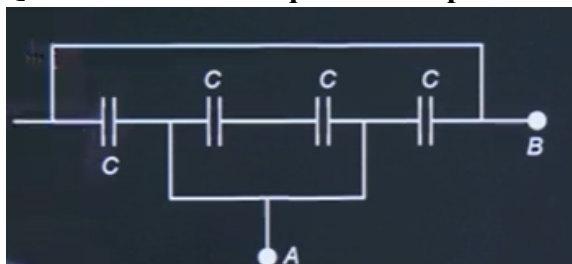


JEE-Main-04-04-2025 (Memory Based)
[MORNING SHIFT]
Physics

Question: Find the equivalent capacitance between A and B, where $C = 16 \mu\text{F}$



Options:

- (a) $48 \mu\text{F}$
- (b) $8 \mu\text{F}$
- (c) $32 \mu\text{F}$
- (d) $16 \mu\text{F}$

Answer: (c)

Question: A ring and a solid sphere released from rest from same height on enough

rough inclined surface. Ratio of their speed when they reach at bottom is $\sqrt{\frac{7}{x}}$ m/s, then x is _____

Options:

- (a) 20
- (b) 15
- (c) 10
- (d) 25

Answer: (c)

Question: Mean free path for an ideal gas is to be observed $20 \mu\text{m}$ while average speed of molecules of gas is observed to be 600 m/s , then frequency of collision is nearby

Options:

- (a) 4×10^7
- (b) 1.2×10^7
- (c) 3×10^7
- (d) 2×10^{-7}

Answer: (c)

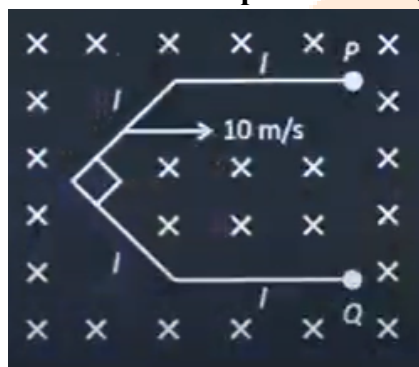
Question: Find the dimension of $\frac{E}{B}$ where, E represents electric field and B represents magnetic field

Options:

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

Answer: (b)

Question: 4 rods of equal length are joined as shown in the figure. Combined system is moving with speed 10 m/s in a perpendicular magnetic field of $\frac{1}{\sqrt{2}}$ tesla. Find emf induced between point P and Q ($l = 10$) cm.



Options:

- (a) 1 volt
- (b) 0.1 volt
- (c) 2 volt
- (d) $\sqrt{2}$ volt

Answer: (a)

Question: A real object placed in front of a spherical mirror forms an image whose magnification is $-\frac{1}{3}$. If the distance between the image and object is 3 cm. The focal length of the mirror is _____ cm.

Options:

- (a) -11.25 cm
- (b) -22.5 cm
- (c) -45 cm
- (d) -60 cm

Answer: (a)

Question: The current in a AC circuit is given as $i = 100\sqrt{2} \sin(100\pi t)$ A. Find rms current and frequency is Hertz.

Options:

- (a) 100 A, 100 Hz
- (b) 50 A, 100 Hz

- (c) 200 A, 50 Hz
(d) 100 A, 50 Hz

Answer: (d)

Question: For a magnification of $\frac{1}{2}$, object is a 40 cm from the mirror. What should be the object distance for $m = \frac{1}{3}$

Options:

- (a) 80 cm
(b) -80 cm
(c) 40 cm
(d) -40 cm

Answer: (b)

Question: There is a closed organ pipe having a certain fundamental frequency. Find the percentage change in fundamental frequency when it is filled one fifth with water.

Options:

- (a) 100 %
(b) 200 %
(c) 300 %
(d) 400 %

Answer: (d)

Question: An electric dipole with charges $2 \mu\text{C}$ and a separation 20 cm is placed close to an infinitely charged non-conducting sheet with surface charge density 100 C/m^2 . Find the torque acting on the dipole if the dipole makes an angle 30° with the normal to the sheet.

Options:

- (a) $\frac{12}{\epsilon_0} \times 10^{-5} \text{ N-m}$
(b) $\frac{2}{\epsilon_0} \times 10^{-5} \text{ N-m}$
(c) $\frac{4}{\epsilon_0} \times 10^{-5} \text{ N-m}$
(d) $\frac{1}{\epsilon_0} \times 10^{-5} \text{ N-m}$

Answer: (d)

Question: The dimensional formula for the ratio of Electric flux & magnetic flux is

$$[M^a L^b T^c A^d]$$

Options:

- (a) $a = 1, b = 2, c = -1, d = 1$
(b) $a = 2, b = -1, c = 1, d = -1$

(c) $a = 0, b = 1, c = -1, d = 0$

(d) $a = 1, b = 3, c = -2, d = 1$

Answer: (c)

Question: Assertion (A): The minimum kinetic energy required to take a body of mass m from surface of earth to infinity is mgR .

Reason (R): Potential energy at surface of earth is zero.

Options:

(a) (A) and (R) both are correct and (R) is correct explanation of (A)

(b) (A) and (R) both are correct and (R) is not correct explanation of (A)

(c) (A) is correct but (R) is incorrect

(d) (A) is incorrect but (R) is correct

Answer: (c)

Question: Longitudinal sound waves travel in three different gases namely helium, methane and carbon dioxide. Mean temperature of three gases are equal then ratio of speeds of wave in 3 gases respectively is

Options:

(a) $\sqrt{5} : \sqrt{7} : \frac{1}{\sqrt{11}}$

(b) $\sqrt{3} : \sqrt{5} : \frac{1}{\sqrt{11}}$

(c) $\sqrt{5} : 1 : \sqrt{\frac{21}{55}}$

(d) $\frac{1}{\sqrt{3}} : \frac{1}{\sqrt{5}} : \frac{1}{2}$

Answer: (c)

Question: Correct relation for Torque

(1) $\vec{y} = \vec{r} \times \vec{F}$

(2) $\vec{y} = \frac{d}{dt}(\vec{r} \times \vec{P})$

(3) $\vec{y} = \vec{r} \times \frac{d\vec{P}}{dt}$

(4) $\vec{y} = (\vec{r} \times \vec{v})$

(5) $\vec{y} = \vec{r} \times \vec{\omega}$

Options:

(a) 1, 2, 3

(b) 2, 3

(c) 3, 4, 5

(d) 1, 5

Answer: (a)

Question: Assertion: In photoelectric effect, if intensity of monochromatic light is increased then stopping potential increases.

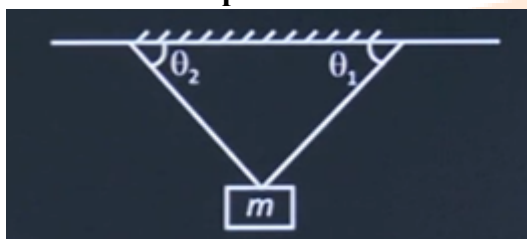
Reason: Increased intensity results in increment of photocurrent.

Options:

- (a) A is correct, R is correct and R is explanation of A
- (b) A is correct, R is correct and R is not explanation of A
- (c) A is incorrect and R is correct
- (d) A is correct and R is incorrect

Answer: (c)

Question: A block of mass m kg is connected to two strings as shown. If $T_1 = \sqrt{3}T_2$, then choose correct option

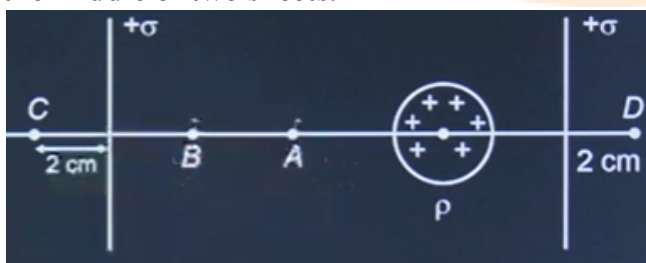


Options:

- (a) $\theta_1 = 60^\circ, \theta_2 = 30^\circ, T_1 = \frac{mg}{2}$
- (b) $\theta_1 = 60^\circ, \theta_2 = 30^\circ, T_2 = \frac{mg}{2}$
- (c) $\theta_1 = 30^\circ, \theta_2 = 60^\circ, T_1 = \frac{3mg}{4}$
- (d) $\theta_1 = 30^\circ, \theta_2 = 60^\circ, T_2 = \frac{3mg}{4}$

Answer: (b)

Question: In arrangement shown, has two non-conducting plane sheets with charge density σ , and a non-conducting sphere with volume charge density ρ . Choose the correct relation between the magnitude of electric fields at A, B, C and D. Point A is at the middle of two sheets.



Options:

- (a) $E_A = E_B, E_C \neq E_D$
- (b) $E_A > E_B, E_C \neq E_D$

(c) $E_A > E_B, E_C = E_D$

(d) $E_A \neq E_B, E_C = E_D$

Answer: (b)

Question: In YDSE setup, distance between slits $d = 0.2$ mm. If d is changed to 0.4 mm, then % change in fringe width

Options:

(a) 25%

(b) 50%

(c) 100%

(d) 75%

Answer: (b)

Question: Two simple pendulums with amplitudes θ_1 and θ_2 have length of strings as l_1 and l_2 respectively. Choose the correct options if the maximum angular accelerations are same.

Options:

(a) $\theta_1 l_1 = \theta_2 l_2$

(b) $\theta_1 l_2 = \theta_2 l_1$

(c) $\theta_1 l_1^2 = \theta_2 l_2^2$

(d) $\theta_1 l_2^2 = \theta_2 l_1^2$

Answer: (b)

Question: The Boolean expression $Y = \overline{A}BC + \overline{A}\overline{C}$ can be realised with which of the following gate configurations

Options:

(a) One-3 input AND gate, 3 NOT gate and one -2 input OR gate, one-2 input AND gate

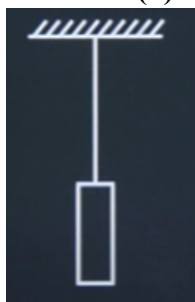
(b) One-3 input OR gate, 1 NOT gate and one -2 input NOR gate, one-2 input OR gate

(c) 3-input OR gate, 3 NOT gate and one -2 input AND gate

(d) 3-input AND gate, 3 NOT gate and one -2 input OR gate

Answer: (a)

Question: A small mirror of mass m is suspended to a fix point with an ideal string of length l . A photon of energy E incident normally on the mirror. Find maximum angular deviation (θ) of the mirror.



Options:

- (a) $\frac{3E}{mc\sqrt{gl}}$
- (b) $\frac{E}{2mc\sqrt{gl}}$
- (c) $\frac{E}{mc\sqrt{2gl}}$
- (d) $\frac{2E}{mc\sqrt{gl}}$

Answer: (d)

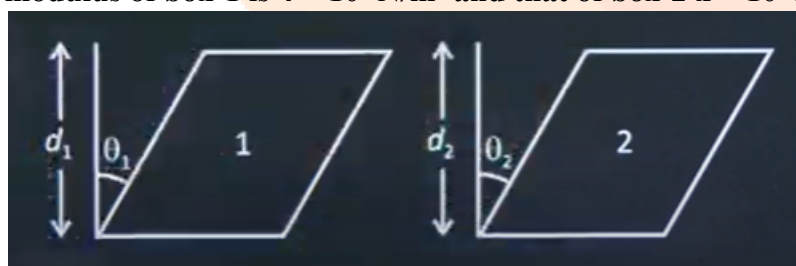
Question: $\vec{L}$ and $\vec{p}$ are angular momentum about origin and linear momentum of a particle. If position vector of particle is given as $\vec{r} = a(\sin \omega t \hat{i} + \cos \omega t \hat{j})$ then direction of force is

Options:

- (a) Opposite to $\vec{L} \times \vec{r}$
- (b) Opposite to $\vec{p} \times \vec{r}$
- (c) Opposite to $\vec{L} \cdot \vec{r}$
- (d) Opposite to $\vec{p} \times \vec{L}$

Answer: (d)

Question: The figure shows two boxes with identical square cross-sections and height h_1 and h_2 ($h_1 = 2h_2$) are made of different materials. An equal force is applied on the square cross-sections such that the deformations θ_1 and θ_2 are realized ($\theta_1 = \theta_2$). If shear modulus of box-1 is $4 \times 10^9 \text{ N/m}^2$ and that of box-2 $x \times 10^9 \text{ N/m}^2$, then x is _____.



Options:

- (a) 3
- (b) 5
- (c) 8
- (d) 10

Answer: (c)