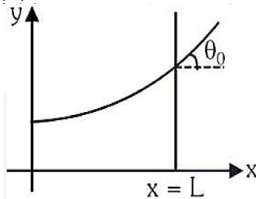


NEET 2025 Paper-(PCB)

Instructions:

1. Consider a water tank shown in the figure. It has one wall at $x = L$ and can be taken to be very wide in the z direction. When filled with a liquid of surface tension S and density ρ , the liquid surface makes angle θ_0 ($\theta_0 \ll 1$) with the x -axis at $x = L$. If $y(x)$ is the height of the surface then the equation for $y(x)$ is:



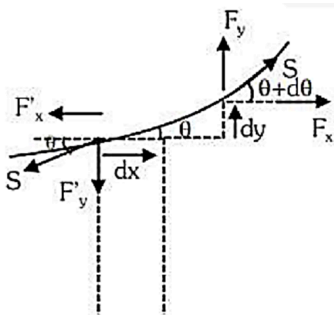
(take $\theta(x) = \sin \theta(x) = \tan \theta(x) = \frac{dy}{dx}$, g is the acceleration due to gravity)

- (A) $\frac{d^2 y}{dx^2} = \frac{\rho g}{S} x$
 (B) $\frac{d^2 y}{dx^2} = \frac{\rho g}{S} y$
 (C) $\frac{d^2 y}{dx^2} = \sqrt{\frac{\rho g}{S}}$
 (D) $\frac{dy}{dx} = \sqrt{\frac{\rho g}{S} x}$

NEET 2025

Correct Option: B

Solution:



For the given element, (consider length d in Z direction)

Net force in upward direction = Weight

Weight

$$(S \sin(\theta + d\theta) - S \sin \theta) d = mg$$

Angle is small $\therefore \sin \theta \approx \theta$

$$\Rightarrow \frac{d\theta}{y dx} = \frac{\rho g}{S} \quad \dots\dots(1)$$

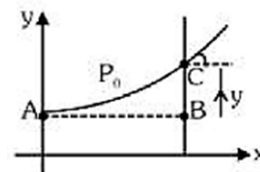
$$\tan \theta = \frac{dy}{dx} \Rightarrow \text{Differentiating wrt } x$$

$$\sec^2 \theta \frac{d\theta}{dx} = \frac{d^2 y}{dx^2} \quad \dots\dots(2)$$

Put $d\theta$ from (2) in (1) and take $\cos \theta \approx 1$, we get

$$\frac{d^2 y}{dx^2} = \frac{\rho g y}{S}$$

Alternative Solution



$$P_A = P_B = P_0$$

$$P_C = P_0 - \rho g y$$

$$P_C = P_0 - \frac{S}{R}$$

$$\rho g y = \frac{S}{R}$$

$$\rho g y = S \frac{d^2 y}{dx^2}$$

$$\frac{d^2 y}{dx^2} = \frac{\rho g y}{S}$$

$$R = \frac{\{1 + (\frac{dy}{dx})^2\}^{3/2}}{\frac{d^2 y}{dx^2}}$$

dy/dx is very small

$$R = \frac{1}{d^2 y / dx^2}$$

$$\frac{d^2 y}{dx^2} = \frac{1}{R}$$

2. A microscope has an objective of focal length 2 cm, eyepiece of focal length 4 cm and the tube length of 40 cm. the distance of distinct vision of eye is 25 cm, the magnification in the microscope is:

- (A) 100 (B) 125 (C) 150 (D) 250

NEET 2021

Correct Option: B

Solution:

$$f_0 = 2\text{ cm}, \quad f_e = 4\text{ cm}$$

$$L = 40\text{ cm}, \quad D = 25\text{ cm}$$

In the condition of normal adjustment.

$$\begin{aligned} m &= \frac{L}{f_0} \cdot \frac{D}{f_e} \\ &= \frac{40}{2} \times \frac{25}{4} \\ &= 125 \end{aligned}$$

3. An electron (mass $9 \times 10^{-31}\text{ kg}$ and charge $1.6 \times 10^{-19}\text{ C}$) moving with speed $c/100$ (c = speed of light) is injected into a magnetic field $\vec{B}$ of magnitude $9 \times 10^{-4}\text{ T}$ perpendicular to its direction of motion. We wish to apply an uniform electric field $\vec{E}$ together with the magnetic field so that the electron does not deflect from its path. Then (speed of light $c = 3 \times 10^8\text{ ms}^{-1}$)

- (A) $\vec{E}$ is perpendicular to $\vec{B}$ and its magnitude is $27 \times 10^4\text{ V m}^{-1}$
 (B) $\vec{E}$ is perpendicular to $\vec{B}$ and its magnitude is $27 \times 10^2\text{ V m}^{-1}$
 (C) $\vec{E}$ is parallel to $\vec{B}$ and its magnitude is $27 \times 10^2\text{ V m}^{-1}$
 (D) $\vec{E}$ is parallel to $\vec{B}$ and its magnitude is $27 \times 10^4\text{ V m}^{-1}$

NEET 2025

Correct Option: B

Solution:

For particle To Remain undeflected

$$\begin{aligned} \vec{F}_e &= -\vec{F}_m \\ \Rightarrow |\vec{E}| &= VB \sin \theta \\ E &= \frac{c}{100} \times 9 \times 10^{-4} \sin 90 \\ E &= 27 \times 10^2\text{ V/m and} \\ \vec{E} &= \vec{B} \times \vec{V} \end{aligned}$$

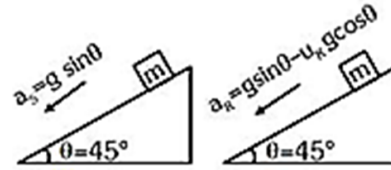
4. There are two inclined surface of equal length (L) and same angle of inclination 45° with the horizontal. One of them is rough and the other is perfectly smooth. A given body takes 2 times as much time to slide down on rough surface than on the smooth surface. The coefficient of kinetic friction (μ_k) between the object and the rough surface is close to :

- (A) 0.25 (B) 0.40 (C) 0.5 (D) 0.75

NEET 2025

Correct Option: D

Solution:



$$\begin{aligned} L &= \frac{1}{2} a_s t_s^2 = \frac{1}{2} a_r t_r^2 \\ \Rightarrow \left(\frac{t_s}{t_r} \right)^2 &= \frac{a_r}{a_s} \\ \Rightarrow \left(\frac{1}{2} \right)^2 &= \frac{g \sin \theta - \mu_k g \cos \theta}{g \sin \theta} \\ \Rightarrow \frac{1}{4} &= \frac{\sin 45^\circ - \mu_k \cos 45^\circ}{\sin 45^\circ} \\ \Rightarrow \frac{1}{4} &= \frac{\left(\frac{1}{\sqrt{2}} \right)}{\left(\frac{1}{\sqrt{2}} \right)} \left(\frac{1 - \mu_k}{1} \right) \\ \Rightarrow \frac{1}{4} &= 1 - \mu_k \Rightarrow \mu_k = 1 - \frac{1}{4} = \frac{3}{4} = 0.75 \end{aligned}$$

5. The kinetic energies of two similar cars A and B are 100 and 225 J respectively. On applying brakes, car A stops after 1000 m and car B stops after 1500 m. If F_A and F_B are the forces applied by the brakes on cars A and B, respectively, then the ratio F_A/F_B is:

- (A) $\frac{3}{2}$ (B) $\frac{2}{3}$
 (C) $\frac{1}{3}$ (D) $\frac{1}{2}$

NEET 2024

Correct Option: B

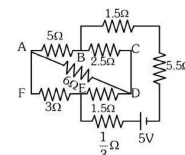
Solution:

$$\therefore \text{W.D.} = \Delta \text{KE}$$

$$\vec{F} \cdot \vec{S} = \Delta \text{KE}$$

$$\begin{aligned} \frac{(\Delta \text{KE})_A}{(\Delta \text{KE})_B} &= \frac{-F_A S_A}{-F_B S_B} \\ \frac{-100}{-225} &= \frac{-F_A (1000)}{-F_B (1500)} \\ \frac{F_A}{F_B} &= \frac{2}{3} \end{aligned}$$

6. The current passing through the battery in the given circuit, is :

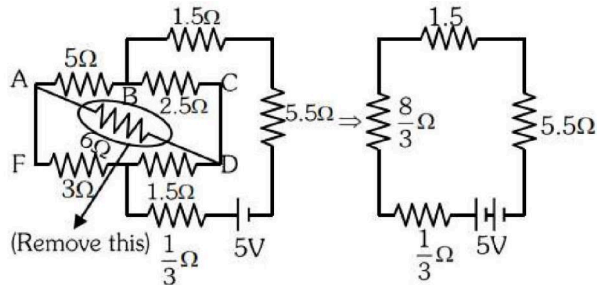


- (A) 2.0 A (B) 0.5 A (C) 2.5 A (D) 1.5 A

NEET 2025

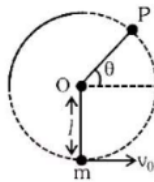
Correct Option: B**Solution:**

Simplified Diagram



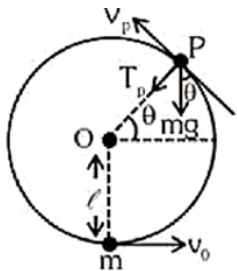
$$i = \frac{V}{R_{eq}} = \frac{5}{\frac{1}{3} + \frac{8}{3} + 1.5 + 5.5} = \frac{5}{10} = 0.5 \text{ A}$$

7. A bob of heavy mass m is suspended by a light string of length l . The bob is given a horizontal velocity v_0 as shown in figure. If the string gets slack at some point P making an angle θ from the horizontal, the ratio of the speed v of the bob at point P to its initial speed v_0 is:



- (A) $(\sin \theta)^{\frac{1}{2}}$
 (B) $(\frac{1}{2+3 \sin \theta})^{\frac{1}{2}}$
 (C) $(\frac{\cos \theta}{2+3 \sin \theta})^{\frac{1}{2}}$
 (D) $(\frac{\sin \theta}{2+3 \sin \theta})^{\frac{1}{2}}$

NEET 2025

Correct Option: D**Solution:**

$$C.O.M.E. \quad \frac{1}{2}mv_0^2 = mgl(1 + \sin \theta) + \frac{1}{2}mv_p^2$$

$$\text{At pt P } T_p + mg \sin \theta = \frac{mv_p^2}{l} \quad (\text{as } T_p = 0)$$

$$mg \sin \theta = \frac{mv_p^2}{l} \Rightarrow mv_p^2 = mgl \sin \theta$$

From (i) & (ii)

$$\frac{1}{2}mv_0^2 = mgl(1 + \sin \theta) + \frac{1}{2}mv_p^2$$

$$v_0^2 = 2gl(1 + \sin \theta) + v_p^2$$

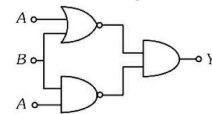
$$v_0 = \sqrt{2gl + v_p^2}$$

$$v_p = \sqrt{gl \sin \theta}$$

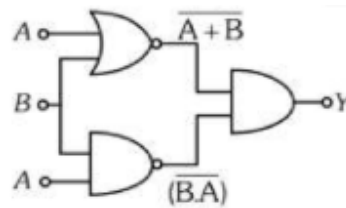
$$v_0 = \sqrt{2gl + gl \sin \theta}$$

$$\frac{v_p}{v_0} = \sqrt{\frac{\sin \theta}{2 + 3 \sin \theta}}$$

8. The output (Y) of the given logic implementation is similar to the output of an/an _____ gate.



- (A) AND (B) NAND (C) OR (D) NOR

NEET 2025**Correct Option: D****Solution:**

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

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

$$\Rightarrow \overline{A} \cdot \overline{B} \cdot \overline{A+B}$$

$$\Rightarrow \overline{A} \cdot \overline{B} + \overline{A} \cdot \overline{B}$$

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

Behaves as NOR gate

9. The electric field in a plane electromagnetic wave is given by

$$E_z = 60 \cos(5x + 1.5 \times 10^9 t) \text{ V/m.}$$

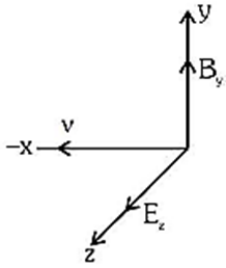
Then expression for the corresponding magnetic field (here subscripts denote the direction of the field) :

- (A) $B = 2 \times 10^{-7} \cos(5x + 1.5 \times 10^9 t) \text{ T}$
 (B) $B_y = 2 \times 10^{-7} \cos(5x + 1.5 \times 10^0 t) \text{ T}$
 (C) $B_z = 60 \cos(5x + 1.5 \times 10^9 t) \text{ T}$
 (D) $B_y = 60 \sin(5x + 1.5 \times 10^0 t) \text{ T}$

NEET 2025**Correct Option: A****Solution:**

$$v = \frac{\omega}{k} = \frac{1.5 \times 10^9}{5} = 3 \times 10^8 \text{ m/s}$$

$$B_0 = \frac{F_0}{v} = \frac{60}{3 \times 10^8} = 20 \times 10^{-8} = 2 \times 10^{-7} \text{ T}$$



$$B_y = 2 \times 10^{-7} \cos(5x + 1.5 \times 10^9 t) \text{ T}$$

10. A ball of mass 0.5 kg is dropped from a height of 40 m. The ball hits the ground and rises to a height of 10 m. The impulse imparted to the ball during its collision with the ground is (Take $g = 9.8 \text{ m/s}^2$)

(A) 21 NS (B) 7 NS (C) 0 (D) 84 NS

NEET 2025

Correct Option: A

Solution:

$$v_i = -\sqrt{2gh_i} = -\sqrt{2 \times 9.8 \times 10} = -28 \text{ m/s}$$

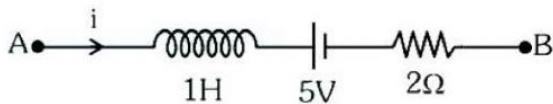
$$v_f = \sqrt{2gh_f} = \sqrt{2 \times 9.8 \times 10} = 14 \text{ m/s}$$

$$\vec{I} = \Delta \vec{P} = m\vec{v}_f - m\vec{v}_i$$

$$= m[\vec{v}_f - \vec{v}_i] = 0.5[14 - (-28)]$$

$$= 0.5 \times 42 = 21 \text{ NS}$$

11. AB is a part of an electrical circuit (see figure). The potential difference $V_A - V_B$, at the instant when current $i = 2 \text{ A}$ and is increasing at a rate of 1 amp/ second is :

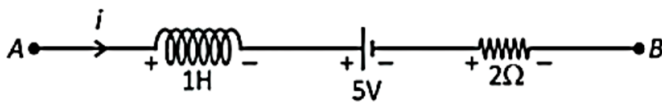


(A) 5 volt (B) 6 volt (C) 9 volt (D) 10 volt

NEET 2025

Correct Option: D

Solution:



Given, $I = 2 \text{ A}$ and $di/dt = +1 \text{ A/s}$

$$V_A - L(di/dt) - 5 - i \times 2 = V_B$$

$$\Rightarrow V_A - 1 \times 1 - 5 - 2 \times 2 = V_B$$

$$\Rightarrow V_A - V_B = 10 \text{ volt}$$

12. A 2 amp current is flowing through two different sm circular copper coils having radii ratio 1 : 2. The ratio their respective magnetic moments will be

(A) 1 : 4 (B) 1 : 2 (C) 2 : 1 (D) 4 : 1

NEET 2025

Correct Option: A

Solution:

$$\text{Magnetic moment } M = I \times (A)$$

$$M = I(\pi r^2)$$

$$\frac{M_1}{M_2} = \frac{I\pi r_1^2}{I\pi r_2^2} = \left(\frac{r_1}{r_2}\right)^2 = \left(\frac{1}{2}\right)^2$$

$$\frac{M_1}{M_2} = \frac{1}{4}$$

13. In a certain camera, a combination of four similar thin convex lenses are arranged axially in contact. Then the power of the combination and the total magnification in comparison to the power (p) and magnification (m) for each lens will be, respectively

(A) 4 p and 4 m (B) p^4 and $4m$

(C) $4p$ and m^4 (D) p^4 and m^4

NEET 2025

Correct Option: C

Solution:

When a combination of lens is used then total power

$$P_{net} = P + P + P + P \\ = 4P$$

$$\text{Total magnification } m_{net} = m \times m \times m \times m = m^4$$

14. An oxygen cylinder of volume 30 litre has 18.20 moles oxygen. After some oxygen is withdrawn from the cylinder, its gauge pressure drops to 11 atmospheric pressure at temperature 27°C . The mass of the oxygen withdrawn from the cylinder is nearly equal to:

[Given, $R = \frac{100}{12} \text{ J}^{-1} \text{ mol}^{-1}$, and molecular mass $O_2 = 32$, 1 atm pressure = $1.01 \times 10^5 \text{ N/m}^2$]

(A) 0.125 kg (B) 0.144 kg (C) 0.116 kg (D) 0.156 kg

NEET 2025

Correct Option: C

**Solution:**

$$n_f = \frac{P_f V}{RT} [P_{\text{abs}} = 12 \text{ atm}]$$

$$= \frac{12 \times 1.01 \times 10^5 \times 30 \times 10^{-3}}{\left(\frac{100}{12}\right) \times 300}$$

$$= 14.544$$

$$\therefore \text{moles removed} = 18.2 - 14.544 = 3.656$$

$$\therefore \text{mass removed} = 3.656 \times \frac{32}{1000} \text{ kg} = 0.116 \text{ kg}$$

15. In some appropriate units, time (t) and position (x) relation of a moving particle is given by $t = x^2 + x$. The acceleration of the particle is

(A) $-\frac{2}{(x+2)^3}$ (B) $-\frac{2}{(2x+1)^3}$
 (C) $+\frac{2}{(x+1)^3}$ (D) $+\frac{2}{2x+1}$

NEET 2025**Correct Option: B****Solution:**

$$t = x^2 + x$$

$$\frac{dt}{dx} = \frac{d}{dx} [x^2 + x]$$

$$\frac{1}{v} = 2x + 1$$

$$v = (2x + 1)^{-1}$$

$$a = \frac{v dv}{dx} = (2x + 1)^{-1} [-1(2x + 1)^{-2} \times 2]$$

$$a = -1(2x + 1)^{-3} \times 2$$

$$a = -2(2x + 1)^{-3}$$

$$= -\frac{2}{(2x+1)^3}$$

16. To an ac power supply of 220 V at 50 Hz, a resistor of 20Ω , a capacitor of reactance 25Ω and an inductor of reactance 45Ω are connected in series. The corresponding current in the circuit and the phase angle between the current and the voltage is, respectively

(A) 7.8 A and 30° (B) 7.8 A and 45°
 (C) 15.6 and 30° (D) 15.6 and 45°

NEET 2025**Correct Option: B****Solution:**

$$X_C = 25\Omega$$

$$X_L = 45\Omega$$

$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

$$Z = \sqrt{20^2 + (45 - 25)^2}$$

$$Z = 20\sqrt{2}$$

$$I_{ms} = \frac{V_{ms}}{Z} = \frac{220}{20\sqrt{2}} = \frac{11}{\sqrt{2}} = 7.8 \text{ A}$$

$$\tan \phi = \frac{X_L - X_C}{R} = \frac{45 - 25}{20} = \frac{20}{20} = 1$$

$$\phi = 45^\circ$$

17. The Sun rotates around its centre once in 27 days. What will be the period of revolution if the Sun were to expand to twice its present radius without any external influence? Assume the Sun to be a sphere of uniform density.

(A) 100 days (B) 105 days (C) 115 days (D) 108 days

NEET 2025**Correct Option: D****Solution:**

Assuming the Sun to be a solid sphere, $I = \frac{2}{5} mR^2$

Using conservation of angular momentum, $I'\omega' = I\omega$

$$\Rightarrow \frac{2}{5} m(2R)^2 \times \frac{2\pi}{T'} = \frac{2}{5} mR^2 \times \frac{2\pi}{T}$$

$$\Rightarrow T' = 4T = 4 \times 27 = 108 \text{ days}$$

18. A model for quantized motion of an electron in a uniform magnetic field B states that the flux passing through the orbit of the electron is $n(h/e)$ where n is an integer, h is Planck's constant and e is the magnitude of electron charge. According to the model, the magnetic moment of an electron in its lowest energy state will be (m is the mass of the electron)

(A) $\frac{he}{\pi m}$ (B) $\frac{he}{2\pi m}$
 (C) $\frac{heB}{\pi m}$ (D) $\frac{heB}{2\pi m}$

NEET 2025**Correct Option: B****Solution:**

$$\text{Magnetic force} = \frac{mv^2}{r}$$

$$evB = \frac{mv^2}{r}$$

$$v = \frac{eBr}{m}$$

$$\phi = BA$$

$$\frac{nh}{e} = B\pi r^2$$

$$Br^2 = \frac{nh}{e\pi}$$

$$\mu = IA$$

$$= \frac{e}{T}\pi r^2$$

$$= \frac{e \times v}{2\pi r} \pi r^2$$

$$\mu = \frac{evr}{2}$$

$$= \frac{1}{2} e \times \frac{eBr}{m}$$

$$\mu = \frac{1}{2} e^2 \frac{Br^2}{m}$$

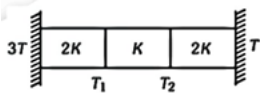
$$\mu = \frac{1}{2} e^2 \frac{nh}{e\pi m}$$

$$\mu = \frac{neh}{2\pi m}$$

$$\text{for } n = 1$$

$$\mu = \frac{eh}{2\pi m}$$

19. Three identical heat conducting rods are connected in series as shown in the figure. The rods on the sides have thermal conductivity $2K$ while that in the middle has thermal conductivity K . The left end of the combination is maintained at temperature $3T$ and the right end at T . The rods are thermally insulated from outside. In steady state, temperature at the left junction is T_1 and that at the right junction is T_2 . The ratio T_1/T_2 is



- (A) $\frac{3}{2}$ (B) $\frac{4}{3}$
(C) $\frac{5}{3}$ (D) $\frac{5}{4}$

NEET 2025

Correct Option: C**Solution:**

$$\text{In steady state} \Rightarrow \left(\frac{dQ}{dt}\right)_1 = \left(\frac{dQ}{dt}\right)_2 = \left(\frac{dQ}{dt}\right)_3$$

$$\frac{2KA(3T - T_1)}{L} = \frac{KA(T_1 - T_2)}{L} = \frac{2KA(T_2 - T)}{L}$$

$$6T - 2T_1 = T_1 - T_2 = 2T_2 - 2T$$

$$6T - 2T_1 = T_1 - T_2$$

$$6T + T_2 = 3T_1 \quad \dots (1)$$

$$T_1 - T_2 = 2T_2 - 2T$$

$$2T - 3T_2 = -T_1 \quad \dots (2)$$

Multiply equation (2) By '3'

$$6T - 9T_2 = -3T_1$$

Equation (1)-(3)

$$10T_2 = 6T_1$$

$$\frac{T_1}{T_2} = \frac{5}{3}$$

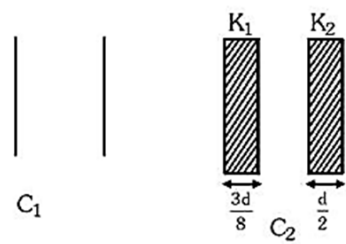
20. The plates of a parallel plate capacitor are separated by two slabs of different dielectric constants K_1 and with thickness $\frac{3}{8}d$ and $\frac{d}{2}$, respectively, are inserted in a capacitor. Due to this, the capacitance becomes two times larger than when there is nothing between the plates. (If $K_1 = 1.25K_2$, the value of K_1 is:)

- (A) 2.66 (B) 2.33 (C) 1.60 (D) 1.33

NEET 2025

Correct Option: A**Solution:**

$$C_1 = \epsilon_0 A/d$$



$$C_2 = \frac{\epsilon_0 A}{\frac{3d}{8K_1} + \frac{d}{2K_2} + (d - \frac{3d}{8} - \frac{d}{2})}$$

$$C_2 = \frac{\epsilon_0 A/d}{\frac{3}{8K_1} + \frac{1}{2K_2} + \frac{1}{8}}$$

$$= \frac{\epsilon_0 A/d}{\frac{3}{8K_1} + \frac{1}{2(\frac{4}{3}K_1)} + \frac{1}{8}}$$

$$C_2 = 2C_1$$

$$\frac{\epsilon_0 A/d}{\frac{3}{8K_1} + \frac{5}{8K_1} + \frac{1}{8}} = 2\epsilon_0 A/d$$

$$\Rightarrow \frac{1}{\frac{3}{K_1} + \frac{1}{8}} = 2 \Rightarrow \frac{1}{K_1} + \frac{1}{8} = \frac{1}{2} \Rightarrow K_1 = \frac{8}{3} = 2.66$$

21. Two cities X and Y are connected by a regular bus service with a bus leaving in either direction every T min. A girl is driving scooter with a speed of 60 km/h in the direction X to Y notices that a bus goes past her every 30 minutes in the direction of her motion, and every 10 minutes in the opposite direction. Choose the correct option for the period T of the bus service and the speed (assumed constant) of the buses.

- (A) 9 min, 40 km/h
(B) 25 min, 100 km/h
(C) 10 min, 90 km/h
(D) 15 min, 120 km/h

NEET 2025

Correct Option: D**Solution:**

City	City
X	Y

$$t_1 = 30 \text{ min} = \frac{1}{2} \text{ hr}$$

$$t_2 = 10 \text{ min} = \frac{1}{6} \text{ hr}$$

 $V_B = \text{Speed of Bus}$
 $V_s = \text{Speed of scooter (girl)}$

$$d = (V_B - V_s) t_1 = (V_B + V_s) t_2$$

$$\Rightarrow (V_B - 60) \frac{1}{2} = (V_B + 60) \frac{1}{6}$$

$$V_B - 180 = V_B + 60$$

$$2V_B = 240$$

$$\Rightarrow V_B = 120 \text{ km/hr Ans.}$$

$$\text{Distance} = (V_B - V_s) t_1$$

$$D = (120 - 60) \frac{1}{2} = 30 \text{ km}$$

$$t = \frac{d}{V_B} = \frac{30}{120} = \frac{1}{4} \text{ hr} = 15 \text{ min Ans.}$$

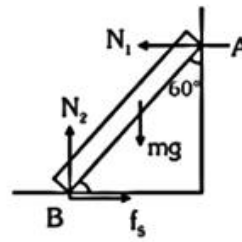
22. A uniform rod of mass 20 kg and length 5 m leans against a smooth vertical wall making an angle of 60° with it. The other end rests on a rough horizontal floor. The friction force that the floor exerts on the rod is (take $g = 10 \text{ m/s}^2$)

- (A) 100 N (B) $100\sqrt{3}$ N
(C) 200 N (D) $200\sqrt{3}$ N

NEET 2025

Correct Option: B**Solution:**

$$N_2 = mg = 200 \text{ N}$$



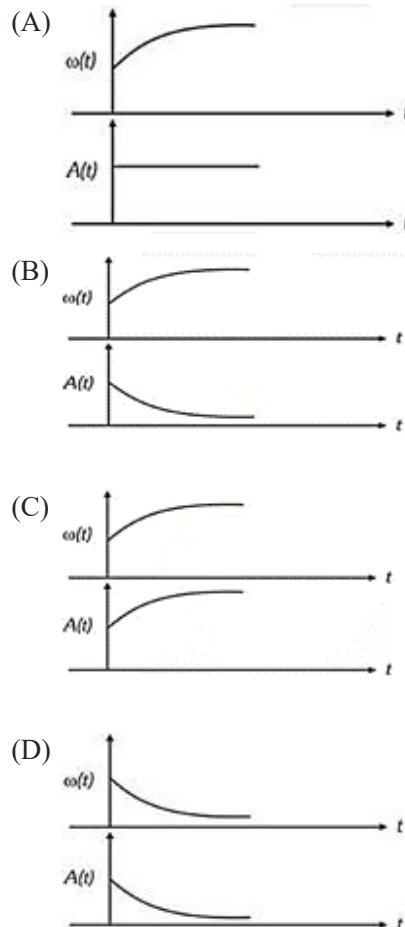
Taking torque about A :

$$f_s L \cos 60^\circ + mg \frac{L}{2} \sin 60^\circ = N_2 L \sin 60^\circ$$

$$f_s \left(\frac{1}{2}\right) + 200 \left(\frac{1}{2}\right) \frac{\sqrt{3}}{2} = 200 \frac{\sqrt{3}}{2}$$

$$f_s = 100\sqrt{3} \text{ N}$$

23. In an oscillating spring mass system, a spring is connected to a box filled with sand. As the box oscillates sand leaks slowly out of the box vertically so that the average frequency $\omega(t)$ and average amplitude $A(t)$ of the system change with time t . Which one of the following options schematically depicts these changes correctly?

**Correct Option: B**

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Solution:

$$\omega = \sqrt{\frac{k}{m}}$$

$$\therefore m \downarrow \Rightarrow \omega \uparrow$$



$$\therefore E = \frac{1}{2}kA^2$$

The part of sand being removed takes away a part of energy.

$\therefore$ Total energy decreases.

$\therefore$ Energy of SHM decreases

As a result Amplitude also decreases.



24. A balloon is made of a material of surface tension S and its inflation outlet (from where gas is filled in it) has small area A . It is filled with a gas of density ρ and takes a spherical shape of radius R . When the gas is allowed to flow freely out of it, its radius changes from R to 0 (zero) in time T . If the speed $v(r)$ of gas coming out of the balloon depends on r as r^2 and $T \propto S^0 A^0 \rho^0 R^0$ then

- (A) $a = \frac{1}{2}, \alpha = \frac{1}{2}, \beta = -1, \gamma = +1, \delta = \frac{3}{2}$
 (B) $a = -\frac{1}{2}, \alpha = -\frac{1}{2}, \beta = -1, \gamma = -\frac{1}{2}, \delta = \frac{5}{2}$
 (C) $a = -\frac{1}{2}, \alpha = -\frac{1}{2}, \beta = -1, \gamma = \frac{1}{2}, \delta = \frac{7}{2}$
 (D) $a = \frac{1}{2}, \alpha = \frac{1}{2}, \beta = -\frac{1}{2}, \gamma = \frac{1}{2}, \delta = \frac{7}{2}$

NEET 2025**Correct Option: C****Solution:**

$$T \rightarrow \text{Time} [T^1]$$

$$S \rightarrow \text{Surface Tension } S = \frac{F}{\ell} = \frac{[M^1 L^1 T^{-2}]}{[L^1]} = [M^1 T^{-2}]$$

$$A \rightarrow \text{Area} [L^2]$$

$$\rho \rightarrow \text{density} [M^1 L^{-3}]$$

$$R \rightarrow \text{Radius} [L^1]$$

With Dimensional Analysis $\rightarrow$

$$T \propto S^a A^\beta \rho^\gamma R^\delta$$

$$[M^0 L^0 T^1] = [MT^{-2}]^a [L^2]^\beta [ML^{-3}]^\gamma [L]^\delta$$

$$[M^0 L^0 T^1] = [M^{a+\gamma} L^{2\beta+\delta-3\gamma} T^{-2a}]$$

$$\Rightarrow -2a = 1 \quad a + \gamma = 0$$

$$\Rightarrow a = -\frac{1}{2} \quad \gamma = -a = \frac{1}{2}$$

$$2\beta + \gamma - 3\gamma = 0$$

$$2\beta + \delta - 3\left(\frac{1}{2}\right) = 0$$

$$2\beta + \delta = \frac{3}{2}$$

25. Consider the diameter of a spherical object being measured with the help of a Vernier callipers. Suppose its Vernier Scale Divisions (V.S.D.) are equal to its 9 Main Scale Divisions (M.S.D.) The least division in the M.S. is 0.1 cm and the zero of V.S. is at $x = 0.1$ cm when the jaws of Vernier callipers are closed.

If the main scale reading for the diameter is $M = 5.0$ cm and the number of coinciding vernier division is 8, the measured diameter after zero error correction is:

- (A) 5.18 cm (B) 5.08 cm (C) 4.98 cm (D) 5.00 cm

NEET 2025**Correct Option: C****Solution:**

$$10 \text{ V.S.D.} = 9 \text{ M.S.D.}$$

$$1 \text{ M.S.D.} = 0.1 \text{ cm (Given)}$$

$$1 \text{ V.S.D.} = \frac{9}{10} \text{ M.S.D.}$$

$$1 \text{ V.S.D.} = 0.9 \times 0.1 \text{ cm}$$

$$\therefore \text{V.S.D.} = 0.09 \text{ cm}$$

$$\text{L.C.} = 1 \text{ M.S.D.} - 1 \text{ V.S.D.}$$

$$= (0.1 - 0.09) \text{ cm}$$

$$= 0.01 \text{ cm}$$

$$\text{Reading} = 5.08 \text{ cm}$$

$$\text{Positive zero error} = 0.1 \text{ cm (Given)}$$

$$\therefore \text{Final Corrected reading} = (5.08 - 0.1) \text{ cm}$$

$$= 4.98 \text{ cm}$$

26. A parallel plate capacitor made of circular plates is being charged such that the surface charge density on its plates is increasing at a constant rate with time. The magnetic field arising due to displacement current is :

- (A) zero at all places
- (B) constant between the plates and zero outside the plates
- (C) non-zero everywhere with maximum at the imaginary cylindrical surface connecting peripheries of the plates
- (D) zero between the plates and non-zero outside

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Correct Option: C**Solution:**

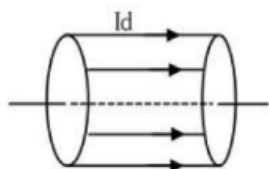
$$I_d = \epsilon_0 \frac{d\phi_e}{dt} = \epsilon_0 \frac{d}{dt} (EA \cos 0^\circ)$$

$$I_d = \epsilon_0 A \frac{dE}{dt}$$

$$\because E = \frac{\sigma}{\epsilon_0}; I_d = \epsilon_0 A \frac{d}{dt} \left(\frac{\sigma}{\epsilon_0} \right)$$

$$\Rightarrow I_d = A \left(\frac{d\sigma}{dt} \right) = \text{constant}$$

Also B due to I_d is max at surface of imaginary cylinder



27. An unpolarized light beam travelling in air is incident on a medium of refractive index 1.73 at Brewster's angle. Then -

- (A) reflected light is completely polarized and the angle of reflection is close to 60°
- (B) reflected light is partially polarized and the angle of reflection is close to 30°
- (C) both reflected and transmitted light are perfectly polarized with angles of reflection and refraction close to 60° and 30° , respectively
- (D) transmitted light is completely polarized with angle of refraction close to 30°

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Correct Option: A**Solution:**

When unpolarised light is incident on a medium of refractive index 1.73 at Brewster's angle then reflected light is completely polarised.

Using Brewster's Law

$$\mu = \tan(i_p)$$

$$1.73 = \tan(i_p)$$

$$i_p = 60^\circ$$

By Law of reflection,

$$i_p = r = 60^\circ$$

28. Two identical charged conducting spheres A and B have their centres separated by a certain distance. Charge on each sphere is q and the force of repulsion between them is F . A third identical uncharged conducting sphere is brought in contact with sphere A first and then with B and finally removed from both. New force of repulsion between spheres A and B (Radii of A and B are negligible compared to the distance of separation so that for calculating force between them they can be considered as point charges) is best given as:

- (A) $\frac{3F}{5}$
- (B) $\frac{2F}{3}$
- (C) $\frac{F}{2}$
- (D) $\frac{3F}{8}$

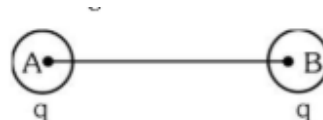
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Correct Option: D**Solution:**

$$F = \frac{kQ_1Q_2}{r^2}$$

$$\text{on touching ; } F' = \frac{k(Q/2)(3Q/4)}{r^2}$$

$$F' = \frac{3F}{8}$$



After touching $\rightarrow$

(A) & (C) $\rightarrow$

$$\text{Total charge} \rightarrow q + 0 = q$$

$$Q'_A = \frac{q}{2}, \quad Q'_C = \frac{q}{2}$$

(B) & (C)



$$\text{Total charge} = q + \frac{q}{2} = \frac{3}{2}q$$

$$Q'_B = \frac{3}{4}q \quad Q'_C = \frac{3}{4}q$$

29. A container has two chambers of volumes $V_1 = 2$ litres and $V_2 = 3$ litres separated by a partition made of a thermal insulator. The chambers contain $n_1 = 5$ and $n_2 = 4$ moles of ideal gas at pressures $p_1 = 1$ atm and $p_2 = 2$ atm, respectively. When the partition is removed, the mixture attains an equilibrium pressure of:

(A) 1.3 atm (B) 1.6 atm (C) 1.4 atm (D) 1.8 atm

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Correct Option: B

Solution:

By energy conservation

$$E_1 + E_2 = E_{\text{mix}}$$

$$\frac{n_1 f_1 R T_1}{2} + \frac{n_2 f_2 R T_2}{2} = \frac{(n_1 + n_2) f R T_{\text{mix}}}{2}$$

$$\Rightarrow \frac{3}{2} P_1 V_1 + \frac{3}{2} P_2 V_2 = \frac{3}{2} P_{\text{mix}} (V_1 + V_2)$$

$$\frac{3}{2} \times 1 \times 2 + \frac{3}{2} \times 2 \times 3 = \frac{3}{2} \times P_{\text{mix}} (5)$$

$$\therefore P_{\text{mix}} = \frac{8}{5}$$

$$P_{\text{mix}} = 1.6 \text{ atm}$$

30. A particle of mass m is moving around the origin with a constant force F pulling it towards the origin. If Bohr model is used to describe its motion, the radius r of the n^{th} orbit and the particle's speed v in the orbit depend on n as

(A) $r \propto n^{1/3}; v \propto n^{1/3}$

(B) $r \propto n^{1/3}; v \propto n^{2/3}$

(C) $r \propto n^{2/3}; v \propto n^{1/3}$

(D) $r \propto n^{4/3}; v \propto n^{-1/3}$

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Correct Option: C

Solution:

$$\frac{mv^2}{r} = F \quad \dots\dots(1)$$

$$mvr = \frac{nh}{2\pi} \Rightarrow v = \frac{nh}{2\pi mr} \quad \dots\dots\dots(2)$$

From equation (1):

$$\frac{m}{r} \left(\frac{nh}{2\pi mr} \right)^2 = F$$

$$\Rightarrow \frac{n^2 h^2}{4\pi^2 m F} = r^3 \Rightarrow r^3 \propto n^2$$

$$\Rightarrow r \propto n^{2/3}$$

From (2):

$$v \propto \frac{n}{r} \propto \frac{n}{n^{2/3}} \Rightarrow v \propto n^{1/3}$$

31. The radius of Martian orbit around the Sun is about times the radius of the orbit of Mercury. The Martian year is 687 Earth days. Then which of the following is the length of 1 year on Mercury ?

(A) 88 earth days (B) 225 earth days

(C) 172 earth days (D) 124 earth days

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Correct Option: A

Solution:

$$\frac{T_{\text{Mercury}}}{T_{\text{Martian}}} = \left(\frac{r_{\text{Mercury}}}{r_{\text{Martian}}} \right)^{3/2} = \left(\frac{1}{4} \right)^{3/2} = \frac{1}{8}$$

$$T_{\text{Mercury}} = \frac{T_{\text{Martian}}}{8} = \frac{687}{8} = 85.875 \text{ days} \approx 88 \text{ days}$$

32. A body weighs 48 N on the surface of the earth. The gravitational force experienced by the body due to earth at a height equal to one-third the radius of the earth from its surface is :

(A) 16 N (B) 27 N (C) 32 N (D) 36 N

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Correct Option: B

Solution:

$$W' = mg = mg \left(\frac{R}{R+h} \right)^2$$

$$= 48 \left(\frac{R}{R + \frac{R}{3}} \right)^2$$

$$= 48 \times \frac{9}{16} = 27 \text{ N}$$

33. A wire of resistance R is cut into 8 equal pieces. From these pieces two equivalent resistances are made by adding four of these together in parallel. Then these two sets are added in series. The net effective resistance of this combination is:

(A) $\frac{R}{64}$ (B) $\frac{R}{32}$

(C) $\frac{R}{16}$ (D) $\frac{R}{8}$

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Correct Option: C

Solution:

$$\text{Resistance of each part} = R/8$$

$$R_{eq} = \frac{1}{4}(R/8) + \frac{1}{4}(R/8) = \frac{R}{16}$$

34. De-Broglie wavelength of an electron orbiting in the $n = 2$ state of hydrogen atom is close to (Given Bohr radius = 0.052 nm)

(A) 0.067 nm (B) 0.67 nm (C) 1.67 nm (D) 2.67 nm

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Correct Option: B

Solution:

Given $n = 2, Z = 1$

$$2\pi r = n\lambda$$

$$2\pi \times (0.052 \frac{n^2}{Z}) = n\lambda$$

On solving $\lambda = 0.67 \text{ nm}$

35. An electric dipole with dipole moment $5 \times 10^{-6} \text{ Cm}$ is aligned with the direction of a uniform electric field of magnitude $4 \times 10^5 \text{ N/C}$. The dipole is then rotated through an angle of 60° with respect to the electric field. The change in the potential energy of the dipole is:

(A) 0.8 J (B) 1.0 J (C) 1.2 J (D) 1.5 J

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Correct Option: B

Solution:

Given,

$$p = 5 \times 10^{-6} \text{ Cm}$$

$$E = 4 \times 10^5 \text{ N/C}$$

$$\theta_i = 0^\circ, \theta_f = 60^\circ$$

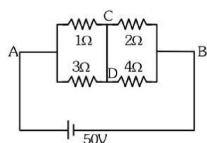
$$\Delta U = U_f - U_i$$

$$= -pE \cos \theta_f - (-pE \cos \theta_i)$$

$$\Rightarrow pE (\cos \theta_i - \cos \theta_f)$$

$$\Rightarrow 5 \times 10^{-6} \times 4 \times 10^5 (1 - \frac{1}{2}) = 1 \text{ J}$$

36. A constant voltage of 50 V is maintained between the points A and B of the circuit shown in the figure. The current through the branch CD of the circuit is :-

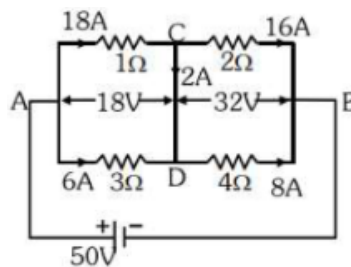


(A) 1.5 A (B) 2.0 A (C) 2.5 A (D) 3.0 A

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Correct Option: B

Solution:



by KCL ; Current in branch CD = $18 - 16 = 2 \text{ A}$

37. A photon and an electron (mass m) have the same energy E . The ratio ($\lambda_{\text{photon}}/\lambda_{\text{electron}}$) of their de Broglie wavelengths is: (c is the speed of light)

(A) $\sqrt{E/2m}$ (B) $c\sqrt{2mE}$
(C) $c\sqrt{\frac{2m}{E}}$ (D) $\frac{1}{c}\sqrt{E/2m}$

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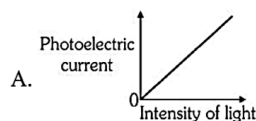
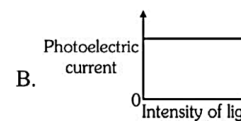
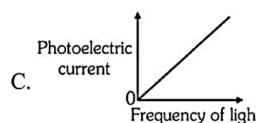
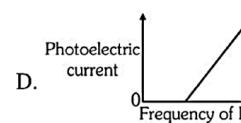
Correct Option: C

Solution:

Photon & electron have same energy E

$$\frac{\lambda_{\text{photon}}}{\lambda_{\text{electron}}} = \frac{\frac{hc}{E}}{\frac{h}{\sqrt{2mE}}} = c\sqrt{\frac{2m}{E}}$$

38. Which of the following options represent the variation of photoelectric current with property of light shown on x-axis?



(A) A only (B) A and C (C) A and D (D) B and I

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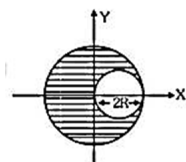
Correct Option: A

Solution:

$i \propto \text{intensity}$ so curve A is correct.

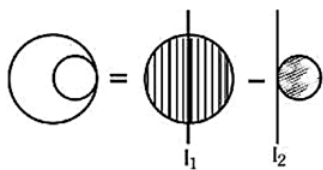
Photo current does not depend linearly on frequency, so graph C & D are not correct.

39. A sphere of radius R is cut from a larger solid sphere of radius $2R$ as shown in the figure. The ratio of the moment of inertia of the smaller sphere to that of the rest part of the sphere about the Y-axis is:



- (A) $\frac{7}{8}$ (B) $\frac{7}{40}$
(C) $\frac{7}{57}$ (D) $\frac{7}{64}$

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Correct Option: C**Solution:**

$$I_1 = \frac{2}{5}M(2R)^2$$

$$I_2 = \frac{2}{5}mr^2 + md^2$$

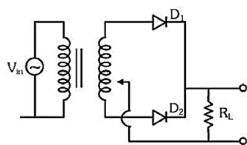
$$= \frac{2}{5}\left(\frac{M}{8}\right)R^2 + \frac{M}{8}(R)^2$$

$$= \frac{7MR^2}{40}$$

$$I = I_1 - I_2 = \frac{8MR^2}{5} - \frac{7MR^2}{40} = \frac{57}{40}MR^2$$

$$\frac{I_2}{I_1} = \frac{7}{57}$$

40. A full wave rectifier circuit with diodes (D_1) and (D_2) is shown in the figure. If input supply voltage $V_{in} = 220 \sin(100\pi t)$ volt, then at $t = 15\text{msec}$



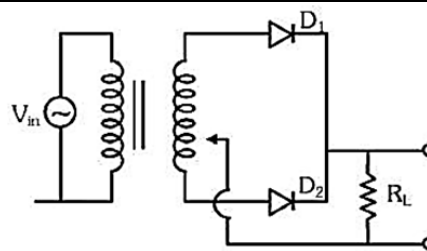
- (A) D_1 is forward biased, D_2 is reverse biased
(B) D_1 is reverse biased, D_2 is forward biased
(C) D_1 and D_2 both are forward biased
(D) D_1 and D_2 both are reverse biased

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Correct Option: B**Solution:**At $t = 15 \text{ msec}$

$$V_{in} = 220 \sin(100\pi \times 15 \times 10^{-3})$$

$$= 220 \sin\left(\frac{3\pi}{2}\right) = -220 \text{ V}$$

So diode D_1 is in reverse bias and D_2 is in forward bias.

41. Two gases A and B are filled at the same pressure in separate cylinders with movable pistons of radius r_A and r_B respectively. On supplying an equal amount of heat both the systems reversibly under constant pressure, the pistons of gas A and B are displaced by 16 cm and 9 cm respectively. If the change in their internal energy is the same, then the ratio $\frac{r_A}{r_B}$ is equal to

- (A) $\frac{4}{3}$ (B) $\frac{3}{4}$
(C) $\frac{2}{\sqrt{3}}$ (D) $\frac{\sqrt{3}}{2}$

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Correct Option: B**Solution:**

According to question

Pressure is constant $P_A = P_B$

$$Q_A = Q_B$$

$$\Delta U_A = \Delta U_B$$

So according to first law of thermodynamics

$$Q = \Delta U + w$$

$$w_1 = w_2$$

$$P_1 \Delta V_1 = P_2 \Delta V_2$$

$$(\pi r_A^2)x_A = (\pi r_B^2)x_B$$

$$\frac{r_A}{r_B} = \sqrt{\frac{x_B}{x_A}} = \sqrt{\frac{9}{16}} = \frac{3}{4}$$

42. A physical quantity P is related to four observables a, b, c and d as follows :

$$P = a^3 b^2 / c \sqrt{d}$$

The percentage errors of measurement in a, b, c and d are 1%, 3%, 2% and 4% respectively. The percentage error in the quantity P is

- (A) 10% (B) 2%
(C) 13% (D) 15%

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Correct Option: C**Solution:**

$$P = a^3 b^2 c^{-1} d^{-\frac{1}{2}}$$

$$\left(\frac{\Delta P}{P} \times 100\right) = \left(3\frac{\Delta a}{a} + 2\frac{\Delta b}{b} + 1\frac{\Delta c}{c} + \frac{1}{2}\frac{\Delta d}{d}\right) \times 100$$

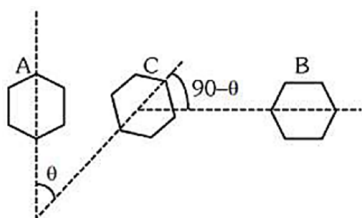
$$= 3(1\%) + 2(3\%) + 1(2\%) + \frac{1}{2}(4\%)$$

$$= 13\%$$

43. The intensity of transmitted light when a polaroid sheet, placed between two crossed polaroids at 22.5° from the polarization axis of one of the polaroid, is (I_0 is the intensity of polarised light after passing through the first polaroid):

- (A) $\frac{I_0}{2}$ (B) $\frac{I_0}{4}$
(C) $\frac{I_0}{8}$ (D) $\frac{I_0}{16}$

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Correct Option: C**Solution:**Initially two polaroids are crossed i.e. 90° After passing from first polaroid intensity is I_0

$$\begin{aligned} I_{\text{unpolarised}} &\xrightarrow{A} I_0 \xrightarrow{C} I_0 \cos^2 \theta \xrightarrow{B} \\ &I_0 \cos^2 \theta \cos^2 \theta (90 - \theta) \\ &\Rightarrow \frac{I_0}{4} \sin^2 (2\theta) \\ &\Rightarrow \frac{I_0}{4} \sin^2 (2 \times 22.5) \\ &\Rightarrow \frac{I_0}{8} \end{aligned}$$

44. Two identical point masses P and Q, suspended from two separate massless springs of spring constants k_1 and k_2 , respectively, oscillate vertically. If their maximum speeds are the same, the ratio (A_Q/A_P) of the amplitude A_Q of mass Q to the amplitude A_P of mass P is:

- (A) $\frac{k_2}{k_1}$

(B) $\frac{k_1}{k_2}$

(C) $\sqrt{\frac{k_2}{k_1}}$

(D) $\sqrt{\frac{k_1}{k_2}}$

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Correct Option: D**Solution:**

Given $m_P = m_Q$

Also $(V_{\max})_P = (V_{\max})_Q$

$$\therefore A_P \omega_P = A_Q \omega_Q$$

$$A_P \sqrt{\frac{k_1}{m_P}} = A_Q \sqrt{\frac{k_2}{m_Q}} \quad [\because \omega = \sqrt{\frac{k}{m}}]$$

$$\therefore \frac{A_Q}{A_P} = \sqrt{\frac{k_1}{k_2}}$$

45. A pipe open at both ends has a fundamental frequency f in air. The pipe is now dipped vertically in a water drum to half of its length. The fundamental frequency of the column is now equal to:

- (A) $\frac{f}{2}$ (B) f
(C) $\frac{3f}{2}$ (D) $2f$

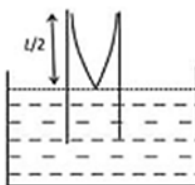
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Correct Option: B**Solution:**

Fundamental frequency of open pipe (at both ends) $f = \frac{v}{2L} \dots (i)$



Now immersed in water open pipe behaves as closed pipe



$$\begin{aligned} f' &= \frac{v}{4\left(\frac{L}{2}\right)} = \frac{v}{2L} \dots (ii) \\ f &= f' \end{aligned}$$

NEET 2025 Paper-(PCB) - ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	B	B	B	D	B	B	D	D	A	A
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	D	A	C	C	B	B	D	B	C	A
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	D	B	B	C	C	C	A	D	B	C
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	A	B	C	B	B	B	C	A	C	B
Que.	41	42	43	44	45					
Ans.	B	C	C	D	B					