

**JEE-Main-23-01-2025 (Memory Based)**  
**[MORNING SHIFT]**  
**Physics**

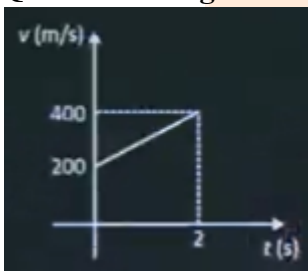
**Question:** If flux can be represented as  $\phi = \lambda\alpha + \beta\sigma$  where  $\lambda$  is the linear charge density and  $\sigma$  is the surface charge density then the dimensions of  $\alpha/\beta$  is that of

**Options:**

- (a) Displacement
- (b) 1/Displacement
- (c) 1/Area
- (d) Area

**Answer:** (b)

**Question:** For given velocity-time (v-t) graph, find distance travelled at 0.5 sec



**Options:**

- (a) 125 m
- (b) 112.5 m
- (c) 137.5 m
- (d) 150 m

**Answer:** (b)

**Question:** The displacement of a particle as function of time is  $x[t] = A \sin(t) + B \cos^2(t)$

+  $ct^2 + D$ . Find dimension of  $\left[ \frac{ABC}{D} \right]$

**Options:**

- (a)  $L^2$
- (b)  $L^2T^{-2}$
- (c)  $LT^{-2}$
- (d)  $L^3T$

**Answer:** (b)

**Question:** Two points represented by position vectors

$2\hat{i} + 3n\hat{j} - 2\hat{k}$  and  $2\hat{i} + 4p\hat{j} - 2\hat{k}$  Same distance from origin. If the vectors are perpendicular then find n.

**Options:**

- (a)  $\pm \frac{2\sqrt{2}}{3}$
- (b)  $\pm \frac{2}{2\sqrt{2}}$
- (c)  $\pm \frac{2}{3}$
- (d)  $\pm \frac{1}{\sqrt{2}}$

Answer: (a)

Question: Match the column (1) and (2)

column (1)	column (2)
(a) Temperature remains constant in a process	(i) Adiabatic process
(b) Pressure remains constant in a process	(ii) Isobaric process
(c) Volume remains constant in a process	(iii) Isothermal process
(d) There is no heat exchange in the process	(iv) Isochoric process

Options:

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

Answer: (a)

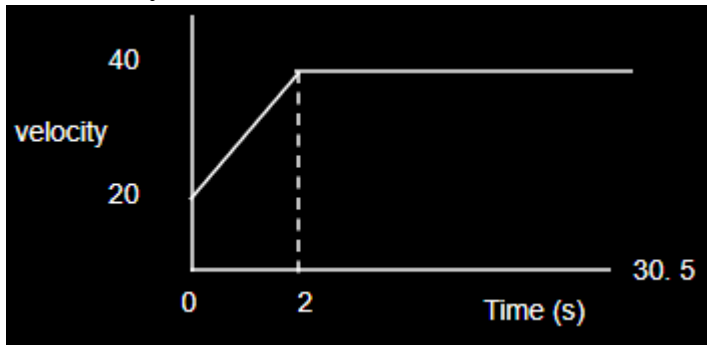
Question: A lead bullet of mass 0.01g moving with a speed of 100m/s enters a fixed wooden block. If no heat is taken away by the wood, the rise in temperature of the bullet in the wood is nearly (Sp. Heat of lead = 150cal/kg, Melting point of lead = 600K)

Options:

- (a) 8 K
- (b) 10 K
- (c) 4 K
- (d) 5 K

Answer: (a)

**Question:** The velocity time graph of a moving car is given below, find the total distance travelled by the car in 30.5 seconds



**Options:**

- (a) 5900 m
- (b) 12000 m
- (c) 14000 m
- (d) 16000 m

**Answer:** (b)

**Question:** An ideal gas is suddenly compressed to 1/4th of its original volume. Ratio of specific heat at constant pressure and constant volume is 3/2. What is the rise in the temperature of gas, the original temperature being 0 degree celsius.

**Options:**

- (a) 546 K
- (b) 273° C
- (c) 546° C
- (d) 600 K

**Answer:** (b)

**Question:** The ratio of electric force to gravitational force between two particles having charges  $q_1$   $q_2$  and masses  $m_1$  and  $m_2$  respectively is (where symbols have their usual meanings)

**Options:**

- (a)  $\frac{4\pi\epsilon_0 m_1 m_2 G}{q_1 q_2}$
- (b)  $\frac{q_1 q_2}{4\pi\epsilon_0 G m_1 m_2}$
- (c)  $\frac{q_1 q_2 r^4}{q_1 q_2 r^4}$
- (d)  $\frac{4\pi\epsilon_0 G m_1 m_2}{q_1 q_2}$

**Answer:** (d)

**Question:** Solid sphere of mass  $m$  rolls down from rest and achieves speed  $V_1$  on an inclined plane of  $30^\circ$  sphere achieves speed  $V_2$  in case of pure rolling on a inclined plane of  $45^\circ$  when released from same height. Then the ratio  $V_1/V_2$  is (Assume pure rolling)

**Options:**

- (a) 1
- (b) 2/5
- (c) 3/5
- (d) 7/5

Answer: (a)

**Question: In a moving-coil galvanometer, if the number of turns are increased then.**

- 1) Current Sensitivity increases
- 2) Resistance of galvanometer increases
- 3) Voltage sensitivity decrease
- 4) A Galvanometer can be connected to an ammeter by connecting a very resistance in parallel with it.

Select option having only correct statement from the above list

Options:

- (a) 1 , 2 , 3
- (b) 3, 4
- (c) 1 , 2 , 4
- (d) 1 , 2 , 3, 4

Answer: (c)

**Question: Statement-1 : Hot water flows faster than cold water**

**Statement -2: Surface tension of soap bubble is more than that of a drop of water**

Options:

- (a) Both Statements are correct
- (b) Statement 1 is true and 2 is false
- (c) Statement 1 is false and 2 is true
- (d) Both Statements are false

Answer: (b)

**Question: A circular disc of diameter 10 cm is cut from one edge of a larger circular disc of radius 20 cm. The shift in centre of mass is**

Options:

- (a) 1 cm
- (b) -1 cm
- (c) 2 cm
- (d) -2 cm

Answer: (b)

**Question: (1) Current  $I_2 = 1$  A**

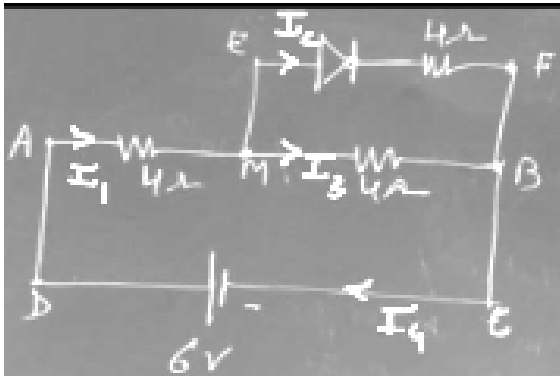
**(2) Current  $I_1 = I_4 = 2$  A**

**(3) Current  $I_3 = 0.5$  A**

**(4) Current  $I_4 = 1$  A**

**(5) Diode is forward bias condition**

Study the above circuit diagram and select only the correct statement/s from the above list.



Options:

- (a) 1, 3, 5
- (b) 3, 4, 5
- (c) 2, 5
- (d) 1, 4, 5

Answer: (b)

Question: If angles of projection for two projectiles are thrown with the same speed at angle  $30^\circ$  and  $60^\circ$  respectively then the ratio of velocity at maximum height is.

Options:

- (a)  $\frac{\sqrt{3}}{2}$
- (b)  $\frac{\sqrt{3}}{\sqrt{3}}$
- (c)  $\frac{4}{4}$
- (d) 2

Answer: (a)

Question: Find the time period of a cube of side length 10 cm and mass 10 g oscillating in water.

(Density of water =  $10^3 \text{ kg/m}^3$  and  $g = 10 \text{ m/s}^2$ )

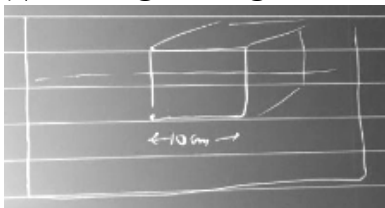
Options:

- (a)  $\pi/25$  second
- (b)  $\pi/50$  second
- (c)  $\pi/100$  second
- (d)  $2\pi/25$  second

Answer: (b)

Question: A cube whose side is 10 cm & mass is 10 mg floats in water. It is pressed and than released so that it oscillates vertically. Find time period of oscillation

( $\rho = 10^3 \text{ kg/m}^3$  &  $g = 10 \text{ m/s}^2$ )



Options:

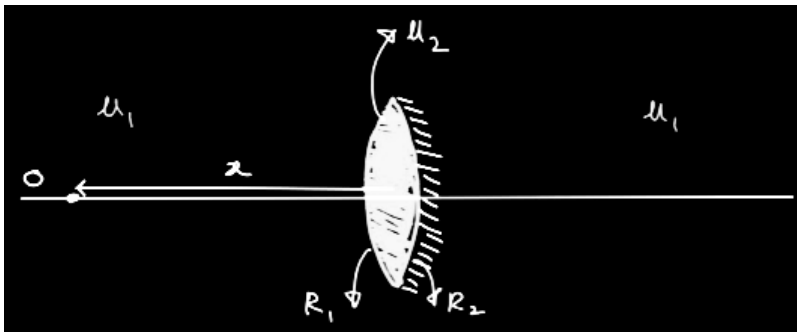
- (a)  $4\pi \times 10^{-2} \text{ s}$

- (b)  $2\pi \times 10^{-2}$  s
- (c)  $\pi \times 10^8$  s
- (d)  $2\pi \times 10^{-3}$  s

Answer: (b)

Question:

A thin biconvex lens having two surfaces of radii of curvature  $R_1$  and  $R_2$  is made of a material of refractive index  $\mu_c$ . It is kept in a medium of refractive index  $\mu_1$ . Now the outer surface lens having radius  $R_2$  is silvered. If a point object is placed on principal axis at a distance of  $x$  from lens and its final image is coinciding with object itself, then find  $x$ .



Options:

- (a)  $x = \frac{2\mu_1 R_1 R_2}{2R_2(\mu_2 + \mu_1) + R_1\mu_2}$
- (b)  $x = \frac{2\mu_1 R_1 R_2}{2R_2(\mu_2 - \mu_1) + R_1\mu_2}$
- (c)  $x = \frac{2\mu_1 R_1 R_2}{2R_2(\mu_2 + \mu_1) - R_1\mu_2}$
- (d)  $x = \frac{2\mu_1 R_1 R_2}{R_2(\mu_2 + \mu_1) - R_1\mu_2}$

Answer: (b)

Question: If the  $\vec{E}$  in an EM wave is given by  $\vec{E} = (4\hat{i} - 3\hat{j})$

$\cos(\omega t - (3x + 4y)k)$  then the magnetic field  $\vec{B}$  will be

Options:

- (a)  $\vec{B} = -\left(\frac{5}{3} \times 10^{-8}\right)\hat{k} \cos(\omega t - (3x + 4y)k)$
- (b)  $\vec{B} = \left(\frac{5}{3} \times 10^{-8}\right)\hat{k} \cos(\omega t - (3x + 4y)k)$
- (c)  $\vec{B} = -\frac{5}{3} \times 10^{-8}\hat{j} \cos(\omega t - (3x + 4y)k)$

$$\vec{B} = \frac{5}{3} \times 10^{-8} \hat{j} \cos(\omega t - (3x + 4y)k)$$

(d)

Answer: (a)

