

MEMORY BASED QUESTIONS JEE–MAIN EXAMINATION – APRIL 2026

(HELD ON MONDAY 06th APRIL 2026)

TIME : 9:00 AM TO 12:00 NOON

PHYSICS

TEST PAPER WITH SOLUTION

1. Potential energy of a particle is given as $u = \frac{A\sqrt{x}}{B+x}$.

Find dimension of A and B :-

- (1) $M^3 L^{3/2} T^{-2}$, L (2) $M L^{5/2} T^{-1}$, L^2
 (3) $M L^{5/2} T^{-2}$, L (4) $M L^{7/2} T^{-3}$, L

Ans. (3)

Sol. $[B] = [x] = L$

$$[U] = \left[\frac{A\sqrt{x}}{B+x} \right] \Rightarrow M L^2 T^{-2} = \frac{[A]L^{1/2}}{L}$$

$$[A] = M L^{5/2} T^{-2}$$

2. In AC circuit supply voltage (V_{rms}) = 1000V, $R = 80 \Omega$, $X_L = 80\Omega$ & source frequency $f = 50$ Hz. Find the power factor.

- (1) $\frac{1}{\sqrt{2}}$ (2) $\frac{1}{\sqrt{3}}$
 (3) $\frac{1}{\sqrt{5}}$ (4) $\frac{1}{\sqrt{6}}$

Ans. (1)

Sol. Power factor, $\cos \phi = \frac{R}{Z}$

$$Z = \sqrt{R^2 + X_L^2} = 80\sqrt{2}\Omega$$

$$\cos \phi = \frac{80}{80\sqrt{2}}$$

$$\cos \phi = \frac{1}{\sqrt{2}}$$

3. Electric field due to half Ring at center is 100 N/C. Find charge on Ring. Radius of Ring is 10cm.

- (1) $\frac{\pi}{9} \times 10^{-9} C$ (2) $\frac{\pi}{27} \times 10^{-9} C$
 (3) $\frac{\pi}{18} \times 10^{-9} C$ (4) $\frac{\pi}{36} \times 10^{-9} C$

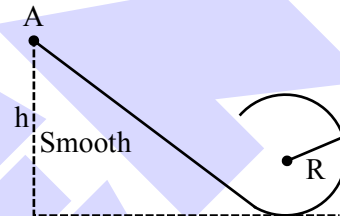
Ans. (3)

Sol. $E = \frac{2k\lambda}{r}$

$$\Rightarrow 100 = \frac{2 \times 9 \times 10^9 \times q}{\pi \times 10 \times 10^{-2} \times 10 \times 10^{-2}}$$

$$q = \frac{\pi}{18} \times 10^{-9} C$$

4. A particle is released from point A of track as shown in figure find h so that normal reaction at highest point is 3 times the weight of block :-



- (1) $h = 4R$ (2) $h = 3R$
 (3) $h = 2.5R$ (4) $h = 6R$

Ans. (1)

Sol. at highest point

$$mg + N = \frac{mv^r}{R}$$

$$4mg = \frac{mv^r}{R}$$

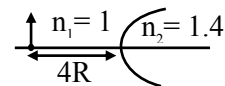
$$v = \sqrt{4gR}$$

Now energy conservation

$$mg(h - 2R) = \frac{1}{2} m \times 4gR$$

$$(h = 4R)$$

5. Find transverse magnification due to curved boundary between two mediums.



- (1) -1.5 (2) -1.67
 (3) +1.2 (4) -0.8

Ans. (2)

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Sol. $x = -A \quad x = 0 \quad \frac{A}{\sqrt{2}} \quad x = +A$

$x = 0 \rightarrow \theta = 0^\circ$

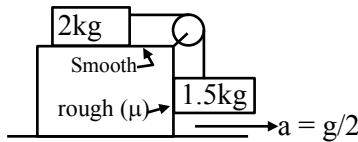
$x = \frac{A}{\sqrt{2}} \rightarrow \theta = \frac{\pi}{4}$

\therefore phase covered = $\frac{\pi}{4}$

time = $\frac{\text{phase}}{\omega} = \frac{\pi}{4\omega} = \frac{\pi}{4} \times \frac{T}{2\pi} = \frac{T}{8}$

$\therefore t = \frac{5}{8}$ secs.

9. Find μ so that blocks are at rest :



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

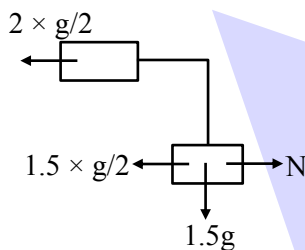
(2) $\frac{2}{3}$

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

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

Ans. (2)

Sol. w.r.t bigger block

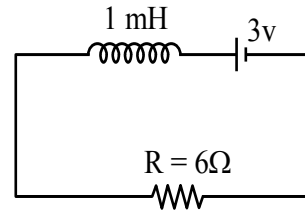


$f = \mu N = \mu \times \frac{1.5g}{2}$

$1.5g = g + \mu \times \frac{1.5g}{2} \Rightarrow 0.5 = \mu \times \frac{1.5}{2}$

$\left(\mu = \frac{2}{3} \right)$

10. For the given circuit, find ratio of instantaneous voltage across inductor when current is 2mA & when current is 4mA.



(1) 1.5
(3) 2

(2) 1
(4) 1.25

Ans. (2)

Sol. At $i = 2\text{mA}$

$\Delta V_R = iR = 2 \times 10^{-3} \times 6 = 0.012 \text{ V}$

$\Delta V_{\text{ind}} = 3 - 0.012 = 2.988 \text{ V}$

At $I = 4\text{mA}$

$\Delta V_{\text{ind}} = iR = 4 \times 10^{-3} \times 6 = 0.024$

$\Delta V_{\text{ind}} = 3 - 0.024 = 2.976$

Ratio = $\frac{2.988}{2.976} = 1.00403$

11. A sphere of mass 5 kg and radius 4 cm is rotating about fixed axis about diameter with 1200 r.p.m. To stop it in 10 sec, a torque is applied. Find magnitude of torque required and revolution made before it stops. Respectively :-

(1) 0.08 N-m and 50 Rev.

(2) 0.04 N-m and 100 Rev.

(3) 0.016 N-m and 200 Rev.

(4) 0.2 N-m and 100 Rev.

Ans. (2)

Sol. $\omega_i = 1200 \text{ rpm} = 1200 \times \frac{2\pi}{60} = 40 \pi \text{ rad/sec}$

$\rightarrow \omega_f = \omega_i + \alpha t \Rightarrow 0 = 40\pi + \alpha(10)$

$\alpha = -4\pi \text{ rad/sec}^2$

$\rightarrow I = \frac{2}{5}MR^2 = \frac{2}{5}(5)(0.04)^2 = 2 \times 0.0016$

$I = 0.0032 \text{ Kg-m}^2$

$\rightarrow \tau = I\alpha = 0.0032 \times 4\pi$

$\tau = 0.04 \text{ N-m}$

$\rightarrow \omega_f^2 = \omega_i^2 + 2\alpha\theta$ &

$0 = (40\pi)^2 + 2(4\pi)\theta$

$\theta = \frac{1600\pi^2}{8\pi} = 200\pi$

No. of revolution = $\frac{\theta}{2\pi} = \frac{200\pi}{2\pi}$

No. of revolution = 100



12. Intensity of two sources is same and path difference at point A and B are $\frac{\lambda}{6}$ and $\frac{\lambda}{3}$ respectively. Ratio of intensity at A & B will be.

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

Ans. (1)

Sol. $\Delta\phi)_A = \frac{2\pi}{\lambda} \times \frac{\lambda}{6} = \frac{\pi}{3}$

$\therefore I)_A = I + I + 2 \cdot 2\sqrt{I} \cdot \sqrt{I} \cdot \cos\left(\frac{\pi}{3}\right)$

$= 2I + 2I \cdot \frac{1}{2} = 3I$

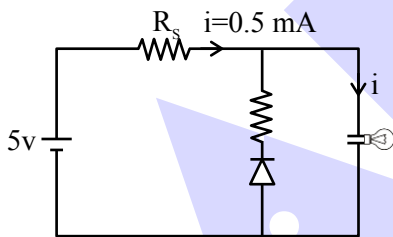
$\Delta\phi)_B = \frac{2\pi}{\lambda} \times \frac{\lambda}{3} = \frac{2\pi}{3}$

$\therefore I)_B = I + I + 2 \cdot 2\sqrt{I} \cdot \sqrt{I} \cdot \cos\left(\frac{2\pi}{3}\right)$

$= 2I - I = I$

$\therefore \frac{I)_A}{I)_B} = \frac{3I}{I} = 3$

13. Find minimum R_s so that LED light does not get damaged (power rating of LED is 2 mW):-



- (1) 1Ω (2) 2Ω
(3) 3Ω (4) 4Ω

Ans. (2)

Sol. Diode in reverse bias so no current in it.

$P_{bulb} = 2 \times 10^{-3} = V_{bulb}$

$V_{bulb} = 4V$

So $5V = V_{RS} + V_{bulb}$

$V_{RS} = 5 - 4 = 1$

$1 = 0.5 R_s \Rightarrow R_s = 2\Omega$

14. The dimension of a solid cylinder is measured as given

Mass = 19.42 ± 0.02 kg

Diameter = 20.20 ± 0.02 cm

Length = 10.10 ± 0.02

Find out % error in density.

- (1) 0.5% (2) 0.3%
(3) 0.4% (4) 0.7%

Ans. (1)

Sol. $\rho = \frac{4M}{\pi d^2 l}$

$\frac{d\rho}{\rho} = \frac{dM}{M} + \frac{dl}{l} + \frac{2dd}{d}$

$\frac{d\rho}{\rho} = \left(\frac{0.02}{19.42} + \frac{0.02}{10.10} + \frac{2 \times 0.02}{20.20} \right) \times 100 = 0.5\%$

15. Electric field in space is given by $\vec{E} = 2x\hat{i} + 3y^2\hat{j} + 4z\hat{k}$. A charge $q = 3C$ is taken from $r_1(0, -1, -3)$ to $r_2(5, 1, 2)$. Find magnitude of ΔU

Ans. (47)

Sol. $\Delta U = -w_{electrostatic} = -\int 2x dx - \int 3y^2 dy - \int 4z dz$

$= (-x^2 - y^3 - 4z)_{(0,-1,-3)}^{(5,1,2)}$

$= -[25 + 2 + 20]$

$= -47 J$

16. Bulk's modulus of an ideal gas for isothermal process initially is B. Gas is compressed from volume V_0 to $\frac{V_0}{3}$ isothermally. Find the work done by gas.

(1) $BV_0 \ln 3$

(2) $\frac{BV_0}{3} \ln 3$

(3) $BV_0 \ln\left(\frac{1}{3}\right)$

(4) $3BV_0 \ln\left(\frac{1}{2}\right)$

Ans. (3)



Sol. For isothermal process initially $B = P_0$.

$$W = nRT \ln \left(\frac{V_2}{V_1} \right)$$

$$= P_0 V_0 \ln \left(\frac{1}{3} \right)$$

$$W = B V_0 \ln \left(\frac{1}{3} \right)$$

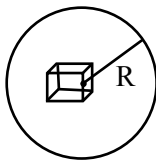
17. A cube of side 1mm is placed at centre of circular coil of radius 10cm. current flowing in coil is 2A. Find magnetic field energy stored in cube.

($\pi = 3.14$)

- (1) 1.57×10^{-14} J (2) 6.28×10^{-14} J
 (3) 12.56×10^{-14} J (4) 9.42×10^{-14} J

Ans. (2)

Sol. Magnetic field at centre $B = \left(\frac{\mu_0}{4\pi} \right) \frac{2\pi i}{R}$



$$= \frac{10^{-7} \times 2 \times \pi \times 2}{10 \times 10^{-2}}$$

So energy stored

$$U = \frac{B^2}{2\mu_0} \times V$$

$$= \frac{10^{-14} \times 4 \times \pi^2 \times 4 \times 100}{2 \times 4\pi \times 10^{-7}} \times (1 \times 10^{-9})$$

$$= 2\pi \times 10^{-14} \text{ J}$$

$$= 6.28 \times 10^{-14} \text{ J}$$

18. Unpolarised light with intensity I_0 , incident on polariser. Find angle between axis of polarises and analyser so that intensity of emergent light becomes $\frac{3I_0}{8}$:-

becomes $\frac{3I_0}{8}$:-

- (1) 60°
 (2) 30°
 (3) 90°
 (4) 0°

Ans. (2)

Sol. I_0 (Unpolarised) $\rightarrow \frac{I_0}{2}$ (Polarised) $\xrightarrow{\text{Analyser}}$

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

$$\frac{3I_0}{8} = \frac{I_0}{2} \cos^2 \theta$$

$$\cos \theta = \frac{\sqrt{3}}{2}$$

$$\theta = 30^\circ$$

19. Shortest wavelength of Lyman is x , then difference of wavelengths of 1st Balmer and 2nd Balmer line is terms of x will be :-

- (1) $\left(\frac{28}{15} \right) x$ (2) $\left(\frac{26}{15} \right) x$
 (3) $\left(\frac{13}{15} \right) x$ (4) $\left(\frac{11}{15} \right) x$

Ans. (A)

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Sol. $\lambda = \frac{91.2\text{nm}}{z^2 \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right)}$

H-atom 1st Lyman $x = 91.2 \text{ nm}$

1st Balmer $\lambda_1 = \frac{91.2}{\left(\frac{1}{4} - \frac{1}{9} \right)} = \frac{36x}{5}$

2nd Balmer $\lambda_2 = \frac{91.2}{\left(\frac{1}{4} - \frac{1}{16} \right)} = \frac{16}{3}x$

$\lambda_1 - \lambda_2 = \left(\frac{36}{5} - \frac{16}{3} \right)x = \frac{28}{15}x$

20. A small drop of mass 1 gm starts falling from rest from a height of 1 km. When it reaches the ground with speed of 5 m/s, magnitude of work done by resistance force is $x \times 10^{-3} \text{ J}$. Find x :-

- (1) 845
- (2) 247.5
- (3) 987.5
- (4) None

Ans. (3)

Sol. $w_g + w_{res} = \Delta k$

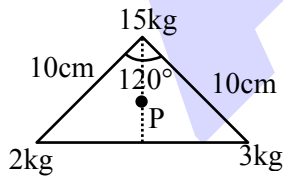
$mgh + w_{res} = \frac{1}{2}mv^2$

$\therefore w_{res} = \frac{1}{2}mv^2 - mgh$

$= 10^{-3} \left(\frac{25}{2} - 10^4 \right)$

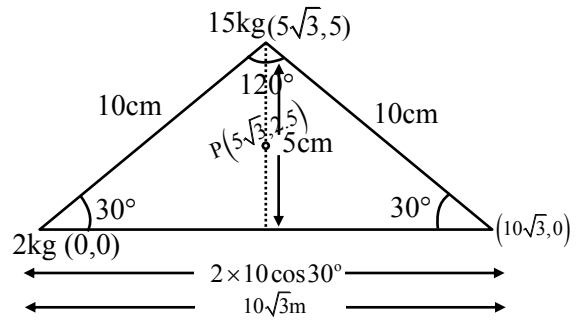
$= 987.5 \times 10^{-3} \text{ J}$

21. If P is the midpoint of median. Find distance of COM from P.



- (1) 6.18
- (2) 5.18
- (3) 6.88
- (4) 1.32

Ans. (4)



Sol.

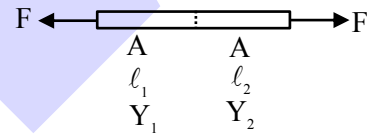
$X_{cm} = \frac{2 \times 0 + 15 \times 5\sqrt{3} + 3 \times 10\sqrt{3}}{20} = \frac{21\sqrt{3}}{4}$

$Y_{cm} = \frac{0 \times 2 + 15 \times 5 + 3 \times 0}{20} = \frac{15}{4}$

Distance = $\sqrt{(5.25\sqrt{3} - 5\sqrt{3})^2 + (3.75 - 2.5)^2}$

$= \sqrt{(0.25\sqrt{3})^2 + (1.25)^2} = \sqrt{1.75}$

22. Two wires are joint together and is elongated with force as shown in figure.



If $\frac{Y_1}{Y_2} = \frac{20}{11}$. Find out $\frac{l_1}{l_2}$ so that they have same

elongation.

- (1) $\frac{11}{20}$
- (2) $\frac{20}{11}$
- (3) $\frac{11}{10}$
- (4) $\frac{10}{11}$

Ans. (2)

Sol. $\Delta l = \frac{Tl}{YA}$

$l \propto Y$

$\frac{l_1}{l_2} = \frac{Y_1}{Y_2} = \frac{20}{11}$



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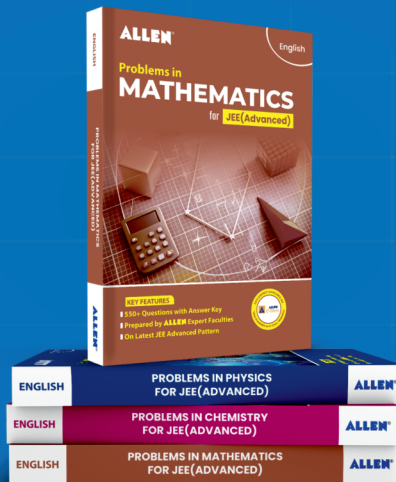
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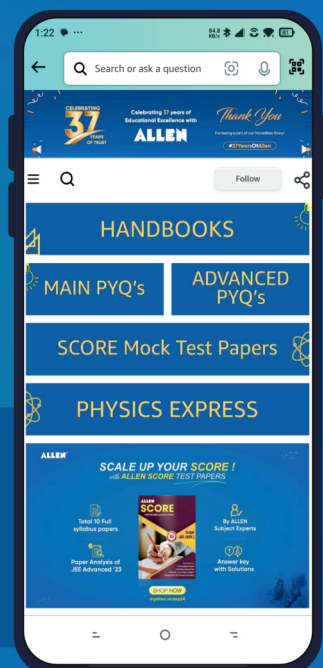
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