JEE-Main-07-04-2025 (Memory Based)
[MORNING SHIFT]
Physics

Question: The dimensions of a physical quantity $\varepsilon_0 \dfrac{d\phi_E}{dt}$ are similar to [Symbols have their usual meanings]

Options:
(a) Electric current
(b) Electric field
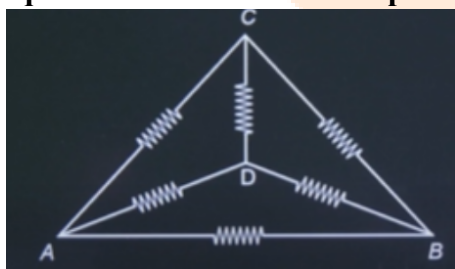(c) Electric flux
(d) Electric charge
Answer: (a)

Question: In a resonance tube closed at one end. Resonance is obtained at length l_1 = 120 cm and l_2 = 200 cm. If Vs = 340 m/s. Find frequency of sound is $\dfrac{100\alpha}{8}$ Hz then α =

Options:
(a) 12
(b) 15
(c) 25
(d) 17
Answer: (d)

Question: Six resistors of resistance R each, are connected as shown in figure. Find equivalent resistance across points A and B.

Options:
(a) R/2
(b) R/3
(c) 2R/3
(d) 3R/2
Answer (a)

Question: 2 plane polarized light waves combine at certain point whose "E" components are

$E_1 = E_0 \sin\omega t$. $E_2 = E_0 \sin(\omega t + \pi/3)$

Find the Amplitude of Resultant wave.

Options:

(a) E_0

(b) $0.9 E_0$

(c) $1.7 E_0$

(d) $3.4 E_0$

Answer: (c)

Question: An object is placed below two parallel layers of thickness d_1, d_2 are refractive index μ_1, μ_2 respectively. Find apparent depth of the object.

Options:

(a) $\dfrac{d_1\mu_2 - d_2\mu_1}{\mu_1\mu_2}$

(b) $\dfrac{d_1\mu_2 + d_2\mu_1}{\mu_1\mu_2}$

(c) $\dfrac{d_1\mu_1 + d_2\mu_2}{\mu_1\mu_2}$

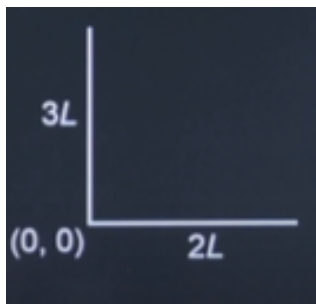(d) $\dfrac{d_1\mu_1 - d_2\mu_2}{\mu_1\mu_2}$

Answer: (b)

Question: A lens of focal length 20 cm in air is made of glass with refractive index 1.6. What is its focal length when it is immersed in a liquid of refractive index 1.8?

Options:

(a) -36 cm

(b) -72 cm

(c) -60 cm

(d) -108 cm

Answer: (d)

Question: A rod of length 5L is converted in L-shape as shown. Find the position of its center of mass w.r.t origin.

Options:

(a) $\left(L, \dfrac{3L}{2} \right)$

(b) $\left(\dfrac{9L}{12}, \dfrac{5L}{12} \right)$

(c) $\left(\dfrac{2L}{5}, \dfrac{9L}{10} \right)$

(d) $\left(\dfrac{9L}{10}, \dfrac{4L}{5} \right)$

Answer: (c)

Question: A composite sound wave is represented by $y = A\cos\omega t \cdot \cos\omega't$. The observed beat frequency is
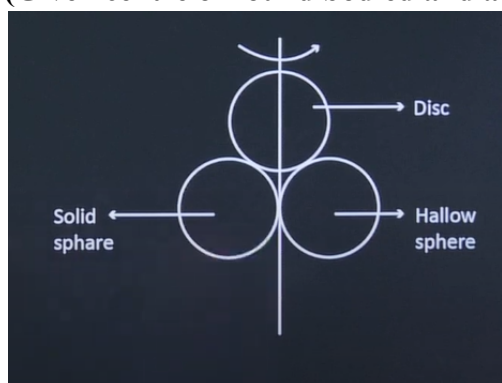
Options:

(a) $\dfrac{\omega - \omega'}{2\pi}$

(b) $\dfrac{\omega - \omega'}{\pi}$

(c) $\dfrac{\omega'}{2\pi}$

(d) $\dfrac{\omega'}{\pi}$

Answer: (d)

Question: MOI of disc about central axis perpendicular to surface is I then moment of inertia of given assembly is, where each round object is of same mass and same radius.

(Given centre of round bodied and axis are planar).

Options:

(a) $\dfrac{89}{15}I$

(b) $\dfrac{79}{17}I$

(c) $\dfrac{199}{30}I$

(d) $\dfrac{209}{32}I$

Answer: (c)

Question: Two convex lenses of focal length 30 cm and 10 cm are kept 10 cm apart. Principal axis of the lenses is common. Find equivalent power of the lens system.
Options:
(a) 5 D
(b) 10 D
(c) 6 D
(d) 13.33 D
Answer: (b)

Question: Two rods whose lengths are in ratio of 1 : 3 and of diameter are in ratio of 2 : 1, then ratio of elongations of rod if force applied and material of rods are same
Options:
(a) 1 : 12
(b) 1 : 3
(c) 4 : 1
(d) 1 : 1
Answer: (a)

Question: AC current is represented by $i = 5\sqrt{2} + 10\cos\left(650\pi t + \dfrac{\pi}{6}\right) \text{Amp.}$ **The rms value of the current is**
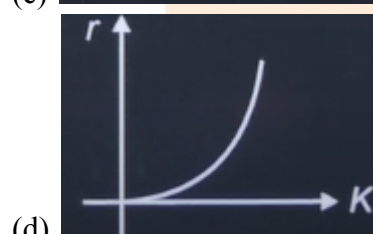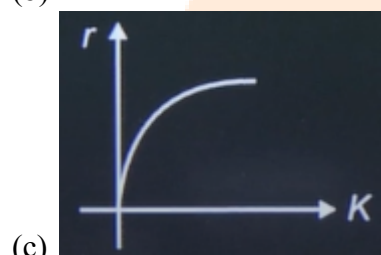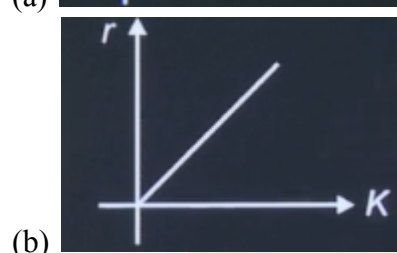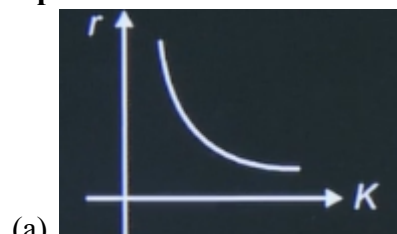**Options:**
(a) $5\sqrt{2}$ Amp
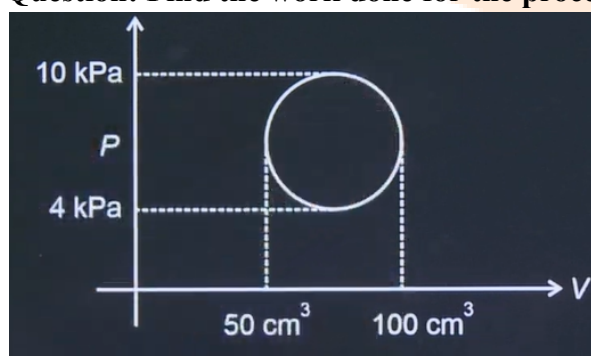(b) 50 Amp

(c) 100 Amp
(d) 10 Amp
Answer: (d)

Question: A charge particle moves in circular path in uniform magnetic field. The graph radius of circular path versus its kinetic energy is best and represented by
Options:

(a)

(b)

(c)

(d)

Answer: (c)

Question: Find the work done for the process shown in figure.

Options:

(a) $\dfrac{3\pi}{40}$ J

(b) $\dfrac{\pi}{20}$ J

(c) $\dfrac{\pi}{10}$ J

(d) $\dfrac{3\pi}{20}$ J

Answer: (a)

Question: Match the two columns.

	Column-I		List-II
a.	Monoatomic gas	(i)	$\gamma = 7/5$
b.	Diatomic rigid gas	(ii)	$\gamma = 4/3$
c.	Diatomic non-rigid	(iii)	$\gamma = 5/3$
d.	Triatomic non-linear rigid	(iv)	$\gamma = 9/7$

Options:
(a) a(i), b(iii), c(ii), d(iv)
(b) a(iii), b(i), c(iv), d(ii)
(c) a(ii), b(iv), c(i), d(ii)
(d) a(iii), b(iv), c(i), d(ii)
Answer: (b)

Question: Let λ_1 be largest wavelength of Lyman series for hydrogen atom and λ_2 be largest wavelength of Balmer series then $\dfrac{\lambda_1}{\lambda_2}$ is

Options:
(a) 5/27
(b) 1/4
(c) 3/4
(d) 4/9
Answer: (a)

Question: Two bodies projected with same initial velocities from same point with angle 45 + α and 45 - α. The ratio of their Time of Flights is
Options:
(a) 1

(b) $\dfrac{1 + \tan\alpha}{1 - \tan\alpha}$

(c) $\dfrac{1 + \sin 2\alpha}{1 - \sin 2\alpha}$

(d) $\dfrac{1 - \tan \alpha}{1 + \tan \alpha}$

Answer: (b)

Question: Two particles A and B are projected from a point on ground with same speed at angles 45° + θ and 45° - θ with horizontal. If the times of flight are T_A and T_B respectively. Then $\dfrac{T_A}{T_B}$ is equal to

Options:

(a) $\dfrac{1 + \tan \theta}{1 - \tan \theta}$

(b) 2 tanθ

(c) tan 2θ

(d) $\dfrac{1 - \tan \theta}{1 + \tan \theta}$

Answer: (a)

Question: Two plane polarised light combine at certain point whose electric field components are

$$\vec{E_1} = E_0 \sin \omega t \,\hat{i}$$

$$\vec{E_2} = E_0 \sin \left(\omega t + \dfrac{\pi}{3} \right) \hat{i}$$

Find the amplitude of electric field of resultant wave.

Options:

(a) $0.9 E_0$
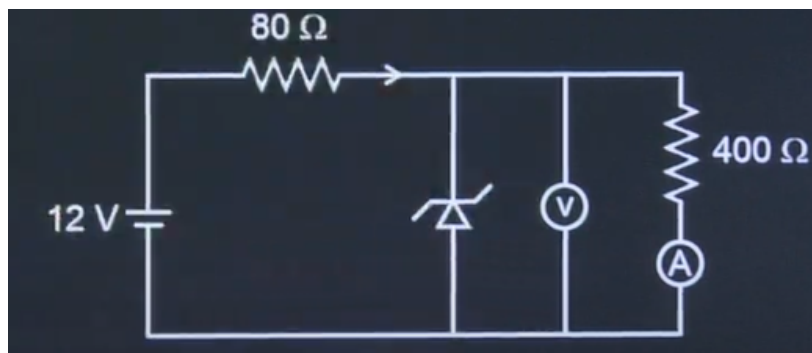
(b) E_0

(c) $0.7 E_0$

(d) $3.7 E_0$

Answer: (c)

Question: A variable force $\vec{F} = 2 t \hat{i} + 3 t^2 \hat{j}$ acts on a particles of mass 1 kg, which is at rest at t = 0. Find the power supplied as a function of time.

Options:

(a) $2t^3 + 3t^5$

(b) $t^3 + 4t^5$

(c) $t^3 + 4t^3$

(d) $t^3 + 5t^4$

Answer: (a)

Question: Find the current through the ammeter for the circuit shown in figure. (Reading voltmeter = 4V)

Options:
(a) 1 mA
(b) 7 mA
(c) 10 mA
(d) 3 mA
Answer: (c)

Question: Find the dimensions of the physical quantity $\dfrac{2B^2\mu_0}{\varepsilon_0}.$ **(Symbols have their usual meanings)**

Options:
(a) $M^4L^{-2}T^{-4}A^{-1}$
(b) $M^4L^4T^{-10}A^{-6}$
(c) $M^{-1}L^{-2}T^{-3}A^{-1}$
(d) $M^{-1}L^{-4}A^{-1}$
Answer: (b)