

JEE Main January 2026
Question Paper With Text Solution
24 January | Shift-2

PHYSICS



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

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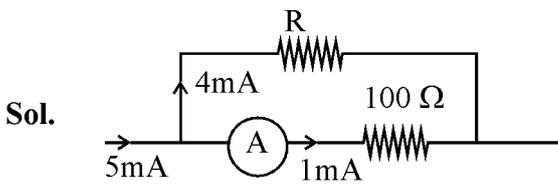
**JEE MAIN JANUARY 2026 | 24 JANUARY SHIFT-2****SECTION - A**

Question ID : 444792634

26. A moving coil galvanometer of resistance 100Ω shows a full scale deflection for a current of 1 mA . The value of resistance required to convert this galvanometer into an ammeter, showing full scale deflection for a current of 5 mA , is _____ Ω .

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- (1) 2.5 (2) 0.5 (3) 25 (4) 10

Ans. Official answer NTA (3)

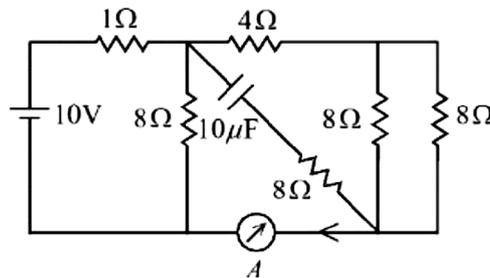
$$4R = 1 \times 100$$

$$R = 25 \Omega$$

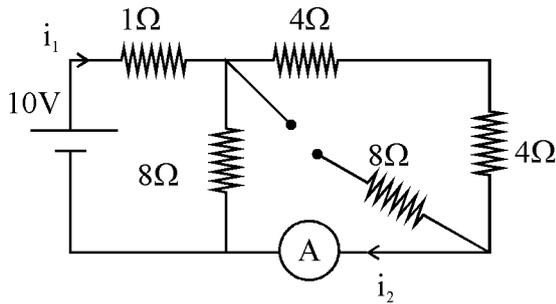
Question ID : 444792645

27. The reading of the ammeter (A) in steady state in the following circuit (assuming negligible internal resistance of the ammeter) is _____ A.

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- (1) 1 (2) 0 (3) 2 (4) 1/2

**Ans.** Official answer NTA (1)**Sol.**

$$i_1 = \frac{10}{5} = 2A$$

$$\therefore i_2 = \frac{i_1}{2} = 1A$$

$$R_{eq} = 1 + \frac{8 \times 8}{8 + 8} = 5\Omega$$

Question ID : 444792642

28. When a light of a given wavelength falls on a metallic surface the stopping potential for photoelectrons is 3.2 V. If a second light having wavelength twice of first light is used, the stopping potential drops to 0.7 V. The wavelength of first light is _____ m.

$$(h = 6.63 \times 10^{-34} \text{ J.s, } e = 1.6 \times 10^{-19} \text{ C, } c = 3 \times 10^8 \text{ m/s})$$

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- (1) 2.5×10^{-7} (2) 3.1×10^{-7} (3) 2.9×10^{-8} (4) 2.2×10^{-8}

Ans. Official answer NTA (1)

$$\text{Sol. } \frac{hc}{\lambda} = \phi + e(3.2)$$

$$\frac{hc}{2\lambda} = \phi + e(0.7)$$

Solving, we get

$$\lambda = 2.5 \times 10^{-7} \text{ m}$$

Question ID : 444792626

29. In a vernier callipers, 50 vernier scale divisions are equal to 48 main scale divisions. If one main scale division = 0.05 mm, then the least count of the vernier callipers is _____ mm.

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- (1) 0.05 (2) 0.005 (3) 0.002 (4) 0.02

Ans. Official answer NTA (3)



Sol. $50 \text{ VSD} = 48 \text{ MSD}$

$$1 \text{ VSD} = \frac{48}{50} \text{ MSD}$$

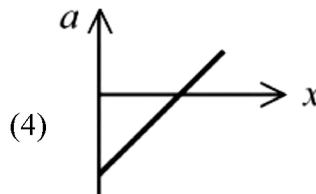
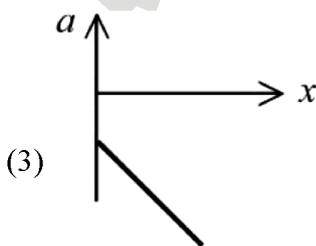
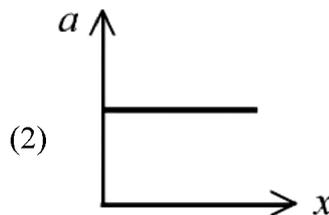
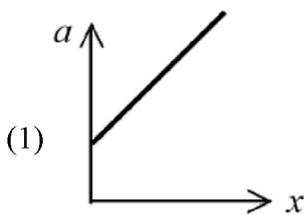
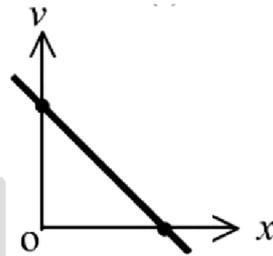
$$\text{L.C.} = 1 \text{ MSD} - 1 \text{ VSD} = \left(1 - \frac{48}{50}\right) \text{ MSD}$$

$$= \frac{1}{25} \text{ MSD} = \frac{1}{25} \times 0.05 \text{ mm} = 0.002 \text{ mm}$$

Question ID : 444792628

30. The velocity (v) – Distance (x) graph is shown in figure. Which graph represents acceleration (a) versus distance (x) variation of this system?

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Ans. Official answer NTA (4)

Sol. $V = -mx + c$

$$a = v \frac{dv}{dx} = (-mx + c)(-m)$$

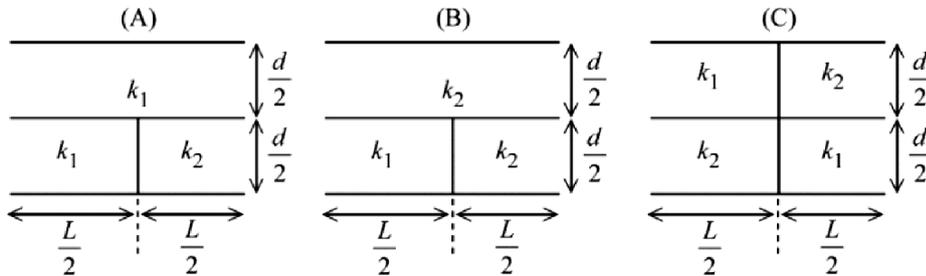
$$a = m^2x - mc$$



equation represents a straight line of positive slope with negative y-intercept.

Question ID : 444792637

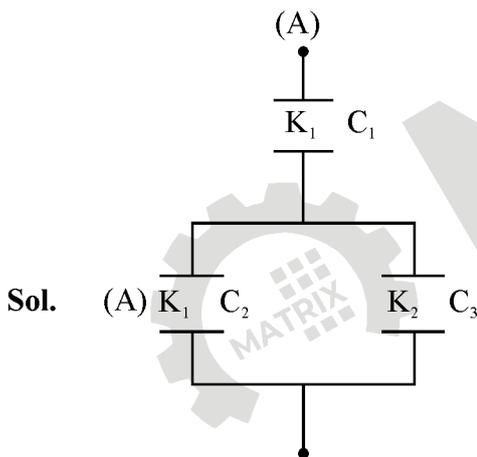
31. Three parallel plate capacitors each with area A and separation d are filled with two dielectric (k_1 and k_2) in the following fashion. Which of the following is true? ($k_1 > k_2$)



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- (1) $C_A > C_C > C_B$ (2) $C_C > C_B > C_A$ (3) $C_C > C_A > C_B$ (4) $C_B > C_C > C_A$

Ans. Official answer NTA (1)



$$C_1 = \frac{K.E.A}{d/2} = \frac{2K_1E_0A}{d}$$

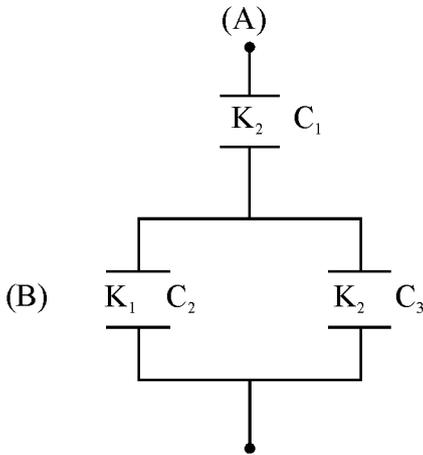
$$C_2 = \frac{K_1E_0A/2}{d/2} = \frac{K_1E_0A}{d}$$

$$C_3 = \frac{K_2E_0A/2}{d/2} = \frac{K_2E_0A}{d}$$

$$C_A = \frac{(C_2 + C_3) \cdot C_1}{C_1 + C_2 + C_3}$$



$$= \frac{(K_1 + K_2) \cdot 2K_1 E_0 A}{(3K_1 + K_2) d}$$

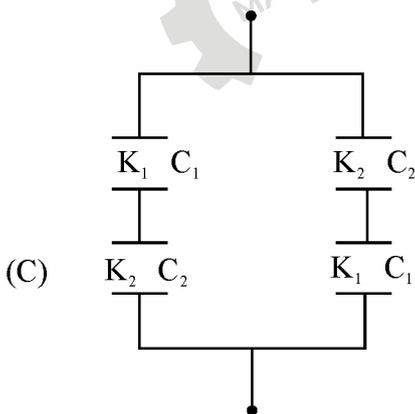


$$C_1 = \frac{K.E.A}{d/2} = \frac{2K_2 E_0 A}{d}$$

$$C_2 = \frac{K_1 E_0 A / 2}{d/2} = \frac{K.E.A}{d}$$

$$C_3 = \frac{K_2 E_0 A / 2}{d/2} = \frac{K_2 E_0 A}{d}$$

$$C_A = \frac{(C_2 + C_3) \cdot C_1}{C_1 + C_2 + C_3} = \frac{(K_1 + K_2) \cdot 2K_2 E_0 A}{(3K_1 + K_2) d}$$



$$C_1 = \frac{K_1 E_0 A / 2}{d/2} = \frac{K_1 E.A}{d}$$



$$C_2 = \frac{K_2 E_0 A / 2}{d / 2} = \frac{K_2 E_0 A}{d}$$

$$C_c = 2 \cdot \frac{C_1 C_2}{C_1 + C_2}$$

$$= 2 \cdot \frac{K_1 K_2 E_0 A}{K_1 + K_2 d}$$

Question ID : 444792629

32. A flexible chain of mass m hangs between two fixed points at the same level. The inclination of the chain with the horizontal at the two points of support is 30° . Considering the equilibrium of each half of the chain, the tension of the chain at the lowest point is _____ .

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(1) $\frac{\sqrt{3}}{2} mg$

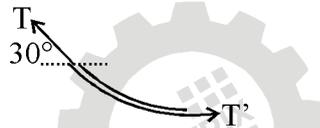
(2) $\frac{1}{2} mg$

(3) $\sqrt{3} mg$

(4) mg

Ans. Official answer NTA (1)**Sol.**

$$2T \sin 30^\circ = Mg \Rightarrow T = Mg$$

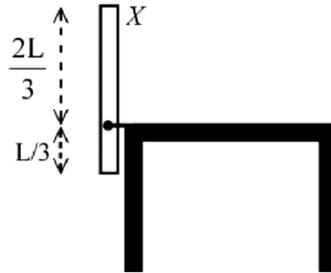


$$T \cos 30^\circ = T' = Mg \frac{\sqrt{3}}{2}$$



Question ID : 444792627

33. A thin uniform rod (X) of mass M and length L is pivoted at a height $(L/3)$ as shown in the figure. The rod is allowed to fall from a vertical position and lie horizontally on the table. The angular velocity of this rod when it hits the table top, is _____. (g = gravitational acceleration)

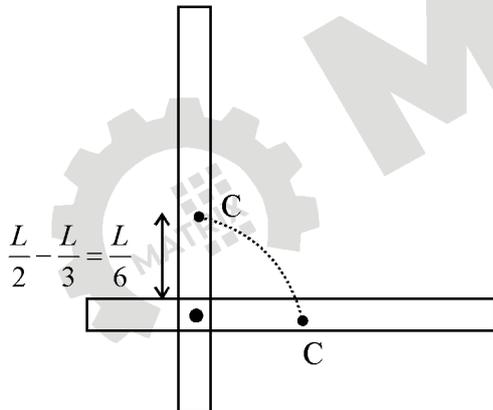


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- (1) $\sqrt{\frac{3g}{L}}$ (2) $\frac{3}{\sqrt{2}}\sqrt{\frac{g}{L}}$ (3) $\frac{1}{\sqrt{2}}\sqrt{\frac{g}{L}}$ (4) $\sqrt{\frac{3g}{2L}}$

Ans. Official answer NTA (1)

Sol.



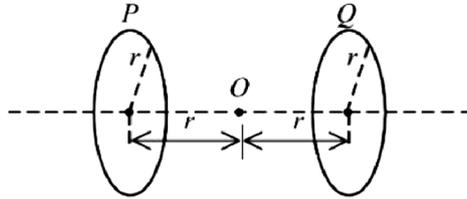
By energy conservation :

$$mg \frac{L}{6} = \frac{1}{2} I \omega^2, \quad I = \frac{ML^2}{12} + M \left(\frac{L}{6} \right)^2 = \frac{ML^2}{9}$$

$$Mg \frac{L}{6} = \frac{1}{2} M \frac{L^2}{9} \omega^2 \quad \Rightarrow \quad \omega = \sqrt{\frac{3g}{L}}$$

Question ID : 444792635

34. Two identical circular loops P and Q each of radius r are lying in parallel planes such that they have common axis. The current through P and Q are I and $4I$ respectively in clockwise direction as seen from O. The net magnetic field at O is :

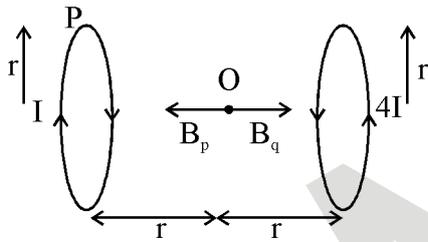


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- (1) $\frac{\mu_0 I}{4\sqrt{2}r}$ towards Q (2) $\frac{\mu_0 I}{4\sqrt{2}r}$ towards P (3) $\frac{3\mu_0 I}{4\sqrt{2}r}$ towards P (4) $\frac{3\mu_0 I}{4\sqrt{2}r}$ towards Q

Ans. Official answer NTA (4)

Sol.



$$B_0 = B_Q - B_P = \frac{\mu_0 4I r}{2(r^2 + r^2)^{3/2}} - \frac{\mu_0 I r}{2(r^2 + r^2)^{3/2}} = \frac{3\mu_0 I}{4\sqrt{2}r} \text{ towards}$$

Question ID : 444792631

35. A cubical block of density $\rho_b = 600 \text{ kg / m}^3$ floats in a liquid of density $\rho_e = 900 \text{ kg / m}^3$. If the height of block is $H = 8.0 \text{ cm}$ then height of the submerged part is _____ cm.

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- (1) 4.3 (2) 7.3 (3) 5.3 (4) 6.3

Ans. Official answer NTA (3)

Sol. For a floating object :

$$\frac{\text{Volume submerged}}{\text{Total Volume}} = \frac{\rho_{\text{solid}}}{\rho_{\text{Liquid}}}$$

$$\frac{AH_{\text{Submerged}}}{AH} = \frac{600}{900} = \frac{2}{3}$$

$$H_{\text{submerged}} = \frac{2}{3}H = 5.3 \text{ cm}$$

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Question ID : 444792641

36. Distance between an object and three times magnified real image is 40 cm . The focal length of the mirror used is _____ cm.

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(1) -15

(2) -20

(3) -15/2

(4) -10

Ans. Official answer NTA (1)**Sol.** Real Image \Rightarrow Concave mirror

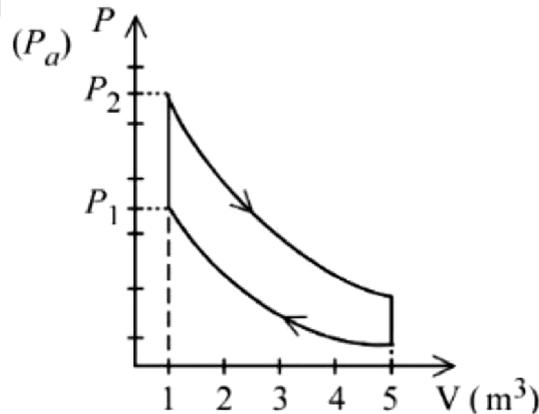
$$\because m = 3 \Rightarrow \frac{|v|}{|u|} = 3 \Rightarrow |v| = 3|u| \text{ \& } |v| - |u| = 40$$

$$\therefore |u| = 20 \text{ cm \& } |v| = 60 \text{ cm}$$

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{P} \Rightarrow \frac{1}{-60} + \frac{1}{-20} = \frac{1}{f} \Rightarrow f = -15 \text{ cm}$$

Question ID : 444792632

37. 10 mole of an ideal gas is undergoing the process shown in the figure. The heat involved in the process from P_1 to P_2 to α Joule ($P_1 = 21.7 \text{ Pa}$ and $P_2 = 30 \text{ Pa}$, $C_v = 21 \text{ J / K.mol}$, $R = 8.3 \text{ J / mol.K}$). The value of α is



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(1) 28

(2) 24

(3) 15

(4) 21

Ans. Official answer NTA (4)**Sol.** $Q = nC_v \Delta T$

$$\therefore v = \text{const.} \Rightarrow V \Delta P = nR \Delta T \Rightarrow \Delta T = \frac{V \Delta P}{nR}$$

$$\therefore Q = nC_v \left[\frac{V \Delta P}{nR} \right] = \frac{C_v V \Delta P}{R} = 21$$

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Question ID : 444792639

38. Five persons P_1, P_2, P_3, P_4 and P_5 recorded object distance (u) and image distance (v) using same convex lens having power $+5\text{ D}$ as $(25,96), (30,62), (35,37), (45,35)$ and $(50,32)$ respectively. Identify correct statement

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- (1) Readings recorded by P_4 and P_5 persons are incorrect
- (2) Readings recorded by P_3 person are incorrect
- (3) Readings recorded by P_3 and P_2 persons are incorrect
- (4) Readings recorded by all persons are correct

Ans. Official answer NTA (2)

Sol. $P = +5\text{ D} = \frac{1}{f} \Rightarrow f = 0.2\text{ m} = 20\text{ cm}$

Leus formula : $\frac{1}{v} - \frac{1}{u} = \frac{1}{f} = \frac{1}{20}$

$$P_1: \frac{1}{96} - \frac{1}{-25} = \frac{1}{f} \Rightarrow f = 19.83\text{ cm}$$

$$P_2: \frac{1}{62} - \frac{1}{-30} = \frac{1}{f} \Rightarrow f = 20.21\text{ cm}$$

$$P_3: \frac{1}{37} - \frac{1}{-35} = \frac{1}{f} \Rightarrow f = 17.99\text{ cm}$$

$$P_4: \frac{1}{35} - \frac{1}{-45} = \frac{1}{f} \Rightarrow f = 19.69\text{ cm}$$

$$P_5: \frac{1}{50} - \frac{1}{-32} = \frac{1}{f} \Rightarrow f = 19.51\text{ cm}$$

Among all, P_3 is way off.

Question ID : 444792636

39. A regular hexagon is formed by six wires each of resistance $r\Omega$ and the corners are joined to the centre by wires of same resistance. If the current enters at one corner and leaves at the opposite corner, the equivalent resistance of the hexagon between the two opposite corners will be

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(1) $\frac{4}{5}r$

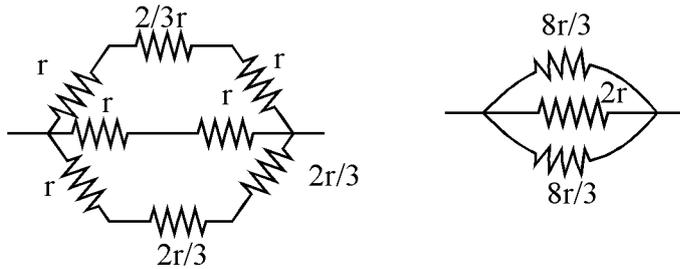
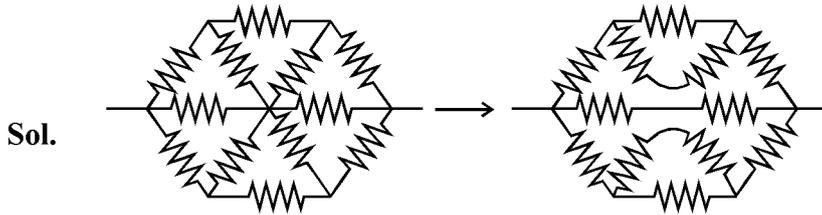
(2) $\frac{3}{5}r$

(3) $\frac{3}{4}r$

(4) $\frac{5}{8}r$



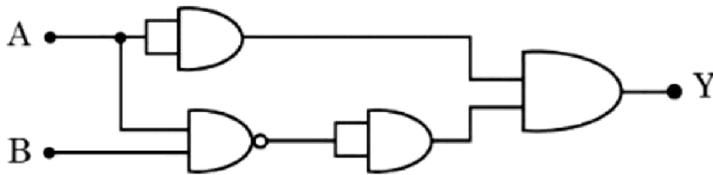
Ans. Official answer NTA (1)



$$R_{eg} = \frac{4}{5}r$$

Question ID : 444792644

40. Identify the correct truth table of the given logic circuit.



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(1)

A	B	Y
0	0	0
0	1	0
1	0	1
1	1	0

(2)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(3)

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

(4)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

**Ans.** Official answer NTA (1)**Sol.** $Y = (\overline{A \cdot B}) \cdot A = (\overline{A} + \overline{B}) \cdot A = 0 + A \cdot \overline{B}$

A	B	Y
0	0	0
0	1	0
1	0	1
1	1	0

Question ID : 444792638

41. A point source is kept at the center of a spherically enclosed detector. If the volume of the detector increased by 8 times, the intensity will

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(1) increase by 8 times

(2) decrease by 4 times

(3) decrease by 8 times

(4) increase by 64 times

Ans. Official answer NTA (2)**Sol.** $I = \frac{P}{4\pi r^2}$

$$I \propto \frac{1}{r^2}$$

$$r \rightarrow 8r$$

$$I \rightarrow \frac{I}{64}$$

Question ID : 444792640

42. In the Young's double slit experiment the intensity produced by each one of the individual slits is I_0 . The distance between two slits is 2 mm. The distance of screen from slits is 10 m. The wavelength of light is 6000 \AA . The intensity of light on the screen in front of one of the slits is _____.

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- (1) $\frac{I_0}{2}$ (2) $4I_0$ (3) $2I_0$ (4) I_0

Ans. Official answer NTA (4)

Sol. $y = \frac{d}{2} \Rightarrow \Delta = \frac{dy}{D} = \frac{d^2}{2D}$

$$\Rightarrow \phi = \frac{2\pi}{\lambda} \Delta = \frac{2\pi}{6 \times 10^{-7}} \times \frac{4 \times 10^{-6}}{2 \times 10} = \frac{2\pi}{3}$$

$$I = 4I_0 \cos^2 \frac{\phi}{2} = 4I_0 \cos^2 \frac{\pi}{3} = I_0$$

Question ID : 444792633

43. The fifth harmonic of a closed organ pipe is found to be in unison with the first harmonic of an open pipe. The ratio of lengths of closed pipe to that of the open pipe is $\frac{5}{x}$. The value of x is _____.

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- (1) 1 (2) 2 (3) 3 (4) 4

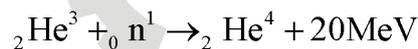
Ans. Official answer NTA (2)

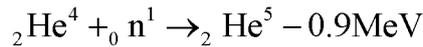
Sol. $5f_{\text{closed}} = f_{\text{open}}$

$$5 \cdot \frac{v}{4L_{\text{closed}}} = \frac{v}{2L_{\text{open}}} \Rightarrow \frac{L_{\text{closed}}}{L_{\text{open}}} = \frac{5}{2}$$

Question ID : 444792643

44. The binding energy for the following nuclear reactions are expressed in MeV.





If X_3, X_4, X_5 denote the stability of ${}_2\text{He}^3, {}_2\text{He}^4$ and ${}_2\text{He}^5$, respectively, then the correct order is :

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- (1) $X_4 > X_5 > X_3$ (2) $X_4 = X_5 = X_3$ (3) $X_4 < X_5 < X_3$ (4) $X_4 > X_5 < X_3$

Ans. Official answer NTA (1)

Sol. More energy is released in formation of ${}_2\text{He}^4$ by ${}_2\text{He}^3$

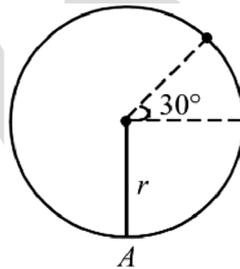
$\therefore x_4$ is highest.

Also, small energy is released in formation of ${}_2\text{He}^4$ by ${}_2\text{He}^5$

$\therefore x_4 > x_5 > x_3$

Question ID : 444792630

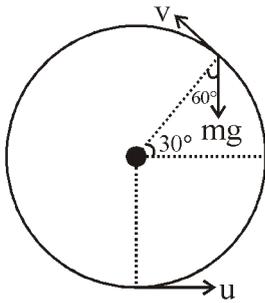
45. In case of vertical circular motion of a particle by a thread of length r if the tension in the thread is zero at an angle 30° shown in figure, the velocity at the bottom point (A) of the circular path is (gravitational acceleration)



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- (1) $\sqrt{\frac{7}{2}gr}$ (2) $\sqrt{\frac{5}{2}gr}$ (3) $\sqrt{5gr}$ (4) $\sqrt{4gr}$

Ans. Official answer NTA (1)

**Sol.**

$$\text{for } T = 0, mg \cos 60^\circ = \frac{mv^2}{r}$$

$$\therefore \frac{1}{2}mv^2 = \frac{mgr}{4}$$

By energy conservation.

$$\frac{1}{2}mu^2 = \frac{1}{2}mv^2 + mg\left(r + \frac{r}{2}\right)$$

$$= \frac{mgr}{4} + \frac{3}{2}mgr \Rightarrow u = \sqrt{\frac{7}{2}gr}$$

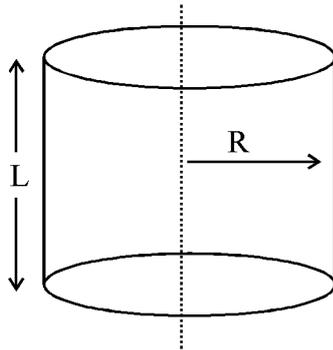
SECTION - B

Question ID : 444792649

46. A uniform solid cylinder of length L and radius R has moment of inertia about its axis equal to I_1 . A small co-centric cylinder of length $L/2$ and radius $R/3$ carved from this cylinder has moment of inertia about its axis equals to I_2 . The ratio I_1/I_2 is

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Ans. Official answer NTA (162)

**Sol.**

$$I_1 = \frac{1}{2}MR^2, \quad M = \rho \times \pi R^2 L$$

$$\therefore I_1 = \frac{1}{2}\rho\pi R^4 L$$

$$I_2 = \frac{1}{2}\rho\pi\left(\frac{R}{3}\right)^4 \cdot \left(\frac{L}{2}\right) = \frac{I_1}{162}$$

Question ID : 444792647

47. When 300 J of heat given to an ideal gas with $C_p = \frac{7}{2}R$ its temperature raises from 20°C to 50°C keeping its volume constant. The mass of the gas is (approximately) _____ g.

$$(R = 8.314 \text{ J/mol.K})$$

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Ans. Official answer NTA (481)

(Bonus or Drop)

Sol. \Rightarrow For isochoric process

$$Q = n C_v \Delta T$$

$$300 = n \cdot \frac{5R}{2} \cdot (50 - 20)$$

$$n = \left(\frac{4}{R}\right) \text{ mole}$$

$$\text{mass of gas} = \left(\frac{4}{R}\right) (\text{molecular weight})$$

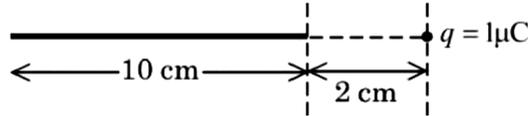
Note : molecular weight of gas is unknown in question.

Question ID : 444792646



48. A point charge $q = 1\mu\text{C}$ is located at a distance 2 cm from one end of a thin insulating wire of length 10 cm having a charge $Q = 24\mu\text{C}$, distributed uniformly along its length, as shown in figure. Force between

q and wire is _____ N. (Use: $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N.m}^2 / \text{C}^2$)



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Ans. Official answer NTA (90)

Sol. $\lambda = \frac{Q}{L}$

$$dF = \frac{Kq \cdot d\theta}{x^2} = \lambda dx$$

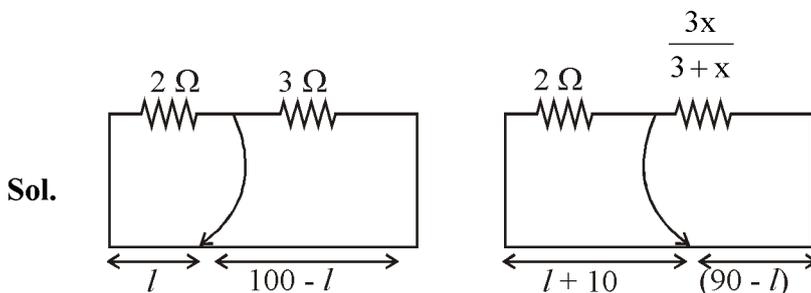
$$F = \int dF = \int_r^{r+L} \frac{kq \cdot \lambda dx}{x^2} = 90$$

Question ID : 444792650

49. In a meter bridge experiment to determine the value of unknown resistance, first the resistances 2Ω and 3Ω are connected in the left and right gaps of the bridge and the null point is obtained at a distance l cm from the left. Now when an unknown resistance $x\Omega$ is connected in parallel to 3Ω resistance, the null point is shifted by 10 cm to the right of wire. The value of unknown resistance x is Ω .

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Ans. Official answer NTA (6)





$$\frac{2}{\ell} = \frac{3}{100 - \ell}$$

$$\frac{2}{\ell + 10} = \frac{3x}{(3 + x)(90 - \ell)}$$

On solving,

$$x = 6$$

Question ID : 444792648

50. A soap bubble of surface tension 0.04 N/m is blown to a diameter of 7 cm . If $(15000 - x)\mu\text{J}$ of work is done in blowing it further to make its diameter 14 cm , then the value of x is _____ .

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Ans. Official answer NTA (11304)

Sol. $W = T\Delta A = 2T \cdot [\pi D_2^2 - \pi D_1^2]$

$$= 2\pi T [D_2^2 - D_1^2] = 2 \times \frac{22}{7} \times 0.04 [14^2 - 7^2] \times 10^{-4}$$

$$= 36.96 \times 10^{-4} = 3696 \mu\text{J} = 15000 - x$$

$$x = 11304$$