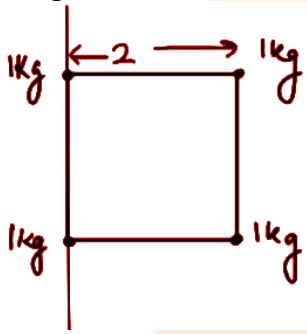
JEE-Mains-27-01-2024 [Memory Based]
[Morning Shift]

Physics

Question: Spherometer cannot measure which of the following quantities?
Options:
(a) Radius of curvature of convex lens
(b) Radius of curvature of concave lens
(c) thickness of thin plates.
(d) specific rotation of liquids
Answer: (d)

Question: Find Moment of Inertia of Massless square frame of side length 2 m with mass of 1 Kg on Each Vertex about axis passing through a side



Options:
(a) 8 kgm^2
(b) 2 kgm^2
(c) 4 kgm^2
(d) 3 kgm^2
Answer: (a)

Question: A particle is moving with initial speed $\left(5\hat{i}+2\hat{j}\right)\frac{m}{s}$ and a constant acceleration of $\left(2\hat{i}+3\hat{j}\right)\frac{m}{s^2}$ starting from origin. After sometime it is observed that it has moved by a distance 84 m along the x-axis. Find the final speed
Options:
(a) $19\hat{i}+23\hat{j}$
(b) $13\hat{i}+23\hat{j}$
(c) $19\hat{i}+13\hat{j}$
(d) $13\hat{i}+13\hat{j}$
Answer: (a)

Question: A beaker is filled with two liquids each of height 6 cm if refractive indices of two liquids are $\mu_1 = 8/3$ and $\mu_2 = 5/3$ then find the apparent depth of a coin kept at the bottom of the container

Options:

(a) 4.85 cm

(b) 5.85 cm

(c) 6.85 cm

(d) 7.85 cm

Answer: (b)

Question: If radius of electron in 3rd stationary orbit is R, radius of electron in 4th stationary orbit is

Options:

(a) $\frac{25}{9}R$

(b) $\frac{16}{9}R$

(c) $\frac{9}{16}R$

(d) $\frac{9}{25}R$

Answer: (b)

Question: A particle executing SHM has amplitude A = 4m and maximum speed of 10 m/s. Find its distance from mean position which its speed is 6m/s.

Options:

(a) 3.0

(b) 3.2

(c) 3.4

(d) 3.6

Answer: (b)

Question: Resistance R having length L is cut into five parts and connected in parallel. The effective resistance now is ?

Options:

(a) R

(b) 5R

(c) R/5

(d) R/25

Answer: (d)

Question: A rectangular loop of length 2.5m and breadth 2m is present in a magnetic field of 5 tesla making an angle of 60° with the plane of the loop. The loop is pulled out from the field slowly in 10 seconds. Find the EMF developed.

Options:

(a) 2.16 volts

(b) 1 volt

(c) 1.16 volt

(d) 3 volts

Answer: (a)

Question: Two parallel infinite wires are carrying current of 10 A in the opposite directions. Distance between the wires is 5 cm. Find the magnetic field at the midpoint between the wires.

Options:

(a) 1.6×10^{-4} T

(b) 4×10^{-4} T

(c) 2×10^{-4} T

(d) 6×10^{-4} T

Answer: (a)

Question: Find percentage volume change of a liquid at depth of 4000m under water as compared to on the surface. Bulk modulus of the liquid is 2×10^{9} Pa.
($g = 10\ m/s^2$)

Options:

(a) ½ %

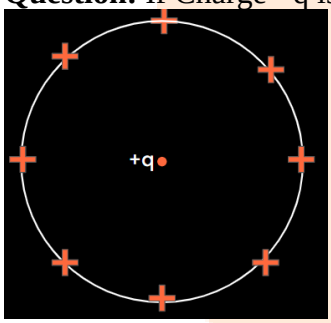
(b) 2%

(c) 1%

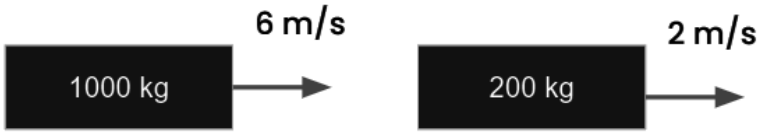
(d) 0.25%

Answer: (b)

Question: If Charge +q is Kept at the centre, find the Tension in the Ring



Question: After Collision Blocks stick. Find there Common Velocity



(a) 4/3 m/s

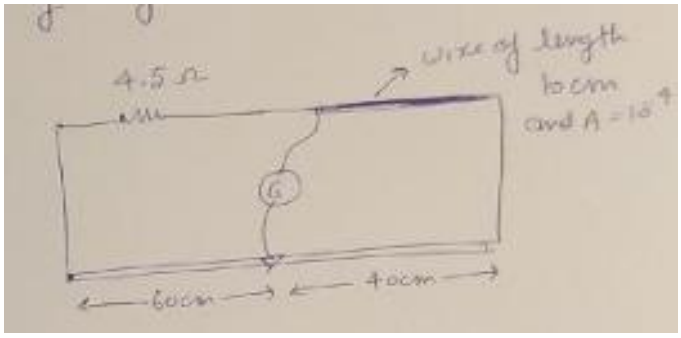
(b) 16/3 m/s

(c) 5 m/s

(d) 9/5 m/s

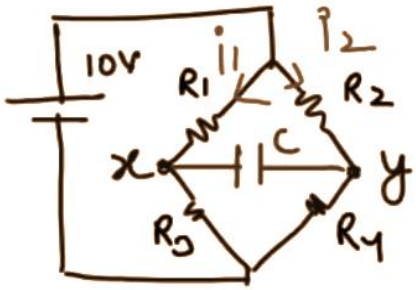
Answer: (c)

Question: In a meter bridge experiment when a wire of length 10 cm and cross section area $10^{-4}\ m^2$ is used in place of unknown resistor, then the balancing length is forced to be 60 cm. Find the resistivity of the wire



Options:
(a) 3×10^{-3} Ω - m
(b) 4×10^{-3} Ω - m
(c) 10^{-3} Ω - m
(d) 2×10^{-3} Ω - m
Answer: (a)

Options: In the following circuit, find the charge on the positive plate of the capacitor after long time given $R_1 = 1$ Ω, $R_2 = 6$Ω, $R_3 = 2$Ω, $R_4 = 4$Ω C = 150 μF, V = 10V



(a) 200 μF
(b) 300 μF
(c) 400 μF
(d) 500 μF
Answer: (c)

Question: If the displacement of a particle is given by $\vec{S} = 2t^2\hat{i} + 5\hat{j}$, then find the velocity of t = 1 second
Options:
(a) $4\hat{i} + 5\hat{j}$
(b) $2\hat{i} + 5\hat{j}$
(c) $4\hat{i}$
(d) $5\hat{j}$
Answer: (c)

Question: Find the intensity of an electromagnetic wave with equation its electric field component as E = 200 sin(1.5 × 107 t - 0.05x) N/C
(a) 53
(b) 67
(c) 84
(d) 43

Answer: (a)

Question: If a monoatomic gas molecule has a KE of 414 eV, then find the temperature of the gas if $K_B = 1.3 \times 10^{-23}$
Options:
(a) 340 K
(b) 3400 K
(c) 3400 °C
(d) 340 °C
Answer: (b)

Question: If diameter of earth's becomes half without changing its mass the value of acc due to gravity on surface become
(a) 2g
(b) g/2
(c) g/4
(d) 4g
Answer: (d)

Question: A charged particle moves in a region with constant velocity which combination of electric field and magnetic field is possible
(i) E ≠ 0 B ≠ 0
(ii) E = 0 B = 0
(iii) E = 0 B ≠ 0
(iv) E ≠ 0 B = 0
Options:
(a) (i), (ii) and (iii) only
(b) (i) and (ii) only
(c) (i) and (iii) only
(d) (ii) and (iii) only
Answer: (a)

Question: In an isothermal expansion initial pressure is P = 800 KPa and initial volume is 30 dm^3 if the final volume is 45 dm^3, find the heat absorbed in the process
[ln(3) = 1.099, ln(2) = 0.693]
(a) 8790
(b) 4350
(c) 2088
(d) 9731
Answer: (d)

Question: A Convex Lens of Focal length 40 cm focus a distant light on electrochemical cell and current I is produced as a results. If a convex lens of focal length 20 cm is used current will change to [assuming both lenses have same diameter]
Options:
(a) I
(b) 2I
(c) I/2
(d) I/4
Answer: (a)

Question: A Pn S_m has a refractive index of $\mu = cot\frac{A}{2}$. Find the minimum deviation if it is kept in air. A is angle of Prism

Options:

(a) $\frac{\pi}{2} - \frac{A}{2}$

(b) π - 2A

(c) π - A

(d) $\frac{\pi}{2} - A$

Answer: (b)

Question 23: If a charge of 1μC is placed at the origin the potential difference between points A(√3, √3) and B(√6, 0) is

Options:

(a) 1μJ

(b) 2μJ

(c) 3μJ

(d) 0

Answer: (d)

Question: Two particles with same KE are having masses of 4 gram and 25 gram respectively. Find the ratio of there linear momentum

Options:

(a) 2:5

(b) 5:2

(c) 4:25

(d) 25:4

Answer: (a)

Question: Read the following statements

S1: Viscosity of gases is more than liquids

S2: Addition of insoluble impurities decreases surface tension

Options:

(a) Both are correct

(b) Only S1 is correct

(c) Only S2 is correct

(d) None is correct

Answer: (c)

Question: Read the following statements

S1: Planck constants and Angular momentum have same dimension

S2: Moment of the force and linear momentum have same dimension

Options:

(a) Both are correct

(b) Only S1 is correct

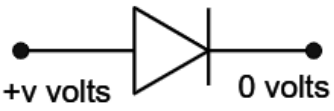
(c) Only S2 is correct

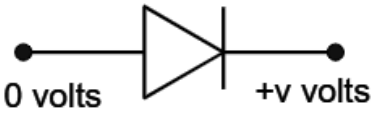
(d) None is correct

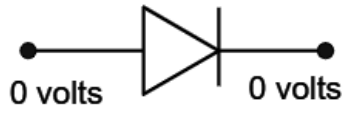
Answer: (b)

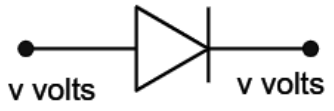
Question: Which of the following option shows the diode in the reverse biased mode

Options:

(a) 

(b) 

(c) 

(d) 

Answer: (b)