MEMORY BASED QUESTIONS JEE–MAIN EXAMINATION – APRIL 2026

(HELD ON MONDAY 06th APRIL 2026) **TIME : 3:00 PM TO 6:00 PM**

PHYSICS

TEST PAPER WITH SOLUTION

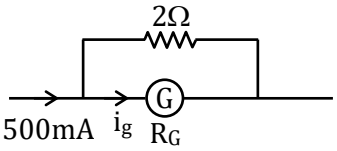
1. A galvanometer is used for making an ammeter of range 500 mA when a shunt of 2Ω is used. The same galvanometer is used for making a voltmeter of range 10V when a resistance of 470 Ω is used in series. Then find resistance of galvanometer.

(1) 30 Ω (2) 50 Ω

(3) 10 Ω (4) 100 Ω

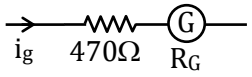
Ans. **(2)**

Sol. For ammeter :



$i_g R_G = (500\times10^{-3} - i_g)\times 2$

For voltmeter :



$i_g = (470 + R_G) = 10$ ....(ii)

From (i) & (ii)

$470\, i_g + 1 - 2i_g = 10$

$i_g = \frac{9}{468}A$

$\therefore 470 + R_G = \frac{10}{9}\times 468$

$\therefore R_G = 50\Omega$

2. Find electric field, for given electrostatic potential at P(2,3), $V = 5(x^2 - y^2)$

(1) $-20\hat{i} + 30\hat{j}$ (2) $20\hat{i} + 30\hat{j}$

(3) $30\hat{i} - 20\hat{j}$ (4) $30\hat{i} + 20\hat{j}$

Ans. **(1)**

Sol. $\vec{E} = \frac{-\partial V}{dx}\hat{i} - \frac{-\partial V}{dy}\hat{j}$

$\Rightarrow -10x\hat{i} + 10y\hat{j}$

P(2,3)

$\vec{E} = -20\hat{i} + 30\hat{j}$

3. If minimum deviation for an equilateral prism is 30°, then refractive index of prism is :-

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

(3) 2 (4) 4

Ans. **(1)**

Sol. A = 60°

$30 = 2i - 60$

$i = 45$

$r_1 = \frac{A}{2} = 30°$

$\sin i = \mu \times \sin r_1$

$\sin 45° = \mu \times \sin 30°$

$\mu = \sqrt{2}$

4. Match the following quantities with their dimensions.

(A)	Boltzman constant (K)	(P)	$[M^{-1}L^{3}T^{-2}]$
(B)	Plank's constant (h)	(Q)	$[M^{1}L^{2}T^{-1}]$
(C)	Stefan's constant (σ)	(R)	$[M^{1}L^{2}T^{-2}K^{-1}]$
(D)	Gravitational constant (G)	(S)	$[M^{1}L^{0}T^{-3}K^{-4}]$

(1) A-Q, B-R, C-S, D-P

(2) A-P, B-Q, C-S, D-R

(3) A-P, B-S, C-R, D-P

(4) A-R, B-Q, C-S, D-P

Ans. **(4)**

Sol. Boltzman constant (K)

$K = \frac{R}{N_A} = \frac{\text{Energy}}{\text{Temperature}} \Rightarrow [M^{1}L^{2}T^{-2}K^{-1}]$

Plank's constant (h) = $h = \frac{E}{\nu} \Rightarrow [M^{1}L^{2}T^{-1}]$

Stefan's constant (σ) = $P = \sigma AT^4 \Rightarrow [M^{1}L^{0}T^{-3}K^{-4}]$

Gravitational constant (G) = $F = \frac{GM_1M_2}{r^2}$

$\Rightarrow [M^{-1}L^{3}T^{-2}]$

5. For the reaction find energy released

$${}_1^2H + {}_1^2H \longrightarrow {}_2^4He$$

$\frac{BE}{A}$ for ${}_1^2H = 1.1\,MeV$ and for ${}_2^4H = 7.2\,MeV$:

(1) 24.4 MeV (2) 6.2 MeV
(3) 6.1 MeV (4) 8 MeV

Ans. **(1)**

Sol. $Q = BE_{He} - BE_H$

$= 4 \times 7.2 - 2(2 \times 1.1) = 24.4\,MeV$

6. A square loop of side 2 cm makes angle 60° with magnetic field $\vec{B} = 0.4\sin(300t)T$. Find maximum induced EMF (in mV) in loop.

(1) 24 (2) 36
(3) 48 (4) 16

Ans. **(1)**

Sol. $E_{max} = B_0AN\omega \cos 60°$

$= 0.4 \times 4 \times 10^{-4} \times 1 \times 300 \times \frac{1}{2} V$

$= 24 \times 10^{-3}\ V$

$= 24\ mV$

7. A charge particle when accelerated from rest by a potential difference V_1 has a de-Broglie wavelength λ_1 and when accelerated by a potential difference V_2 has a de-Broglie wavelength λ_2. If $\lambda_2 = \frac{3\lambda_1}{2}$, find ratio $\frac{V_1}{V_2}$.

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

Ans. **(1)**

Sol. $\lambda = \frac{h}{P} = \frac{h}{\sqrt{2mq\Delta V}}$

$\therefore \lambda_1 = \frac{h}{\sqrt{2mqV_1}}$

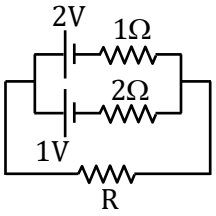
$\therefore \lambda_2 = \frac{h}{\sqrt{2mqV_2}}$

Given, $\lambda_2 = \frac{3\lambda_1}{2}$

$\therefore \frac{h}{\sqrt{2mqV_2}} = \frac{3}{2}\frac{h}{\sqrt{2mqV_1}}$

$\therefore \frac{V_1}{V_2} = \frac{9}{4}$

8. In the given circuit, current passing through R is 1 ampere. Now polarity of one cell is reversed, then current through R becomes $\frac{\alpha}{5}$ Amp., then find α.



Ans. **(3)**

Sol. $\varepsilon_{eq} = \frac{2\times2+1\times1}{3} = \frac{5}{3}$

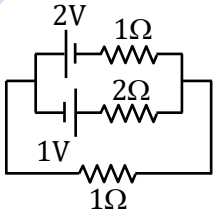
$r_{eq} = \frac{2}{3}$

$I = \frac{5}{3\left[R + \frac{2}{3}\right]}$

$3R + 2 = 5$

$R = 1\Omega$

Now,



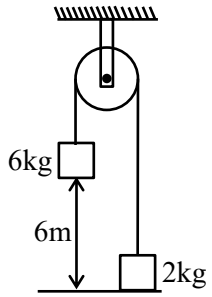
$\varepsilon_{eq} = \frac{4-1}{3} = 1\,V$

$r_{eq} = \frac{2}{3}$

$I = \frac{1}{1+\frac{2}{3}} = \frac{3}{5}$

$\alpha = 3$

9. If 6kg block is released from rest as shown in figure then find velocity of 6 kg block just before hitting ground.



(1) 6.2 m/sec (2) 7.74 m/sec
(3) 4.7 m/sec (4) 3.87 m/sec

Ans. (2)

Sol. $+6 \times 10 \times 6 - 2 \times 10 \times 6$

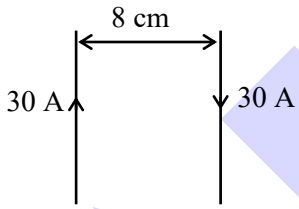
$= \frac{1}{2}6V^2 + \frac{1}{2}2V^2$

$360 - 120 = 4V^2$

$4V^2 = 240$

$V = 2\sqrt{15}$

10. Find magnetic field at mid point between two parallel infinite wire carrying current of 30 Amp as shown in figure.



(1) 0 μT (2) 300 μT
(3) 150 μT (4) 30μT

Ans. (2)

Sol. $B_{net} = B_1 + B_2$ direction of magnetic field due to both wire in same direction.

$$B_{net} = \frac{\mu_0 30}{2\pi\left(\frac{4}{100}\right)} + \frac{\mu_0 30}{2\pi\left(\frac{4}{100}\right)}$$

$$= \frac{2\mu_0 30}{2\pi\left(\frac{4}{100}\right)} = \frac{2\times 4\pi\times 10^{-7}\times 30\times 100}{2\pi\times 4}$$

$B = 30 \times 10^{-5}$ T

$B = 300\mu T$

11. Consider two spheres A(solid sphere) and B(hollow sphere) each of radius R, kept on perfectly rough surface. Mass of sphere A is 5 m and that of B is 2m. If same force 'F' is applied at the top tangentially, then find the ratio of acceleration of A to acceleration of B.

(1) $\frac{5}{17}$ (2) $\frac{10}{21}$
(3) $\frac{3}{5}$ (4) $\frac{2}{7}$

Ans. (2)

Sol. Since surface is perfectly rough $\Rightarrow$ sphere will roll

$\therefore \tau_{\text{contact point}} = F\ 2R$

$I_A = \frac{7}{5}(5m)R^2$

$\therefore \alpha_A = \frac{2FR}{7mR^2} = \frac{2}{7}\frac{F}{mR}$

$\therefore a_A = \frac{2F}{7m}$

$I_B = \frac{5}{3}(2m)R^2$

$\alpha_B = \frac{2FR}{\frac{10mR^2}{3}} = \frac{6F}{10mR} = \frac{3}{5}\frac{F}{mR}$

$a_B = \frac{3F}{5m}$

$\therefore \frac{a_A}{a_B} = \frac{2\times 5}{7\times 3} = \frac{10}{21}$

12. C = 100 pF, V = 100 V (given spherical capacitor). Identical capacitor is touched with this capacitor. If change in total energy is $\alpha \times 10^{-7}$ J then find α = ? {Combined capacitance = 200 PF}

(1) 2.5 (2) 25
(3) 1 (4) 10

Ans. (1)

Sol. Initial energy $V_i = \frac{1}{2}CV^2$

After connecting with other capacitor

$V_1 = V_2 = \frac{V}{2} \Rightarrow 50V$

Final energy $V_f \Rightarrow \frac{1}{2}C\left(\frac{V}{2}\right)^2 + \frac{1}{2}\times C\times\left(\frac{V}{2}\right)^2$

$= \frac{CV^2}{4}$

Energy loss $\Rightarrow V_i - V_f$

$\Rightarrow \frac{1}{2}CV^2 - \frac{1}{4}CV^2$

$= \frac{1}{4}CV^2 = \frac{1}{4}\times 100 \times 10^{-12} \times 10^4$

$= 25 \times 10^{-8}$

$= 2.5 \times 10^{-7}$ J

$\alpha = 2.5$

13. On an incline plane of angle 45° time taken by an object is t if it is smooth and 2t if it is rough. Find value of α if friction coefficient is $\frac{\alpha}{100}$.

Ans. **(75)**

Sol. $t = \sqrt{\frac{2h}{g\sin 45°}}$

$2t = \sqrt{\frac{2h}{g\sin 45° - \mu g\cos 45°}}$

$\frac{1}{2} = \sqrt{1-\mu}$

$\mu = 1 - \frac{1}{4} = \frac{3}{4} = \frac{\alpha}{100}$

$\alpha = 75$

14. Figure shows an adiabatic container which is divided into two equal parts by an adiabatic freely moving piston

P_0, V_0, T_0	P_0, V_0, T_0

Both sides contain same gas having $\gamma = 1.5$. If heat is supplied to left part such that its pressure becomes $\frac{27P_0}{8}$, find volume of right part

(1) $\frac{3}{5}V_0$ (2) $\frac{2}{9}V_0$

(3) $\frac{4}{9}V_0$ (4) $\frac{V_0}{2}$

Ans. **(3)**

Sol. $\gamma = \frac{3}{2} = 1 + \frac{2}{f} \Rightarrow f = 4$

At equilibrium, $P_{left} = P_{right}$

$\therefore P_{left} = \frac{27P_0}{8} = P_{right}$

Since no heat is supplied to right chamber.

$\therefore P_0V_0^{\gamma} = P_fV_f^{\gamma}$

$\Rightarrow P_0V_0^{1.5} = \frac{27}{8}P_0V_f^{1.5}$

$\Rightarrow V_f = \left(\frac{8}{27}\right)^{2/3}V_0 = \frac{4}{9}V_0$

15. When a mass of 200 gm hangs from ceiling via spring in equilibrium, the extension in the spring is observed to be 2mm. Find angular frequency of its SHM and energy stored in equilibrium position respectively.

(1) $\omega = 2$ rad/sec. ; $U = 50\sqrt{2}$ mJ

(2) $\omega = 50\sqrt{2}$ rad/sec. ; $U = 2$mJ

(3) $\omega = 100\sqrt{2}$ rad/sec. ; $U = 4$mJ

(4) $\omega = 25\sqrt{2}$ rad/sec. ; $U = 1$mJ

Ans. (2)

Sol. At equilibrium

$kx_0 = mg$

$k \times 2 \times 10^{-3} = 200 \times 10^{-3} \times 10$

$k = 1000$ N/m

$$\omega = \sqrt{\frac{k}{m}} = \sqrt{\frac{1000}{200\times10^{-3}}} = \sqrt{\frac{1000000}{200}} = \sqrt{5000}$$

$$\omega = 50\sqrt{2}$$

$$U = \frac{1}{2}kx_0^2$$

$$= \frac{1}{2}\times1000\times(2\times10^{-3})^2$$

$= 2 \times 10^{-3}$ J

$U = 2$mJ

16. An EM wave has angular frequency ω. Propagation constant $\vec{k}$ and electric field vector $\vec{E}$ is given, then $\vec{B}$ can be represented by :

(1) $\vec{B} = \omega(\vec{K}\times\vec{E})$ (2) $\vec{B} = \omega(\vec{E}\times\vec{K})$

(3) $\vec{B} = \frac{1}{\omega}(\vec{K}\times\vec{E})$ (4) $\vec{B} = \frac{1}{\omega}(\vec{E}\times\vec{K})$

Ans. (3)

Sol. $\vec{B} = \frac{1}{\omega}(\vec{K}\times\vec{E})$ Theoretical

17. In YDSE intensity of both coherent sources are I_0. Separation between the two slits is 5 cm and screen is placed at distance of 50 cm from slit. Wavelength of light is 6000Å. If intensity for a point on screen is I_0 then find path difference at point P.

(1) 1000 Å (2) 2000 Å

(3) 3000 Å (4) 5000 Å

Ans. (2)

Sol. $I_R \Rightarrow 4I_0\cos^2\frac{\phi}{2}$

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

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

$\frac{\phi}{2} = 60°$

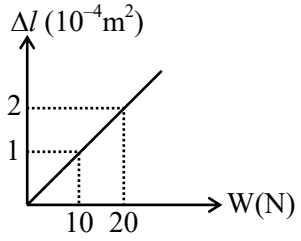
$\phi = 120° = \frac{2\pi}{3}$

Path difference

$\frac{\phi}{2\pi} = \frac{\Delta x}{\lambda}$

$\Delta x = \frac{\phi}{2\pi}\times\lambda \Rightarrow \frac{2\pi}{3\times2\pi}\times6000 = 2000$ Å

18. A weight W is connected to one end of a wire and other end is fixed, length of wire is 1m. Area of cross-section is $10^{-5}m^2$, Graph between change in length and weight is shown then calculate Young's modulus.



(1) 10^{11} N/m^2 (2) 10^9 N/m^2

(3) 10^8 N/m^2 (4) 10^{10} N/m^2

Ans. (4)

Sol. $\tan\theta = \frac{10^{-4}}{10} = \frac{\Delta l}{W}$

$\Delta l = 10^{-5}$ W

$$Y = \frac{Wl}{A\Delta l}$$

$$Y = \frac{10^5\times1}{10^{-5}}$$

$Y = 10^{10}$ N/m^2

19. 2 moles of monoatomic ideal gas has temperature T and 6 moles of monoatomic ideal gas has temperature 2T. Find the temperature of mixture.

(1) $\frac{7T}{4}$ (2) $\frac{3T}{4}$

(3) $\frac{4T}{4}$ (4) 7T

Ans. **(1)**

Sol. $Q_1 + Q_2 = Q_{net}$

$n_1CT_1 + n_2CT_2 - n_1C\,T + n_2CT$

$T_2 = \frac{n_1T_1 + n_2T_2}{n_1 + n_2} = \frac{2T + 6\times(2T)}{2+6}$

$= \frac{7T}{4}$

20. If error in diameter of a sphere is 2%, then find error in volume of sphere.

Ans. **(6)**

Sol. $V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}\pi\left(\frac{d}{2}\right)^3$

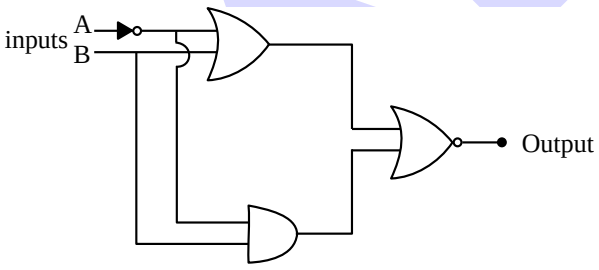
$V \propto d^3$

$(\%V) = 3\,(\%d)$

$= 3 \times 2$

$= 6\%$

21.



Which of the following is correct outputs for inputs (1, 1) and (0, 1)

(1) 1, 1 (2) 0, 0

(3) 1, 0 (4) 0, 1

Ans. (2)

Sol. Truth table

A	B	Output
1	1	0
0	1	0

22. For a concave mirror of focal length 10cm magnification is 2 for two positions of an object, Find distance between these two positions (in cm).

Ans. (10)

Sol. $\frac{v}{u} = \pm 2 \quad \ldots(1)$

$\frac{1}{v} - \frac{1}{u} = \frac{1}{-10} \quad \ldots(2)$

$\frac{1}{\pm 2u} - \frac{1}{u} = \frac{-1}{10}$

$\Rightarrow \quad \frac{3}{2u_1} = \frac{1}{10}; \frac{1}{2u_2} = \frac{1}{10}$

u_1 15 cm ; $u_2 = 5$ cm

so distance $u_1 - u_2 = 15 - 5 = 10$ cm

23. A block of mass 1 kg moving with velocity varies according to position as $v = 2x^2$. If block goes from x = 0 to x = 5. Find work done by the block

(1) zero

(2) 1250 J

(3) 1000 J

(4) 750 J

Ans. **(2)**

Sol. $W = \Delta KE = \frac{1}{2}M\left[V_2^2 - V_1^2\right]$

at $x = 0$, $V_1 = 0$

$x = 5$, $V_2 = 2 \times (5)^2 = 50$

$W = \frac{1}{2} \times 1 \times 1\{50^2 - 0^2\}$

$= \frac{2500}{2} = 1250\,T$

24. Two particles of same masses moving initially with velocity $4\hat{i}$ and $4\hat{j}$ m/s respectively. Acceleration of first is $6\hat{i}+6\hat{j}$ and of second is zero. Find path of centre of mass of the system.

(1) straight line

(2) circle

(3) parabola

(4) ellipse

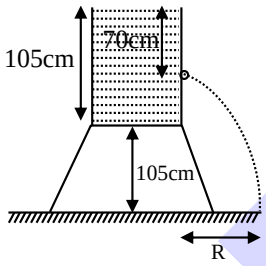
Ans. **(1)**

Sol. $\vec{V}_{cm}=\frac{m4\hat{i}+m4\hat{j}}{2m}=2\hat{i}+2\hat{j}$

$\vec{a}_{cm}=\frac{2(6\hat{i}+6\hat{j})+m(0)}{2m}=3\hat{i}+3\hat{j}$

both have same direction so straight line.

25. A cylindrical container has radius 40 cm and volume 528 $(dm)^3$. It is placed on a table of same height as of container. A hole is made 70 cm below from free surface find range of efflux on ground if container filed completely.



(1) $280\sqrt{2}$cm (2) $140\sqrt{2}$cm

(3) 140 (4) 280 cm

Ans. **(2)**

Sol. $V=\pi r^2 h$

$528\times10^3=\frac{22}{7}(40)^2 h$

$h=105$ cm

$t=\sqrt{\frac{2H}{g}}$

$=\sqrt{\frac{2\times140\times10^{-2}}{10}}=\sqrt{28}\times10^{-1}$

$R=ut$

$=\sqrt{2\times10\times70\times10^{-2}}\sqrt{28}\times10^{-1}$

$=\sqrt{14}\sqrt{28}\times10^{-1}$

$=14\sqrt{2}\times10^{-1}=140\sqrt{2}$cm

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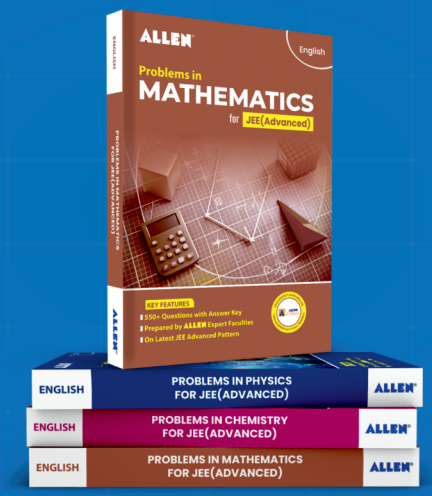

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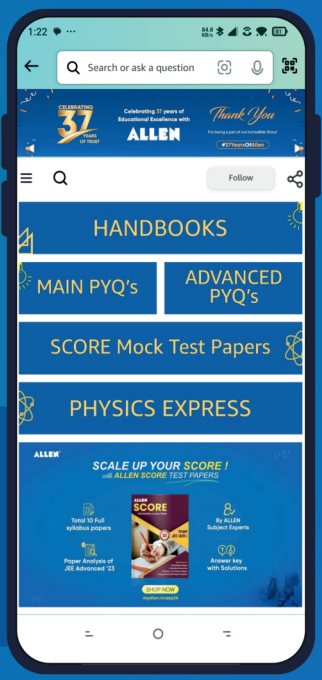

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