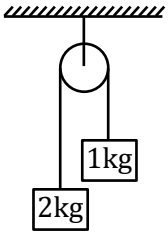
MEMORY BASED QUESTIONS JEE–MAIN EXAMINATION – APRIL 2026

(HELD ON THURSDAY 02nd APRIL 2026) **TIME : 3:00 PM TO 6:00 PM**

PHYSICS

TEST PAPER WITH SOLUTION

1. For given atwood machine. Find displacement (in m) of centre of mass after 2 sec of release.



(1) $\frac{20}{9}$(Downward) (2) $\frac{20}{9}$(upward)

(3) $\frac{10}{9}$(Downward) (4) $\frac{10}{9}$(upward)

Ans. (1)

Sol. $a=\frac{(m_2-m_1)}{m_1+m_2}g=\frac{(2-1)}{3}\times 10=\frac{10}{3}m/s^2$

$a_{cm}=\frac{(1)(10/3)-(2)(10/3)}{3}=\frac{-10}{9}m/s^2(\downarrow)$

$S_{cm}=u_{cm}t+\frac{1}{2}a_{cm}t^2$

$=0+\frac{1}{2}\left(\frac{10}{9}\right)(4)=\frac{20}{9}$ m (downward)

$S_{COM}=\frac{20}{9}$ (Downward)

2. At any instant, if $\vec{B}=-2\times10^{-7}\hat{j}$ T and C is along +x axis then $\vec{E}$ at this instant is :-

(1) $60\hat{k}$ V/m (2) $45\hat{k}$ V/m

(3) $90\hat{k}$ V/m (4) $30\hat{k}$ V/m

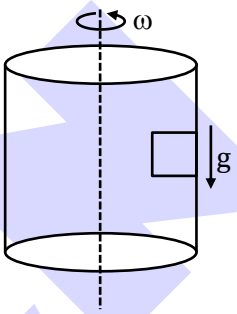
Ans. (1)

Sol. $\vec{E}=\vec{B}\times\vec{C}$

$=-2\times10^{-7}\hat{j}\times3\times10^{8}\hat{i}$

$\vec{E}=60\hat{k}$ V/m

3. A hollow cylinder of radius 1m is rotating with angular velocity ω = 10 rad/sec. Find minimum coefficient of friction μ so that block remains at rest w.r.t. cylinder.



(1) 0.1

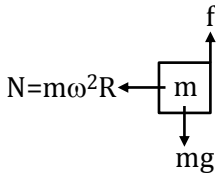
(2) 0.2

(3) 0.15

(4) 0.25

Ans. (1)

Sol.



$f_{max}=mg$

$\mu_{min}N=mg$

$\mu_{min}\times m\omega^2R=mg$

$\mu_{min}=\frac{g}{\omega^2R}=\frac{10}{10^2\times1}=0.1$

4. An air bubble of radius 1 mm is rising up with constant speed of 0.5 cm/s in a liquid of density ρ_{liq} 2000 kg/m^3. Find coefficient of viscosity η in poise.

(1) $\frac{70}{9}$ poise

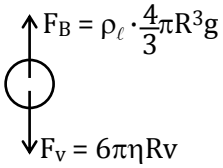
(2) 20 poise

(3) $\frac{80}{9}$ poise

(4) 50 poise

Ans. **(3)**

Sol.



For constant speed

$F_B = F_V$

$\Rightarrow \rho_\ell \frac{4}{3}\pi R^3 g = 6\pi\eta Rv$

$\frac{2}{9}\frac{\rho_\ell R^2 g}{v} = \eta$

$\Rightarrow \frac{2}{9} \times \frac{2000 \times 10^{-6} \times 10}{5 \times 10^{-3}} = \eta$

$\Rightarrow \eta = \frac{8}{9}$ Pa.s

$\Rightarrow \eta = \frac{80}{9}$ Poise

5. Work function for an object is 2.3 eV. If maximum kinetic energy of ejected electrons is 0.18 eV. Find wavelength λ of incident photon on object.

(1) 200 nm (2) 500 nm

(3) 250 nm (4) 300 nm

Ans. **(2)**

Sol. $KE_{max} = E_{incident\ photon} - \phi$

$2.3 = E - 0.18$

$E = 2.3 + 0.18 = 2.48$ eV

$\Rightarrow \frac{1240 eV - nm}{\lambda(nm)}$

$\lambda = \frac{1240}{2.48} = 500$ nm

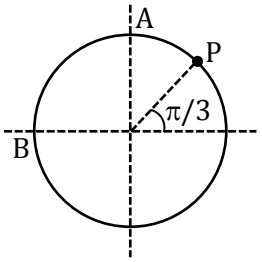
6. Position of a particle is given by $x = A\sin\left(50t + \frac{\pi}{3}\right)$. If speed and acceleration becomes '0' for the first time at t_1 and t_2 sec respectively, then find t_1 & t_2 (in sec) :-

(1) $\frac{\pi}{300}, \frac{\pi}{75}$ (2) $\frac{\pi}{300}, \frac{\pi}{150}$

(3) $\frac{\pi}{150}, \frac{\pi}{75}$ (4) $\frac{\pi}{150}, \frac{\pi}{300}$

Ans. **(1)**

Sol. Phase of the motion of particle is as follows :



V = 0, when particle cross A.

$\therefore t_1 = \frac{\pi}{6\omega} = \frac{\pi}{300}$

a = 0, when particle cross B.

$\therefore t_2 = \frac{2\pi}{3\omega} = \frac{\pi}{75}$

7. Find $\left(\frac{BE}{A}\right)$ of $_{83}Bi^{209}$.

Given : M_{Bi} = 208.9804 amu, m_p = 1.007276 amu, m_n = 1.008665 amu, 1 amu = 931 MeV

(1) 5.8908729 MeV/A

(2) 3.0008729 MeV/A

(3) 4.2506229 MeV/A

(4) 7.6408729 MeV/A

Ans. **(4)**

Sol. $83\,{}_1P^1 + 126\,{}_0n^1 \rightarrow {}_{83}Bi^{209}$

$\Delta m = 83m_p + 126\,m_n - M_{Bi}$

$= 83 \times 1.007276 + 126 \times 1.008665 - 208.9804$

$= 1.715298$ amu

$BE = 1.715298 \times 931$ MeV

$\frac{BE}{A} = \frac{1.715298 \times 931}{209}$ MeV

$\frac{BE}{A} = 7.6408729$ MeV /A

8. A screw gauge has pitch of 0.1 mm and 100 division on its circular scale. When it's both jaws touches, fifth division of its circular scale is coincide with zero. When a sphere is placed between jaws, then reading of linear scale is 5 mm and 50th division of circular scale coincides with zero of main scale. Find diameter of the sphere.

(1) 5.55 mm

(2) 5.45 mm

(3) 5.056 mm

(4) 5.045 mm

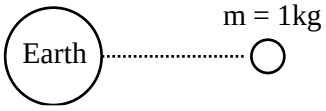
Ans. **(4)**

Sol. Least count : $\frac{0.1}{100}\text{mm} = 0.001\frac{\text{mm}}{\text{division}}$

Reading = MSD + (CSD) × LC – zero error

$= 5\text{mm} + 50 \times 0.001 - 5 \times 0.001 = 5.045$ mm

9. Find speed of 1 kg object when it reaches close to earth's surface from long distance after it is released from rest as shown in diagram. [Given R_e = 6400 km, g_s = 9.8 m/s^2]



(1) 12.5 km/s (2) 11.2 km/s

(3) 9.8 km/s (4) 2.4 km/s

Ans. **(2)**

Sol. M.E.C

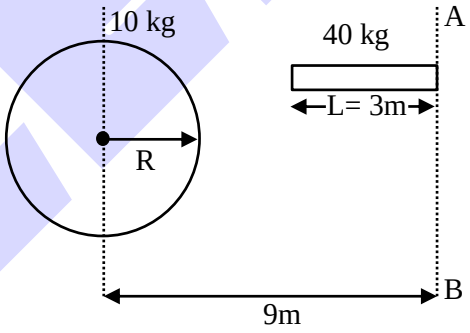
$K_i + U_i = K_f + U_f$

$\Rightarrow O - \frac{GM_em}{\infty} = \frac{1}{2}mv^2 - \frac{GMm}{Re}$

$V = \sqrt{\frac{2GM}{Re}} = \sqrt{2gRe} = \sqrt{2 \times 9.8 \times 6400 \times 1000}$

$= 11.2$ km/s

10.



If moment of inertia of rod about axis AB is equal to moment of inertia of solid sphere about an axis parallel to AB which is at 9m from AB axis as shown in the figure. If $R = \sqrt{\frac{\alpha}{2}}$ then find α = ?

Ans. **α = 60**

Sol. $\frac{2}{5}M_1R^2 = \frac{M_2L^2}{3}$

$\frac{2}{5} \times 10 \times R^2 = \frac{40}{3} \times 9$

$R = \sqrt{30} = \sqrt{\frac{\alpha}{2}}$

$\alpha = 60$

11. Surface tension of soap bubble is 0.03 N/m. The work done in increasing the diameter of bubble from 2 cm to 6 cm is $\alpha\pi \times 10^{-4}$ J. Find the value of α.

Ans. **(1.92)**

Sol. $W = \Delta U = 2T\,[4\pi R_2^2 - 4\pi R_1^2]$

$W = 2 \times 3 \times 10^{-2} \times 4\pi\,[9 \times 10^{-4} - 1 \times 10^{-4}]$

$W = 1.92\,\pi \times 10^{-4}$ J

$\alpha = 1.92$

12. A paper is placed in front of lens at a distance 30 cm, such that paper gets burn in minimum time. Radius of curvature of bi-convex lens is 60 cm. If refractive index of lens is $\mu = \frac{\alpha}{10}$ then value of α is

Ans. **(20)**

Sol. To burn in minimum time distance of paper must be at focus.

So f = 30 cm

$$\frac{1}{30} = (\mu - 1)\left(\frac{1}{60} - \frac{1}{-60}\right)$$

$$\frac{1}{30} = \frac{\mu - 1}{30}$$

$\mu = 2$

$\boxed{\alpha = 20}$

13. Consider Bohr's model of a H-atom. If magnetic field at centre due to electron in 2^{nd} orbit is B_1 and magnetic field due to electron in 4^{th} orbit is B_2. Find $\frac{B_1}{B_2}$

Ans. **(64)**

Sol. $B = \frac{\mu_0 I}{2\pi r}$

$I = \frac{ev}{2\pi r}$

$B \propto \frac{V}{r^2}$

$V \propto \frac{Z}{n}$

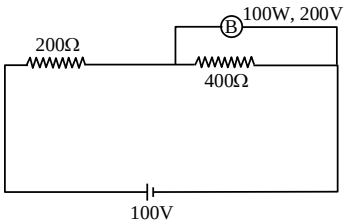
$r \propto \frac{n^n}{Z}$

$$B \propto \frac{\left(\frac{Z}{n}\right)}{\left(\frac{n^2}{Z}\right)^2}$$

$$B \propto \frac{Z^3}{n^5}$$

$$\frac{B_1}{B_2} = \frac{n_2^5}{n_1^5} = \frac{4^5}{2^5} = 64$$

14.



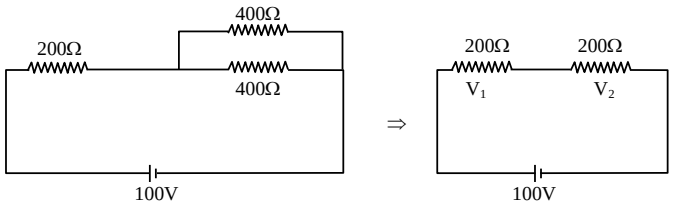
Find potential difference across bulb as shown in the figure.

Ans. **(50)**

Sol. For resistance of bulb

$$R = \frac{V^2}{P} = \frac{200\times200}{100} = 400\Omega$$

Now circuit will look like this



V_1 & V_2 will be same as resistances are same

$V_1 = V_2 = 50V$

$\boxed{V_{bulb} = V_2 = 50V}$

15. Force on a charge q = 10^{-9} C in uniform electric and magnetic field is $\vec{F} = (2\times10^{-10}\hat{i} + 3\times10^{-10}\hat{j})N$. Find velocity (in m/s) of charge if value of electric field is $0.4\hat{j}\ V/m$ and magnetic field is $2\times10^{-3}\hat{k}$ T.

(1) $\vec{V} = 50\hat{i} + 100\hat{j}$

(2) $\vec{V} = 100\hat{i} + 100\hat{j}$

(3) $\vec{V} = 50\hat{i} + 50\hat{j}$

(4) $\vec{V} = 50\hat{i} + 10\hat{j}$

Ans. (1)

Sol. $\vec{F} = q\vec{E} + q(\vec{V}\times\vec{B})$

$(2\times10^{-10}\hat{i} + 3\times10^{-10}\hat{j}) = 0.4 \times 10^{-9}\hat{j} + 10^{-9}\{v_x\hat{i} +$

$v_y\hat{j} + v_z\hat{k}\} \times (2 \times 10^{-3})\hat{k}$

$(2 \times 10^{-10}\hat{i}) + (3 \times 10^{-10}\hat{j}) = 4 \times 10^{-10}\hat{j} - 2v_x \times 10^{-}$

$^{12}\hat{j} + 2v_y \times 10^{-12}\hat{i}$

On comparing

$3 \times 10^{-10} = 4 \times 10^{-10} - 2v_x \times 10^{-12}$

$2v_x \times 10^{-12} = 1 \times 10^{-10}$

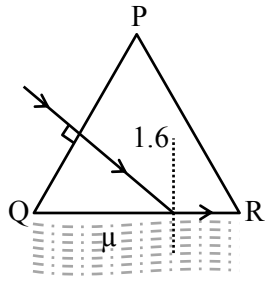
$v_x \Rightarrow \frac{10^2}{2} \Rightarrow 50$

$2 \times 10^{-10} = 2v_y \times 10^{-12}$

$v_y = \frac{200}{2} = 100$

$\vec{V} = 50\hat{i} + 100\hat{j}$

16. There is thin layer of refractive index μ below base of equilateral prism. The path of a ray is shown in figure. Find out μ.



(1) 1.38

(2) 1.52

(3) 1.414

(4) 1.23

Ans. (1)

Sol. For surface QR

$i = 60°$

$1.6 \sin 60° = \mu \sin 90°$

$\mu = 1.6 \times \frac{\sqrt{3}}{2} = 0.8 \times \sqrt{3} = 1.38$

17. If G → Gravitational constant and h is Plank's constant then dimension of G is :

(1) $[M^{-2}L^{+1}T^{-1}h^{+2}]$

(2) $[M^{-2}L^{+1}T^{-1}h^{+1}]$

(3) $[M^{-1}L^{+1}T^{-1}h^{+3}]$

(4) $[M^{-2}L^{+1}T^{-1}]$

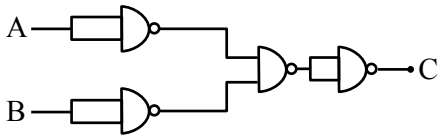
Ans. (2)

Sol. $\text{Energy} = \frac{hc}{\lambda} = \frac{GM_1M_2}{r}$

$[ML^2T^{-2}] = [h][T^{-1}] = [G][M^2L^{-1}]$

$[G] = [M^{-2}L^{+1}T^{-1}h^{+1}]$

18. For given logic gate circuit an equivalent gate will be



(1) OR gate (2) AND gate

(3) NAND gate (4) NOR gate

Ans. (2)

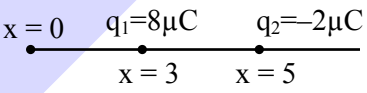
Sol. $Y_1 = \overline{A \cdot A} = \overline{A}$

$Y_2 = \overline{B \cdot B} = \overline{B}$

$Y_3 = \overline{\overline{A} \cdot \overline{B}} = A + B$

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

19. Find the ratio of electric flux passing through two spheres centred at origin having radius 4m and 6m respectively :



(1) 2.36

(2) 1.33

(3) 5.72

(4) 6.83

Ans. (2)

Sol. For sphere with radius 4m and center origin

$\phi_1 = \frac{q_{en}}{\varepsilon_0} = \frac{8\mu C}{\varepsilon_0}$

for sphere of radius 6m

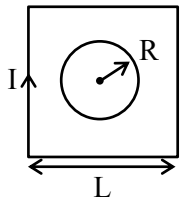
$\phi_2 = \frac{q_{en}}{\varepsilon_0} = \frac{(8-2)\mu C}{\varepsilon_0} = \frac{6\mu C}{\varepsilon_0}$

$\frac{\phi_1}{\phi_2} = \frac{8}{6} = \frac{4}{3} = 1.33$

$\frac{\phi_1}{\phi_2} = 1.33$

20. Side of square is L and R <<< L.

Find mutual inductance of system shown in figure.



(1) $\frac{\sqrt{2}\mu_0 R^2}{L}$

(2) $\frac{4\sqrt{2}\mu_0 R^2}{L}$

(3) $\frac{2\mu_0 R^2}{L}$

(4) $\frac{2\sqrt{2}\mu_0 R^2}{L}$

Ans. (4)

Sol. Magnetic field due to square

$$B = 4 \times \frac{\mu_0 I}{4\pi\frac{L}{2}} \{2 \sin 45°\}$$

$$= \frac{4\mu_0 I}{\pi L} \times \frac{1}{\sqrt{2}} = \frac{2\sqrt{2}\mu_0 I}{\pi L}$$

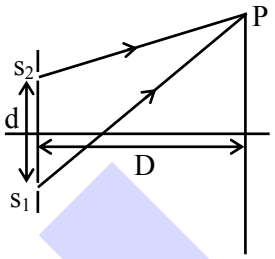
$$Q = B \times A_{circle}$$

$$Q = \frac{2\sqrt{2}\mu_0 I}{\pi L} \times \pi R^2$$

$$Q = \frac{2\sqrt{2}\mu_0 R^2}{L} I$$

$$\text{Inductance} = \frac{2\sqrt{2}\mu_0 R^2}{L}$$

21. As shown in the figure in YDSE experiment if intensity is $\frac{3}{4}$th of maximum intensity at point P, and path difference at point 'P' is $\Delta x = \frac{\lambda}{\alpha}$. Find the value of "α". (where λ is wavelength of light)



(1) 4

(2) 6

(3) 5

(4) 2

Ans. (2)

Sol. $I = 4I_0 \cos^2 \frac{\Delta\phi}{2}$

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

$$\cos \frac{\Delta\phi}{2} = \frac{\sqrt{3}}{2}$$

$$\frac{\Delta\phi}{2} = \frac{\pi}{6}$$

$$\frac{k\Delta x}{2} = \frac{\pi}{6}$$

$$\frac{2\pi}{\lambda} \times \frac{\Delta x}{2} = \frac{\pi}{6}$$

$$\Delta x = \frac{\lambda}{6} = \frac{\lambda}{\alpha}$$

$$\alpha = 6$$

22. An ideal gas of 5 mole has $C_P = 8$ cal/mol.°C. If its temperature changes from 10°C to 20°C, then calculate change in its internal energy (in cal).

Ans. **(300)**

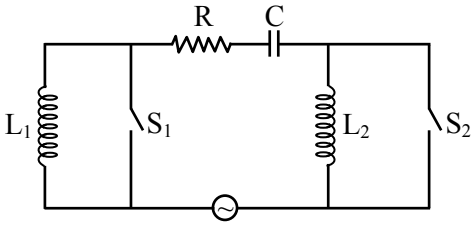
Sol. $C_P - C_V = R \Rightarrow C_V = (C_P - R)$

$C_V = 6$ cal/mol°C

$\Delta U = nC_V \Delta T$

$= 5 \times 6 \times 10 = 300$ cal

23. If S_1 is closed and S_2 open, θ is 30° and if S_1 is open and S_2 closed then θ is 60°. Then find $3L_2 - L_1$ if $C = 100\mu F$.

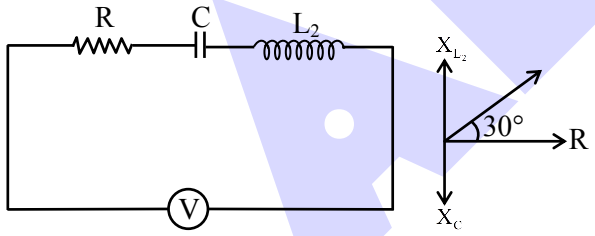


(1) $\frac{2}{9}$ (2) $\frac{4}{9}$

(3) $\frac{9}{4}$ (4) $\frac{2}{7}$

Ans. **(1)**

Sol. For S_1 is closed and S_2 open

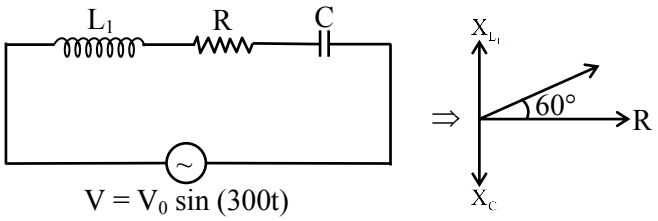


$V = V_0 \sin(300\,t)$

$$\frac{X_{L_2} - X_C}{R} = \tan(30°) = \frac{1}{\sqrt{3}}$$

$$\sqrt{3}\,(X_{L_2} - X_C) = R \quad .....(1)$$

For S_1 is open and S_2 is closed.



$$\frac{|X_{L_1} - X_C|}{R} = \tan 60° = \sqrt{3}$$

$$\frac{|X_{L_1} - X_C|}{\sqrt{3}} = R \quad ....(2)$$

from Eq. (1) and (2)

$$\sqrt{3}\,(X_{L_2} - X_C) = \frac{(X_{L_1} - X_C)}{\sqrt{3}}$$

$$3\left(\omega L_2 - \frac{1}{\omega C}\right] = \left[\omega L_1 - \frac{1}{\omega C}\right]$$

$$|3L_2 - L_1| = \frac{2}{\omega^2 C} = \frac{2}{9\times10^4 \times 100 \times 10^{-6}}$$

$$|3L_2 - L_1] = \frac{2}{9}$$

24. A small ball of mass 1 kg is released from height of 20 m on the sand. It penetrates 10 cm in sand and comes to rest. Find average force exerted by sand on ball. ($g = 10$ m/s^2)

(1) 1000 (2) 1980

(3) 2010 (4) 4020

Ans. **(3)**

Sol. $(W.D.)_g + (W.D.)_{sand} = \Delta K$

$$mg\left(\frac{10}{100} + 20\right) - F_{sand}\left(\frac{10}{100}\right) = 0$$

$F_{sand} = 2010$

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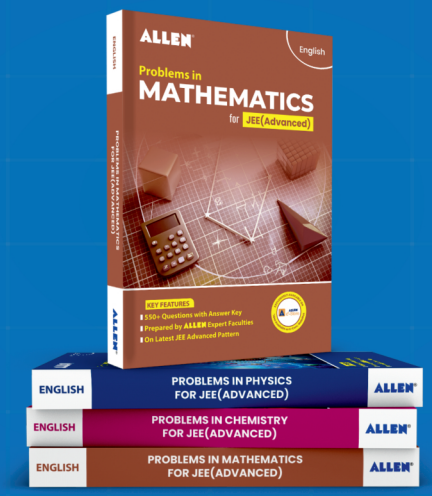

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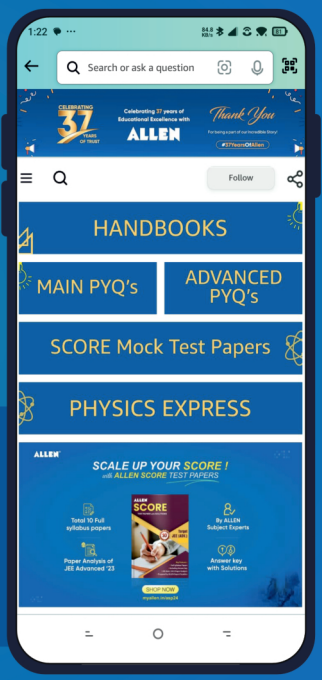

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