frac{2q\epsilon_0}{mg}$

Answer: (a)

Question: Find the ratio of $\left(\gamma = \frac{C_p}{C_v}\right)$ for two gases having degree of freedoms $f = 3$ and $f = 5$.

Options:

(a) 21/25

(b) 3/7

(c) 25/21

(d) 7/3

Answer: (c)

Question: What is the SI unit of viscosity, intensity of work & pressure gradient?

Options:

(a) Pa.s, Watt, Pa/m²

(b) Watt, Pa/m, Pa

(c) Pa.s, Watt/m², Pa.m

(d) Pa.s, Watt/m², N/m³

Answer: (d)

Question: Find the ratio of magnetic field at the centre of circular coil to that at a

distance of $\frac{3R}{4}$ from the centre on the axis of the coil.

Options:

(a) $\frac{64}{125}$

(b) $\frac{125}{64}$

(c) $\frac{8}{5}$

(d) $\frac{5}{8}$

Answer: (b)

Question: A current carrying wire is in form of a circle of radius R. Find ratio of magnetic field at centre to the magnetic field at axial point at a distance R from its centre.

Options:

(a) 2

(b) $2\sqrt{2}$

(c) $\sqrt{3}$

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

Answer: (b)

Question: A Two SHMs are superimposed on a particle moving along x axis as $x_1 = A \sin \omega t$ and $x_2 = A \sin(\omega t + \pi/3)$ then acceleration of particle is (given $\omega = 5$)

Options:

(a) $-25 A \sin(5t + \pi/3)$

(b) $-25 A \sin(5t + \pi/6)$

(c) $-25\sqrt{3} A \sin(5t + \pi/6)$

(d) $25\sqrt{3} A \sin(5t - \pi/6)$

Answer: (c)

Question: There is a metal plate with work function Φ a photon of frequency ν incident on it. An electron is rejected normally from point A with maximum Kinetic energy and a magnetic field perpendicular to initial velocity and parallel to metallic plate exists throughout the path. The electron strikes plate at B. Find the distance between point A & B

Options:

(a) $\frac{h\nu - \phi}{eB}$

(b) $\frac{\sqrt{2m(h\nu - \phi)}}{eB}$

(c) $\frac{2\sqrt{2m(h\nu - \phi)}}{eB}$

(d) $\frac{m(h\nu - \phi)}{eB}$

Answer: (c)

Question: What is the ratio of radius of nth orbit in H, He^+ and Li^{+2} ? (Assume Bohr model is applicable)

Options:

(a) 6 : 3 : 1

(b) 6 : 3 : 2

(c) 3 : 6 : 2

(d) 4 : 3 : 2

Answer: (b)

Question: Find the dimension of $\frac{a}{b^2}$ from the given formula $\left(P + \frac{a}{V^2}\right)(V - b) = RT$ where symbols have their usual meaning.

Options:

- (a) ML^3T^{-2}
 (b) $ML^{-1}T^{-2}$
 (c) ML^3T^{-1}
 (d) MLT

Answer: (b)

Question: Match the List-I with the List-II.

	List-I		List-II
(i)	Coefficient of viscosity	(a)	$M^0L^0T^0$
(ii)	Strain	(b)	$M^{-1}LT^2$
(iii)	Compressibility	(c)	$ML^{-2}T^{-2}$
(iv)	Pressure gradient	(d)	$ML^{-1}T^{-1}$

Options:

- (a) (i)-(a), (ii)-(c), (iii)-(d), (iv)-(b)
 (b) (i)-(d), (ii)-(a), (iii)-(b), (iv)-(c)
 (c) (i)-(b), (ii)-(d), (iii)-(c), (iv)-(a)
 (d) (i)-(c), (ii)-(b), (iii)-(d), (iv)-(a)

Answer: (b)

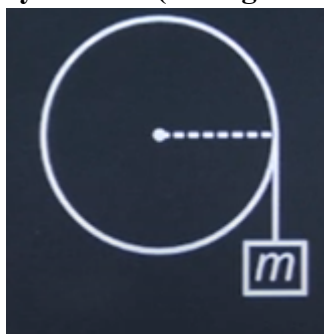
Question: Speed of a boat in still water is 27 km/hr and speed of river flow is 9 km/hr. If boat rows at angle 150° with the river flow and it takes 30 seconds to cross the river. Find width of the river.

Options:

- (a) 56 m
 (b) 100 m
 (c) 225 m
 (d) 112.5 m

Answer: (d)

Question: The figure shows a disc of mass 5 kg and radius 10 cm having axis fixed and free to rotate about its axis. A 2 kg block is suspended with the help of a string wound the disc and released from rest. The angular velocity of the disc when the block moves by 0.2 m is (Take $g = 10 \text{ ms}^{-2}$)



Options:

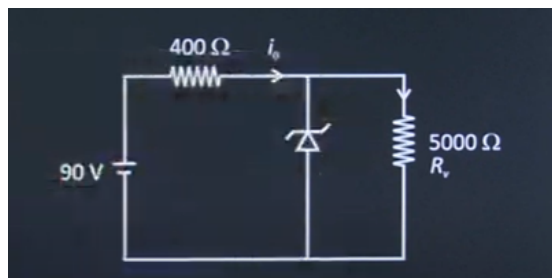
- (a) $40/9 \text{ rad/s}$

- (b) $40/3$ rad/s
- (c) $30/7$ rad/s
- (d) $28/5$ rad/s

Answer: (b)

Question: Zener the figure shows an electric diode with series circuit with a voltage

$V_z = 30V$ find the current through the diode in mA



Options:

- (a) 6 mA
- (b) 150 mA
- (c) 144 mA
- (d) 154 mA

Answer: (c)

Question: In a single slit diffraction using light of wavelength λ , the 2nd minima is formed at θ_1 and 3rd maxima is at θ_2 . If $\theta_1 + \theta_2 = 30^\circ$, then the slit width is

Options:

- (a) $\frac{66\lambda}{\pi}$
- (b) $\frac{22\lambda}{\pi}$
- (c) $\frac{33\lambda}{\pi}$
- (d) $\frac{11\lambda}{\pi}$

Answer: (c)

Question: A wire having length 2 m having Young modulus $Y = 2 \times 10^{11} \text{ N/m}^2$. Axial strain is 0.2 and Poisson ratio is 0.01 for a deformation. Find energy density for elastic energy stored in rod.

Options:

- (a) $2 \times 10^9 \text{ J/m}^3$
- (b) $4 \times 10^9 \text{ J/m}^3$
- (c) 10^9 J/m^3
- (d) $5 \times 10^8 \text{ J/m}^3$

Answer: (b)

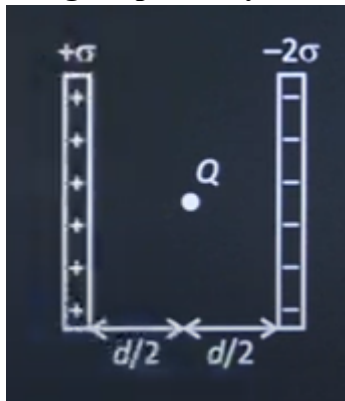
Question: Correct relation between permeability of vacuum μ_0 , relative permeability μ_r , permeability of medium μ and magnetic susceptibility χ is

Options:

- (a) $\mu = \chi \mu_0$
- (b) $\mu = (\mu_{r+1})\mu_0$
- (c) $\mu = (1 + \chi)\mu_0$
- (d) $\mu = \chi (\mu_{r+1})$

Answer: (c)

Question: Two uniformly charged sheets are shown in the figure. Find net force on the charge Q placed symmetrically between the plates.

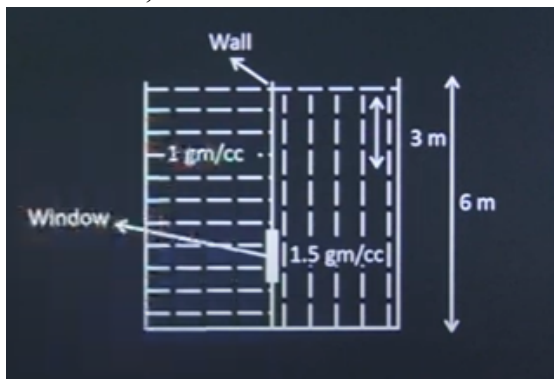


Options:

- (a) $\frac{3\sigma Q}{\epsilon_0}$
- (b) $\frac{2\sigma Q}{\epsilon_0}$
- (c) $\frac{3\sigma Q}{2\epsilon_0}$
- (d) Zero

Answer: (c)

Question: A concrete wall represents two liquids of densities 1 gm/cc and 1.5 gm/cc as shown. There is a square window of area 100 cm² of wood instead of concrete. Assuming no friction, find extend force needed to hold the window.



Options:

- (a) 400 N
- (b) 300 N
- (c) 150 N
- (d) 250 N

Answer: (c)

Question: The figure shows a spherical surface of radius 40 cm separating two mediums of refractive indices $\mu_1 = 1$ and $\mu_2 = 1.5$. A point object in the medium μ_1 at a distance 20 cm from the separation forms an image whose distance from the separation is $\times$ cm, where $\times$ is

Answer: (40)

