JEE Main April 2026

Question Paper With Text Solution

08 April | Shift-2

PHYSICS

MATRIX

JEE Main & Advanced | XI-XII Foundation| VI-X Pre-Foundation

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JEE MAIN APRIL 2026 | 08 APRIL SHIFT-2

SECTION – A

Question ID : 691121551

26. A new unit (α) of length is chosen such that it is equal to the speed of light in vacuum. What is the distance between Venus and Earth in terms of α units if light takes 6 min. 40 s to cover this distance?

(1) 200 α (2) 400 α

(3) 300 α (4) 500 α

Ans. (2)

Sol. Time taken = 6 min 40 s

= 400 s

Distance = speed × time

= (c) × (400)

= 400 α

Question ID : 691121552

27. Consider the equation $H = \frac{x^p \epsilon^q E^r}{t^s}$, Where H = magnetic field; E= electric field, $\epsilon =$ permittivity, x= distance, t = time. The values of p, q, r and s respectively are :

(1) 1,1,1,1 (2) –1,1,2,1

(3) 1, –1, –2, 1 (4) –1, –2, –2,1

Ans. (1)

Sol. Formula used :

$B = \mu_0 H = \mu_0 ni$

$E = F/q$

$$F = \frac{1}{4\pi\varepsilon_0}\frac{q^2}{r^2}$$

$[x] = [L], [t] = [T]$

$[H] = [L^{-1}A], [E] = [MLT^{-3}A^{-1}]$

$[\varepsilon] = [M^{-1}L^{-3}T^4A^2]$

$$\left[L^{-1}A\right] = \frac{\left[L^P\right].\left[M^{-1}L^{-3}T^4A^2\right]^q.\left[MLT^{-3}A^{-1}\right]^r}{\left[T^s\right]}$$

$\Rightarrow [L^{-1}A] = [M^{-q+r}].[L^{P-3q+r}].[T^{4q-3r-s}].[A^{2q-r}]$

Compare and solve : P = 1, q = 1, r = 1, s = 1

Question ID : 691121553

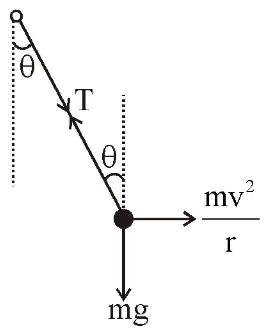
28. A car moving with a speed of 54 km/h takes a turn of radius 20 m . A simple pendulum is suspended from the ceiling of the car. Determine the angle made by the string of the pendulum with the vertical during the turning. (Take g =10 m/s^2)

(1) $\tan^{-1}(0.5)$ (2) $\tan^{-1}(0.75)$

(3) $\tan^{-1}(1,125)$ (4) $\tan^{-1}(0,25)$

Ans. (3)

Sol. Free body diagram of the pendulum :



Speed of the car $\Rightarrow$ v = 54 km/h = 15 m/s

$T\sin\theta = \frac{mv^2}{r}$

$T\cos\theta = mg$

$\Rightarrow \tan\theta = \frac{v^2}{gr}$

$\Rightarrow \tan\theta = \frac{225}{200} = 1.125$

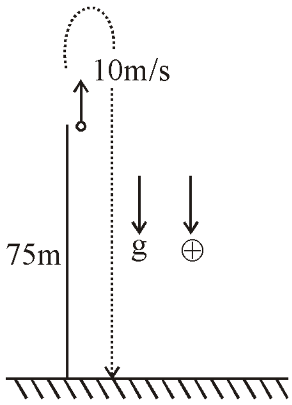
Question ID : 691121554

29. A gas balloon is going up with a constant velocity of 10 m/s. When this balloon reached a height of 75 m , a stone is dropped from it and balloon keeps moving up with the same velocity. The height of the balloon when the stone hits the ground is ________ m. (Take g=10 m/s^2)

(1) 85 (2) 150

(3) 129 (4) 125

Ans. (4)

Sol. 

At t = 0,

→ u = 10 m/s (upwards)

→ h = 75 m

→ g = 10 m/s^2 (downwards)

Time taken to hit the ground :

$\Rightarrow 75 = -10t + \frac{1}{2}(10)t^2$

$\Rightarrow t^2 - 2t - 15 = 0$

$\Rightarrow t = 5s, t = -3s$

Height of the ballon at t = 5s

$\rightarrow 75 + (10 \times 5) = 125$ m

Question ID : 691121555

30. A thin biconvex lens is prepared from the glass (μ=1.5) both curved surfaces of which have equal radii of 20 cm each. Left side surface of the lens is silvered from outside to make it reflecting. To have the position of image and object at the same place, the object should be placed, from the lens at a distance of ________ cm.

(1) 10 (2) 12.5

(3) 13 (4) 13.5

Ans. (1)

Sol. Focal length of the lens $\Rightarrow \frac{1}{f_l} = (1.5-1)\left(\frac{1}{R}+\frac{1}{R}\right) = \frac{1}{R} = \frac{1}{20}$

Focal length of mirrored surface $\Rightarrow f_m = -\frac{R}{2} = -10$

The equivalent system will behave like a mirror :

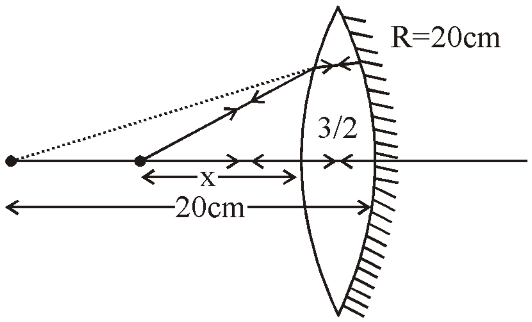
$\frac{1}{f_{eq}} = \frac{1}{f_m} - \frac{2}{f_\ell} = \frac{1}{-10} - \frac{2}{20} = -\frac{1}{5}$

$\Rightarrow$ Equivalent focal length $\Rightarrow$ 5 cm, concave mirror

If we keep be at the centre of curvature and the image will be formed on the object ltself.

$\Rightarrow x = 2(5) = 10$ cm

Alternate solution :



$$\frac{3/2}{V} - \frac{1}{u} = \frac{3/2-1}{R}$$

$$\Rightarrow \frac{3/2}{-20} - \frac{1}{-x} = \frac{1/2}{20}$$

$$\Rightarrow \frac{1}{x} = \frac{1}{10} \Rightarrow x = 10\text{cm}$$

Question ID : 691121556

31. Two identical bodies, projected with the same speed at two different angles cover the same horizontal range R. If the time of flight of these bodies are 5 s and 10 s , respectively, then the value of R is _______ m. (Take g = 10 m/s^2)

(1) 250 (2) 25

(3) 500 (4) 125

Ans. (1)

Sol. For complimentary angles of projection, the range is same.

$$T_1 = \frac{2u\sin\theta}{g} = 5 \Rightarrow u\sin\theta = 25\,\text{m/s}$$

$$T_2 = \frac{2u\cos\theta}{g} = 10 \Rightarrow u\cos\theta = 50\,\text{m/s}$$

$$\Rightarrow \tan\theta = \frac{1}{2} \Rightarrow \sin\theta = \frac{1}{\sqrt{5}}, \cos\theta = \frac{2}{\sqrt{5}}$$

$$\Rightarrow R = \frac{u^2\sin 2\theta}{g} = \frac{2(u\sin\theta)(u\cos\theta)}{g} = \frac{2\times25\times50}{10} = 250\,\text{m}$$

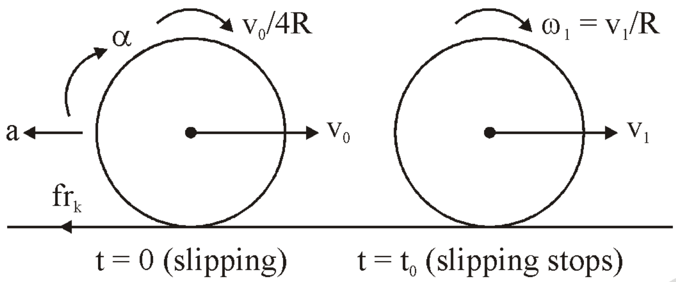
Question ID : 691121557

32. A solid cylinder having radius R and length L is slipping on a rough horizontal plane. At time t = 0 the cylinder has a translational velocity $v_0 = 49$ m/s, perpendicular to its axis and a rotational velocity $v_0/4R$ about the centre. The time taken by the cylinder to start rolling is _______ seconds. (coefficient of kinetic friction $\mu_K = 0.25$ and $g = 9.8\,m/s^2$)

(1) 15 (2) 5
(3) 10 (4) 7.5

Ans. (2)

Sol.



$\rightarrow fr_k = -ma \Rightarrow \mu mg = -ma \Rightarrow a = -\mu g$

$\rightarrow \tau = fr_k R$

$\Rightarrow I\alpha = \mu mgR$

$\Rightarrow \frac{mR^2}{2}\alpha = \mu mgR$

$\Rightarrow \alpha = \frac{2\mu g}{R}$

$\rightarrow v_1 = v_0 - at$

$\rightarrow \omega_1 = \omega_0 + \alpha t$

$= \frac{v_0}{4R} + \frac{2\mu gt}{R}$

$\rightarrow v_1 = \omega_1 R$ at the time of slipping

$\Rightarrow v_0 - \mu gt = \frac{v_0}{4} + 2\mu gt$

$\Rightarrow 3\mu gt = \frac{3v_0}{4}$

$\Rightarrow t = \frac{v_0}{4\mu g} = 5$

Question ID : 691121558

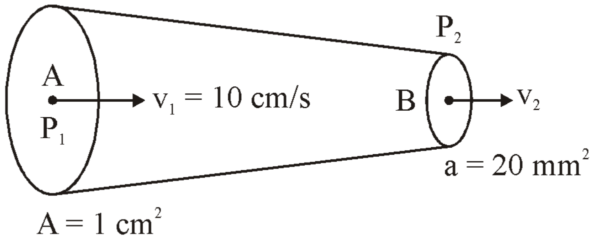
33. A liquid of density $600\,\text{kg}/\text{m}^3$ flowing steadily in a tube of varying cross-section. The cross-section at a point A is 1.0cm^2 and that at B is 20 mm^2. Both the points A and B are in same horizontal plane, the speed of the liquid at A is 10 cm/s. The difference in pressures at A and B points is ________ Pa.

(1) 18 (2) 144

(3) 36 (4) 72

Ans. (4)

Sol.



Equation of continuity $\Rightarrow Av_1 = av_2$

$\Rightarrow (100\text{ mm}^2)\,v_1 = (20\text{ mm}^2)\,v_2$

$\Rightarrow v_2 = 5v_1$

$\Rightarrow v_2 = 50\text{ cm/s}$

Bernoulli's theoreum :

$$\rightarrow P_1 + \frac{1}{2}\rho v_1^2 = P_2 + \frac{1}{2}\rho v_2^2$$

$$\Rightarrow P_1 - P_2 = \frac{1}{2}\rho(50^2 - 10^2)\times 10^{-4}$$

$$\Rightarrow \Delta P = \frac{1}{2}\times 600\times 2400\times 10^{-4}$$

$= 72\text{ Pa}$

Question ID : 691121559

34. A spherical liquid drop of radius R acquires the terminal velocity v_1 when falls through a gas of viscosity η. Now the drop is broken into 64 identical droplets and each droplet acquires terminal velocity v_2 falling through the same gas. The ratio of terminal velocities v_1/v_2 is ________ .

(1) 4 (2) 0.25

(3) 32 (4) 16

Ans. (4)

Sol. One big drop = 64 small drops

$\Rightarrow \frac{4}{3}\pi R^3 = 64\left(\frac{4}{3}\pi r^3\right)$

$\Rightarrow R = 4r$

Terminal velocity $\Rightarrow v_t = \frac{2}{9}\frac{(\sigma - \rho)r^2 g}{\eta}$

$\Rightarrow v_t \propto r^2$

$\Rightarrow \frac{v_1}{v_2} = \frac{R^2}{r^2} \Rightarrow \frac{v_1}{v_2} = (4)^2 = 16$

Question ID : 691121560

35. One mole of diatomic gas having rotational modes only is kept in a cylinder with a piston system. The cross-section area of the cylinder is $4 cm^2$. The gas is heated slowly to raise the temperature by 1.2°C during which the piston moves by 25 mm . The amount of heat supplied to the gas is ________ J.

(Atmospheric pressure = 100 kPa, R=8.3 J/mol. K (Neglect mass of the piston)

(1) 24.8
(2) 25
(3) 15.04
(4) 29.98

Ans. (Bonus)

Sol. Bonus

Question ID : 691121561

36. Initial pressure and volume of a monoatomic ideal gas are P and V. The change in internal energy of this gas in adiabatic expansion to volume $V_{final} = 27V$ is ________ J.

(1) $-2PV(3\sqrt{3}-1)$
(2) $\frac{4}{3}PV$
(3) $-\frac{4}{3}PV$
(4) $\frac{3}{4}PV$

Ans. (3)

Sol. $\gamma = 1 + \frac{2}{3} = \frac{5}{3}$

$P_1V_1^{\gamma} = P_2V_2^{\gamma}$

$\Rightarrow PV^{\gamma} = P_2(27V)^{\gamma}$

$\Rightarrow P_2 = \frac{P}{(27)^{\frac{5}{3}}} = \frac{P}{243}$

$\Delta U = nC_V\,\Delta T$

$= n\frac{3R}{2}\Delta T$

$= \frac{3}{2}(nRT_2 - nRT_1)$

$= \frac{3}{2}(P_2V_2 - P_1V_1)$

$= \frac{3}{2}\left(\frac{P.27V}{243} - PV\right)$

$= \frac{3}{2}PV\left(-\frac{8}{9}\right)$

$= -\frac{4PV}{3}$

Question ID : 691121562

37. The frequency of oscillation of a mass m suspended by a spring is v_1. If the length of the spring is cut to half, the same mass oscillates with frequency v_2. The value of v_2/v_1 is ______.

(1) 1
(2) 2
(3) $\sqrt{2}$
(4) $\sqrt{3}$

Ans. (3)

Sol. For spring, $k \propto \frac{1}{\ell}$

$\Rightarrow 2k \propto \frac{1}{\left(\frac{\ell}{2}\right)}$

$v_1 = \frac{1}{2\pi}\sqrt{\frac{k}{m}}$

$v_2 = \frac{1}{2\pi}\sqrt{\frac{2k}{m}}$

$\frac{v_2}{v_1} = \sqrt{2}$

Question ID : 691121563

38. A monochromatic source of light operating at 15 kW emits 2.5×10^{22} photons/s. The region of an electromagnetic spectrum to which the emitted electromagnetic radiation belongs to ______ .

(Take $h = 6.6\times10^{-34}$ J.s and $c = 3\times10^{8}$ m / s).

(1) Microwave
(2) Infrared
(3) Visible
(4) Ultraviolet

Ans. (4)

Sol. $\text{Power} = \dfrac{\text{Energy}}{\text{time}}$

$$\Rightarrow P = \frac{N\left(\frac{hc}{\lambda}\right)}{\Delta t}$$

$$\Rightarrow \lambda = \left(\frac{N}{\Delta t}\right).\frac{hc}{P}$$

$$\frac{N}{\Delta t} = 2.5\times10^{22}$$

$$\lambda = \frac{(2.5\times10^{22}).(6.6\times10^{-34})\times(3\times10^{8})}{15\times10^{3}}$$

$\Rightarrow \lambda = 330$ nm $\Rightarrow$ ultravoilet

Question ID : 691121564

39. A current carrying circular loop of radius 2 cm with unit normal $\hat{n} = \dfrac{\hat{k}+\hat{i}}{\sqrt{2}}$ is placed in a magnetic field, $\vec{B} = B_o(3\hat{i}+2\hat{k})$. If $B_o = 4\times10^{-3}$ T and current $I = 100\sqrt{2}$ A, the torque experienced by the loop is ______ Wb.A. ($\pi = 3.14$)

(1) $16\times10^{-5}\hat{k}$
(2) $5024\times10^{-7}\hat{k}$
(3) $5024\times10^{-7}\hat{i}$
(4) $5024\times10^{-7}\hat{j}$

Ans. (4)

Sol. $\vec{\tau} = \vec{M}\times\vec{B}$

$$\vec{M} = Ni\vec{A} = (1)\left(100\sqrt{2}\right)\left(\frac{\hat{i}+\hat{k}}{\sqrt{2}}\right).\pi(2\times10^{-2})^2$$

$$\vec{B} = B_0\left(3\hat{i}+2\hat{k}\right)$$

$\vec{\tau} = 5024 \times 10^{-7}\hat{j}$

Question ID : 691121565

40. A 30 cm long solenoid has 10 turns per cm and area of 5 cm^2. The current through the solenoid coil varies from 2 A to 4 A in 3.14 s . The e.m.f. induced in the coil is $\alpha \times 10^{-5}$ V . The value α is ________ .

(1) 60
(2) 12
(3) 120
(4) 34

Ans. (2)

Sol. Self inductance = $\mu_0 n^2 (Al)$

$n = 1000$ turns/m

$A = 5 \times 10^{-4}\ m^2,\ l = 0.3$ m

$\rightarrow L = (4\pi \times 10^{-7}) \cdot (1000)^2 \cdot (5 \times 10^{-4}) \cdot (0.3)$

$= 6\pi \times 10^{-5}$ H

$\rightarrow EMF = L\dfrac{\Delta i}{\Delta t} = (6\pi \times 10^{-5}) \cdot \dfrac{(4-2)}{\pi}$

$= 12 \times 10^{-5}$ V

Question ID : 691121566

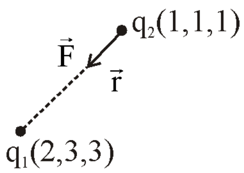
41. Two point charges $q_1 = 3\mu C$ and $q_2 = -4\mu C$ are placed at points $(2\hat{i} + 3\hat{j} + 3\hat{k})$ and $(\hat{i} + \hat{j} + \hat{k})$ respectively. Force on charge q_2 is _______ N.

$\left(\text{Take SI } \dfrac{1}{4\pi\varepsilon_0} = 9 \times 10^9 \text{ SI Units}\right)$

(1) $(12\hat{i} + 24\hat{j} + 24\hat{k}) \times 10^{-3}$
(2) $(4\hat{i} + 8\hat{j} + 8\hat{k}) \times 10^{-3}$
(3) $(3\hat{i} + 6\hat{j} + 6\hat{k}) \times 10^{-3}$
(4) $(-4\hat{i} - 8\hat{j} - 8\hat{k}) \times 10^{-3}$

Ans. (2)

Sol.



$\vec{r} = (2-1)\hat{i} + (3-1)\hat{j} + (3-1)\hat{k}$

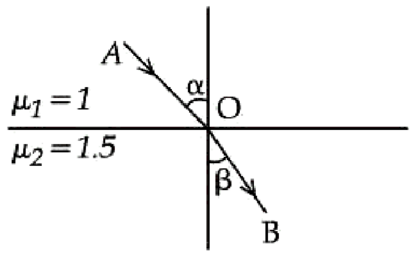
$= \hat{i} + 2\hat{j} + 2\hat{k}$

$$\vec{F} = \left(\frac{k|q_1q_2|}{r^3}\right)\vec{r} = \frac{(9 \times 10^9).|3 \times 10^{-6} \times -4 \times 10^{-6}|}{\left(\sqrt{1+4+4}\right)^3}.(\hat{i} + 2\hat{j} + 2\hat{k})$$

$= (4\hat{i} + 8\hat{j} + 8\hat{k}) \times 10^{-3}$ N

Question ID : 691121567

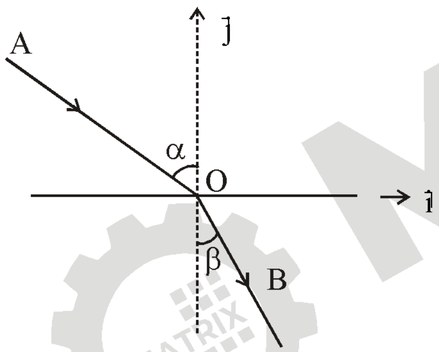
42. Light ray incident along a vector $\overrightarrow{AO}(\overrightarrow{AO} = 2\hat{i} - 3\hat{j})$ emerges out along vector $\overrightarrow{OB}(\overrightarrow{OB} = C\hat{i} - 4\hat{j})$ as shown in the figure below. The value of C is ________ .



(1) 1.6
(2) 0.16
(3) 11.6
(4) 16

Ans. (1)

Sol.



$\vec{A} = 2\hat{i} - 3\hat{j}$

$\vec{B} = c\hat{i} - 4\hat{j}$

$$\cos\alpha = \frac{\vec{A}.-\hat{j}}{|\vec{A}|}$$

$$= \frac{3}{\sqrt{13}}$$

Similarly,

$$\cos\beta = \frac{4}{\sqrt{c^2+16}}$$

$$\Rightarrow \sin\alpha = \frac{2}{\sqrt{13}}, \qquad \sin\beta = \frac{c}{\sqrt{c^2+16}}$$

$$\Rightarrow \text{Snell's law} \Rightarrow 1\sin\alpha = 1.5\sin\beta$$

$\Rightarrow \frac{2}{\sqrt{13}} = \frac{3}{2}\frac{c}{\sqrt{c^2+16}}$

$\Rightarrow c = 1.6$

Question ID : 691121568

43. K_1 and K_2 be the maximum kinetic energies of photoelectrons emitted from a surface of a given material for the light of wavelength λ_1 and λ_2, respectively. If $\lambda_1 = 2\lambda_2$ then the work function of material is given by :

(1) $K_2 + 2K_1$ (2) $2K_2 - 2K_1$

(3) $K_1 - 2K_2$ (4) $K_2 - 2K_1$

Ans. (4)

Sol. $\frac{hc}{\lambda_1} - \phi = K_1 \Rightarrow \lambda_1 = \frac{hc}{K_1+\phi}$

$\frac{hc}{\lambda_2} - \phi = K_2 \Rightarrow \lambda_2 = \frac{hc}{K_2+\phi}$

$\rightarrow \frac{hc}{K_1+\phi} = 2\left(\frac{hc}{K_2+\phi}\right)$

$\Rightarrow K_2 + \phi = 2K_1 + 2\phi$

$\Rightarrow \phi = K_2 - 2K_1$

Question ID : 691121569

44. Two radioactive substances A and B of mass numbers 200 and 212 respectively, shows spontaneous α-decay with same Q value of 1 MeV . The ratio of energies of α-rays produced by A and B is

(1) $\frac{2548}{2650}$ (2) $\frac{2706}{2646}$

(3) $\frac{2597}{2600}$ (4) $\frac{2862}{2499}$

Ans. (3)

Sol. $\underset{\text{rest}}{\overset{A}{X}} \rightarrow \underset{m=(A-4)m_P}{\overset{A-4}{Y}} + \underset{m=4m_P}{\alpha - \text{particle}}$

$\rightarrow$ Momentum conservation

$\Rightarrow (A-4)V_1 = (4)V_2$

$\Rightarrow \frac{V_1}{V_2} = \frac{4}{A-4}$

$\rightarrow K_\alpha + K_\gamma = Q$

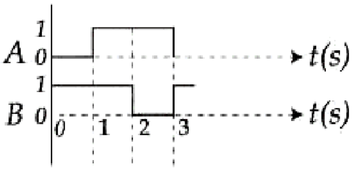
$$\Rightarrow K_\alpha = Q\left(\frac{A-4}{A}\right)$$

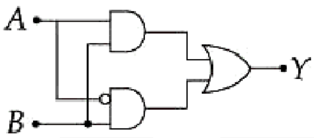
$\rightarrow Q = 1$ MeV for both

$$\rightarrow \frac{K_{\alpha_1}}{K_{\alpha_2}} = \frac{1.\left(\frac{200-4}{200}\right)}{1.\left(\frac{212-4}{212}\right)} = \frac{2597}{2600}$$

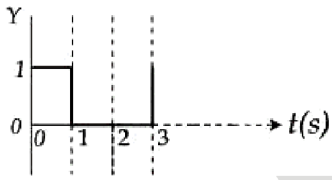
Question ID : 691121570

45. The output Y for the given inputs A and B to the circuit is :





(1)



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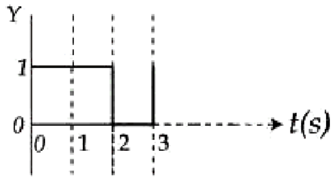

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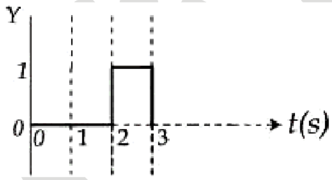

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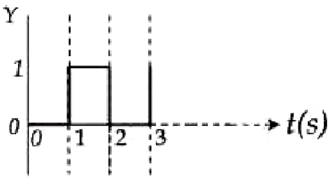
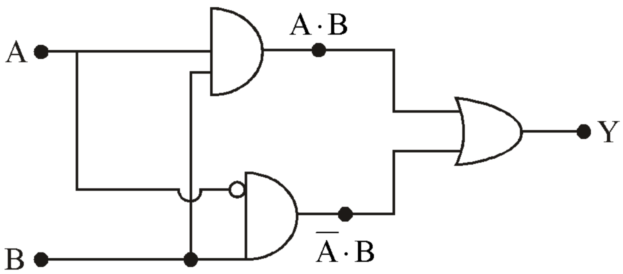


Ans. (2)

Sol.



$$Y = (A \cdot B) + (\overline{A} \cdot B)$$

$$= (A + \overline{A}) \cdot B$$

$= 1 \cdot B = B$

output has same wave form $\Rightarrow$ B.

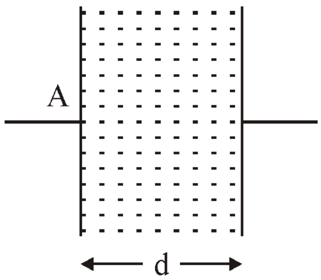
Question ID : 691121571

46. A parallel plate capacitor is having separation between plates 0.885 mm. It has a capacitance of $1\mu F$ when the space between the plates is filled with an insulating material of resistivity $1 \times 10^{13}\,\Omega m$ and resistance $17.7 \times 10^{14}\,\Omega$. Relative permittivity of the insulating material is $\alpha \times 10^{7}$. The value of α is ________.

(Take permittivity of free space = 8.85×10^{-12} F/m)

Ans. (2)

Sol.



$R = \rho \frac{d}{A}$

$\Rightarrow 17.7 \times 10^{14} = 10^{13} . \frac{d}{A}$

$\Rightarrow \frac{d}{A} = 177$

$C = \frac{k\varepsilon_0 A}{d}$

$\Rightarrow 10^{-6} = k.8.85 \times 10^{-12} . \frac{1}{177}$

$\Rightarrow k = 2 \times 10^{7}$

$\alpha = 2$

Question ID : 691121572

47. Some distant star is to be observed by some telescope of diameter of objective lens a, at an angular resolution of 3.0×10^{-7} radian. If the wavelength of light from the star reaching the telescope is 500 nm, the minimum diameter of the objective lens of the telescope is ______ cm. (nearest interger)

Ans. (220.3)

Sol. Angular resolution $\Rightarrow \theta = \frac{1.22\lambda}{a}$

$\theta = 3 \times 10^{-7}$ rad

$\lambda = 5 \times 10^{-7}$ m

$$a = \frac{1.22\lambda}{\theta} = \frac{1.22 \times 5 \times 10^{-7}}{3 \times 10^{-7}} = 2.033\,\text{m}$$

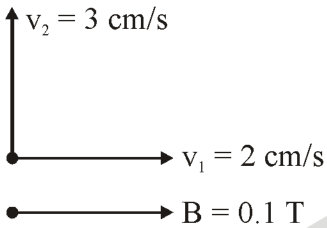
= 203.3 cm

Question ID : 691121573

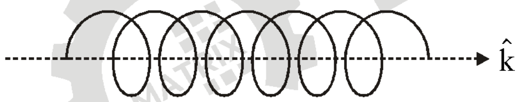
48. A 5 mg particle carrying a charge of $5\pi \times 10^{-6}$ C is moving with velocity of $(3\hat{i} + 2\hat{k}) \times 10^{-2}$ m/s in a region having magnetic field $\vec{B} = 0.1\hat{k}$ Wb/m^2. It moves a distance of α meter along $\hat{k}$ when it completes 5 revolutions. The value of α is __________ .

Ans. (2)

Sol.



$$T = \frac{2\pi m}{qB} = 20\,\text{s}$$



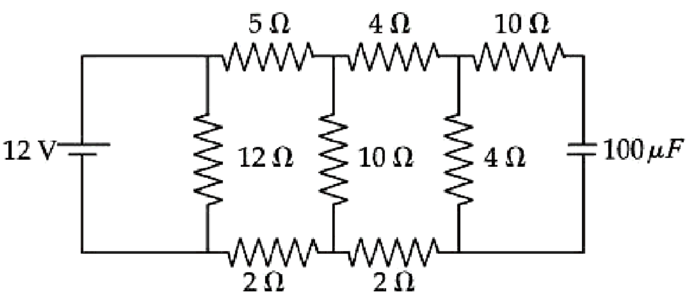
$\Delta l = \alpha = v_1(5T)$

= (2) (100) cm

= 2 m

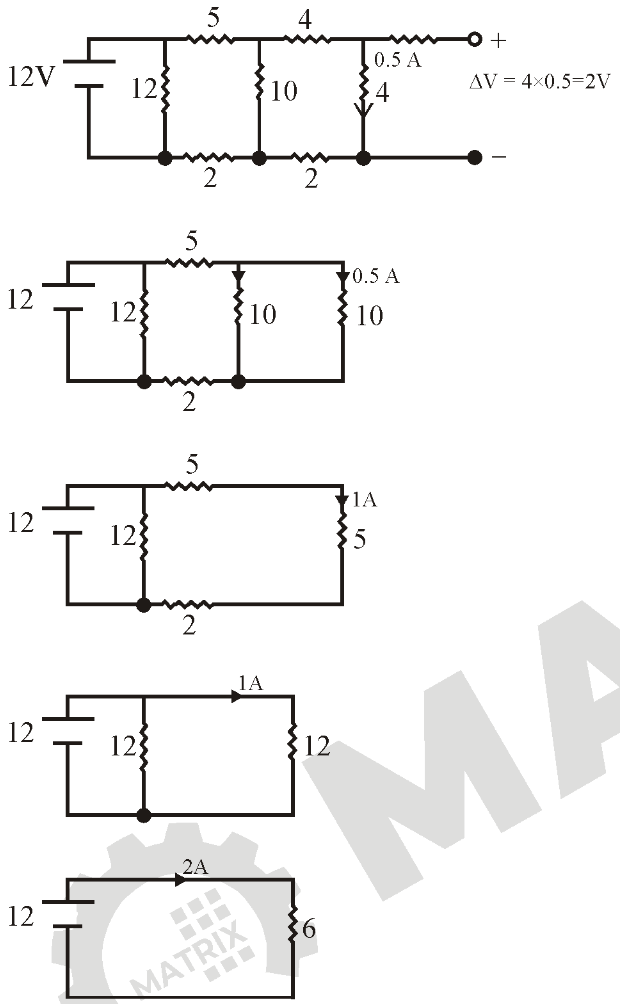
Question ID : 691121574

49. The stored charge in the capacitor in steady state of the following circuit is _______ μC .



Ans. (200)

Sol. In steady state, the capacitor behaves like a broken circuit.



$\Delta Q = c\Delta v = \left(100\times10^{-6}\right).(2) = 200\mu C$

Question ID : 691121575

50. Two masses of 3.4 kg and 2.5 kg are accelerated from an initial speed of 5 m/s and 12 m/s, respectively. The distances traversed by the masses in the 5th second are 104 m and 129 m , respectively. The ratio of their momenta after 10 s is $\frac{x}{8}$. The value of x is ________?

Ans. (9)

Sol. $S_n = u + \frac{a}{2}(2n-1)$

$104 = 5 + \frac{a_1}{2}(10-1) \Rightarrow \frac{a_1}{2} = 11 \Rightarrow a_1 = 22\,m/s^2$

$$129 = 12 + \frac{a_2}{2}(10-1) \Rightarrow \frac{a_2}{2} = 13 \Rightarrow a_2 = 26\,m/s^2$$

$$\rightarrow \text{ratio} = \frac{m_1 v_1}{m_2 v_2} = \left(\frac{3.4}{2.5}\right)\left(\frac{5+22(10)}{12+26(10)}\right) = \left(\frac{34}{25}\right).\frac{225}{272} = \frac{x}{8}$$

$$\Rightarrow x = 9$$