

JEE-Main-04-04-2024 (Memory Based)
[MORNING SHIFT]

Physics

Question: If 5 identical convex lenses are kept close to each other so that the equivalent power of the system is $25D$, then find the focal length of each lens

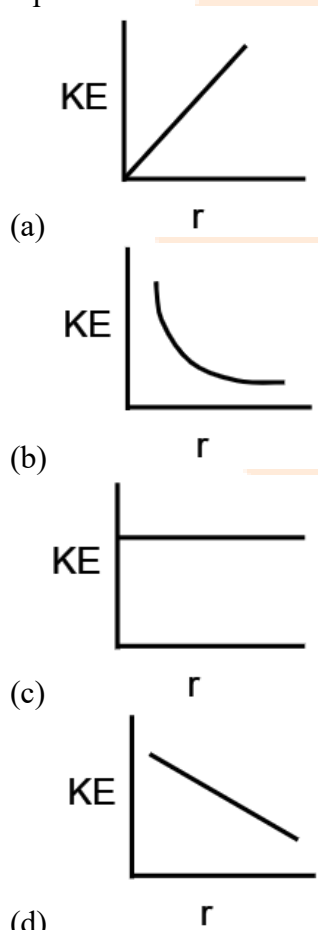
Options:

- (a) 10 cm
- (b) 20 cm
- (c) 30 cm
- (d) 40 cm

Answer: (b)

Question: An electron is revolving around an infinite wire. Which graph correctly shows the relation between KE of electron and the distance from the wire

Options:



(d)
Answer: (c)

Question: Change of 40 degree in Celsius scale is equivalent to What degree in Fahrenheit scale?

Options:

- (a) 52°F
- (b) 72°F
- (c) 17°F
- (d) 50°F

Answer: (b)

Question: Elongation caused by a load of 3N in a wire is 'a'. When 2N force is applied on the same wire the elongation is 'b'. What load will be required for the elongation of 3a - 2b:

Options:

- (a) 4
- (b) 5
- (c) 9
- (d) 10

Answer: (b)

Question: A rod of length 'L' and mass 'M' is bent in the form of a semicircle. Now a particle of mass 'm' is kept at the center. Find the force experienced by the particle

Options:

- (a) $\frac{2GMm\pi}{L^2}$
- (b) $\frac{GMm\pi}{2L^2}$
- (c) $\frac{GMm\pi}{L^2}$
- (d) $\frac{4GMm\pi}{L^2}$

Answer: (a)

Question: A mass 'm' is dropped on a ground from height 'h' it rebounds to a height of h/2 after hitting the ground for the first time. Find the loss in energy during the first time it hits the ground and also the speed with which it will hit the ground for the second time

Options:

- (a) $\frac{mgh}{2}, \sqrt{gh}$
- (b) $mgh, \sqrt{2hg}$
- (c) $\frac{mgh}{4}, \sqrt{\frac{gh}{2}}$
- (d) $\frac{mgh}{8}, \sqrt{gh}$

Answer: (a)

Question: For the 4th orbit of hydrogen atom the debroglie wavelength of electron is $n\pi a_0$ where a_0 is bohr radius. The value of n

Options:

Answer: (8)

Question: If the current is given by $i = 6 + \sqrt{56} \sin(\omega t)$ then what will be the RMS current

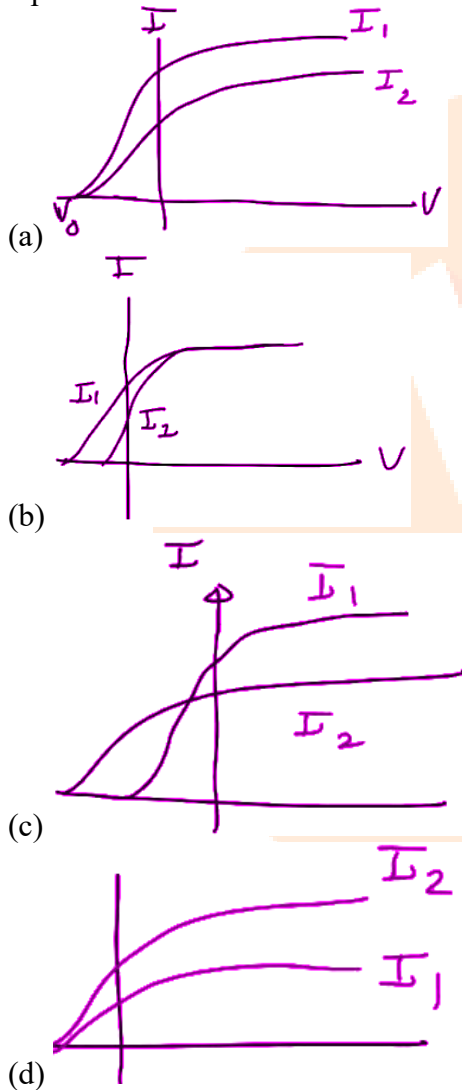
Options:

- (a) 64
- (b) 8
- (c) 32
- (d) $\sqrt{28}$

Answer: (b)

Question: Which of the following graph of correctly represent effect of increase in intensity ($I_2 > I_1$) of light falling on a metal in photoelectric effect.

Options:



Answer: (d)

Question: An electron is thrown inside the solenoid, parallel to the axis of the solenoid, with some velocity. Then the velocity of electron will

Options:

- (a) Increase
- (b) Decrease
- (c) Remains unchanged
- (d) Path will be circular with uniform speed

Answer: (c)

Question: Magnitude of current is zero when voltage is maximum when the load has

- A. Pure inductor
- B. Pure capacitor
- C. Pure resistance
- D. Combination of inductor and capacitor

Options:

- (a) A, B, C
- (b) A, B, D
- (c) A, C D
- (d) B C D

Answer: (b)

Question: For a particle in motion in a plane, x and y coordinates can be expressed as

$\begin{cases} x = 2 + 4t \\ y = 3 + 8t^2 \end{cases}$ Where x, y is in meter and t is in second which of the following is false

Options:

- (a) Uniform accelerated motion
- (b) Constant velocity along x
- (c) Parabolic trajectory
- (d) Particle will pass through origin

Answer: (d)

Question: Find out the electric field at the centre of a hollow hemisphere with the surface charge density σ on the sphere

Options:

- (a) $\frac{\sigma}{\epsilon_0}$
- (b) $\frac{\sigma}{2\epsilon_0}$
- (c) $\frac{\sigma}{3\epsilon_0}$
- (d) $\frac{\sigma}{4\epsilon_0}$

Answer: (d)

Question: A solid Sphere and Solid Cylinder are rolled on an inclined plane with same initial speed v. Find the ratio of their respective vertical heights they will reach

Options:

- (a) 15/14
- (b) 14/15
- (c) 7/15
- (d) 15/7

Answer: (b)

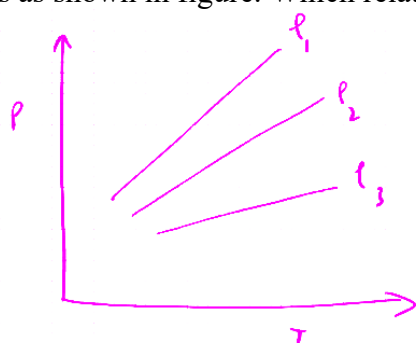
Question: If a bubble of radius 7 cm requires 36960 ergs of work to increase its size then find the new radius surface tension is $s = 40$ dynes / cm & $\pi = \frac{22}{7}$

Options:

- (a) 9.3 cm
- (b) 12.3 cm
- (c) 14.3 cm
- (d) 17.3 cm

Answer: (a)

Question: Pressure versus temperature graphs of ideal gases having equal volume and moles is as shown in figure. Which relation of densities of the gases will be correct?



Options:

- (a) $\rho_1 > \rho_2$
- (b) $\rho_3 > \rho_2$
- (c) $\rho_2 > \rho_1$
- (d) $\rho_1 = \rho_2 = \rho_3$

Answer: (a)

Question: If the electric field vector at a point in an electromagnetic wave is given by

$$\vec{E} = 40 \cos \omega \left(t - \frac{Z}{C} \right) \hat{i}, \text{ Then corresponding } \vec{B} \text{ will be}$$

Options:

- (a) $\vec{B} = \frac{40}{3} \times 10^{-8} \cos \omega \left(t - \frac{Z}{C} \right) \hat{j}$
- (b) $\vec{B} = \frac{40}{3} \times 10^{-8} \cos \omega \left(t - \frac{Z}{C} \right) \hat{k}$
- (c) $\vec{B} = \frac{40}{3} \times 10^{-8} \cos \omega \left(t - \frac{Z}{C} \right) (\hat{j} + \hat{k})$
- (d) $\vec{B} = \frac{40}{3} \times 10^{-8} \cos \omega \left(t - \frac{Z}{C} \right) (\hat{j} - \hat{k})$

Answer: (a)

Question: Two Forces F_1 and F_2 having relation in magnitude as $F_1 = 3F_2$ the resultant of F_1 & F_2 has magnitude equal to F_1 Find the angle between the forces $\theta = \cos^{-1}(-1/n)$

Options:

Answer: (6)

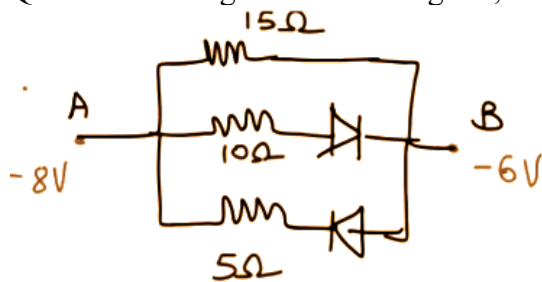
Question: If the m^{th} maximum of $\lambda_1 = 450 \text{ nm}$ coincides with n^{th} maximum of $\lambda_2 = 650 \text{ nm}$, then find the minimum possible value of m ($m \neq 0$)

Options:

- (a) 9
- (b) 13
- (c) 7
- (d) 11

Answer: (b)

Question: From given circuit diagram, find equivalent resistance between AB.



Options:

- (a) 0.75Ω
- (b) 4Ω
- (c) 2.5Ω
- (d) 3.75Ω

Answer: (d)

Question: An infinite charged sheet is kept in X - Y plane where surface charge density is $+\sigma$ & an infinite long charged wire with linear charge density $+\lambda$ is kept at $Z = 4$. The ratio of the electric field due to sheet and wire at $(0, 0, 2)$ in form $n\pi$. Find n given ,

$$|\sigma| = 2|\lambda|$$

Options:

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

Answer: (d)

Question: If a particle moving at constant acceleration travels 102.5 m in n^{th} second and 115 m in $(n + 2)^{\text{th}}$ second, then its acceleration is:

Options:

- (a) 6.25
- (b) 12.5
- (c) 25
- (d) 3.12

Answer: (a)

Question: If body initially at rest was pushed with a force which increase linearly with time what is acceleration vs time graph

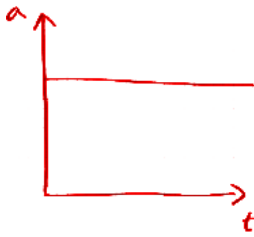
Options:



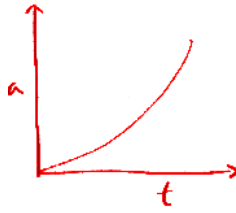
(a)



(b)



(c)



(d)

Answer: (b)

Question: Resistance of a platinum wire at ice point and steam point is 8Ω and 10Ω respectively. Find its resistance when the temperature of wire is raised to 400°C

Options:

(a) 10Ω

(b) 16Ω

(c) 20Ω

(d) 30Ω

Answer: (b)