

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

Question: What is the dimensional formula of $\sqrt{\frac{1}{\mu_0 \epsilon_0}}$ (where μ_0 is permeability and ϵ_0 is permittivity of free space)

Options:

- (a) LT^{-1}
- (b) L^2T^{-2}
- (c) MLT^{-1}
- (d) ML^2T^{-2}

Answer: (b)

Question: An equilateral prism is made of a material of refractive index $\sqrt{2}$. Find angle of incidence for minimum deviation of the light ray.

Options:

- (a) 60°
- (b) 30°
- (c) 37°
- (d) 45°

Answer: (d)

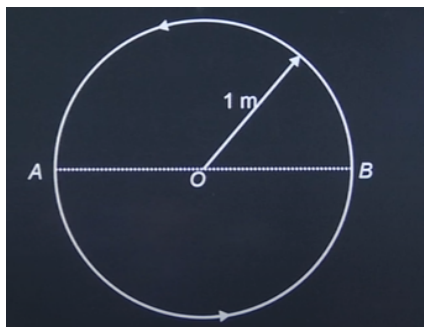
Question: The moment of inertia of a ring of mass M and radius R about an axis passing through tangential point in the plane of ring is

Options:

- (a) $\frac{5MR^2}{2}$
- (b) $\frac{3MR^2}{2}$
- (c) $\frac{4MR^2}{3}$
- (d) $\frac{2MR^2}{3}$

Answer (b)

Question: A particle moves on a circular path of radius 1 m. Find its displacement moves from $A \rightarrow B \rightarrow A \rightarrow B$. Also its distance are it moves from



Options:

- (a) Distance = 2 m, Displacement = 4π m
- (b) Distance = 2 m, Displacement = 5π m
- (c) Distance = 4π m, Displacement = 2 m
- (d) Distance = 5π m, Displacement = 2 m

Answer: (c)

Question: Two water drops each of radius of r coalesce to form a bigger drop. If T is the surface tension, surface energy released in this process

Options:

- (a) $n^{\frac{1}{2}} r^{\frac{1}{2}}$
- (b) $n^{\frac{1}{3}} r$
- (c) $n^2 r^2$
- (d) $n r^2$

Answer: (b)

Question: A disc of mass M and radius 2 m is hinged keeping axis horizontal. If angular acceleration of disc is 2 rad/s^2 . Find moment of inertia



Options:

- (a) 10 kg m^2
- (b) 5 kg m^2
- (c) 6 kg m^2
- (d) 20 kg m^2

Answer: (a)

Question: There is a satellite which is revolving around earth in a circular orbit at a height $2R$ from the surface of earth. Find the kinetic energy of the satellite.

(R is radius of earth)

Options:

(a) $\frac{GMm}{2R}$

(b) $\frac{GMm}{3R}$

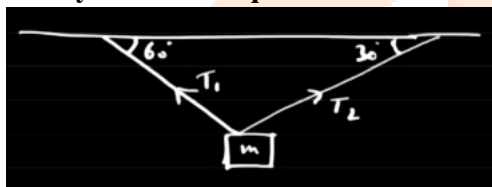
(c) $\frac{GMm}{6R}$

(d) $\frac{GMm}{9R}$

Answer: (c)

Question: There is a block of mass m by two massless strings which makes angle 60° and 30° respectively with the horizontal at the end which is connected to fixed support as shown in figure.

The system is in equilibrium. Find the ratio of T_1 & T_2



Options:

(a) 1 : 1

(b) $\sqrt{3} : 1$

(c) 1 : $\sqrt{3}$

(d) 2 : 1

Answer: (b)

Question: Binding energy per nucleon in ${}^2_1\text{H}$ is x and for ${}^4_2\text{He}$ is y. Find energy released in the given reaction ${}^2_1\text{H} + {}^2_1\text{H} \rightarrow {}^4_2\text{He}$

Options:

(a) $2x - 2y$

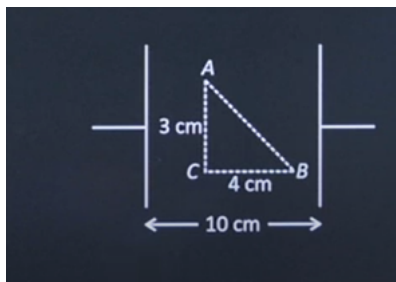
(b) $-4x + 4y$

(c) $4x - 4y$

(d) $2y - 4x$

Answer: (b)

Question: The figure shows the plates of a parallel plate capacitor with a separation 10 cm and charged to a potential difference V. Find the potential difference between B and A.



Options:

(a) $\frac{2V}{5}$

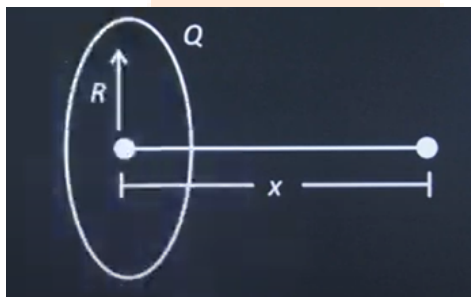
(b) $\frac{V}{2}$

(c) $\frac{3V}{5}$

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

Answer: (a)

Question: Figure shows a uniformly charged ring having charge Q and radius R . Find the distance from the centre on the axis of the ring where electric field is maximum



Options:

(a) $R\sqrt{2}$

(b) $\frac{R}{\sqrt{2}}$

(c) $2R$

(d) R

Answer: (b)

Question: Two galvanometers G_1 and G_2 are having resistors $R_1 = 5\Omega$ and $R_2 = 7\Omega$, number of turns $N_1 = 21$, $N_2 = 15$, magnetic fields $B_1 = 0.25 \text{ T}$, $B_2 = 0.50 \text{ T}$ and area of coil $A_1 = 3.6 \times 10^{-3} \text{ cm}^2$ and $A_2 = 1.8 \times 10^{-3} \text{ cm}^2$. Find the ratio of their voltage sensitivity (same spring in both)

Options:

(a) $49/25$

(b) $7/5$

(c) $5/7$

(d) $49/20$

Answer: (a)

Question: A solenoid having area A and length ' l ' is filled with a material having relative permeability 2. The magnetic energy stored in the solenoid is

Options:

- (a) $\frac{B^2 Al}{\mu_0}$
- (b) $\frac{B^2 Al}{4\mu_0}$
- (c) $\frac{B^2 Al}{2\mu_0}$
- (d) $\frac{B^2 Al}{\mu_0}$

Answer: (b)

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

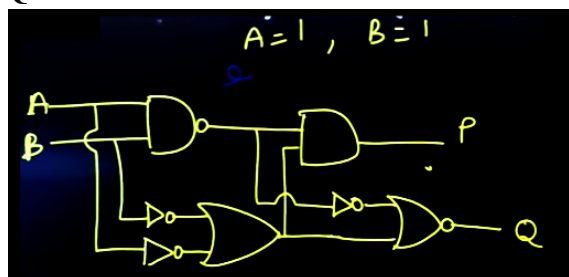
	List-I		List-II
(i)	Heat capacity	(a)	$\text{J kg}^{-1} \text{K}^{-1}$
(ii)	Specific heat capacity	(b)	J K^{-1}
(iii)	Latent heat	(c)	$\text{W m}^{-1} \text{K}^{-1}$
(iv)	Thermal conductivity	(d)	J kg^{-1}

Options:

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

Answer: (d)

Question: If P and Q is the output of the following logic gates combination. Find P and Q.



Options:

- (a) $P = 0, Q = 0$
- (b) $P = 0, Q = 1$
- (c) $P = 1, Q = 0$

(d) $P = 1, Q = 1$

Answer: (a)

Question: An electron with mass 'm' with an initial velocity ($t = 0$) $\vec{v} = v_0 \hat{i}$ ($v_0 > 0$) enters a magnetic field $\vec{B} = B_0 \hat{j}$. If the initial de-broglie wavelength at $t = 0$ is λ_0 . Then its value after time 't' would be.

Options:

(a) $\frac{\lambda_0}{\sqrt{1 + \frac{e^2 B_0^2 t^2}{m^2}}}$

(b) $\frac{\lambda_0}{\sqrt{1 - \frac{e^2 B_0^2 t^2}{m^2}}}$

(c) $\lambda_0 \sqrt{1 + \frac{e^2 B_0^2 t^2}{m^2}}$

(d) λ_0

Answer: (d)

Question: In a system of measurement, electric charge (Q), permeability (μ_0) and electric current (i) are considered as fundamental quantity. The dimension of linear momentum in this system is

Options:

(a) $[Q^2 \mu_0^2 i]$

(b) $[Q \mu_0 i]$

(c) $[Q \mu_0 i^2]$

(d) $[Q^2 \mu_0 i]$

Answer: (b)

Question: A satellite of mass 1000 kg is launched to revolve around the earth in an orbit at a height of 270 km from the earth's surface. Kinetic energy of the satellite in this orbit is $\times 10^{10}$ J.

(Mass of earth = 6×10^{24} kg, Radius of earth = 6400 Km, Gravitational constant = $6.67 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$).

Options:

(a) 9

(b) 3

(c) 5

(d) 13

Answer: (b)

Question: Which of the following items (labelled i, ii, iii, iv and v) are true?

When an ideal gas undergoes adiabatic process, (symbols have their usual meaning)

(i) $\Delta U = 0$

(ii) $W = -\Delta U$

(iii) $PV = \text{Constant}$

(iv) $VT = \text{Constant}$

(v) $W \propto [T_1 - T_2]$

Options:

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

Answer: (b)

Question: A wave is travelling along a string. The wavelength (λ) of the wave is 7.5 m and amplitude is 2 cm. At $t = 0$, there is a crest at $x = 0$ and in 0.3 seconds it travels a distance of 12 cm in +ve x-direction. The equation of the wave is

Options:

- (a) $2 \sin \left(\frac{2\pi}{15}x + \frac{6\pi}{25}t \right) \text{cm}$
- (b) $2 \cos \left(\frac{4\pi}{15}x - \frac{8\pi}{75}t \right) \text{cm}$
- (c) $2 \cos \left(\frac{4\pi}{15}x + \frac{6\pi}{25}t \right) \text{cm}$
- (d) $2 \sin \left(\frac{4\pi}{15}x - \frac{8\pi}{75}t \right) \text{cm}$

Answer: (b)

Question: The internal energy of air in $4 \text{ m} \times 4 \text{ m} \times 3 \text{ m}$ sized room at 1 atmospheric pressure will be $\times 10^6 \text{ J}$. (Consider air as diatomic molecule).

Options:

- (a) 20
- (b) 15
- (c) 12
- (d) 9

Answer: (c)

Question: An equiconvex lens of radius $R = \frac{1}{6} \text{ m}$ is having power P. Another Bi convex lens of radii R_1 and R_2 is having same power P, then

Options:

- (a) $R_1 = \frac{1}{9} \text{ m}, R_2 = \frac{1}{3} \text{ m}$
- (b) $R_1 = \frac{1}{6} \text{ m}, R_2 = \frac{1}{3} \text{ m}$
- (c) $R_1 = \frac{1}{9} \text{ m}, R_2 = \frac{1}{4} \text{ m}$
- (d) $R_1 = \frac{1}{4} \text{ m}, R_2 = \frac{1}{5} \text{ m}$

Answer: (a)

Question: Two identical objects are placed in front of convex mirror and concave mirror having same radii of curvature of 12 cm, at same distance of 18 cm from the respective mirrors. The ratio of sizes of the images formed by convex mirror and by concave mirror is:-

Options:

- (a) 1/2
- (b) 3
- (c) 2
- (d) 1/3

Answer: (a)

Question: The radius of first Bohr orbit of Li^{2+} is $\frac{a_0}{X}$, where a_0 is the radius of the first Bohr orbit of H. Find X.

Options:

- (a) 4
- (b) 3
- (c) 5
- (d) 9

Answer: (b)

Question: The length of the string is 104 m when the tension in it is 5 N. The length becomes 1.56 m when the tension in it is 7 N. The natural length of the string is _____ m.

Options:

- (a) 2
- (b) 1
- (c) 10
- (d) 20

Answer: (a)