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JEE (MAIN) 2026

MEMORY BASED QUESTIONS & TEXT SOLUTION

SHIFT-2

DATE & DAY: 06th April 2026 & Monday

PAPER-1

Duration: 3 Hrs.
Time: 03:00 – 6:00 IST

SUBJECT: PHYSICS

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PART : PHYSICS

1. 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. $E_{max} = B_0 AN\omega\cos 60^\circ$

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

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

$= 24$mV

2. 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 2 m . 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

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

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

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

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

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

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

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

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

3. 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 6000 Å. 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. $I_R \Rightarrow 4I_0\cos^2\frac{\phi}{2}$

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

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

$\frac{\phi}{2} = 60^\circ$

$\phi = 120^\circ = \frac{2\pi}{3}$

Path difference

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

$\Delta x = \frac{\phi}{2\pi} \times \lambda \Rightarrow \frac{2\pi}{3\times 2\pi} \times 6000 = 2000$ Å

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

at $x = 0,\ V_1 = 0$

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

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

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

5. 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)

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

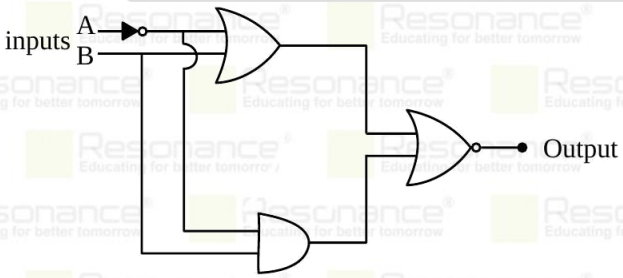
Plank's constant $(h) = h = \frac{E}{\nu} \Rightarrow [M^1L^2T^{-1}]$

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

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

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

6.



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

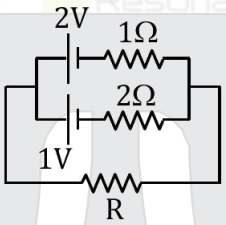
(1) 1,1 (2) 0,0 (3) 1,0 (4) 0, 1

Ans. **(2)**

Sol. Truth table

A	B	Output
1	1	0
0	1	0

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

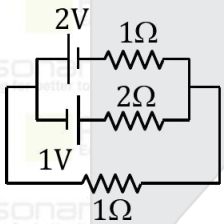
$r_{eq} = \frac{2}{3}$

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

$3R + 2 = 5$

$R = 1\Omega$

Now,



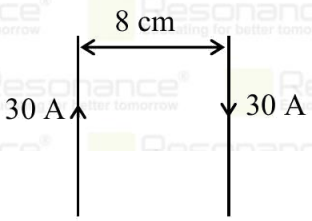
$\varepsilon_{eq} = \frac{4-1}{3} = 1\ V$

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

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

$\alpha = 3$

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



(1) 0μ T (2) 300μ T (3) 150μ T (4) 30μ T

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

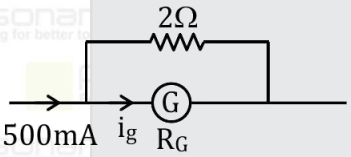
$B = 300\mu$ T

9. 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 10 V when a resistance of 470Ω is used in series. Then find resistance of galvanometer.

(1) 30Ω (2) 50Ω (3) 10Ω (4) 100Ω

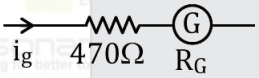
Ans. **(2)**

Sol. For ammeter :



$i_g R_G = (500 \times 10^{-3} - i_g) \times 2$

For voltmeter :



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

From (i) & (ii)

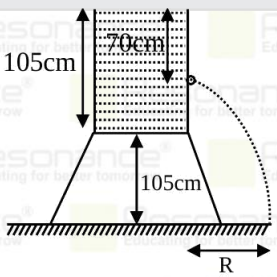
$470 i_g + 1 - 2i_g = 10$

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

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

$\therefore R_G = 50\Omega$

10. A cylindrical container has radius 40 cm and volume $528(\text{dm})^3$. 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. $V = \pi r^2 h$

$$528 \times 10^3 = \frac{22}{7}(40)^2 \, h$$
$$h = 105 \text{ cm}$$
$$t = \sqrt{\frac{2H}{g}}$$
$$= \sqrt{\frac{2 \times 140 \times 10^{-2}}{10}} = \sqrt{28} \times 10^{-1}$$
$$R = ut$$
$$= \sqrt{2 \times 10 \times 70 \times 10^{-2}}\sqrt{28} \times 10^{-1}$$
$$= \sqrt{14}\sqrt{28} \times 10^{-1}$$
$$= 14\sqrt{2} \times 10^{-1} = 140\sqrt{2} \text{ cm}$$

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

(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

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

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 $\Rightarrow V_i - V_f$

$$\Rightarrow \frac{1}{2}CV^2 - \frac{1}{4}CV^2$$
$$= \frac{1}{4}CV^2 = \frac{1}{4} \times 100 \times 10^{-12} \times 10^4$$
$$= 25 \times 10^{-8}$$
$$= 2.5 \times 10^{-7} \text{ J}$$
$$\alpha = 2.5$$

12. Two particles of same masses moving initially with velocity $4\hat{\imath}$ and $4\hat{\jmath}$ m/s respectively. Acceleration of first is $6\hat{\imath} + 6\hat{\jmath}$ 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. $\vec{V}_{cm} = \frac{m4\hat{\imath} + m4\hat{\jmath}}{2m} = 2\hat{\imath} + 2\hat{\jmath}$

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

both have same direction so straight line.

13. 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, $\lambda_2 = \frac{3\lambda_1}{2}$

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

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

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

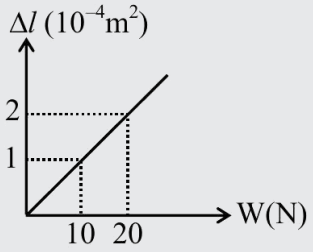
$2t = \sqrt{\frac{2h}{g\sin 45° - \mu g\cos 45°}}$

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

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

$\alpha = 75$

15. A weight W is connected to one end of a wire and other end is fixed, length of wire is 1 m . 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

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

$Y = \frac{10^5 \times 1}{10^{-5}}$

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

16. 2 moles of monoatomic ideal gas has temperature T and 6 moles of monoatomic ideal gas has temperature 2 T . Find the temperature of mixture.

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

Ans. **(1)**

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

$n_1CT_1 + n_2CT_2 - n_1CT + n_2CT$

$T_2 = \frac{n_1\ T_1 + n_2\ T_2}{n_1 + n_2} = \frac{2\ T + 6 \times (2\ T)}{2 + 6}$

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

17. 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.

$\therefore P_0\ V_0^{\gamma} = P_fV_f^{\gamma}$

$\Rightarrow P_0\ V_0^{1.5} = \frac{27}{8}P_0\ V_f^{1.5}$

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

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

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

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

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

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

Ans. **(2)**

Sol. At equilibrium

$kx_0 = mg$

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

$k = 1000\ \text{N/m}$

$\omega = \sqrt{\frac{k}{m}} = \sqrt{\frac{1000}{200 \times 10^{-3}}} = \sqrt{\frac{1000000}{200}} = \sqrt{5000}$

$\omega = 50\sqrt{2}$

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

$= \frac{1}{2} \times 1000 \times (2 \times 10^{-3})^2$

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

$U = 2\ \text{mJ}$

19. 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

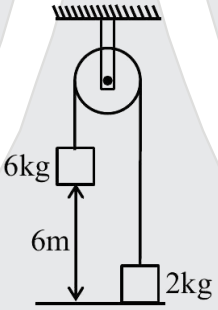
20. For the reaction find energy released
${}_1^2H + {}_1^2H \longrightarrow {}_2^4He$
$\frac{BE}{A}$ for ${}_1^2H = 1.1MeV$ and for ${}_2^4H = 7.2MeV$:

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

Ans. **(1)**

Sol. $Q = BE_{He} - BE_H$
$= 4 \times 7.2 - 2(2 \times 1.1) = 24.4MeV$

21. If 6 kg 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. $+6 \times 10 \times 6 - 2 \times 10 \times 6$
$= \frac{1}{2}6\,V^2 + \frac{1}{2}2\,V^2$
$360 - 120 = 4\,V^2$
$4\,V^2 = 240$
$V = 2\sqrt{15}$

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

Ans. **(6)**

Sol. $V = \frac{4}{3}\pi r^3$
$V = \frac{4}{3}\pi\left(\frac{d}{2}\right)^3$
$V \propto d^3$
$(\%\ V) = 3(\%\ d)$
$= 3 \times 2$
$= 6\%$

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

Ans. **(10)**

Sol. $\frac{v}{u} = \pm 2$

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

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

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

$u_1 15 \text{ cm}; u_2 = 5 \text{ cm}$

so distance $u_1 - u_2 = 15 - 5 = 10 \text{ cm}$

24. 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)

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

25. 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. $A = 60°$

$30 = 2i - 60$

$i = 45$

$r_1 = \frac{A}{2} = 30°$

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

$\sin 45° = \mu \times \sin 30°$

$\mu = \sqrt{2}$