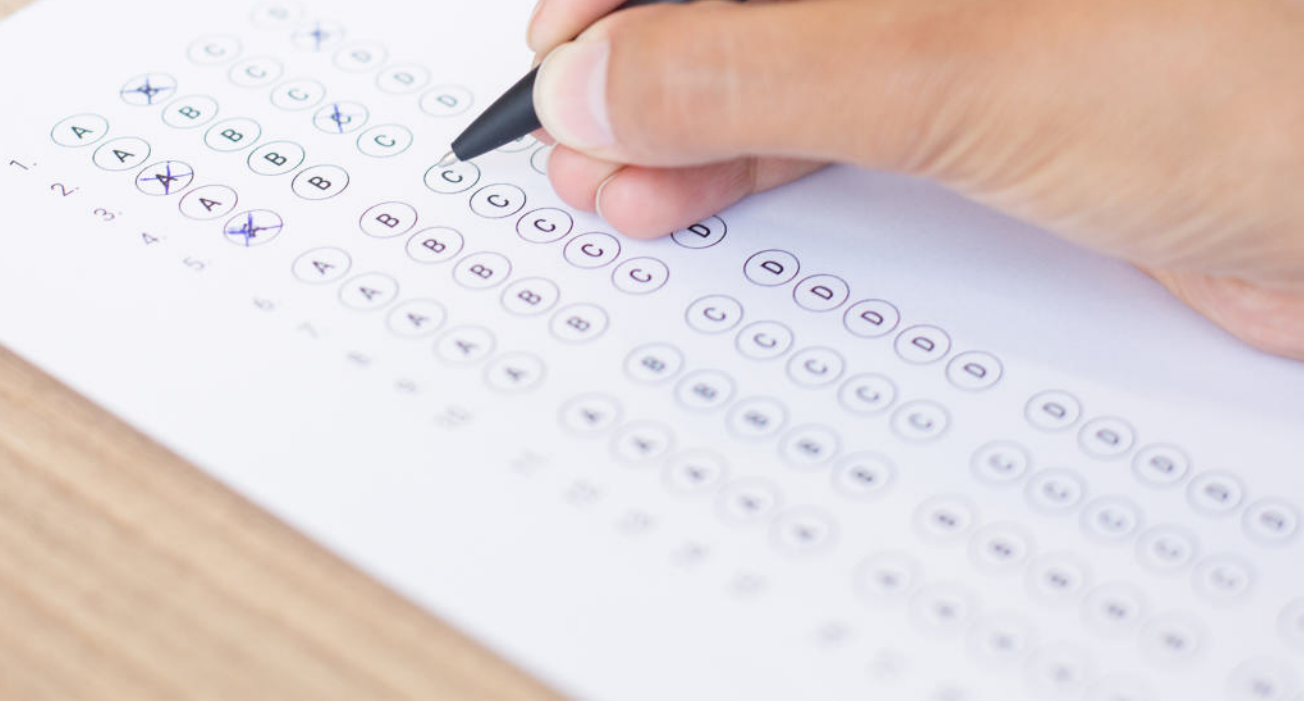




SethiSwiftLearn

Concept Understanding
Through Illustration

NEET 2025 PAPER WITH SOLUTION



11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

+1 Physics

NEET-2025 Paper

8:00

1. Units and Measurements 15, 21, 29
2. Motion in a Straight Line 16, 32
3. Motion in a Plane
4. Laws of Motion 26, 31
5. Work, Energy and Power 19, 14
6. System of Particles and Rotational Motion 28, 42, 45
7. Gravitation 10, 37
8. Mechanical Properties of Solids
9. Mechanical Properties of Fluids
10. Thermal Properties of Matter 43
11. Thermodynamics 8
12. Kinetic Theory 9, 33
13. Oscillations 23, 35, 38
14. Waves 3



11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

+2 Physics

O.Nos

NREB-2020

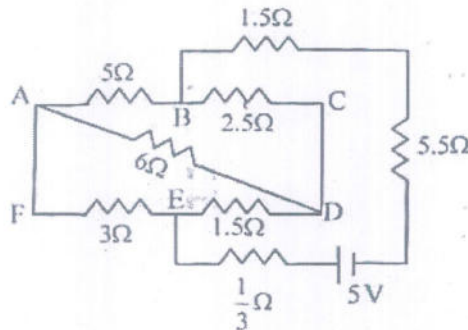
1. Electric charges and field 14,
2. Electric potential and capacitance 25, 30
3. Current Electricity 1, 7, 12
4. Moving Charges and Magnetism 4, 6.
5. Magnetism and meter
6. EMI
7. Alternating current 11, 34
8. Electromagnetic waves 2, 24,
9. Ray Optics and Optical Instruments 5, 22,
10. Wave optics 39, 41
11. Dual nature of radiation and matter 17, 40
12. Atoms 10, 27, 36
13. Nuclei
14. Semiconductor Electronics: Materials, Devices and Simple circuits 13, 20,

-----XXX-----

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET (UG), CUET AND OTHER ENTRANCE EXAMS

Current Electricity

Q.1 The current passing through the battery in the given circuit is:



(1) 1.5 A

(2) 2.0 A

(3) 0.5 A

(4) 2.5 A

(NEET-2025)

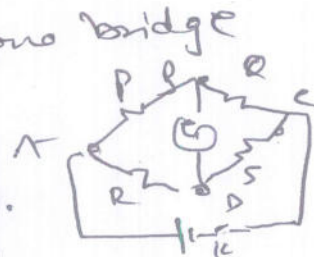
CONCEPT APPLICABLE AND SOLUTION:

Standard diagram of Wheatstone bridge

+ve Terminal P & R
-ve Terminal Q & S

if $P/Q = R/S$ Bridge is balanced.
then G is not considered.

(P & Q will be in series) || (R & S in series)



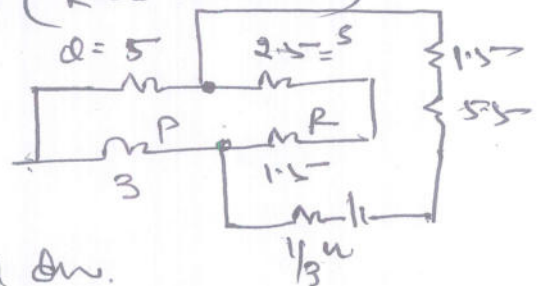
ATQ: Now

As here

$$P/Q = R/S$$

$$3/1.5 = 1.5/2.5 = 3/5$$

Balanced Br.



$$\begin{aligned} \therefore R_{eq} &= \left[(3+1.5) \parallel (1.5+2.5) \right] + (1.5+5.5+\frac{1}{3}) \\ &= (4.5 \parallel 4) + (7+\frac{1}{3}) = \frac{4 \times 4.5}{4+4.5} + \frac{22}{3} \\ &= \frac{32}{12} + \frac{22}{3} = \frac{8}{3} + \frac{22}{3} = \frac{30}{3} = 10 \Omega \end{aligned}$$

\therefore The current passing through the battery = $\frac{\text{Applied emf}}{R_{eq}}$

$$= \frac{5}{10} = 0.5 \text{ A}$$

Option (3) is correct

**11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS**

EMW's

Q.2 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 is (here subscripts denote the direction of the field).

- (1) $B_y = 60 \sin(5x + 1.5 \times 10^9 t) \text{ T}$
- (2) $B_y = 2 \times 10^{-7} \cos(5x + 1.5 \times 10^9 t) \text{ T}$
- (3) $B_x = 2 \times 10^{-7} \cos(5x + 1.5 \times 10^9 t) \text{ T}$
- (4) $B_z = 60 \cos(5x + 1.5 \times 10^9 t) \text{ T}$

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

In EMW: Electric field vector \vec{E}
 Magnetic field vector \vec{B}
 Direction of Propagation is z axis
 all are mutually perpendicular to each other.
 Phase difference between \vec{E} & \vec{B} is 0° .
 $\frac{E_0}{B_0} = c = \text{velocity of light} = 3 \times 10^8 \text{ m/s} = \frac{1}{\mu_0 \epsilon_0}$
 As \vec{E} is along z axis
 Direction of Propagation is z axis
 So direction of magnetic field will be along 'y' axis
 $B_0 = \frac{E_0}{c} = \frac{60}{3 \times 10^8} = 2 \times 10^{-7} \text{ T} = 2 \times 10^{-7} \text{ s/m}$

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

option (3) is correct

Additional info: Poynting vector $\vec{S} = \vec{E} \times \vec{H}$ represents the direction of energy flow per unit area per second along the direction of wave propagation. Its unit is W/m^2 .

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Topic : Waves \rightarrow Organ Pipes

Q.3 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 air column is now equal to :

(1) $2f$

(2) $\frac{f}{2}$

(3) f

(d) $\frac{3f}{2}$

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

In organ pipes: longitudinal stationary waves are produced.

In open organ pipe: i.e. open at both ends, the natural frequency of oscillation form a harmonic series that includes all integer multiples of the fundamental freq. The fundamental frequency is given by same express i.e.

$$f_n = n \cdot \frac{v}{2L} \quad n=1, 2, 3, \dots$$

In closed organ pipe i.e. closed at one end, only odd harmonics are present & is given by

$$f_n = n \cdot \frac{v}{4L} \quad n=1, 3, 5, \dots$$

Distance between N & A: $\lambda/4$ & two consecutive nodes or antinodes is $\lambda/2$

ATQ

Open
 $f_{\text{op}} = \frac{v}{2L_{\text{open}}}$
 Let $L_{\text{open}} = L$, then $L_{\text{closed}} = L/2$
 $f_{\text{op}} = \frac{v}{2L}$ & $f_{\text{ic}} = \frac{v}{4(L/2)} = \frac{v}{2L}$
 $\therefore f_{\text{op}} = f_{\text{ic}}$ correct option is (3)

closed
 $f_{\text{ic}} = \frac{v}{4L_{\text{closed}}}$

is velocity of sound

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Topic : Motion in combined E & B,

Q.4 An electron (mass 9×10^{-31} kg and charge 1.6×10^{-19} C) moving with speed $c/100$ ($c =$ speed of light) is injected into a magnetic field \vec{B} of magnitude 9×10^{-4} 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 $c = 3 \times 10^8$ ms⁻¹)

- (1) \vec{E} is parallel to \vec{B} and its magnitude is 27×10^4 V m⁻¹
- (2) \vec{E} is perpendicular to \vec{B} and its magnitude is 27×10^4 V m⁻¹
- (3) \vec{E} is perpendicular to \vec{B} and its magnitude is 27×10^4 V m⁻¹
- (4) \vec{E} is parallel to \vec{B} and its magnitude is 27×10^2 V m⁻¹

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

- For a charge moving in magnetic field (\vec{v}) is given by $F_B = qvB$
- Force experienced by charge particle in Electric field = $F_E = qE$

ATQ

As there is no deflection

$$F_B = F_E$$

$$qvB = qE$$

$$\text{so } E = vB = \frac{c}{100} \times 9 \times 10^{-4}$$

$$= \frac{3 \times 10^8}{100} \times 9 \times 10^{-4}$$

$$= 27 \times 10^2 \text{ V/m.}$$

option (3) is correct.

Additional Information

- $F = q(\vec{v} \times \vec{A}) = qvB \sin \theta$
- Ampere's law: $\oint \vec{B} \cdot d\vec{l} = \mu_0 I$
- B due to solenoid ($\vec{B} = \mu_0 n I$) = $\mu_0 n I$ at end
points: $\frac{\mu_0 n I}{2}$
• n : No of turns per unit length
• Gauss = 10^{-4} Tesla
1 Tesla = 1 wb/m^2
- B due to toroid
 $B = \frac{\mu_0 n I}{2\pi r}$
 $N = \text{No of turns}$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Topic: Ray Optics → Camera.

Q.5 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 —

(1) p^4 and m^4

(2) $4p$ and $4m^4$

(3) p^4 and $4m$

(4) $4p$ and m^4

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

- In combination of lenses: Power adds up. (considering sign also according to radius of the lenses.)
- In combination of lenses: Magnification is multiplied.

Q. Ans: $P_{\text{total}} = P_1 + P_2 + P_3 + P_4 = p + p + p + p = 4p$
 & magnification = $m_{\text{total}} = m \times m \times m \times m = m^4$
 option (4) is correct.

Additional Information

In camera: $f\text{-number} = \frac{\text{focal length}}{\text{Aperture}}$

Intensity $\propto \frac{1}{d^2}$ is small
 \downarrow is light transmitting area of lens.
 $\propto A \propto d^2$ d is aperture of lens.
 $\therefore I d^2 = \text{constant}$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Topic: Moving Charges & Magnetism.

Q.6 A 2 amp current is flowing through two different small circular copper coils having radii ratio 1:2. The ratio of their respective magnetic moments will be

(1) 4:1

(2) 1:4

(3) 1:2

(4) 2:1

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

ATQ, $\frac{r_1}{r_2} = \frac{1}{2}$ $I_1 = I_2 = 2$ amp.
Magnetic moment is given by
 $M = IA$
 $\therefore \frac{M_1}{M_2} = \frac{I_1 \cdot A_1}{I_2 \cdot A_2} = \frac{\pi r_1^2}{\pi r_2^2} = \left(\frac{r_1}{r_2}\right)^2 = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$
Option (2) is correct

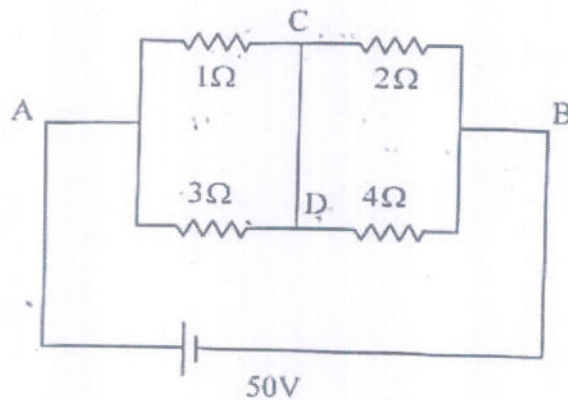
Additional Information

- Force between two parallel currents: $F = \frac{\mu_0 I_1 I_2 l}{2\pi r}$
Direction of current is same $\rightarrow F$ is attractive
& if opposite Repulsive,
 r : separation,
- Time period of oscillating bar magnet
 $T = 2\pi \sqrt{\frac{I}{MB}}$
Moment of inertia
Magnetic field
magnetic moment
- ~~$M = \mu_0 (I \times r)$~~
- $B \propto I$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET (UG), CUET AND OTHER ENTRANCE EXAMS

Current Electricity

Q.7 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:



(1) 3.0 A

(2) 1.5 A

(3) 2.0 A

(4) 2.5 A

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

By application of KCL currents as shown.

In the diagram.

1Ω & 3Ω are parallel

$$\therefore R_{P1} = \frac{1 \times 3}{1+3} = \frac{3}{4} \Omega$$

Similarly 2Ω & 4Ω are parallel

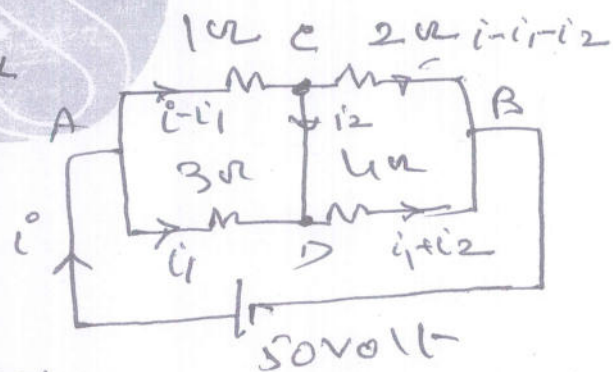
$$\therefore R_{P2} = \frac{2 \times 4}{2+4} = \frac{4}{3} \Omega$$

R_{P1} & R_{P2} are in series

$$R_{eq} = R_{P1} + R_{P2} = \frac{3}{4} + \frac{4}{3} = \frac{9+16}{12} = \frac{25}{12} \Omega$$

$$\therefore \text{Current drawn from battery} = \frac{\text{Applied emf}}{R_{eq}} = \frac{50}{25/12} = 24 \text{ A}$$

$$\therefore i = 24 \text{ A}$$



11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Continued for Q. No 7 :

In parallel, voltage is same,

$$\therefore V_{Ae} = V_{AD}$$

$$(24 - i_1) \times 1 = 3 \times i_1$$

$$24 - i_1 = 3i_1$$

$$i_1 = 6 \text{ amp}$$

iii) 4

~~$$V_{CB} = V_{DB}$$~~

$$V_{CB} = V_{DB}$$

$$(i - i_1 - i_2) \times 2 = (i_1 + i_2) \times 4$$

$$i - i_1 = 24 - 6 = 18$$

$$\therefore (18 - i_2) \times 2 = (6 + i_2) \times 4$$

$$18 - i_2 = 12 + 2i_2$$

$$3i_2 = 6$$

$$i_2 = 2 \text{ amp}$$

\therefore Current through Branch CD = 2 amp
Option (3) is correct

Additional ans :

1. KCL is based on conservation of charge & applicable at a junction. sum of incoming currents = sum of outgoing currents at a junction.

2. KVL is applied to a closed loop & based on conservation of energy.

$$\sum IR = \sum E$$

leaving pt. of +ve terminal of battery is assigned sign. to it.

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET (UG), CUET AND OTHER ENTRANCE EXAMS

Topic : Thermodynamics

Q.8 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 to 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 r_A/r_B is equal to

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

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

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

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

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

ATQ : $Q_A = 16 \text{ eu}$, $Q_B = 9 \text{ eu}$,

for internal energy ΔU which is a state function and depends only on initial and final states. $\Delta U = U_{\text{final}} - U_{\text{initial}} = 0$

First law of thermodynamics increase

Sign convention is Q is +ve, W is -ve. $\Delta Q = \Delta U + \Delta W$ By a system

How $\Delta Q_A = \Delta Q_B$ $\Delta U_A = \Delta U_B$
 $\Delta W_A = \Delta W_B \Rightarrow P_A \Delta V_A = P_B \Delta V_B$

Additional info.

$C_{pl} = \gamma = 1 + \frac{2}{f}$
 f = degree of freedom

$\frac{P_A \Delta V_A}{\pi r_A^2} = \frac{P_B \Delta V_B}{\pi r_B^2} = \frac{9}{12}$

$\Delta V_A / r_A = 3/4$ option (3) is correct

**11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS**

Kinetic Theory of Gases

Q.9 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 chamber $n_1 = 5$ and $n_2 = 4$ moles of ideal gas at pressure $p_1 = 1$ atm and $p_2 = 2$ atm, respectively. When the partition is removed, the mixture attains an equilibrium pressure of:

- (1) 1.8 atm (2) 1.3 atm
(3) 1.6 atm (4) 1.4 atm

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

To find when partition is removed:

$V_1 = 2 \text{ lit}$	$V_2 = 3 \text{ lit}$
$n_1 = 5$	$n_2 = 4$
$p_1 = 1 \text{ atm}$	$p_2 = 2 \text{ atm}$

Diagram: A container divided into two chambers, V_1 and V_2 , by a partition. An arrow points to the partition with the text "This is removed".

Equilibrium pressure = ?

$$P_{\text{equilibrium}} (V_1 + V_2) = P_1 V_1 + P_2 V_2$$

$$\therefore P_{\text{eq}} = \frac{P_1 V_1 + P_2 V_2}{V_1 + V_2} \quad \text{sub values}$$

$$= \frac{1 \times 2 + 2 \times 3}{5} = \frac{8}{5} = 1.6 \text{ atm}$$

Option (3) is correct.

Additional Information

- V_{rms} = RMS or avg velocity = $\sqrt{\frac{3RT}{M}} = \sqrt{\frac{3P}{\rho}} = \sqrt{\frac{3PV}{M}}$
 - V_{av} = Average velocity = $\frac{v_1 + v_2 + \dots + v_n}{n} = \sqrt{\frac{8RT}{\pi M}}$
 - V_{mp} = Most Probable velocity = $\sqrt{\frac{2RT}{M}}$
- decreasing order of velocities
- $$= V_{\text{rms}} > V_{\text{av}} > V_{\text{mp}}$$
- $$= \sqrt{3} > \sqrt{\frac{8}{\pi}} > \sqrt{2}$$
- $$= 1.732 > 1.6 > 1.4$$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Current Electricity

Expt-

Q.12 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 the combination is :

(1) $\frac{R}{8}$

(2) $\frac{R}{64}$

(3) $\frac{R}{32}$

(4) $\frac{R}{16}$

(NEET-2025)

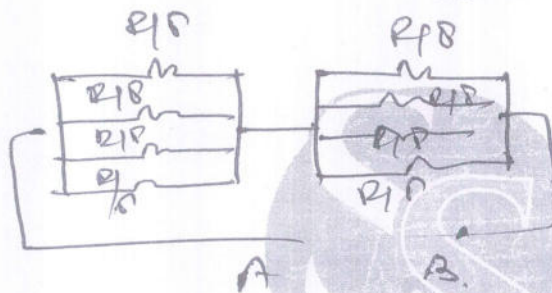
CONCEPT APPLICABLE AND SOLUTION:

Ans:

Wire of R = 8 equal parts i.e. each will have $\frac{R}{8}$ Ohm resistance.

As $R = \frac{\rho l}{a}$

To find R_{AB}



$$R_{AB} = \left(\frac{R}{8} \parallel \frac{R}{8} \parallel \frac{R}{8} \parallel \frac{R}{8} \right) + \left(\frac{R}{8} \parallel \frac{R}{8} \parallel \frac{R}{8} \parallel \frac{R}{8} \right)$$

$$\frac{1}{R_{AB}} = \frac{8}{R} + \frac{8}{R} = \frac{16}{R} \Rightarrow R_{AB} = \frac{R}{16}$$

Option (4) is correct.

Additional ans:

If wire is stretched: mass remains same.

$m_1 = m_2$

$V_1 \rho = V_2 \rho$

$\pi r_1^2 l_1 = \pi r_2^2 l_2$

$\frac{l_1}{r_1^2} = \left(\frac{l_2}{r_2} \right)^2$

As $R = \frac{\rho l}{a}$

$\therefore \frac{R_1}{R_2} = \left(\frac{l_1}{l_2} \right) \left(\frac{r_2}{r_1} \right)$

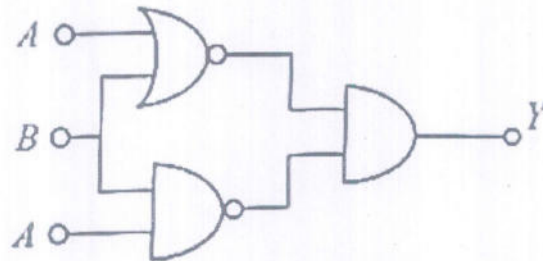
∴ shape par...

$\Rightarrow \left[R \propto l^2 \propto \frac{1}{A^2} \propto \frac{1}{a^4} \right]$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET (UG), CUET AND OTHER ENTRANCE EXAMS

Semiconductor Electronics: Logic Gates

Q.13 The output (Y) of the given logic implementation is similar to the output of an/a _____ gate.



- (1) NOR
- (2) AND
- (3) NAND
- (4) OR

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

$$\begin{aligned}
 Y &= \overline{A \cdot B} (\overline{A \cdot A}) \\
 &= \overline{A \cdot B} + \overline{A \cdot A} \\
 &= \overline{A \cdot B} = \overline{A \cdot B} \\
 &= \text{NOR gate}
 \end{aligned}$$

option (1) is correct

Additional Information:

$A \cdot A = A$, $A + A = A$

A	B	OR(A+B)	AND(A·B)	NAND(A·B)	NOR(A+B)
0	0	0	0	1	1
0	1	1	0	1	0
1	0	1	0	1	0
1	1	1	1	0	0

Exclusive OR

A	B	A ⊕ B
0	0	0
0	1	1
1	0	1
1	1	0

$Y = \overline{A}B + A\overline{B} = A \oplus B$
 If both input same, low & if inputs are of opposite, output is high.

**11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS**

Electrostatics : Coulomb's Law

Q.14 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 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) $\frac{3F}{8}$

(b) $\frac{3F}{5}$

(c) $\frac{3F}{3}$

(d) $\frac{3F}{2}$

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

Redistribution of charge
 $q_1 = q$ $q_2 = 0$
 $= \frac{q_1 + q_2}{2} = \frac{q + 0}{2} = \frac{q}{2}$

Diagram 1: Two spheres A and B with charges q and q separated by distance r . Force $F = \frac{1}{4\pi\epsilon_0} \frac{q^2}{r^2}$

Diagram 2: Sphere A with charge $q/2$ and sphere B with charge $q/2$ separated by distance r . Force $F' = \frac{1}{4\pi\epsilon_0} \frac{(q/2)^2}{r^2} = \frac{1}{4\pi\epsilon_0} \frac{q^2}{4r^2} = \frac{1}{4} F$

Diagram 3: Sphere A with charge $q/2$ and sphere B with charge $3q/4$ separated by distance r . Force $F' = \frac{1}{4\pi\epsilon_0} \frac{(q/2)(3q/4)}{r^2} = \frac{3}{8} F$

(a) option is correct

Additional Inf :
 Charge induced $q_i = -q \left(1 - \frac{1}{K}\right)$
 $K =$ Dielectric constant
 $K = 1$ for air or vacuum
 $K = \infty$ for metal

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Unit & Measurement
Experiment Skills: Vernier Callipers.

Q.15 Consider the diameter of a spherical object being measured with the help of a Vernier callipers. Suppose its 10th 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 VS. is at $x = 0.1$ cm when the jaws of Vernier callipers are closed.

If the main scale reading for the diameter is $M = 5$ cm and the number of coinciding Vernier division is 8, the measured diameter after zero error correction, is

- (1) 5.00 cm (2) 5.8 cm
(3) 5.08 cm (4) 4.98 cm

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

In V.C: $\text{Least-count (LC)} = \frac{\text{Smallest Division on Main Scale}}{\text{No. of Divisions on Vernier Scale}}$

Actual Reading: (Observed) $\boxed{\text{MSR} + \text{VSR} \times \text{LC}}$ if zero error is not there.
if zero error is given
Corrected Reading = Observed Reading - zero error

Now A.T.O., $10 \text{ VSD} = 9 \text{ MSD}$
 $1 \text{ VSD} = \frac{9}{10} \text{ MSD} = \frac{9}{10} \times 0.1 = 0.09 \text{ cm}$
 $\text{LC} = 1 \text{ MSD} - 1 \text{ VSD} = 0.1 - 0.09 = \boxed{0.01 \text{ cm}}$

\therefore Observed Reading = $5 + 8 \times 0.01 = 5.08 \text{ cm}$
 \therefore Corrected Reading = $5.08 - 0.1 = \boxed{4.98 \text{ cm}}$

Additional Q.: screw gauge.
 $\text{LC} = \frac{\text{Pitch of screw}}{\text{No. of Divisions on circular scale}}$

if zero error is not there: Actual Reading = $\boxed{\text{MSR} + \text{CSR} \times \text{LC}}$
↳ is the distance moved by the screw to one full rotation.

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Motion in one-dimension.

Q.16 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

(1) $+\frac{2}{2x+1}$

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

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

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

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

$t = x^2 + x$ — (1)

Diff. both sides w.r.t x

$\frac{dt}{dx} = \frac{d}{dx} x^2 + \frac{d}{dx} x = (2x+1)$

As dy/dx can be written as dy/dx in separation.

\therefore velocity $v = \frac{dx}{dt} = \frac{1}{(2x+1)}$ — (2)

Diff eqn (2) w.r.t t

acc = $-\frac{dv}{dt} = \frac{d^2x}{dt^2} = \frac{d}{dt} \left(\frac{1}{2x+1} \right) = \frac{d}{dx} (2x+1)^{-1} \cdot \frac{dx}{dt}$
 $= -\frac{1 \times 2}{(2x+1)^2} \cdot \frac{1}{(2x+1)}$

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

option (2) is correct.

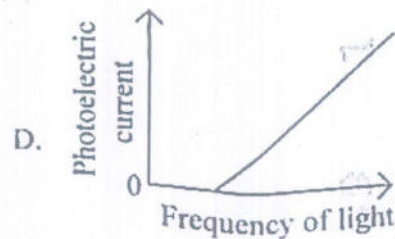
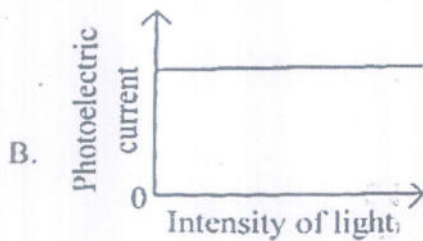
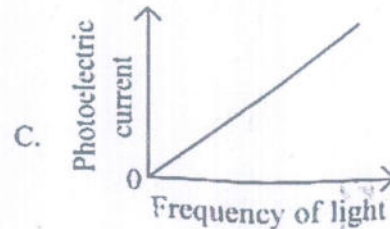
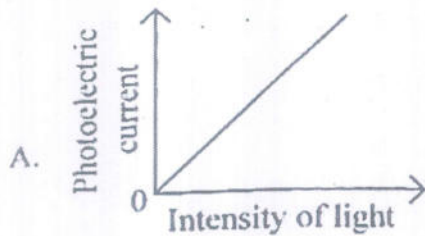
Additional Inf :

on math. expression : if we have find physical term which is ratio time & diff. if it is product, think of integration.

$a = \frac{dv}{dt} = \frac{dx}{dt}$ $\frac{d}{dt} (ax+bn)^n = n(ax+bn)^{n-1} \times a$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Q.17 Which of the following options represent the variation of photoelectric current with property of light shown on the x-axis?



(1) B and D

(2) A and C

(2) A only

(4) A and D

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

According to Law's of photoelectric effect
 (i) The no. of photoelectrons emitted per sec i.e. photoelectric current is proportional to the intensity of incident light.
 (ii) $f > f_0$ (Threshold freq) or $\lambda < \lambda_0$
 (iii) emission is instantaneous. (time difference between incident of light & emission of photo electrons is very small $< 10^{-9}$ sec)
 (iv) For $f > f_0 \Rightarrow$ max. velocity depend on frequency & not on intensity of light

Additionaly:

Einstein's Photoelectric equation:
 $W = W_0 + K.E_{max} (= eV_0 = \frac{1}{2} m v_{max}^2)$
 ↳ stopping potential

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Topic = Atoms,

Q.18 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

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

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

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

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

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

centrifugal force = $F = \frac{mv^2}{r}$ — (1)
centrif. force
ATCE

A. Bohr's Model is used to describe its motion }
 we can use, $L = \text{angular momentum} = mvr = \frac{nh}{2\pi}$ — (2)

(1) $\Rightarrow F = \frac{mv^2}{r}$ Sub. $mv = \frac{L}{r}$

$F = \frac{L^2}{mr^3}$ As F is constant

$\therefore L^2 \propto mr^3$

$\frac{L^2}{4\pi^2} \propto mr^3$

$m \propto r^3 \Rightarrow$

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

Now to find v : From (2) \Rightarrow

option (4) is correct

$mv \cdot r^{2/3} = \frac{nh}{2\pi}$
 $\therefore v \propto \frac{n}{n^{2/3}} \propto n^{1/3}$

$v \propto n^{1/3}$

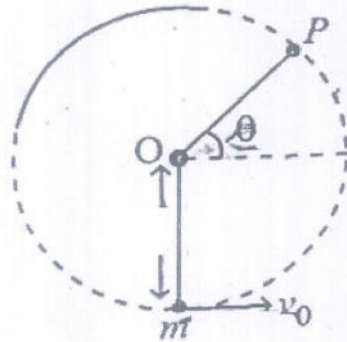
Additional Q.

$E = -13.6 \frac{Z^2}{n^2}$, $v = \left(\frac{c}{137}\right) \frac{Z}{n}$, $f \propto \frac{Z^2}{n^3}$ & $\lambda_n = 0.53 \frac{n^2}{Z}$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Work, Power & Energy

Q.19 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:



(1) $\left(\frac{\sin \theta}{2+3 \sin \theta}\right)^{1/2}$

(2) $(\sin \theta)^{1/2}$

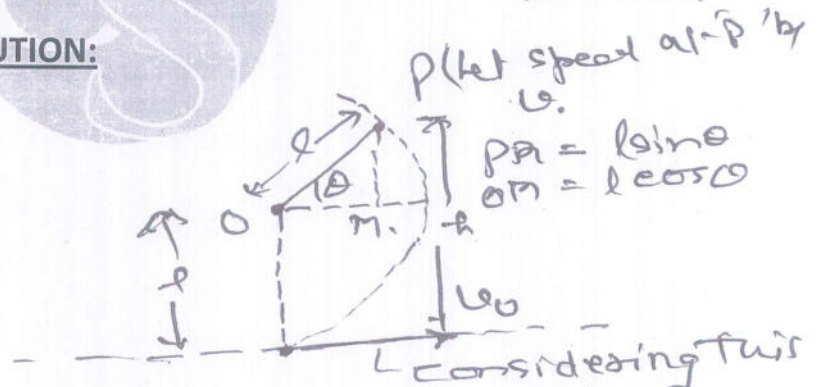
(3) $\left(\frac{1}{2+3 \sin \theta}\right)^{1/2}$

(4) $\left(\frac{\cos \theta}{2+3 \sin \theta}\right)^{1/2}$

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

$h = l + l \sin \theta$



Considering conservation of Energy concept (W.K.T + base U.W) as a base line 0
 $(K.E + P.E)_{at\ base\ U.W} = (K.E + P.E)_{at\ P}$

$\Rightarrow \frac{1}{2} m v_0^2 + 0 = \frac{1}{2} m v^2 + m g h$
 $\frac{1}{2} v_0^2 = \frac{1}{2} v^2 + g(l + l \sin \theta)$

continued on Page Next

Qulq. continued

$$\Rightarrow \frac{1}{2} u_0^2 = gl(1 + \sin\theta) + \frac{1}{2} u^2 \quad \text{--- (1)}$$

At ~~some p-p~~ string gets slack i.e
 $T = 0$

$$\therefore T + mg \sin\theta = \frac{mv^2}{r} \quad (\text{centrifugal force})$$

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

$$gl = \frac{v^2}{r \sin\theta} \quad \text{sub in eqn (1)}$$

$$\frac{1}{2} u_0^2 = \frac{v^2}{\sin\theta} (1 + \sin\theta) + \frac{1}{2} v^2$$

$$\sin\theta u_0^2 = v^2 (2 + 2\sin\theta + \sin\theta)$$

$$\therefore \frac{v^2}{u_0^2} = \frac{\sin\theta}{2 + 3\sin\theta}$$

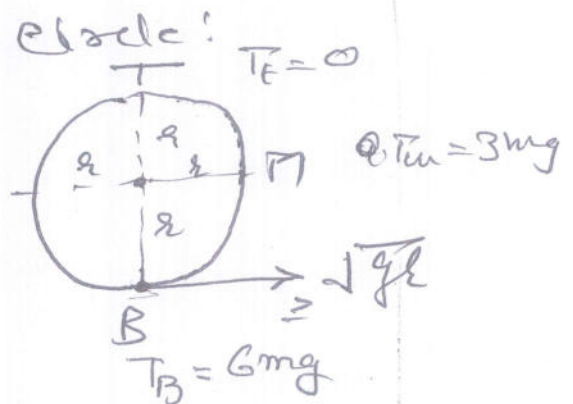
$$\therefore \frac{v}{u_0} = \sqrt{\frac{\sin\theta}{2 + 3\sin\theta}}$$

option (1) is correct

Additional q.:

Motion in Vertical Circle:

For loop the loop, min^u velocity at bottom $\geq \sqrt{gr}$



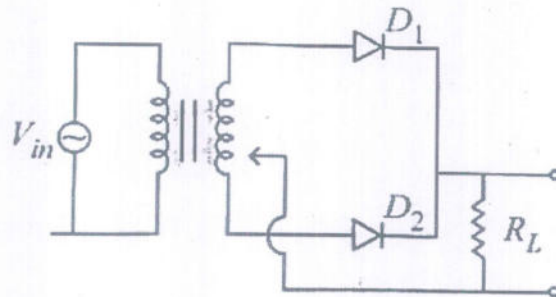
At top A: $\sqrt{5gr}$

At middle M: $\sqrt{3gr}$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Semi conductor Electronics : FWR

Q.20 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 $t = 15\text{ msec}$



- (1) D_1 and D_2 both are reverse biased
- (2) D_1 forward biased, D_2 is reverse biased
- (3) D_1 is reverse biased, D_2 is forward biased
- (4) D_1 and D_2 both are forward biased

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

$$V_{in} = 220 \sin(100\pi t)$$

At $t = 15\text{ msec}$.

$$\begin{aligned} V_{in} &= 220 \sin(100\pi \times 15 \times 10^{-3}) \\ &= 220 \sin(1.5\pi) = 220 \sin \frac{3\pi}{2} \\ &= 220 \sin(\pi + \frac{\pi}{2}) = -220 \sin \frac{\pi}{2} \\ &= -220 \text{ volt.} \end{aligned}$$

$$\omega = 100\pi = 2\pi f \Rightarrow \boxed{f = 50\text{ Hz}}$$

Also $\omega = \frac{2\pi}{T} = 100\pi \Rightarrow T = \frac{2}{100} = 0.02\text{ sec}$

Given HW is 0.02 sec i.e. to complete one period

0.02 sec is repeated

in 0.15 msec

$$t = 15 \times 10^{-3}\text{ sec} = 0.015\text{ sec}$$

$$\frac{t}{T} = \frac{0.015}{0.02} = \frac{15}{20} = \frac{3}{4}$$

$t = \frac{3}{4}T = \frac{T}{2} + \frac{T}{4}$ i.e. 2nd half cycle
so for both way, it is (3) is



correct Ans

**11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS**

Units & Measurement

Q.21 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 r 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^a and $T \propto S^a A^b \rho^\gamma R^\delta$ then

(1) $a = \frac{1}{2}, \alpha = \frac{1}{2}, \beta = -\frac{1}{2}, \gamma = \frac{1}{2}, \delta = \frac{7}{2}$

(2) $a = \frac{1}{2}, \alpha = \frac{1}{2}, \beta = -1, \gamma = +1, \delta = \frac{3}{2}$

(3) $a = -\frac{1}{2}, \alpha = -\frac{1}{2}, \beta = -1, \gamma = -\frac{1}{2}, \delta = \frac{5}{2}$

(4) $a = -\frac{1}{2}, \alpha = -\frac{1}{2}, \beta = -1, \gamma = \frac{1}{2}, \delta = \frac{7}{2}$

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

$T = k \cdot (S)^\alpha (A)^\beta (\rho)^\gamma$
 $M^0 L^0 T^1 = k [ML^{-2}]^\alpha [L^2]^\beta [ML^{-3}]^\gamma [L]^\delta$
 const. of prop. No dimension
 $S = \frac{F}{L} = \frac{ML^{-1}T^{-2}}{L} = MT^{-2}$
 $M^0 L^0 T^1 = k \cdot M^{\alpha+\gamma} L^{2\beta-3\gamma+\delta} T^{-2\alpha}$
 regrouping powers
 compare powers,
 $\alpha + \gamma = 0$ (1) $2\beta - 3\gamma + \delta = 0$ (2) $-2\alpha = 1$
 $-\frac{1}{2} + \gamma = 0$ $\alpha = -\frac{1}{2}$
 $\gamma = \frac{1}{2}$
 Sub values of α & γ in eqn(2)
 $2\beta - 3(\frac{1}{2}) + \delta = 0 \Rightarrow 2\beta + \delta = \frac{3}{2}$
 By checking four options,
 $\beta = -1, \delta = \frac{7}{2}$

Continued for Q. No 21 :

To find a :

As we know that excess pressure

$$p_i - p_o = \Delta P \propto \frac{\sigma}{r} \quad \left(= \frac{\text{Surface tension}}{\text{radius}} \right)$$

Pressure inside the balloon due to surface tension $\propto \frac{\sigma}{r}$ which drives the gas out of balloon.

W.E $\Rightarrow U \propto \sqrt{\frac{\sigma}{r}} \propto \sigma^{-1/2} \propto \sigma^a$

$$\therefore \boxed{a = -1/2}$$

$$\therefore \alpha = -\frac{1}{2}, \beta = -1, \gamma = \frac{1}{2}, \delta = \frac{7}{2} \Rightarrow a = -\frac{1}{2}$$

Option 'A' is correct.

Additional Information

Rounding off :

Digit '5' is to be rounded off, there are two cases :

1. { 2. '5' followed by zeros; Preceding digit is left unchanged if it is even.
3.250 \approx 3.2.
 2. { Preceding digit is raised by one, if it is odd.
3.750 \approx 3.8.
3. digit '5' is followed by digits other than zero, preceding digit is raised by 1. $16.351 \approx 16.4$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Ray Optics : Optical Instruments.

Q.22 A microscope has an objective of focal length 2 cm. eyepiece of focal length 4 cm and the tube length of 40 cm. If the distance of distinct vision of eye is 25 cm, the magnification in the microscope is

- (1) 250 (2) 100
(3) 125 (4) 150

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

$f_o = 2\text{ cm}$ $f_e = 4\text{ cm}$

tube length $= L = 40\text{ cm}$

L.D.V = 25 cm

To find: $M = ?$

Compound Microscope:

$M = \left(\frac{L}{f_o}\right) \left(\frac{D}{f_e}\right)$ Sub values

$= \left(\frac{40}{2}\right) \left(\frac{25}{4}\right) = 125$

Correct ans is (3)

Additional Inf :

For Simple Microscope

$M = \left(1 + \frac{D}{f}\right)$ → eye is strained
Objective lens has small
compared to the

In compound microscope:
aperture & focal length
eye piece.

Resolving Power = R.P $\propto \frac{1}{\Delta x} \propto \frac{1}{\lambda}$

Δx is min distance between two lines
at which they are just distinct is called limit of
resolution.

As $u \rightarrow \infty$ $M = \frac{D}{f}$ Magnifying Power is min → eye is
least strained

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET (UG), CUET AND OTHER ENTRANCE EXAMS

Oscillations

Q.23 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 :-

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

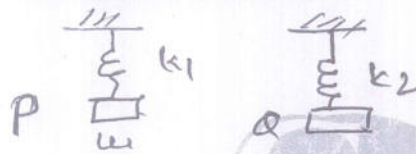
(2) $\frac{k_2}{k_1}$

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

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

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:



$v_{max} = v_{max}$
to find $\frac{A_Q}{A_P} = ?$

For spring-mass system,

Angular freq = $\omega = \frac{2\pi}{T} = 2\pi f = \sqrt{\frac{k}{m}}$

Every symbol have usual meaning
As $v = \omega A$

For Body P:

$v_{max P} = \omega_P A_P$
 $v_{max Q} = \omega_Q A_Q$

ATQ

$v_{max P} = v_{max Q}$

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

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

option (1) is correct.

Add I :

- Springs in series: $\frac{1}{k_{eq}} = \frac{1}{k_1} + \frac{1}{k_2}$
- Springs in Parallel: $k_P = k_1 + k_2$
- Two body case system = $\frac{m_1 m_2}{m_1 + m_2}$ $T = 2\pi \sqrt{\frac{\mu}{k}}$

where $\mu = \frac{m_1 m_2}{m_1 + m_2}$
is reduced mass

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

BAW's

Q.24 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:

- (1) zero between the plates and non-zero outside
- (2) zero at all places
- (3) constant between the plates and zero outside the plates
- (4) non-zero everywhere with maximum at the imaginary cylindrical surface connecting peripheries of the plates

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

Option (4) is correct.
As Displacement current is max^m (strongest) where the changing magnetic field is most concentrated.

Additional Qy.

Modified Ampere's Circuital Law

$$\oint \vec{B} \cdot d\vec{r} = \mu_0 \left(I + I_D \right) \\ = \mu_0 \left(I + \epsilon_0 \frac{d\Phi_E}{dt} \right)$$

I_D = Displacement current is that current which comes into play in the region in which the electric field & hence the electric flux is changing with time.

I = conduction current.

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Electric Potential & Capacitance

Q.25 An electric dipole with dipole moment $5 \times 10^{-6} \text{ Cm}$ is aligned with the direction of 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:

- (1) 1.5 J (2) 0.8 J
(3) 1.0 J (4) 1.2 J

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

change in Electrostatic P.E

$$= -pE (\cos \theta_2 - \cos \theta_1)$$
 Initial Position $\theta_1 = 0^\circ$
 final position $\theta_2 = 60^\circ$

Sub Values

$$= -(5 \times 10^{-6}) (4 \times 10^5) (\cos 60^\circ - \cos 0^\circ)$$

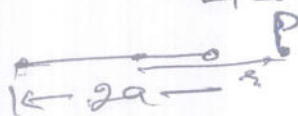
$$= 5 \times 10^{-6} \times 4 \times 10^5 \times (1 - \frac{1}{2})$$

$$= 10 \times 10^{-1} = \boxed{1 \text{ Joule}}$$

option (3) is correct.

Additional Inf

In Electric dipole:



Electric Potential at axial line $\theta = 0$

~~$$V_{axial} = \frac{1}{4\pi\epsilon_0} \frac{p}{r^2 - a^2}$$~~

Required: $\theta = 90^\circ$ $V = 0$

$$V_{equat} = \frac{1}{4\pi\epsilon_0} \frac{p \cos \theta}{r^2 - a^2 \cos^2 \theta}$$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

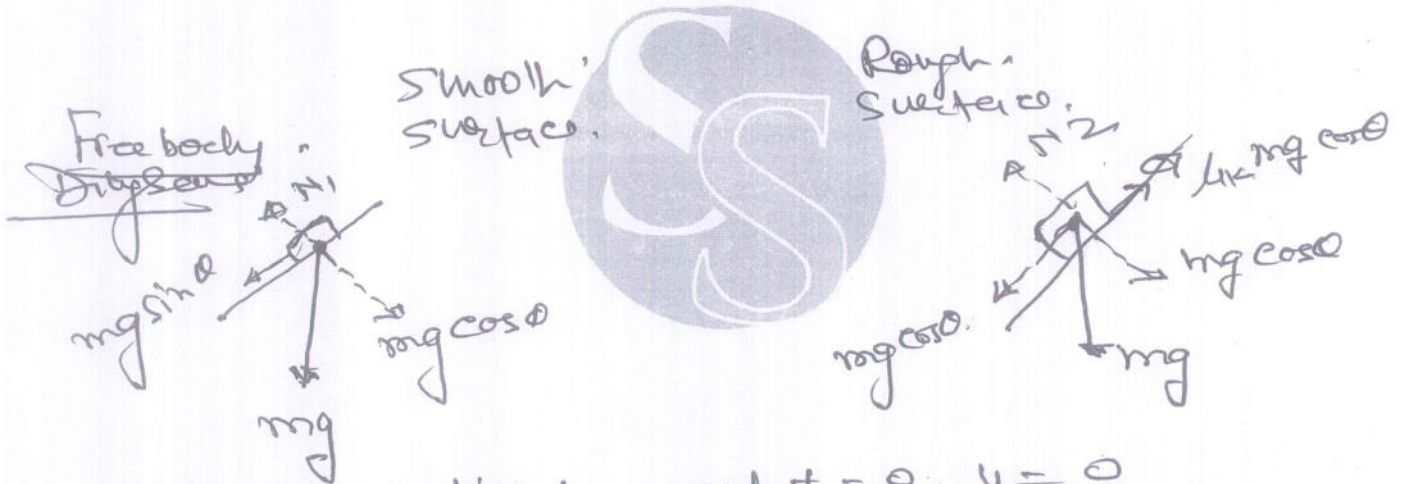
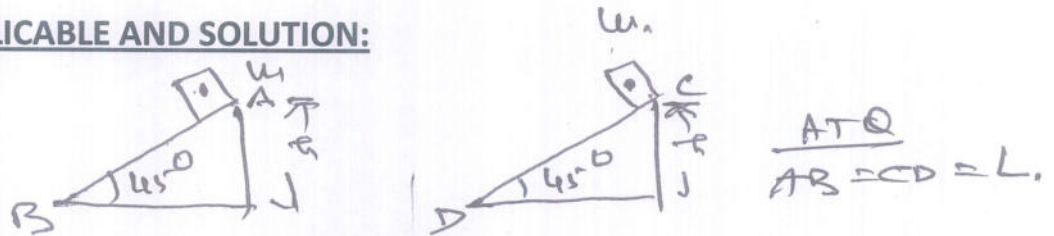
LAWS OF MOTION

Q.26 There are two inclined surfaces 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

- (1) 0.75 (2) 0.25
(3) 0.40 (4) 0.5

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:



Considering motion: at $t=0$, $u=0$
using $s = ut + \frac{1}{2}at^2$

$$s_1 = 0 + \frac{1}{2} g \sin \theta \cdot t_1^2$$

$$s_2 = \frac{1}{2} (g \sin \theta - \mu_k g \cos \theta) t_2^2$$

$$\text{As } s_1 = s_2$$

$$\frac{1}{2} g \sin \theta t_1^2 = \frac{1}{2} g (\sin \theta - \mu_k \cos \theta) t_2^2$$

$$\frac{t_1}{t_2} = \frac{\sin \theta}{\sin \theta - \mu_k \cos \theta} \left(\frac{\sin \theta - \mu_k \cos \theta}{\sin \theta} \right)^{1/2}$$

Formula to be used,

continued on next page

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Continued on Q.No. 26

ATQ

$$t_{\text{rough}} = 2 t_{\text{smooth}}$$

Sub. values

$$\frac{1}{2} = \left(\frac{\sin 45^\circ - \mu \cos 45^\circ}{\sin 45^\circ} \right)^{1/2}$$

$$\frac{1}{4} = (1 - \mu)$$

$$\text{As } \sin 45^\circ = \cos 45^\circ = \frac{1}{\sqrt{2}}$$

$$\mu = 1 - \frac{1}{4} = \frac{3}{4}$$

$$\mu = 0.75$$

Option (D) is correct.

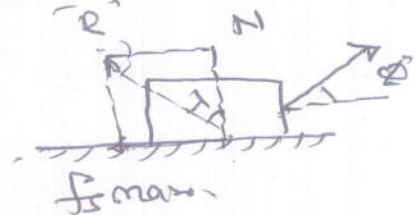
Additional Info

- Minimum angle to which a block starts sliding down an inclined plane is known as angle of repose. Angle of repose is independent of mass of the object.

- Block can be moved with least effort on rough surface (μ), if force is applied at an angle of friction, that is $\phi = \tan^{-1} \mu = \lambda$.

- Min^m magnitude of force is given by

$$F_{\text{min}} = mg \sin \lambda$$



11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Rotational Motion

Q.28 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 sphere of uniform density.

- (1) 108 days (2) 100 days
(3) 105 days (4) 115 days

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

$T_1 =$ time period of sun = 27 days

$T_2 = ?$ time period of sun, when radius is doubled by expanding

ρ : Density of sun is uniform.

Acc to law of Conservation of angular momentum.

$$I_1 \omega_1 = I_2 \omega_2$$

$$\frac{2}{5} m R_1^2 \left(\frac{2\pi}{T_1} \right) = \frac{2}{5} m R_2^2 \cdot \frac{2\pi}{T_2}$$

formula to be used.

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

Optic. (1) is correct.

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

Sub value

$$T_2 = 4 \times 27 = 108 \text{ days}$$

Additional Info.

Direction of angular momentum

$$L = \vec{r} \times \vec{p}$$

as in $\vec{A} \times \vec{B}$.

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Units & Measurement

Q.29 A physical quantity P is related to four observations a, b, c and d as follows: $P = a^3 b^2 / c \sqrt{d}$

1%, 3%,

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

(1) 15%

(2) 10%

(3) 2%

(4) 13%

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

Acc to concept of Propagation of error.

$$Z = \frac{A^x B^y}{C^z}$$

$$\frac{dz}{Z} \times 100 = \left[x \frac{dA}{A} + y \frac{dB}{B} + z \frac{dC}{C} \right] \times 100$$

$$\therefore \% \text{ error in } P = \left(\frac{dP}{P} \times 100 \right) = \left(3 \frac{da}{a} + 2 \frac{db}{b} + \frac{dc}{c} + \frac{1}{2} \frac{dd}{d} \right) \times 100$$

Sub values

$$= 3 \times 2 + 2 \times 3 + 2 + \frac{1}{2} \times 4$$

$$= 3 + 6 + 2 + 2 = \boxed{13\%}$$

Additional Information:

Error in sum of two quantities:

Let $x = a + b$, Absolute error in measurement of x is

$$\Delta x = \pm (\Delta a + \Delta b)$$

$$\therefore \% \text{ value in the value of } x = \frac{\Delta a + \Delta b}{a + b} \times 100$$

In case of difference:

$$\frac{\Delta a + \Delta b}{a - b} \times 100$$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Electric Potential & Capacitance

Q.30 The plates of parallel plate capacitor are separated by d . Two slabs of different dielectric constant K_1 and K_2 with thickness $\frac{3}{8}d$ and $\frac{d}{2}$, respectively are inserted in the capacitor. Due to this, the capacitance becomes two times larger than when there is nothing between the plates.

If $K_1 = 1.25 K_2$, the value of K_1 is:

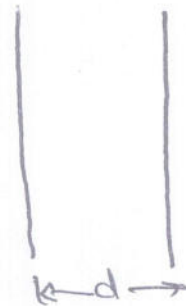
- (1) 1.33 (2) 2.66
(3) 2.33 (4) 1.60

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

Capacitance of a parallel plate capacitor without dielectric = $C_0 = \frac{\epsilon_0 A}{d}$ — (1)

A = Area of plates
 d = Separation of plates
When, 2 dielectrics of different thicknesses are filled



$$C_{eq} = \frac{\epsilon_0 A}{d - (t_1 + t_2) + \left(\frac{t_1}{K_1} + \frac{t_2}{K_2}\right)} \quad \text{--- (2)}$$

Here $t_1 = \frac{3}{8}d$, $t_2 = \frac{d}{2}$ $\therefore t_1 + t_2 = \frac{3d}{8} + \frac{d}{2}$
Sub values $= \frac{7d}{8}$

$$C_{eq} = \frac{\epsilon_0 A}{d - \frac{7d}{8} + \left(\frac{3d}{8K_1} + \frac{d}{2K_2}\right)} \quad \text{As } K_1 = 1.25K_2$$

$$= \frac{\epsilon_0 A}{\frac{d}{8} + d\left(\frac{3}{8 \times 1.25K_2} + \frac{1}{2K_2}\right)}$$

$$= \frac{(\epsilon_0 A) / d}{\frac{1}{8} + \frac{1}{1.25} \left(\frac{3}{8} + \frac{1}{2}\right)}$$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Continued for 0.30 : $\frac{C_0}{C_0} \left(\text{for } C_0 = \frac{\epsilon_0 A}{d} \right)$

$$C_{eq} = \frac{1}{\frac{1}{\epsilon_0} + \frac{1}{\epsilon_2} \left(\frac{3+5}{10} \right)}$$

ATA $C_{eq} = 2C_0$

$$\therefore 2C_0 = \frac{C_0}{\frac{1}{\epsilon_0} + \frac{1}{\epsilon_2} \cdot \frac{4}{5}}$$

$$\therefore \frac{1}{\epsilon_0} + \frac{4}{5\epsilon_2} = \frac{1}{2} \Rightarrow \frac{4}{5\epsilon_2} = \frac{1}{2} - \frac{1}{\epsilon_0}$$

$$\frac{4}{5\epsilon_2} = \frac{4-1}{2} = \frac{3}{2}$$

$$\therefore \epsilon_2 = \frac{32}{15} = 2.13$$

$$\therefore \epsilon_1 = 1.25 \times \epsilon_2 = 1.25 \times 2.13 = \boxed{2.66}$$

Option (2) is correct.

Additional Qnt :

- In case Area is distributed combination is parallel. In the given case distance is distributed combination is series,

$$C_{dielectric} = \frac{\epsilon_0 A}{d-t(1-\frac{1}{\epsilon_2})} \quad C_{metal} = \frac{\epsilon_0 A}{d-t}$$

- Dielectric plate is inserted when battery remains connected. \Rightarrow Capacity inc ($C_0 k$), V same, Charge inc, Electric field $\frac{E_0}{\epsilon}$ dec, $\epsilon k = \frac{1}{2} \epsilon_0 k^2$ inc.
- When battery disconnected, dielectric slab is inserted $C_{eq} = C_0 k$ inc, $\phi = q_{enc}$, $\frac{V}{d} = \frac{V_0}{1+d}$ dec, $\frac{1}{2} \epsilon_0 k^2 = \frac{1}{2} \frac{Q^2}{C}$ dec.

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

LAWS OF MOTION

Q.31 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 $g = 9.8 \text{ m/s}^2$)

- (1) 84 NS (2) 21 NS
(3) 7 NS (4) 0

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

$$v^2 = u^2 + 2as$$

$$v_1^2 = 0 + 2g \times h$$

$$v_1 = \sqrt{2gh}$$

$$= \sqrt{2 \times 9.8 \times 40}$$

$$v_1 = \sqrt{784} = 28 \text{ m/sec}$$

only Q. Rebound

$$0 = v_2^2 + 2as$$

$$= \cancel{v_2^2} - \cancel{2g \times h}$$

$$v_2^2 - 2g \times 10 \Rightarrow v_2 = \sqrt{20g} = 14 \text{ m/sec}$$

ATQ Impulse = change in momentum

$$= m(v_2 - (-v_1))$$

$$= 0.5(14 + 28)$$

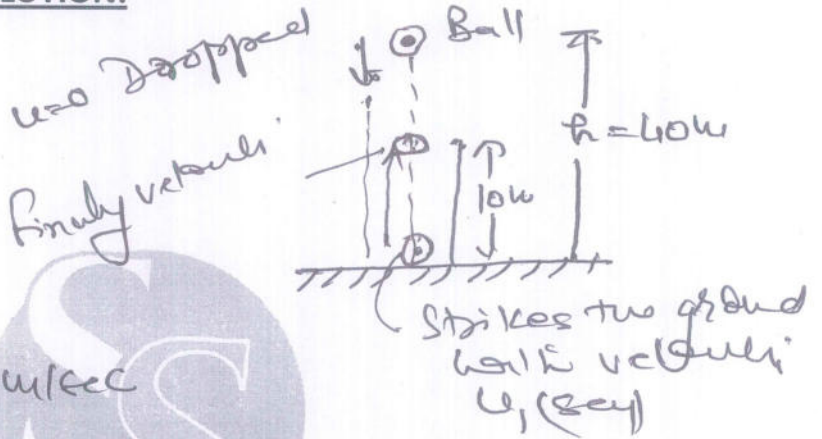
$$= 0.5 \times 42$$

$$= \boxed{21 \text{ NS}}$$

option (2)
is correct

Additional def:

• $\vec{F} = \frac{d\vec{p}}{dt}$, where \vec{p} denotes momentum, slope of momentum versus time graph given force. ($\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$)



11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Motion in a straight line.

Q.32 Two cities X and Y are connected by a regular bus services with a bus leaving in either direction every T min. A girl is driving scooty 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.

(1) 15 min, 120 km/h

(2) 9 min, 40 km/h

(3) 25 min, 100 km/h

(4) 10 min, 90 km/h

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

Velocity of scooty = 60 km/hr. Let U_B be the velocity of bus.

\therefore R.V of Bus in same direction of scooty = $U_B - U_S$
R.V of bus in opposite = $U_B + U_S$

As, speed = $\frac{\text{Dist.}}{\text{time}}$ $\therefore \text{time} = \frac{\text{Dist.}}{\text{speed}}$

\therefore Distance travelled by bus in time $T = U_B T$
 $\frac{U_B T}{U_B - T} = 30$ (1) & $\frac{U_B T}{U_B + T} = 10$ (2)

On simplification,
 $T = 15 \text{ min} \Rightarrow \frac{U}{5} = 120 \text{ km/hr}$

Option (1) is correct

Additional Inf:
If a body starts from rest and moves with uniform acceleration, then distance covered by the body in t secs is proportional to t^2 i.e. $s \propto t^2$. We can say distance covered in 1 sec, 2 sec & 3 sec is 1:4:9

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Kinetic theory of Gases

Q.33 An oxygen cylinder of volume 30 litre has 18.20 moles of 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:

[Given, $R = \frac{100}{12} \text{ J mol}^{-1} \text{ K}^{-1}$, and molecular mass of $\text{O}_2 = 32$, 1 atm pressure = $1.01 \times 10^5 \text{ N/m}^2$]

(1) 0.156 kg

(2) 0.125 kg

(3) 0.144

(4) 0.116 kg

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

$V_1 = 30 \text{ litre}, n_1 = 18.20 \text{ moles}$

Absolute $P_r = \text{Gauge Press} + \text{Atm. Press}$
 $= 11 + 1 = 12 \text{ Atm}$

To find mass of the oxygen withdrawn
 $= m_1 - m_2$
 $= n_1 M - n_2 M = (n_1 - n_2) M$
 Molar mass of oxygen

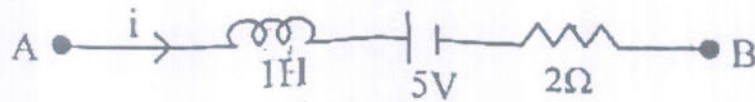
$= \left(n_1 - \frac{P_2 V_2}{RT_2} \right) M$ sub values
 $= \left[18.20 - \frac{(12 \times 1.01 \times 10^5) (30 \times 10^{-3})}{\left(\frac{100}{12} \right) 300} \right] \times 32$
 $= (18.20 - 14.60) \times 32 = 115.2 \text{ kg}$
 $= \approx 0.116 \text{ kg}$ option (4) is correct

Additional info:
 $P = \frac{1}{3} \rho v_{rms}^2$ $KE = \frac{1}{2} M v_{rms}^2$
 $\left[P = \frac{2}{3} E \right] \rightarrow KE \text{ per unit volume}$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Alternating Current

Q.34 AB is a part of an electrical circuit (see figure). The potential difference " $V_A - V_B$ " at the instant when current $i = 2$ A and is increasing at a rate of 1 amp / second is:



(1) 10 volt

(2) 5 volt

(3) 6 volt

(4) 9 volt

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

$$V_A - L \frac{di}{dt} - 5 - 2i = V_B$$

sub value.

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

$$= 1 + 5 + 4 = 10 \text{ volt}$$

Option (1) is correct

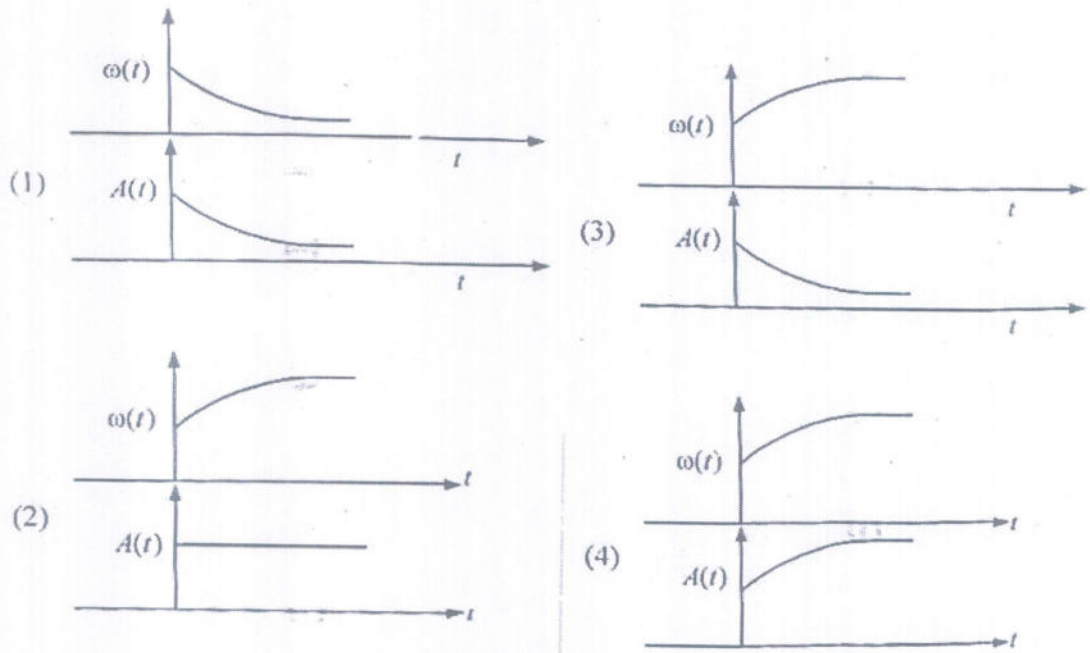
Additional Inf:

- Alternating current cannot produce chemical effects of currents. as electroplating or electrolysis as due to large ions, they can not follow the rep. of ac.
- For dc circuit, $\omega = 0 \Rightarrow X_L = \omega L = 0$, so inductor offers zero resistance to a dc circuit.
- At resonance (ie when $X_L = X_C$ in RLC circuit)
power factor $\cos \phi = \frac{R}{Z} = 1$.
- Quality factor of Resonance $= Q = \frac{1}{R} \sqrt{\frac{L}{C}} = \frac{V_{L \text{ or } C \text{ at reso}}{\text{app. voltage}}$.

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET (UG), CUET AND OTHER ENTRANCE EXAMS

Oscillations

Q.35 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?



(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

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

As sand leaks, effective mass of box decreases & acc to above relation, ω increases.

As mass reduces, amplitude will decrease due to dissipation of energy. Option (3) is correct.

Add. Inf : $\frac{Qm}{SHE}$

$$\left\{ \begin{array}{l} K.E = \frac{1}{2} m \omega^2 A^2 \sin^2 \omega t \\ P.E = \frac{1}{2} m \omega^2 A^2 \cos^2 \omega t \\ T.E = \frac{1}{2} m \omega^2 A^2 \end{array} \right\}$$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Topic :- Atoms,

Q.36 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 $n(h/e)$ is an integer, h is Planck's constant and e is the magnitude of electron's 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)

(1) $\frac{heB}{2\pi m}$

(2) $\frac{he}{\pi m}$

(3) $\frac{he}{2\pi m}$

(4) $\frac{heB}{\pi m}$

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

Magnetic moment = $M = IA$
 $M = \frac{q}{T} \cdot \pi r^2 \Rightarrow$ As $\omega = 2\pi f = \frac{2\pi}{T}$
 $= \frac{e \cdot \omega \cdot \pi r^2}{2\pi} = \frac{1}{2} e \omega r^2$ As: $v = \omega r$
 $= \frac{1}{2} e \frac{v}{r} r^2 = \frac{1}{2} e v r$

$\therefore M = \frac{1}{2} e v r$ — (1)

Now ATQ flux = $BA = B \cdot \pi r^2 = \frac{h^2}{e} \quad \text{--- (2)}$

Also centripetal force will be provided by magnetic force

$\Rightarrow \frac{mv^2}{r} = e B v r$ — (3)

eliminating v from (1) using (2) & (3)

(1) $\Rightarrow M = \frac{1}{2m} e (mv^2) r = \frac{1}{2m} e \left(\frac{h^2}{e B r} \right) r$
 $= \frac{1}{2m} e \cdot \frac{h^2}{e B} = \frac{h^2 e}{2\pi m B}$

for lowest energy state $n=1$, $M = \frac{he}{2\pi m}$

Option (3) is correct

**11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS**

Gravitation

Q.37 A body weighs 48 N on the surface of the earth. The gravitational force experienced by the body due to the earth at a height equal to one-third the radius of the earth from its surface is :

(1) 36 N

(2) 16 N

(3) 27 N

(4) 32 N

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

As, we know that with height, value of g decreases, as below

$$g_h = g \left(\frac{R}{R+h} \right)^2 = g \left(1 - \frac{2h}{R} \right) \quad \text{if } h \ll R$$

if h is comparable to R .

Here: $h = R/3$

$$\therefore g_h = g \left(\frac{R}{R+R/3} \right)^2 = g \left(\frac{3}{4} \right)^2 = \frac{9}{16} g$$

\therefore Gravitational force experienced =

$$W_{gh} = (Wg) \cdot \frac{9}{16} = 48 \times \frac{9}{16} = \boxed{27 \text{ N}}$$

option (3) is correct.

Additional Inf. :

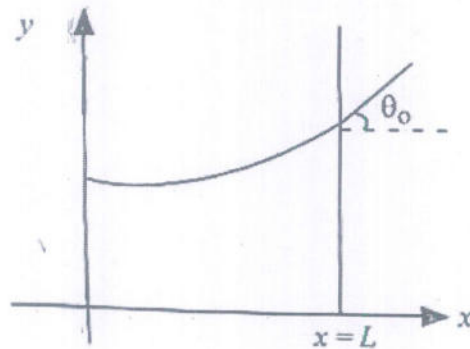
- % decrease in the value of g is $\frac{g-g'}{g} \times 100 = \frac{2h}{R} \times 100$
- With depth, g also decreases as $g_d = \left(1 - \frac{d}{R} \right) g$
- \therefore % dec in g with depth = $\frac{d}{R} \times 100$
- Effect of shape of earth:
 $R_e = R_p + 21 \text{ km}$
- g is least at equator & max at pole
- At sea level $g_{\text{equator}} - g_{\text{pole}} = 1.03 \text{ cm/s}^2$



11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Oscillations

Q.38 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 with the x -axis at $x = L$. If $y(x)$ is the height of the surface then the equation for is:



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

(1) $\frac{dy}{dx} = \sqrt{\frac{\rho g}{S}} x$

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

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

(4) $\frac{d^2y}{dx^2} = \sqrt{\frac{\rho g}{S}}$



CONCEPT APPLICABLE AND SOLUTION:

As Pressure is given by $P = \rho h g$

$P = y \rho g$ (1)

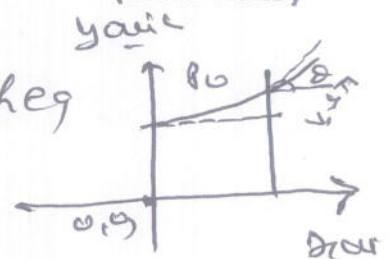
Excess pressure = S/R (2)

$(1) = (2)$

$y \rho g = S/R$ (A)

$R =$ Radius of curvature is given by $\frac{[1 + (\frac{dy}{dx})^2]^{3/2}}{\frac{d^2y}{dx^2}}$

As per question: θ is small
 \therefore $\tan\theta$ will be small
 $\frac{dy}{dx}$ will be small
 $(\frac{dy}{dx})^2$ will be further small



(NEET-2025)

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Continued from Page 21038

So Rejecting ^{equating} $(1 + \frac{dy}{dx})^3 h = 1$

$\therefore R = \sqrt{dy/dx}$
i.e. $\frac{1}{R} = \frac{dy}{dx}$

Sub in above eqn. (A)

$pg = s \cdot \frac{dy}{dx}$

$\therefore \frac{dy}{dx} = \left(\frac{pg}{s}\right) \cdot y$

Option (3) is correct.

Additional Information:

$m = \tan \theta = \frac{dy}{dx} = \text{slope of tangent}$

θ is the angle made by the line with +ve direction of x-axis

Also $m = \frac{y_2 - y_1}{x_2 - x_1}$

$\left(\frac{dy}{dx}\right)^2$: indicates how steeply the curve is changing at that point.
 $\frac{dy}{dx}$: rate of change of slope, indicating how quickly the slope is changing at that point.

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Wave optics & Polarization.

Q.39 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):

(1) $\frac{I_0}{16}$

(2) $\frac{I_0}{2}$

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

(4) $\frac{I_0}{8}$

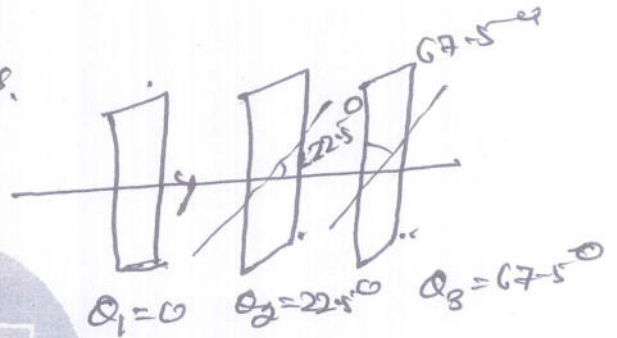
(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

Acc to Law of Malus,

$$I = I_0 \cos^2 \theta$$

$$\boxed{I_1 = I_0}$$



$$I_2 = I_1 \cos^2 \theta_2$$

$$= I_0 (\cos 22.5) ^2$$

$$I_2 = I_0 (0.92) ^2$$

$$\therefore I_3 = I_2 \cos^2 \theta_3 = I_0 \times 0.92 \times \cos^2 67.5 = I_0 \times 0.92 \times (0.37) = I_0 \times 0.125$$

$$\boxed{I_3 = \frac{I_0}{8}}$$

Also second method using Biot's law $\sin 2\theta = 2 \sin \theta \cos \theta$

$$I_2 = I_0 \cos^2 22.5$$

$$I_3 = I_2 \cos^2 67.5 = I_0 \cos^2 22.5 \cdot \cos^2 67.5$$

$$= I_0 (\cos^2 22.5 \cdot \sin^2 22.5) = \frac{I_0}{4} \sin^2 45$$

$$= \frac{I_0}{4} \sin^2 45 = \frac{I_0}{4} \cdot 1 = \frac{I_0}{4}$$

$$= \boxed{\frac{I_0}{8}}$$

Additional Info: Law of Malus states that the intensity of polarized light through an analyser varies as square of the cosine of the angle between plane of transmission of the analyser and the plane of the polariser.

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET (UG), CUET AND OTHER ENTRANCE EXAMS

Dual Nature of Radiation and Matter.

Q.40 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)

(1) $\frac{1}{c} \sqrt{E/2m}$

(2) $\sqrt{E/2m}$

(3) $c\sqrt{2mE}$

(4) $c \sqrt{\frac{2m}{E}}$

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

For Photon : $E = \frac{hc}{\lambda}$ so $\lambda_{ph} = \frac{hc}{E}$

For electron : $\lambda_e = \frac{h}{p}$ As $p = mv$

$p^2 = m^2 v^2$
 $\frac{p^2}{2} = (\frac{1}{2} mv^2) \cdot m$
 $\frac{p^2}{2} = E \cdot m$
 $p = \sqrt{2mE}$

As both have same energy

$$\therefore \frac{\lambda_{ph}}{\lambda_e} = \frac{\frac{hc}{E}}{\frac{h}{\sqrt{2mE}}} = \frac{hc}{E} \cdot \frac{\sqrt{2mE}}{h} = c \cdot \sqrt{\frac{2m}{E}}$$

optical (4) is correct.

Additional Inf. :

- Force exerted by light beam on a surface
- (i) Photons incident on black body = $\frac{P}{c}$
- (ii) If surface of body is perfectly reflect $F = \frac{2P}{c}$

- m^l to Pressure
 - (i) Fully absorbed $P = \frac{I}{c}$
 - (ii) Fully reflected $P = \frac{2I}{c}$

$I = \text{intensity}$
 $c = \text{velocity of light}$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Wave optics: Polarization.

Q.41 An unpolarized light beam travelling in air is incident on a medium of refractive index 1.73 at Brewster's angle. Then-

- (1) transmitted light is completely polarized with angle of refraction close to 30°
- (2) reflected light is completely polarized and the angle of reflection is close to 60°
- (3) reflected light is partially polarized and the angle of reflection is close to 30°
- (4) both reflected and transmitted light are perfectly polarized with angles of reflection and refraction close of 60° and 30° , respectively.

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

Brewster's angle: is the angle ^{of incidence} at which angle θ between refracted ray and reflected ray is 90° .

$$\mu = \tan i_p$$

$$\tan i_p = 1.73 = \sqrt{3}$$

$$i_p = \tan^{-1} \sqrt{3} = 60^\circ$$

→ Acc to Brewster's law: At $\theta = i = i_p = 60^\circ$, reflected ray is completely polarized. Option (2) is correct.

Additional info:
• For $i < \theta_p$ or $i > \theta_p$, both reflected and refracted rays become partially polarized.
• For glass $\theta_p = 57^\circ$ → for water $\theta_p = 53^\circ$

$$\tan 57^\circ = 1.54 \quad \& \quad \tan 53^\circ = 1.33$$

$$\% \text{ of } \uparrow \text{ polarization} = \frac{(I_{\text{max}} - I_{\text{min}})}{(I_{\text{max}} + I_{\text{min}})} \times 100$$

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

System of Particles & R.M

Q.42 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 end rests on a rough horizontal floor. The friction force that the floor exerts on the rod is

(take $g = 10 \text{ m/s}^2$)

(1) $200\sqrt{3} \text{ N}$

(2) 100N

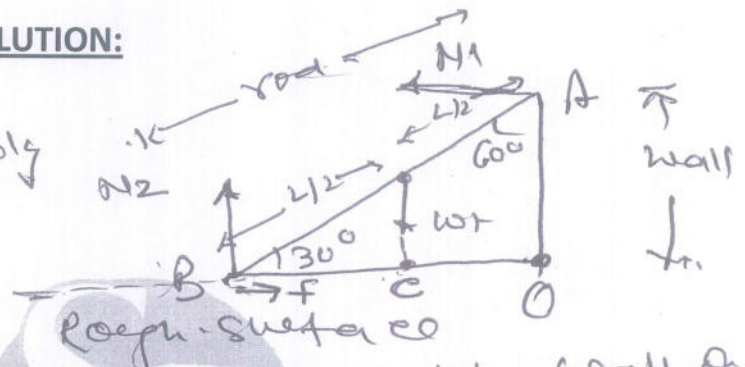
(3) $100\sqrt{3} \text{ N}$

(4) 200N

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

$AB = 5 \text{ m}$
Mass of rod = 20 kg



N_1 is normal reaction exerted by wall @ rod
 N_2 is normal reaction exerted by floor @ rod
 f is frictional force

Vertical direction $W = N_2$
Horizontal direction $f = N_1$
As rod is stationary, so net torque is zero.

As rod is stationary, so net torque is zero.
(about A-B).
 $W \times \text{perp. distance BC} = N_1 \times \text{perp. distance OA}$
 $mg \cdot \frac{L}{2} \cos 30^\circ = f \cdot L \sin 30^\circ$
Sub values
 $\therefore f = \frac{mg \cdot \cos 30^\circ}{2}$
 $= \frac{20 \times 10 \times \sqrt{3}}{2}$
 $= 100\sqrt{3} \text{ N}$
Option (3) is correct.

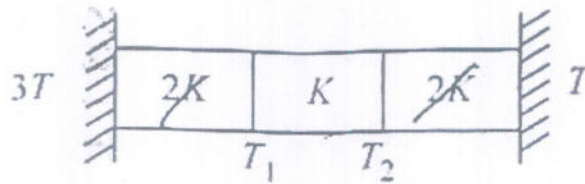
Additional Info:
Torque:

about any pt: force x its distance.
if clockwise +ve then
take anticlockwise -ve.

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Thermal Properties of Matter: Transfer of Heat

Q.43 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



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

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

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

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

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

Rate of transfer of heat is same in series combination of conducting rods
 $Q = \frac{kA(\theta_1 - \theta_2)}{l}$

Considering transfer of heat at junction T_1

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

$$\begin{aligned} 6T - 2T_1 &= T_1 - T_2 \\ \boxed{3T_1 - T_2 = 6T} &\quad \text{--- (1)} \end{aligned}$$

Now consider transfer of heat at T_2

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

$$\begin{aligned} T_1 - T_2 &= 2T_2 - 2T \\ \therefore 3T_2 - T_1 &= 2T &\quad \text{--- (2)} \end{aligned}$$

cont. Q Next for

Continued for previous page QNO 13:

On solving (1) & (2)

$$3T_1 - T_2 = 6T$$

$$-T_1 + 3T_2 = 2T \quad \times 3 \quad \text{adding}$$

$$-T_2 + 9T_2 = 12T$$

$$8T_2 = 12T$$

$$T_2 = 3/2 T$$

sub in (2)

$$T_1 = 3T_2 - 2T = 3 \times \frac{3}{2} T - 2T = \frac{5}{2} T$$

$$\therefore \frac{T_1}{T_2} = \frac{5/2 T}{3/2 T} = 5/3$$

option (4) is correct.

Additional 2m -

Thermal conduction

$$H = \frac{dQ}{dt} = \frac{dQ}{dt}$$

$$H = \frac{Q_1 - Q_2}{R_{th}}$$

$$R = \frac{l}{kA}$$

$$R_{eq} = R_1 + R_2 \quad \text{(in series)}$$

$$1/R_{eq} = 1/R_1 + 1/R_2 \quad \text{(in parallel)}$$

$$L_{steam} = \text{latent heat of steam} = 540 \text{ cal/gm}$$

$$L_{ice} = \text{latent heat of ice} = 80 \text{ cal/gm}$$

Electric conduction

$$I = \frac{dq}{dt}$$

$$I = \frac{V_2 - V_1}{R}$$

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

Same as in thermal conduction.

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Work, Power & Energy

Q.44 The kinetic energies of two similar cars A and B are 100 J and 225 J respectively. On applying breaks, car A stops after 1000 m and car B stops after 1500 m. If F_A and F_B are the car forces applied by the breaks on cars A and B, respectively, then the ratio F_A / F_B is

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

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

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

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

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

KE of car A = 100 J & that of B = 225 J
A stops after application of 1000 m. & that car B
stops after 1500 m.
To find ratio of Break forces $\frac{F_A}{F_B} = ?$
According to Work Energy theorem
change in KE = W.D
$$\frac{\Delta KE_A}{\Delta KE_B} = \frac{F_A \cdot S_A}{F_B \cdot S_B}$$

Sub values.
$$\left(\frac{F_A}{F_B}\right) \left(\frac{1000}{1500}\right) = \frac{100}{225} \Rightarrow \boxed{\frac{F_A}{F_B} = \frac{2}{3}}$$
 option (3) is correct

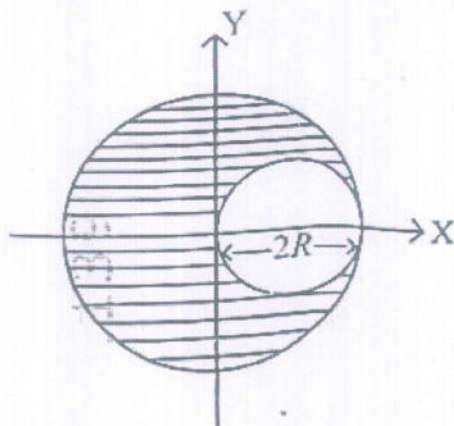
Additional Info :

- 1 hp = 746 watt
- 1 kWh = 3.6×10^6 joules.
- Slope of work-time curve gives the instantaneous power. As $P = \frac{dw}{dt} = \frac{dW}{dt}$
- A force is conservative if it can be derived from a scalar quantity $\Rightarrow F = -\frac{dU(x)}{dx}$.

11th AND 12th STANDARD PCM FOR CBSE BOARD, JEE MAIN, NEET
(UG), CUET AND OTHER ENTRANCE EXAMS

Rotational Motion

Q.45 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:



(1) $\frac{7}{64}$

(2) $\frac{7}{8}$

(3) $\frac{7}{40}$

(4) $\frac{7}{57}$

(NEET-2025)

CONCEPT APPLICABLE AND SOLUTION:

Let mass of big sphere be $M_b = M$
 & that of smaller be M_s

As smaller is cut from bigger, ρ of both will be same.

$$\frac{M_s}{M_b} = \frac{\frac{4}{3}\pi R^3 \times \rho}{\frac{4}{3}\pi (2R)^3 \times \rho} = \frac{1}{8}$$

$$\therefore M_s = \frac{M_b}{8} = \frac{M}{8}$$

M.I of remaining part = M.I of big - M.I of small
 i.e. $I_R = I_b - I_s$ As per 11 axis theorem

$$= \left[\frac{2}{5} M (2R)^2 \right] - \left[\frac{2}{5} M_s R^2 + M_s R^2 \right]$$

continued @
next Pg

Continued previous:

$$\begin{aligned}
 I_R &= \frac{8}{5} MR^2 - \left(\frac{2}{5} + 1\right) MR^2 \\
 &= \frac{8}{5} MR^2 - \frac{7}{5} \cdot \frac{5}{8} MR^2 \\
 &= \left(\frac{8}{5} - \frac{7}{40}\right) MR^2 \\
 &= \left(\frac{64-7}{40}\right) MR^2 \\
 &= \frac{57}{40} MR^2
 \end{aligned}$$

$$\frac{I_S}{I_R} = \frac{\frac{7}{40} MR^2}{\frac{57}{40} MR^2} = \frac{7}{57}$$

Option (D) is correct

Additional Information:

- M.I of a body is not constant, it depends on the axis of rotation.
- M.I depends on distribution of mass about an axis. The further the mass, the higher will be the M.I.
- Theorem of parallel axis is applicable to any type of rigid body whether it is two dimensional or 3 dimensional.
- Theorem of perpendicular axis is applicable to laminae type or two-dimensional bodies only.
- $I = MR^2 \Rightarrow$ Radius of gyration = $\sqrt{\frac{I}{M}}$