JEE Main January 2026

Question Paper With Text Solution

22 January | Shift-1

PHYSICS

MATRIX

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

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JEE MAIN JANUARY 2026 | 22 JANUARY SHIFT-1

SECTION – A

Question ID : 444792176

26. Match the List-I with List-II

List-I	List-II
A. Spring constant	I. $ML^2T^{-2}K^{-1}$
B. Thermal conductivity	II. ML^0T^{-2}
C. boltzmann constant	III. $ML^2T^{-3}A^{-2}$
D. Inductive reactance	IV. $MLT^{-3}K^{-1}$

Choose the correct answer from the options given below:

(1) A-I, B-IV, C-II, D-III (2) A-II, B-IV, C-I, D-III

(3) A-III, B-II, C-IV, D-I (4) A-II, B-I, C-IV, D-III

Ans. Official answer NTA (2)

Sol. (A) $[K]=\frac{[F]}{[x]}$ $[K] = M^1L^1T^{-3}K^{-1}$

(B) Thermal Conductivity as $= \frac{dQ}{dt} = KA\frac{dt}{dx}$

(C) Bolteman constant = $M^1L^2T^{-2}K^{-1}$

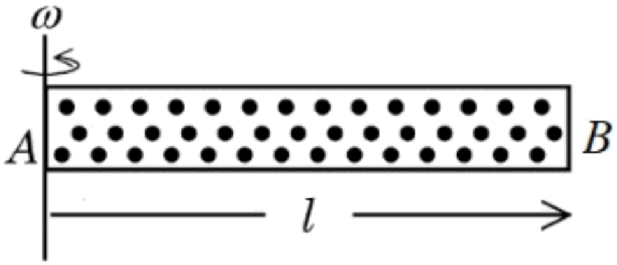
(D) Inductine Reactance $\Rightarrow x_L = \omega L$

$[x_L] = M^1L^2T^{-3}A^{-2}$

Question ID : 444792184

27. A cylindrical tube AB of length l, closed at both ends contains an ideal gas of 1 mole having molecular weight M. The tube is rotated in a horizontal plane with constant angular velocity ω about an axis perpendicular to AB and passing throught the edge at end A, as shown in the figure. If P_A and P_B are the pressures at A and B respectively, then

(Consider the temperature is same at all points in the tube)



(1) $P_B = P_A \exp(M\omega^2 l^2/RT)$ (2) $P_B = P_A \exp(M\omega^2 l^2/3RT)$

(3) $P_B = P_A \exp(M\omega^2 l^2/2RT)$ (4) $P_B = P_A$

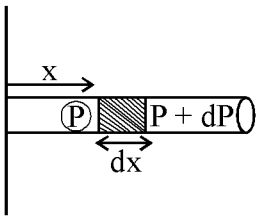
Ans. Official answer A (3)

Sol. Net force on element

$\Rightarrow dF = (P + dP)A - PA$

$\Rightarrow dPA = (dm) \times \omega^2$

$$\Rightarrow dP = \frac{dm}{A}\omega^2 x \quad \ldots.(1)$$



A = Area of crossection

$$\left.\begin{aligned} dm &= \delta A dx \\ PM &= \delta RT \end{aligned}\right\} \quad \ldots.(2)$$

from (1) & (2)

$$dP = \frac{PM}{RT}\omega^2 \times dx \quad \Rightarrow \int_{P_A}^{P_B}\frac{dP}{P} = \frac{M\omega^2}{RT}\int_0^L x dx \quad \Rightarrow \ln\left(\frac{P_B}{P_A}\right) = \frac{M\omega^2 L^2}{2RT} \quad \Rightarrow P_B = P_A e^{\left(\frac{M\omega^2 L^2}{2RT}\right)}$$

Question ID : 444792194

28. The minimum frequency of photon required to break a particle of mass 15.348 amu into 4 α particles is _____ kHz.

[mass of He nucleus = 4.002 amu, 1 amu = 1.66×10^{-27} kg, h = 6.6×10^{-34} J.s and c = 3×10^8 m/s]

(1) 9×10^{19} (2) 14.94×10^{20} (3) 9×10^{20} (4) 14.94×10^{19}

Ans. Official answer NTA (4)

Sol. $\Delta Q = \Delta mC^2 = h\nu$

$\Rightarrow h\nu = [4 \times 4.002 - 15.348] \times 1.66 \times 10^{-27} \times 9 \times 10^{16}$

$\Rightarrow \nu = 14.94 \times 10^{19}$ KHz

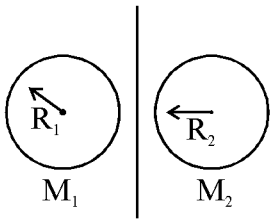
Question ID : 444792181

29. A solid sphere of mass 5 kg and radius 10 cm is kept in contact with another solid sphere of mass 10 kg and radius 20 cm. the moment of inertia of this pair of spheres about the tangent passing through the point of contact is _____ kg.m^2.

(1) 0.72 (2) 0.18 (3) 0.63 (4) 0.36

Ans. Official answer NTA (3)

Sol.



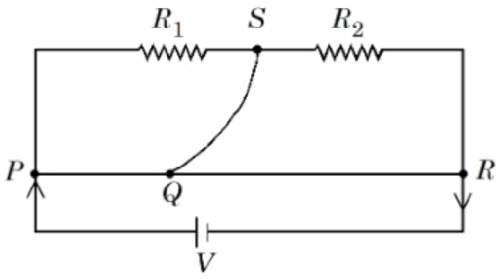
$$I = \left[\frac{2}{5}M_1R_1^2 + M_1R_1^2\right] + \left[\frac{2}{5}M_2R_2^2 + M_2R_2^2\right]$$

$$= \frac{7}{5}\left[M_1R_1^2 + M_2R_2^2\right] \quad = \frac{7}{5}\left[5\times100 + 10\times400\right]\times10^{-4}$$

$$= 63 \times 10^{-2} \quad = 0.63 \text{ kg} - \text{m}^2$$

Question ID : 444792177

30. A meter bridge with two resistances R_1 and R_2 as shown in figure was balanced (null point) at 40 cm from the point P. The null point changed to 50 cm from the point P, when 16 Ω resistance is connected in parallel to R_2. The values of resistances R_1 and R_2 are _____.

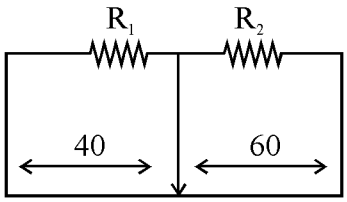


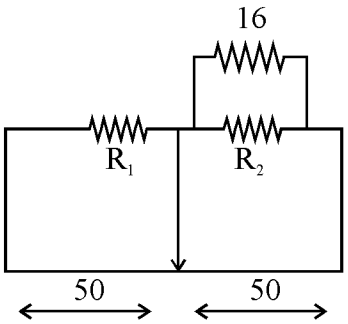
(1) $R_2 = 16\Omega, R_1 = \frac{16}{3}\Omega$ (2) $R_2 = 4\Omega, R_1 = \frac{4}{3}\Omega$

(3) $R_2 = 12\Omega, R_1 = \frac{12}{3}\Omega$ (4) $R_2 = 8\Omega, R_1 = \frac{16}{3}\Omega$

Ans. Official answer NTA (4)

Sol.





here $\frac{R_1}{40}=\frac{R_2}{60}\Rightarrow\frac{R_1}{R_2}=\frac{2}{3}$ .... (1)

here $R_1=\frac{16R_2}{16+R_2}$ .... (2)

from (1) & (2) $\frac{16R_2}{16+R_2}=\frac{2}{3}R_2$

$\Rightarrow 24 = 16 + R_2$

$\Rightarrow R_2 = 8\Omega$

$\Rightarrow R_1=\frac{16}{3}\Omega$

Question ID : 444792185

31. The volume of an ideal gas increases 8 times and temperature becomes $(1/4)^{th}$ of initial temperature during a reversible change. If there is no exchange of heat in this process ($\Delta Q = 0$) then identify the gas from the following options (Assuming the gases given in the options are ideal gases):

(1) He (2) CO_2 (3) NH_3 (4) O_2

Ans. Official answer NTA (1)

Sol. $TV^{\gamma-1} = \text{const}$

$\Rightarrow T_0V_0^{\gamma-1}=\frac{T_0}{4}(8V_0)^{\gamma-1}$

$\Rightarrow (8)^{\gamma-1}=4$

$\Rightarrow 3(\gamma-1)=2$

$\Rightarrow \gamma=\frac{5}{3}\rightarrow$ monoatomic gas $\rightarrow$ He

Question ID : 444792188

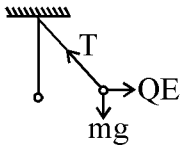
32. A simple pendulum has a bob with mass m and charge q. The pendulum string has negligible mass. When a uniform and horizontal electric field $\vec{E}$ is applied, the tension in the string changes. The final tension in the string, when pendulum attains an equilibrium position is _____.

(g: acceleration due to gravity)

(1) mg – qE (2) $\sqrt{m^2g^2+q^2E^2}$ (3) mg + qE (4) $\sqrt{m^2g^2-q^2E^2}$

Ans. Official answer NTA (2)

Sol.



$$T=\sqrt{(QE)^2+(mg)^2}$$

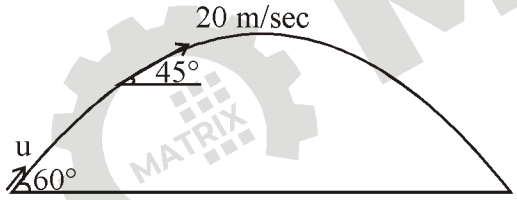
Question ID : 444792179

33. A projectile is thrown upward at an angle 60° with the horizontal. The speed of the projectile is 20 m/s when its direction of motion is 45° with the horizontal. The initial speed of the projectile is _____m/s.

(1) $20\sqrt{3}$ (2) $20\sqrt{2}$ (3) $40\sqrt{2}$ (4) 40

Ans. Official answer NTA (2)

Sol.



Horizontal component of velocity remains constant

so u cos 60° = 20 cos 45°

$$I\ell B=mg$$

$\Rightarrow$ u = $20\sqrt{2}$ m/sec

Question ID : 444792190

34. Three identical coils C_1, C_2 and C_3 are closely placed such that they share a common axis. C_2 is exactly midway. C_1 carries current I in anti-clockwise direction while C_3 carries current I in clockwise direction. An induced current flows through C_2 will be in clockwise direction when:

(1) C_1 moves away from C_2 and C_3 moves towards C_2

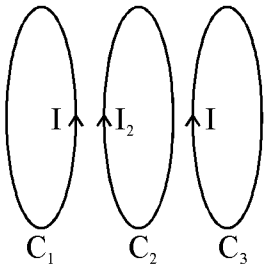
(2) C_1 and C_3 moves with equal speeds towards C_2

(3) C_1 moves towards C_2 and C_3 moves away from C_2

(4) C_1 and C_3 moves with equal speeds away from C_2

Ans. Official answer NTA (3)

Sol.



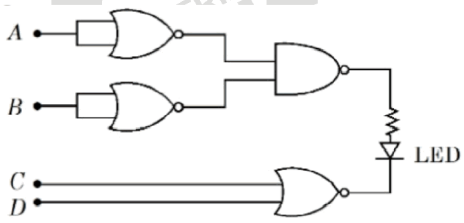
For I_2 to be clockwise

$\Rightarrow C_1$ should move towards C_2 so that induced current in C_2 repel C_1.

$\Rightarrow C_3$ should move away from C_2 so that induced current in C_2 attract C_3.

Question ID : 444792195

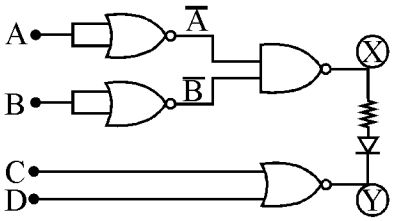
35. Find the correct combination of A, B, C and D inputs which can cause the LED to glow.



(1) 1000 (2) 0100 (3) 1101 (4) 0011

Ans. Official answer NTA (3)

Sol.



$X = \overline{\bar{A}.\bar{B}}$

$X = A + B$

& $Y = \overline{C + D} = \overline{C}.\overline{D}$

for LED to Glow. It should be forword based so x = 1 & y = 0

for - 1 →	A = 1	here X = 1
	B = 0	Y = 1
	C = 0	
	D = 0	
for - 2	X = 1, Y = 1	
for - 3	X = 1, Y = 0	
for - 4	X = 0, Y = 0	

Question ID : 444792189

36. Electric field in a region is given by $\vec{E} = Ax\hat{i} + By\hat{j}$, where A = 10 V/m^2 and B = 5 V/m^2. If the electric potential at a point (10, 20) is 500 V, then the electric potential at origin is _____ V.

(1) 2000 (2) 500 (3) 0 (4) 1000

Ans. Official answer NTA (1)

Sol. As $\Delta V = -\int E.d\vec{r}$

$$V_P - V_O = -\int_{r_0}^{r_P} (10xdx + 5ydy)$$

$$\Rightarrow 500 - V_O = \left[-5x^2\right]_0^{10} - \left[\frac{5}{2}y^2\right]_0^{20}$$

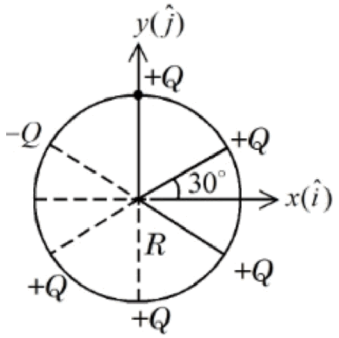
$= -500 - 1000$

$\Rightarrow V_O = 2000$ volt

Question ID : 444792187

37. Six point charges are kept 60° apart from each other on the circumference of a circle of radius R as shown in figure. The net electric field at the center of the circle is _____.

($\in_0$ is permittivity of free space)



(1) $\frac{Q}{4\pi\varepsilon_0 R^2}\left(\sqrt{3}\hat{i}-\hat{j}\right)$

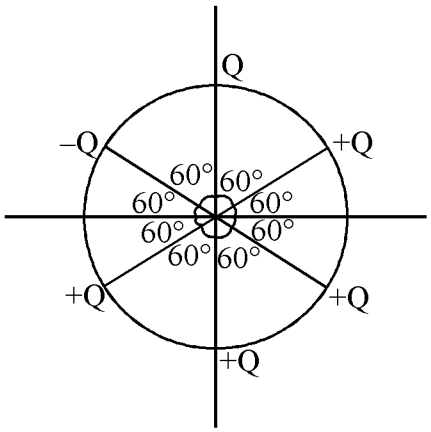
(2) $-\left(\frac{5Q}{8\pi\varepsilon_0 R^2}\right)\left(\hat{i}-3\hat{j}\right)$

(3) $-\frac{Q}{4\pi\varepsilon_0 R^2}\left(\sqrt{3}\hat{i}-\hat{j}\right)$

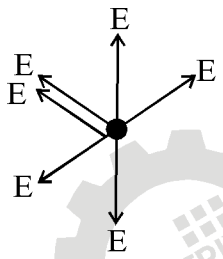
(4) $-\frac{5Q}{8\pi\varepsilon_0 R^2}\left(\hat{i}+\sqrt{3}\hat{j}\right)$

Ans. Official answer NTA (3)

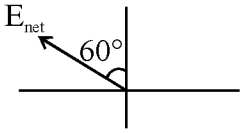
Sol.



If E = field due to each charge then



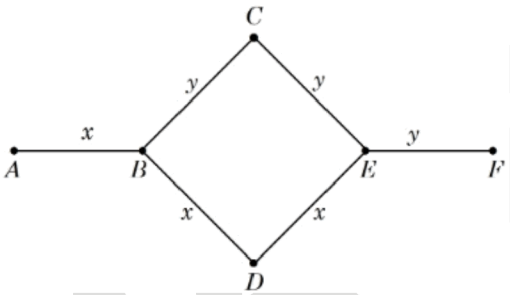
$E_{net} = 2E = \frac{2KQ}{R^2}$



$$\vec{E}_{net} = \frac{-2KQ}{R^2}\sin 60°\, i + \frac{2KQ}{R^2}\cos 60°\, j = \frac{Q}{4\pi \in_0 R^2}\left[-\sqrt{3}i + j\right]$$

Question ID : 444792182

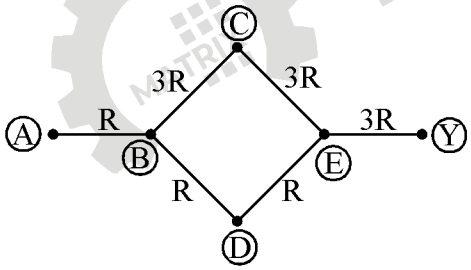
38. Rods x and y of equal dimensions but of different matierals are joined as shown in figure. Temperatures of end points A and F are maintained at 100 °C and 40 °C respectively. Given the thermal conductivity of rod x is three times of that of rod y, the temperature at junction points B and E are (close to):



(1) 80 °C and 60 °C respectively
(2) 80 °C and 70 °C respectively
(3) 89 °C and 73 °C respectively
(4) 60 °C and 45 °C respectively

Ans. Official answer NTA (3)

Sol.



so $R_x = \frac{L}{3KA} = R$

$R_y = \frac{L}{KA} = 3R$

here $T_C = T_D = T$ also $R_{eq} = \frac{11R}{2}$

& $\frac{dQ}{dt} = \frac{100-40}{\frac{11R}{2}} = \frac{120}{11R}$

Now $\frac{dQ}{dt}=\frac{100-T_B}{R}=\frac{120}{11R}$

$\Rightarrow T_B=100-\frac{120}{11}$

$T_B=\frac{980}{11}\simeq 89°C$

& $\frac{dQ}{dt}=\frac{T_E-40}{3R}=\frac{120}{11R}$

$\Rightarrow T_E=40+\frac{360}{11}$

$T_E=\frac{800}{11}=72.7\simeq 73°C$

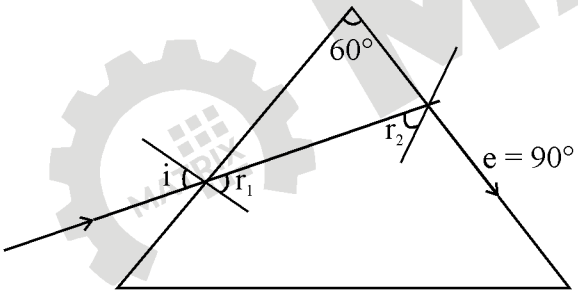
Question ID : 444792192

39. Consider an equilateral prism (refractive index $\sqrt{2}$). A ray of light is incident on its one surface at a certain angle *i*. if the emergent ray is found to graze along the other surface then the angle of refraction at the incident surface is close to _____.

(1) 20° (2) 40° (3) 30° (4) 15°

Ans. Official answer NTA (4)

Sol.



for graze $\rightarrow$ e = 90°

so $\sqrt{2}\times \sin r_2 = 1\times \sin 90°$

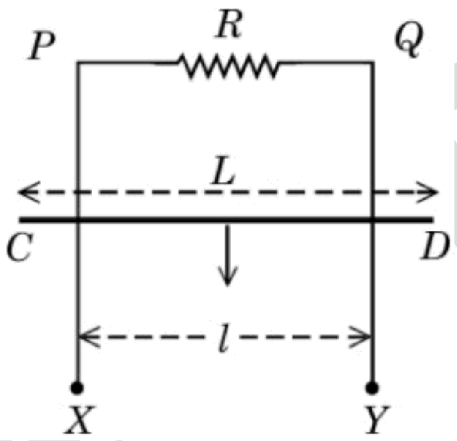
$\sin r_2 = \frac{1}{\sqrt{2}}$

$\Rightarrow r_1 = 45°$

$r_1 = 15°$ [as $r_1 + r_2 = 60°$]

Question ID : 444792186

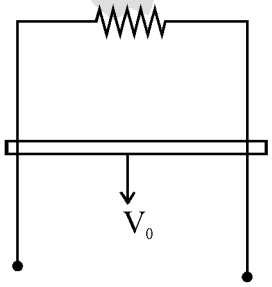
40. XPQY is a vertical smooth long loop having a total resistance R where PX is parallel to QY and separation between them is l. A constant magnetic field B perpendicular to the plane of the loop exists in the entire space. A rod CD of length L(L > l) and mass m is made to slide down from rest under the gravity as shown in figure. The terminal speed acquired by the rod is _____ m/s. ()



(1) $\frac{mgR}{B^2l^2}$ (2) $\frac{8mgR}{B^2l^2}$ (3) $\frac{2mgR}{B^2l^2}$ (4) $\frac{2mgR}{B^2L^2}$

Ans. Official answer NTA (1)

Sol.



Motional emf $\Rightarrow E = BV_0l$

Currento in loop $\Rightarrow I = \frac{E}{R} = BV_0l$

for terminal velocity

$\Rightarrow F_{magnetic} = F_{gravity}$

$I\ell B = mg \qquad \Rightarrow \frac{B^2\ell^2 v_0}{R} = mg \qquad \Rightarrow v_0 = \frac{mgR}{B^2\ell^2}$

Question ID : 444792178

41. The escape velocity from a spherical planet A is 10 km/s. The escape velocity from another planet B whose density and radius are 10% of those of planet A, is _____ m/s.

(1) 1000 (2) $1000\sqrt{2}$ (3) $200\sqrt{5}$ (4) $100\sqrt{10}$

Ans. Official answer NTA (4)

Sol. $V_e = \sqrt{\frac{2GM}{R}} = \sqrt{2G\rho\frac{4}{3}\frac{\pi R^3}{R}} = \sqrt{\frac{8}{3}G\pi\rho R^2}$

So $V_e \propto \sqrt{\rho R^2}$

$\frac{(V_e)_A}{(V_e)_B} = \sqrt{\frac{\rho_A}{\rho_B}\left(\frac{R_A}{R_B}\right)^2} \qquad \left(\rho_B = \frac{\rho_A}{10}, R_B = \frac{R_A}{10}\right)$

$\Rightarrow \frac{10,000}{V_B} = \sqrt{\frac{\rho_A}{\left(\frac{\rho_A}{10}\right)}\left(\frac{R_A}{\frac{R_A}{10}}\right)^2} = 10\sqrt{10}$

$\Rightarrow V_B = \frac{1000}{\sqrt{10}} = 100\sqrt{10}\ m/\sec$

Question ID : 444792193

42. 7.9 MeV α-particle scatters from a target material of atomic number 79. From the given data the estimated diameter of nuclei of the target material is (approximately) _____ m.

$\left[\frac{1}{4\pi\varepsilon_0} = 9\times10^9\ Nm^2/C^2 \ and\ electron\ charge\ = 1.6\times10^{-19}C\right]$

(1) 1.69×10^{-12} (2) 5.76×10^{-14} (3) 1.44×10^{-13} (4) 2.88×10^{-14}

Ans. Official answer NTA (2)

Sol. If 'α'-Particle just reaches the surface of target atom then $K_i + U_i = K_f + U_f$

$\Rightarrow 7.9\ MeV + 0 = 0 + \frac{KQq}{R} \qquad \begin{bmatrix} Q = 79e \\ q = 2e \end{bmatrix}$

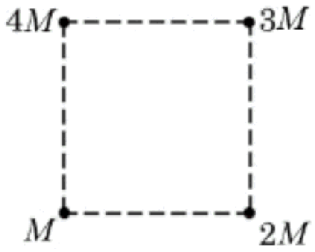
$\Rightarrow 7.9 \times 10^6 \times e = 9\times10^9 \times \frac{79e.2e}{R}$

$\Rightarrow R = 2.88 \times 10^{-14}$ m

Diameter $= 5.76 \times 10^{-14}$ m

Question ID : 444792180

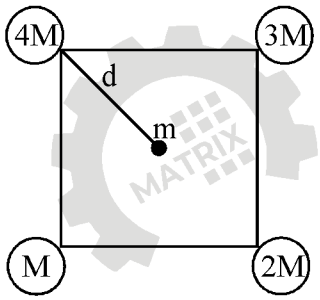
43. Net gravitational force at the center of a square is found to be F_1 when four particles having mass M, 2M, 3M and 4M are placed at the four corners of the square as shown in figure and it is F_2 when the positons of 3 M and 4 M are interchanged. The ratio $\frac{F_1}{F_2}$ is $\frac{a}{\sqrt{5}}$. the value of a is _____.



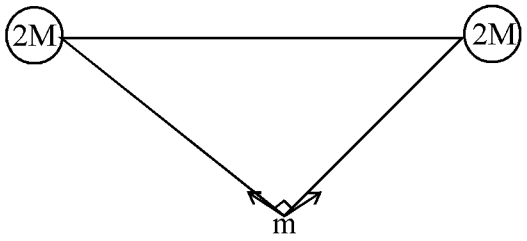
(1) 3 (2) 2 (3) $2\sqrt{5}$ (4) 1

Ans. Official answer NTA (2)

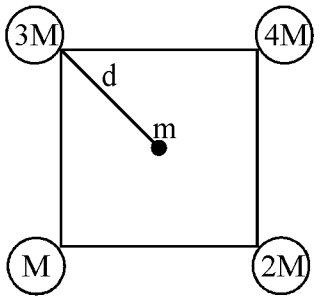
Sol.



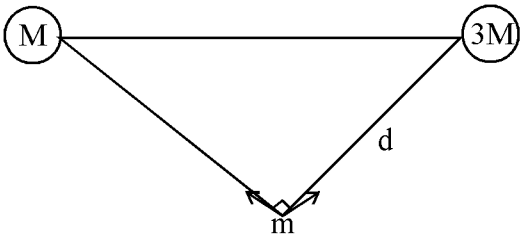
$\Rightarrow$



$F_1 = \sqrt{2}\frac{G2M.m}{d^2}$



$\Rightarrow$



$$F_2 = \frac{GMm}{d^2}\sqrt{1+9} = \sqrt{10}\frac{GMm}{d^2}$$

so $\frac{F_1}{F_2} = \frac{2\sqrt{2}}{\sqrt{10}} = \frac{2}{\sqrt{5}} = \frac{\alpha}{\sqrt{5}}$

$\Rightarrow \alpha = 2$

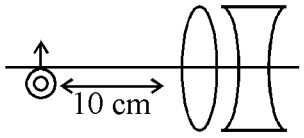
Question ID : 444792191

44. A thin convex lens of focal length 5 cm and a thin concave lens of focal length 4 cm are combined together (without any gap) and this combination has magnification m_1 when an object is placed 10 cm before the convex lens. Keeping the positions of convex lens and object undisturbed a gap of 1 cm is introduced between the lenses by moving the concave lens away, which lead to a change in magnification of total lens system to m_2. The value of $\left|\frac{m_1}{m_2}\right|$ is _____.

(1) 5/27 (2) 25/27 (3) 3/2 (4) 5/9

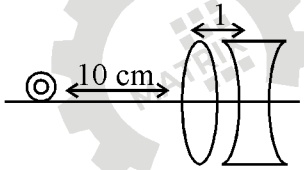
Ans. Official answer NTA (Dropped)

Sol.



$$\frac{1}{f_{ea}} = \frac{1}{5} - \frac{1}{4} \Rightarrow f_{eq} = -20$$

$$\Rightarrow m_1 = \frac{f}{f+u} = \frac{-20}{-20-10} = \frac{2}{3}$$



$(f_1 = 5)(f_2 = -4)$

1st refraction

u = – 10

$f_1 = 5$

$$v = \frac{uf_1}{u+f_1} = \frac{(-10)\times 5}{-10+5} = 10 \;\&\; m = \frac{10}{-10} = -1$$

2nd refaction

u = 9

$f_2 = -4$

$$v = \frac{9\times(-4)}{9-4} = -\frac{36}{5} \;\&\; m = -\frac{4}{5}$$

So $m_2 = (-1) \times \left(-\frac{4}{5}\right) = \frac{4}{5}$

So $\frac{m_1}{m_2} = \frac{\left(\frac{2}{3}\right)}{\left(\frac{4}{5}\right)} = \frac{5}{6}$

Question ID : 444792183

45. Given below are two statements:

Statement I: Pressure of a fluid is exerted only on a solid surface in contact as the fluid-pressure does not exist everywhere in a still fluid.

Statement II: Excess potential energy of the molecules on the surface of a liquid, when compared to interior, results in surface tension.

In the light of the above statements, choose the correct answer from the options given below:

(1) Statement I is true but Statement II is false

(2) Statement I is false but Statement II is true

(3) Both Statement I and Statement II are true

(4) Both Statement I and Statement II are false

Ans. Official answer NTA (2)

Sol. Statement I $\rightarrow$ wrong

Statement II $\rightarrow$ Correct

Question ID : 444792199

46. The electric field of a plane electromagnetic wave, travelling in an unknown non-magnetic medium is given by,

$E_y = 20 \sin(3 \times 10^6 x - 4.5 \times 10^{14} t)$ V/m

(where x, t and other values have S.I. units). The dielectric constant of the medium is _____

(Speed of light in free space is 3×10^8 m/s)

Ans. Official answer NTA (4)

Sol. $w = 4.5 \times 10^{14}$

$k = 3 \times 10^6$

$v = \frac{w}{K} = \frac{4.5 \times 10^{14}}{3 \times 10^6}$

$v = 1.5 \times 10^8$

as $v = \frac{C}{\mu} \Rightarrow 1.5 \times 10^8 = \frac{3 \times 10^8}{\mu}$

$\Rightarrow \mu = 2 = \sqrt{\varepsilon_r \mu_r}$

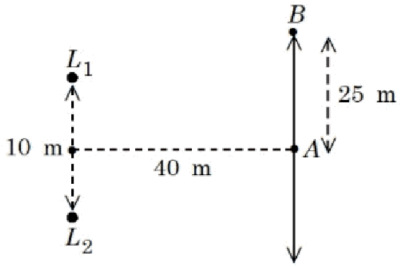
as $\mu_r = 1$

then $\varepsilon_r = 4$

Question ID : 444792197

47. Two loudspeakers (L_1 and L_2) are placed with a separation of 10 m, as shown in figure. Both speakers are fed with an audio input signal of same frequency with constant volume. A voice recorder, initially at point A, at equidistance to both loud speakers, is moved by 25 m along the line AB while monitoring the audio signal. The measured signal was found to undergo 10 cycles of minima and maxima during the movement. The frequency of the input signal is _____ Hz.

(Speed of sound in air is 324 m/s and $\sqrt{5} = 2.23$)



Ans. Official answer NTA (600)

Sol. $L_1B = \sqrt{40^2 + (25)^2} = 20\sqrt{5}$

$L_2B = \sqrt{(40)^2 + (30)^2} = 50$

Path difference $\Rightarrow \Delta = l_2B - l_1B$

$= 50 - 20\sqrt{5} = 10\lambda$

$\lambda = 5 - 2\sqrt{5}$ m [As 10 cycle of maxima & minima = 10 λ]

$f = \frac{C}{\lambda} = \frac{324}{5 - 2\sqrt{5}} = 600Hz$

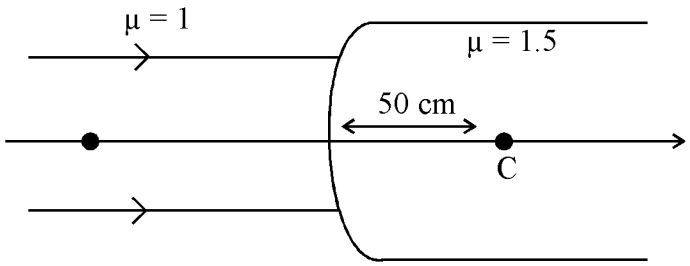
Question ID : 444792200

48. A parallel beam of light travelling in air (refractive index 1.0) is incident on a convex spherical glass surface of radius of curvature 50 cm. Refractive index of glass is 1.5. The rays converge to a point at a distance x cm from the centre of the curvature of the spherical surface. The value of x is _____ cm.

वायु (अपवर्तनांक 1.0) में गमन करता हुआ प्रकाश का एक समान्तर किरण–पुंज वक्रता त्रिज्या 50 cm के एक उत्तल गोलीय काँच पृष्ठ पर आपतित है। काँच पृष्ठ पर अपतित है। काँच का अपवर्तनांक 1.5 है। किरणें गोलीय पृष्ठ की वक्रता के केन्द्र से एक दूरी x cm पर एक बिन्दु पर अभिसरित होती हैं। x का मान _____ cm है।

Ans. Official answer NTA (100)

Sol.



$$\frac{1.5}{v}-\frac{1}{\infty}=\frac{1.5-1}{50}$$

v = 150 cm

Distance from center = 150 – 50

of curvature = 100 cm

Question ID : 444792198

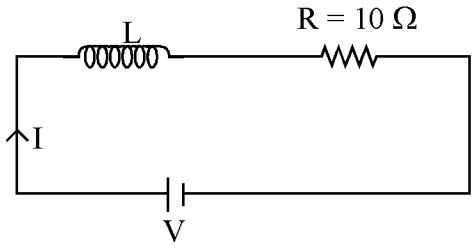
49. Inductance of a coil with 10^4 turns is 10 mH and it is connected to a dc source of 10 V with internal resistance of 10 Ω. The energy density in the inductor when the current reaches (1/e) of its maximum value is $\alpha\pi\times\frac{1}{e^2}J/m^3$. The value of α is _____. $\left(\mu_0=4\pi\times10^{-7}Tm/A\right)$.

10^4 फेरों वाली एक कुण्डली का प्रेरकत्व 10 mH है और यह 10 Ω के आंतरिक प्रतिरोध के साथ 10 V के एक dc स्रोत से संयोजित है। जब धारा अपने अधिकतम मान का (1/e) पहुँचती है, तो प्रेरक में ऊर्जा घनत्व $\alpha\pi\times\frac{1}{e^2}J/m^3$ है। α का मान _____ है।

$\left(\mu_0=4\pi\times10^{-7}Tm/A\right)$.

Ans. Official answer NTA (20)

Sol.



$$I_0 = \frac{V}{R} \& I = \frac{I_0}{e}$$

Energy densety $= \frac{B^2}{2\mu_0} = \frac{(\mu_0 nI)^2}{2\mu_0}$

$$= \frac{\mu_0 n^2}{2} I^2$$

$$= \frac{4\pi \times 10^{-7}}{2} \times 10^8 \times \frac{1}{e^2}$$

$$= \frac{2\pi}{e^2} \times 10 = \alpha\pi \times \frac{1}{e^2}$$

$\Rightarrow \alpha = 20$

Question ID : 444792196

50. A circular disc has radius R_1 and thickness T_1. Another circular disc made of the same material has radius R_2 and thickness T_2. If the moment of inertia of both discs are same and $\frac{R_1}{R_2} = 2$ then $\frac{T_1}{T_2} = \frac{1}{\alpha}$. The value of α is _____.

एक वृत्ताकार चक्रिका (चकती) की त्रिज्या R_1 और मोटाई T_1 है। समान पदार्थ से निर्मित एक अन्य वृत्ताकार चक्रिका की त्रिज्या R_2 ओर मोटाई T_2 है। यदि दोनों चक्रिकाओं के जड़त्व–आघूर्ण समान हैं और $\frac{R_1}{R_2} = 2$ है तो $\frac{T_1}{T_2} = \frac{1}{\alpha}$ है। α का मान _____ है।

Ans. Official answer NTA (16)

Sol. As moment of inertia of both disc are same then $\frac{M_1 R_1^2}{2} = \frac{M_2 R_2^2}{2}$

$$\Rightarrow \rho \times \left(\pi R_1^2\right) \times \frac{T_1 R_1^2}{2} = \rho\left(\pi R_2^2\right) \times T_2 \times \frac{R_2^2}{2}$$

$$\Rightarrow \frac{T_1}{T_2} = \left(\frac{R_2}{R_1}\right)^4 = \frac{1}{16} = \frac{1}{\alpha}$$

$\alpha = 16$