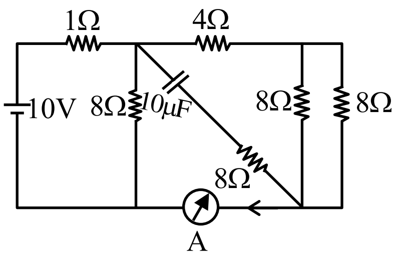
JEE–MAIN EXAMINATION – JANUARY 2026

(HELD ON SATURDAY 24th JANUARY 2026) **TIME : 3:00 PM TO 6:00 PM**

PHYSICS — TEST PAPER WITH SOLUTION

SECTION-A

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

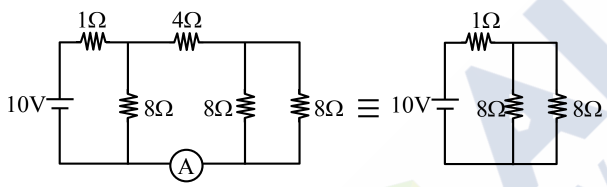


(1) 2 (2) 1

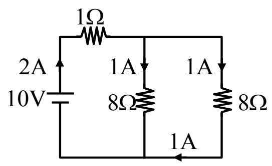
(3) 1/2 (4) 0

Ans. (2)

Sol. In steady state



I = 2A



Ammeter reading is 1A.

27. 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.

(1) 0.002 (2) 0.05

(3) 0.02 (4) 0.005

Ans. (1)

Sol. $LC = 1\text{ MSD} - 1\text{ MSD} = 1\text{ MSD} - \frac{48}{50}\text{MSD}$

$$= \frac{2}{50}\text{MSD} = \frac{2}{50} \times .05\text{mm} = 0.002\text{mm}$$

28. 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 +5D as (25,96), (30,62), (35,37), (45,35) and (50,32) respectively. Identify correct statement

(1) Readings recorded by all persons are correct

(2) Reading recorded by P_3 persons are incorrect

(3) Reading recorded by P_3 and P_2 persons are incorrect

(4) Reading recorded by P_4 and P_5 persons are incorrect

Ans. (2)

Sol. P = +5D

$$\frac{1}{f} = 5 \Rightarrow f = 20\text{ cm}$$

$\Rightarrow$ If object is between f & 2f image will be beyond 2f & magnified.

$\Rightarrow$ If object is beyond 2f, image will be between f & 2f & diminished.

Hence reading of P_3 are incorrect.

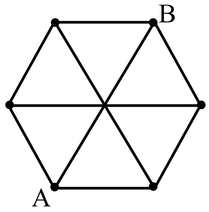
29. A regular hexagon is formed by six wires each of resistance r Ω and the corners are joined to centre by wires of same resistance. If the current enters at one corner and leaves at the opposite corner, the equivalent resistance of the hexagon between the two opposite corners will be

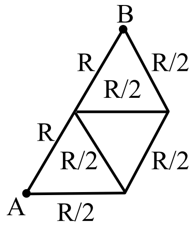
(1) $\frac{4}{5}r$ (2) $\frac{5}{8}r$

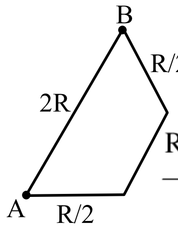
(3) $\frac{3}{4}r$ (4) $\frac{3}{5}r$

Ans. (1)

Sol.





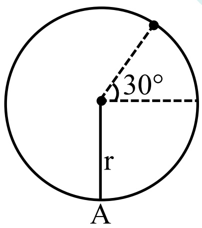


$$\frac{R \times \frac{R}{2}}{\frac{3R}{2}} = \frac{R}{3}$$

$$R_{eq} = \frac{2R \times \frac{4R}{3}}{2R + \frac{4R}{3}} = \frac{8R^2}{10R} = \frac{4}{5}R$$

30. 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

(g = gravitational acceleration)

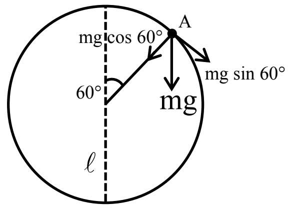


(1) $\sqrt{5gr}$ (2) $\sqrt{\frac{7}{2}gr}$

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

Ans. **(2)**

Sol.



$$T + mg\cos 60° = \frac{mV^2}{\ell}$$

$T = 0$

$V^2 = \frac{g\ell}{2}$ here V is the speed at point A

M.E.C.

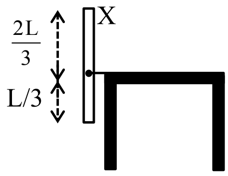
$$\frac{1}{2}mu^2 = mg(\ell + \ell\cos 60°) + \frac{1}{2}mV^2$$

$$u^2 = 3g\ell + \frac{g\ell}{2}$$

$$u = \sqrt{\frac{7g\ell}{2}}$$

31. A thin uniform rod (X) of mass M and length L is pivoted at a height $\left(\frac{L}{3}\right)$ 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)



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

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

Ans. **(4)**

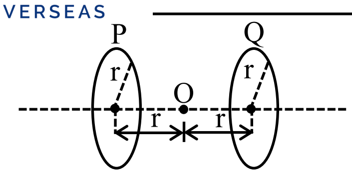
Sol. $mg\frac{\ell}{6} = \frac{1}{2}I\omega^2$

Here $I = \frac{m\ell^2}{12} + \frac{m\ell^2}{36} = \frac{m\ell^2}{9}$

$$mg\frac{\ell}{6} = \frac{m\ell^2}{18}\omega^2 \Rightarrow \omega^2 = \frac{3g}{\ell}$$

$$\omega = \sqrt{\frac{3g}{\ell}}$$

32.



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:

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

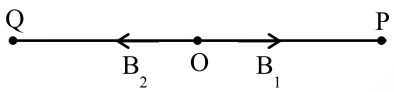
(2) $\frac{\mu_0 I}{4\sqrt{2}r}$ toward P

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

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

Ans. **(4)**

Sol. $B_{net} = B_1 - B_2$



$$= \frac{4\mu_0 iR^2}{2(R^2+R^2)^{3/2}} - \frac{\mu_0 iR^2}{2(R^2+R^2)^{3/2}}$$

$$= \frac{3\mu_0 i}{4\sqrt{2}R}$$

33. 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.

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

(1) 2.9×10^{-8} (2) 2.2×10^{-8}

(3) 3.1×10^{-7} (4) 2.5×10^{-7}

Ans. **(4)**

Sol. $q.(3.2) = \frac{hc}{\lambda} - \phi$ ...(1)

$q(0.7) = \frac{hc}{2\lambda} - \phi$ ...(2)

Eq. (1) – Eq. (2)

$q.(2.5) = \frac{hc}{2\lambda}$

$2.5 = \left(\frac{hc}{e}\right)\left(\frac{1}{2\lambda}\right)$

$2.5 = \frac{12400}{2(\lambda)}$

$\lambda = \frac{12400}{5}$ Å

$\lambda = 2480$ Å

$\lambda = 2.48 \times 10^{-7}$ m

34. 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 5/x. The value of x is______.

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

Ans. **(2)**

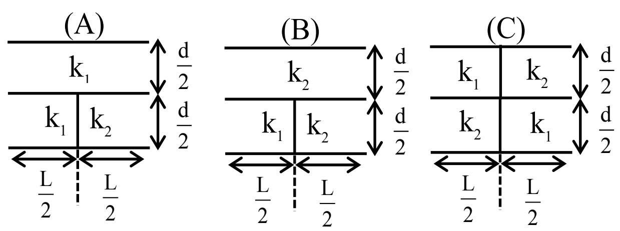
Sol. $f_{5\,closed} = f_{1\,open}$

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

$\frac{L_{closed}}{L_{open}} = \frac{5}{2}$

$x = 2$

35. 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? ($k_1 > k_2$)

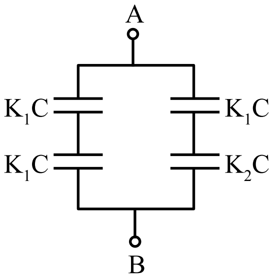


(1) $C_B > C_C > C_A$ (2) $C_C > C_B > C_A$

(3) $C_C > C_A > C_B$ (4) $C_A > C_C > C_B$

Ans. **(4)**

Sol. For C_A :

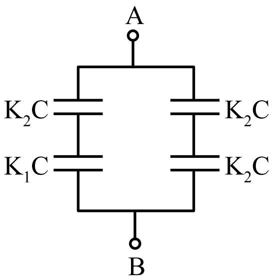


Let $\frac{\varepsilon_0 A}{d} = C$

$$\therefore \quad C_A = \frac{K_1 C}{2} + \frac{K_1 K_2 C}{K_1 + K_2}$$

$$= K_1 C\left[\frac{K_1 + 2K_2}{2(K_1 + K_2)}\right]$$

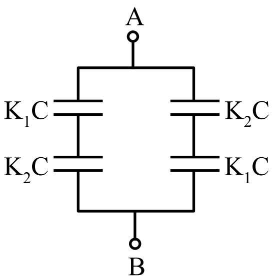
For C_B :



$$C_B = \frac{K_2 C}{2} + \frac{K_1 K_2 C}{K_1 + K_2}$$

$$= K_2 C\left[\frac{K_1 + 2K_2}{2(K_1 + K_2)}\right]$$

For C_C :



$$C_C = \frac{2K_1 K_2 C}{(K_1 + K_2)}$$

$C_A > C_C > C_B$

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

${}_2He^3 + {}_0n^1 \rightarrow {}_2He^4 + 20$ MeV

${}_2He^4 + {}_0n^1 \rightarrow {}_2He^5 - 0.9$ MeV

If X_3, X_4, X_5 denote the stability of ${}_2He^3$, ${}_2He^4$ and ${}_2He^5$, respectively, then the correct order is :

(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. **(1)**

Sol. $BE_{He^4} - BE_{He^3} = 20\text{MeV}$ ...(1)

$BE_{He^5} - BE_{He^4} = -0.9\text{MeV}$ ...(2)

From eq (1) & (2)

$BE_{He^4} > BE_{He^5} > BE_{He^3}$

$X_4 > X_5 > X_3$

37. A cubical block of density ρ_b = 600 kg/m^3 floats in a liquid of density ρ_e = 900 kg/m^3. If the height of block is H = 8.0 cm then height of the submerged part is _____ cm.

(1) 7.3 (2) 4.3

(3) 6.3 (4) 5.3

Ans. **(4)**

Sol. $Mg = F_b$

$dAHg = \rho Ahg$

$600 \times 8 \text{ cm} = 900 \times h$

$$h = \frac{16}{3} \text{ cm}$$

$h = 5.3$ cm

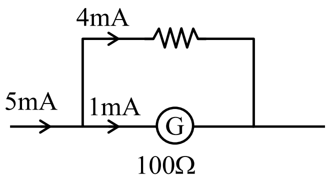
38. A moving coil galvanometer of resistance 100 Ω shows a full scale deflection for a current of 1 mA. The value of resistance required to convert this galvanometer into an ammeter, showing full scale deflection for a current of 5 mA, is _____ Ω

(1) 25 (2) 10

(3) 0.5 (4) 2.5

Ans. **(1)**

Sol.



$G = 100\ \Omega$

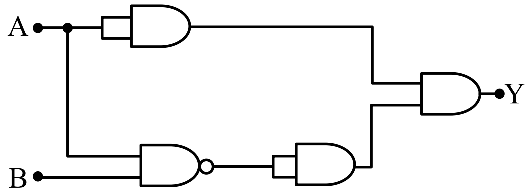
$i_g = 1mA$

$i = 5mA$

$$r_s = \frac{G}{\left(\frac{i}{i_g} - 1\right)}$$

$$= \frac{100}{\left(\frac{5}{1} - 1\right)} = 25\Omega$$

39. Identify the correct truth table of the given logical circuit.



(1)

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

(2)

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

(3)

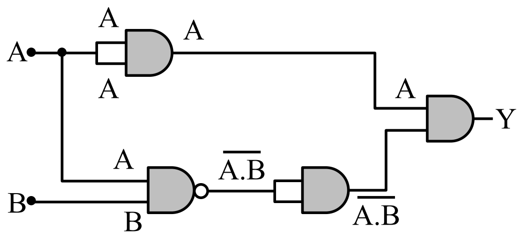
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(4)

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

Ans. (4)

Sol.



$y = A.\ \overline{A.B}$

$= A.\left(\bar{A} + \bar{B}\right) = 0 + A\bar{B}$

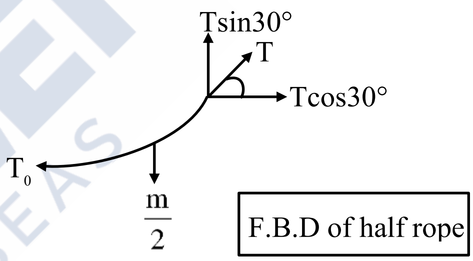
A	B	Y
0	0	0
0	1	0
1	0	1
1	1	0

40. 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 _____.

(1) $\frac{\sqrt{3}}{2}mg$ (2) $\frac{1}{2}mg$ (3) mg (4) $\sqrt{3}\,mg$

Ans. (1)

Sol.



$$T\sin 30° = \frac{m}{2}g$$

$$T\cos 30° = T_0$$

$$\tan 30° = \frac{mg}{2T_0}$$

$$T_0 = \frac{\sqrt{3}}{2}mg$$

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

(1) increase by 8 times (2) increase by 64 times

(3) decrease by 8 times (4) decrease by 4 times

Ans. (4)

Sol. $V \rightarrow 8V \Rightarrow R \rightarrow 2R$

$\Rightarrow A \rightarrow 4A$

$\Rightarrow I \rightarrow \frac{I_0}{4}$

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 Å. The intensity of light on the screen in front of one of the slits is ____.

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

Ans. (2)

Sol. d = 2mm

D = 10 m

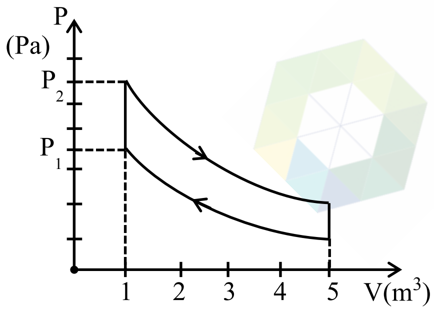
$\lambda = 6000$ Å

$y = \frac{d}{2}$ (in front of one slit)

$$I = 4I_0 \cos^2\left(\frac{2\pi}{\lambda}.\frac{y}{D}d\right)$$

$\Rightarrow I = I_0$

43. 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 is α Joule (P_1 = 21.7 Pa and P_2 = 30 Pa, C_v = 21 J/K.mol, R = 8.3 J/mol.K). The value of α is ____.



(1) 24 (2) 15 (3) 21 (4) 28

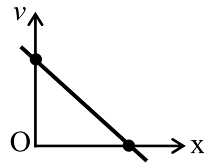
Ans. (3)

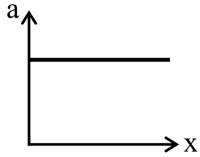
Sol. $\Delta Q = nC_v\Delta T$ (isochoric)

$$= \frac{C_v}{R}.nR\Delta T = \frac{C_v}{R}(P_2 - P_1)V$$

$$= \frac{21}{8.3}\times(30-21.7)\times1 = 21J$$

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



(1)


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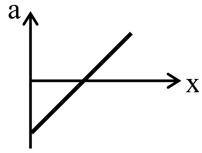
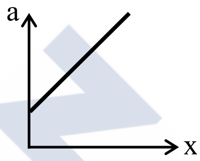
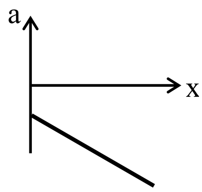
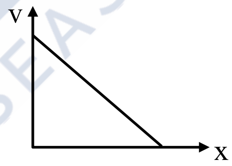


(3)


(4)


Ans. (2)

Sol.



Eq. of V vs x from graph

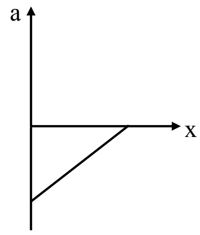
$V = C_1 - C_2x$

$$a = V\frac{dV}{dx}$$

$= (C_1 - C_2x) \times - C_2$

$a = C_2^2x - C_1C_2$

$\therefore$ graph is straight line +ve solve –ve intercept



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

(1) – 15/2 (2) – 10

(3) – 20 (4) – 15

Ans. (4)

Sol. $m = -3 = \frac{v}{u}$

$v = -3u$

$|v| - |u| = 40$

$u = 20$ cm

$v = 60$ cm

$\therefore \frac{1}{v} + \frac{1}{u} = \frac{1}{f}$

$\frac{1}{-60} + \frac{1}{-20} = \frac{1}{f}$

$f = -15$ cm

SECTION-B

46. 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 J/mol.K).

NTA Ans. (481)

Allen Ans. (Bonus)

Sol. $C_V = C_P - R = \frac{5}{2}R$

$\Delta Q = nC_V \Delta T$

$300 = n \times \frac{5}{2} \times 8.314 \times 30$

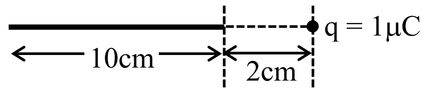
$n = 0.48$

$\frac{m}{M} = 0.48$

We cannot find mass (m) because molar mass (M) not given.

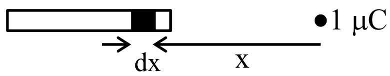
47. A point charge q = 1 μC is located at a distance 2 cm from one end of a thin insulating wire of length 10 cm having a charge *Q* = 24 μC, distributed uniformly along its length, as shown in figure. Force between q and wire is ____ N.

(Use $\frac{1}{4\pi \in_0} = 9 \times 10^9 \text{N.m}^2/\text{C}^2$)



Ans. (90)

Sol.



$$F = \int dF = \int_{2cm}^{12cm} \frac{kq\lambda dx}{x^2} = kq\lambda\left(\frac{1}{2 \times 10^{-2}} - \frac{1}{12 \times 10^{-2}}\right)$$

$$F = (9 \times 10^9)(10^{-6})\left(\frac{24 \times 10^{-6}}{10^{-1}}\right)\left(\frac{5}{12}\right) \times 10^2$$

$$= 9 \times 24 \times \frac{5}{12} = 90\text{N}$$

48. In a meter bridge experiment to determine the value of unknown resistance, first the resistances 2 Ω and 3 Ω 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 Ω is connected in parallel to 3 Ω resistance, the null point is shifted by 10 cm to the right of wire. The value of unknown resistance x is ___ Ω.

Ans. (6)

Sol. In case I

$\frac{2}{3} = \frac{\ell}{(100 - \ell)}$ ......(1)

$\ell = 40$ cm

In case II

$\frac{2}{R} = \frac{\ell + 10}{100 - (\ell + 10)}$

Put $\ell = 40$ cm & solve

$R = 2\Omega$

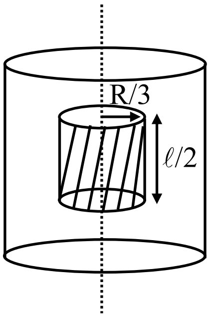
$\therefore \frac{3x}{3 + x} = 2$

$x = 6\Omega$

49. 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 _____.

Ans. **(162)**

Sol.



Original mass (M)

The removed mass (m)

$$m = \rho \times \pi \left(\frac{R}{3}\right)^2 \times \frac{L}{2}$$

$$= \frac{\rho.\pi R^2 L}{18} = \frac{M}{18}$$

$$I' = \frac{1}{2}.\frac{M}{18}.\frac{R^2}{9} = \frac{1}{324} MR^2$$

$$\frac{I}{I'} = \frac{\frac{1}{2}MR^2}{\frac{1}{324}MR^2} = 162$$

50. A soap bubble of surface tension 0.04 N/m is blown to a diameter of 7 cm. If (15000 – x) μJ of work is done in blowing it further to make its diameter 14 cm, then the value of x is ____.

($\pi = 22/7$)

Ans. **(11304)**

Sol. $W = \Delta u$

$$= S \times \left(8\pi r_2^2 - 8\pi r_1^2\right)$$

$$= 0.04 \times 2 \times \frac{22}{7}(147) \times 10^{-4}$$

$$W = 3696 \times 10^{-6}\ J$$

$$3696 = 15000 - x$$

$$x = 11304\ \mu J$$