AAYAM

CAREER INSTITUTE

NEET 2023

VIDEO SOLUTION

Question no. 41

The radius of inner most orbit of hydrogen atom is 5.3×10^{-11} m. What is the radius of third allowed orbit of hydrogen atom ?

$r \propto n^2$

5.3×10^{-11} m

$5.3\times10^{-1}\times10^{-10}$ m

0.53 Å

$r = 0.53\left(\frac{n^2}{Z}\right)$ Å

$= 0.53\times9$ Å

(1) 1.59 Å

(2) 4.77 Å

(3) 0.53 Å

(4) 1.06 Å

Question no. 42

Calculate the maximum acceleration of a moving car so that a body lying on the floor of the car remains stationary. The coefficient of static friction beteween the body and the floor is 0.15 ($g = 10\ ms^{-2}$).

$\mu mg = ma$

$a = \mu g$

$= 0.15 \times 10$

$= 1.5 m/s^2$

(1) $1.5\ ms^{-2}$ (2) $50\ ms^{-2}$

(3) $1.2\ ms^{-2}$ (4) $150\ ms^{-2}$

Question no. 43

A satellite is orbitting just above the surface of the earth with period T. If d is the density of the earth and G is the universal cosntant of gravitation, the quantity $\frac{3\pi}{Gd}$ represents :

(1) T_3 (2) $\sqrt{T}$

(3) T (4) T^2

$T = \frac{2\pi R}{V}$ $V = \sqrt{\frac{GM}{R}}$

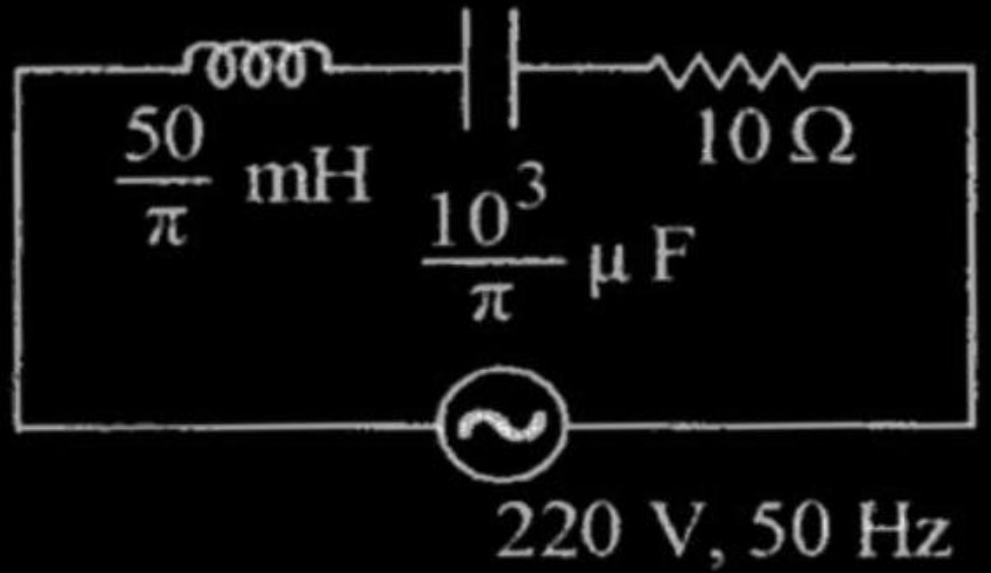
$T = \frac{2\pi R R^{1/2}}{\sqrt{GM}}$

$T = \frac{2\pi R^{3/2}}{\sqrt{GM}}$

$T^2 = \frac{4\pi^2 R^3}{G \cdot \frac{4}{3}\pi R^3 \cdot d} \Rightarrow T^2 = \frac{3\pi}{Gd}$

Question no. 44

The net impedance of circuit (as shown in figure) will be :



$|Z| = \sqrt{R^2 + (S)^2}$

$X_L = 2\pi f L = 2\pi \times 50 \times \frac{50}{\pi} \times 10^{-3} H$

$= 2 \times 2 \times 100 \times 10^{-3}$

$= 5 H$

$X_C = \frac{1}{2\pi f C} = \frac{1}{2 \times \pi \times 50 \times \frac{10^3}{\pi} \times 10^{-6}}$

$= \frac{1}{100 \times 10^3 \times 10^{-6}}$

$= \frac{1}{10^{-1}} = 10 f$

$= \sqrt{100 + 25}$

$= \sqrt{125} = 5\sqrt{5}\Omega$

(1) $5\sqrt{5}\ \Omega$ (2) $25\ \Omega$

(3) $10\sqrt{2}\ \Omega$ (4) $15\ \Omega$

Question no. 45

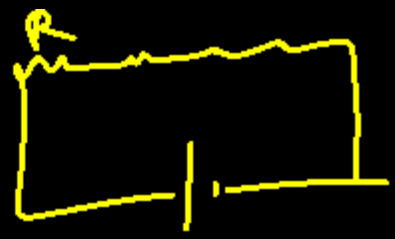
10 resistors, each of resistance R are connected in series to a battery of emF E and negligible internal resistance. Then those are connected in parallel to the same battery, the current is increased n times. The value of n is

(1) 1

(2) 1000

(3) 10

(4) 100



$$I_S = \frac{E}{10R} \times (100)$$

$$I_P = \frac{E}{R/10} = \frac{10E}{R}$$

Question no. 46

A horizontal bridge is built across a river. A student on the bridge throws a small ball vertically upwards with a velocity 4 ms^{-1}. The ball strikes the water surface water after 4s. The height of bridge above water surface is (Take g = 10 ms^{-2}) :

(1) 64 m (2) 68 m

(3) 56 m (4) 60 m

$S = ut + \frac{1}{2}at^2$

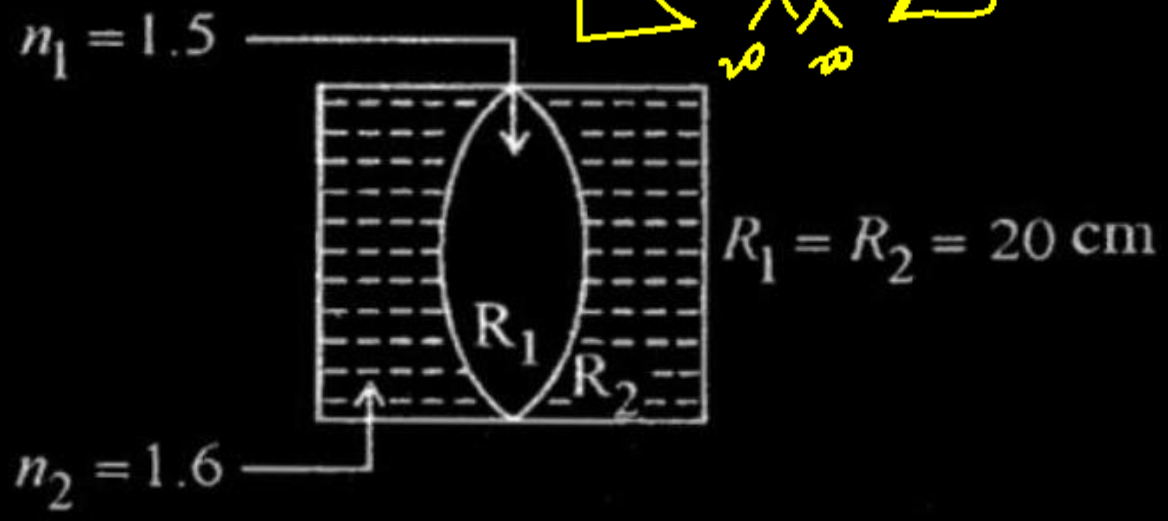
$-H = (4 \times 4) + \frac{1}{2}(-10) \cdot 4^2$

$-H = 16 - 80$

$H = 64$

Question no. 47

In the figure shown here, what is the equivalent focal length of the combination of lenses (Assume that all layers are thin) ?



$$\frac{1}{f} = (\mu - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$$\frac{1}{f} = -\frac{3}{100} + \frac{+5}{100} - \frac{3}{100}$$

$$\frac{1}{f} = \frac{-1}{100}$$

(1) –100 cm (2) –50 cm

(3) 40 cm (4) –40 cm

Question no. 48

A wire carrying a current I along the positive x–axis has length L. It is kept in magnetic field $\vec{B} = (2\hat{i} + 3\hat{j} - 4\hat{k})T$. The magnitude of the magnetic force acting on the wire is :

(1) 5 IL

(2) $\sqrt{3}$ IL

(3) 5 IL

(4) $\sqrt{5}$ IL

$f = I(L \times B)$

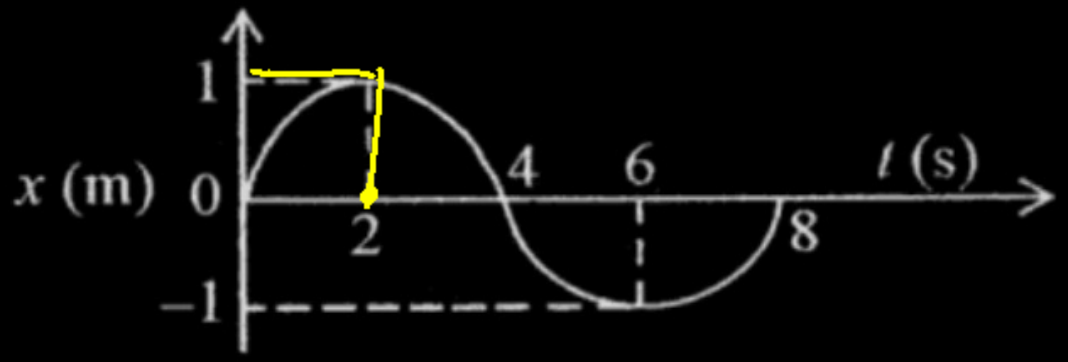
$I\left(L\hat{i} \times (2\hat{i} + 3\hat{j} - 4\hat{k})\right)$

$I\sqrt{9+16}$

5

Question no. 49

The x–t graph of a particle performing simple harmonic motion is shown in the figure. The acceleration of the particle at t = 2 s is :



$a = -\omega^2 A$

$= -\left(\frac{2\pi}{8}\right)^2 1$

$= -\frac{4\pi^2}{64} = -\frac{\pi^2}{16}$

(1) $\frac{\pi^2}{16}\,ms^{-2}$

(2) $-\frac{\pi^2}{16}\,ms^{-2}$

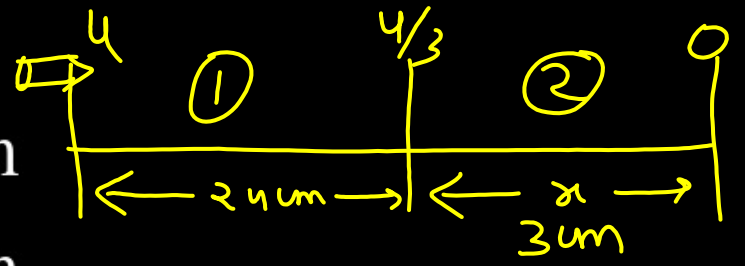
(3) $\frac{\pi^2}{8}\,ms^{-2}$

(4) $-\frac{\pi^2}{8}\,ms^{-2}$

Question no. 50

A bullet from a gun is fired on a rectangular wooden block with velocity u. When bullet travels 24 cm through the block along its length horizontally, velocity of bullet becomes $\frac{u}{3}$. Then it further penetrates into the block in the same direction before coming to rest exactly at the other end of the block. The total length of the block is :

(1) 28 cm (24+3)
(2) 30 cm
(3) 27 cm
(4) 24 cm



$V^2 = u^2 + 2as$

$\left(\frac{u}{3}\right)^2 = u^2 + 2(-a)s$

$2as = u^2 - \frac{u^2}{9}$ — ①

$0^2 = \left(\frac{u}{3}\right)^2 + 2\cdot(-a)x$

$2ax = \frac{u^2}{9}$ — ②

$\frac{s}{x} = \frac{8/9u^2}{u^2/9}$

$\frac{s}{x} = 8$

$x = \frac{s}{8}$