24/01/2026
Morning

Aakash
Medical | IIT-JEE | Foundations

Corporate Office : AESL, 3rd Floor, Incuspaze Campus-2, Plot-13, Sector-18, Udyog Vihar, Gurugram, Haryana-122015

Memory Based
Answers & Solutions

Time : 3 hrs. M.M. : 300

for

JEE (Main)-2026 (Online) Phase-1

(Physics, Chemistry and Mathematics)

PHYSICS

SECTION - A

Multiple Choice Questions: This section contains 20 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4), out of which **ONLY ONE** is correct.

Choose the correct answer:

1. A spring of stiffness k= 15 N/m is cut into a ratio of 3 : 1. Find the spring constant of smaller length spring thus formed.

(1) 15 N/m (2) 30 N/m

(3) 45 N/m (4) 60 N/m

Answer (4)

Sol. $\frac{1}{k}=\frac{4}{k_1}$

$\Rightarrow k_1 = 4k$

$\Rightarrow k_1 = 60$ N/m

2. EM waves and their source are given

	Column-I		Column-II
(a)	X-rays	(p)	Hot bodies & Molecules
(b)	Infrared rays	(q)	Oscillating current in antennas
(c)	Microwaves	(r)	Magnetron
(d)	Radio waves	(s)	Fast moving electrons Striking a metal plate

(1) (a)-(p); (b)-(s); (c)-(r); (d)-(q)

(2) (a)-(s); (b)-(p); (c)- (r); (d)-(q)

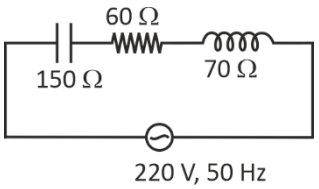
(3) (a)-(s); (b)-(p); (c)- (s); (d)-(q)

(4) (a)-(s); (b)-(r); (c)- (p); (d)-(q)

Answer (2)

Sol. Theoretical

3. For the given AC circuit find the power factor.

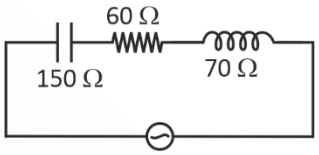


(1) $\frac{4}{5}$ (2) $\frac{3}{5}$

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

Answer (2)

Sol.



$X=|X_L-X_C|=80\ \Omega$

$R = 60\ \Omega$

$\Rightarrow \tan\theta=\frac{80}{60}=\frac{4}{3}$

$\Rightarrow \cos\theta$ = Power factor = $\frac{3}{5}$

4. In H-like atom ratio of speed in two orbits is 3 : 2, then ratio of energy is

(1) 2 : 3 (2) 9 : 4

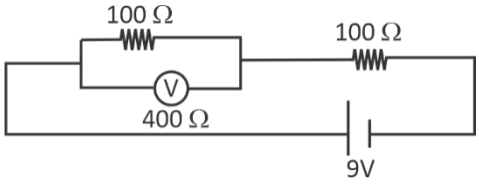
(3) 2 : 1 (4) 5 : 3

Answer (2)

Sol. $v=\frac{Z}{n}$

$KE=\left(\frac{Z}{n}\right)=9:4$

5. A voltmeter of 400 Ω resistance is in parallel with 100 Ω resistor. And the combination is connected with 100 Ω resistor and a battery of 9 volt in series as shown. Find the reading of voltmeter.



(1) 5 volts (2) 3 volts

(3) 4 volts (4) 6 volts

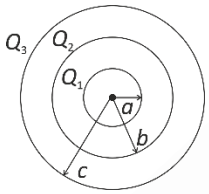
Answer (3)

Sol. $R_{eq.} = \frac{400\times100}{500} + 100 = 180$

$I = \frac{9}{180}$

So, V(voltmeter) = $\frac{9}{180}\times80$ = 4 volts.

6. Three concentric uniformly charged shells are kept as show. Find potential of the each shell.



(1) $V_A = \frac{kQ_1}{a} + \frac{kQ_2}{b} + \frac{kQ_3}{c}$

$V_B = \frac{k(Q_1+Q_2+Q_3)}{b}$

$V_C = \frac{k(Q_1+Q_2+Q_3)}{c}$

(2) $V_A = \frac{kQ_1}{a} + \frac{kQ_2}{b} + \frac{kQ_3}{c}$

$V_B = \frac{k(Q_1+Q_2)}{b} + \frac{kQ_3}{c}$

$V_C = \frac{k(Q_1+Q_2+Q_3)}{c}$

(3) $V_A = \frac{kQ_1}{a} + \frac{k(Q_2+Q_3)}{c}$

$V_B = \frac{k(Q_1+Q_2)}{b} + \frac{kQ_3}{c}$

$V_C = \frac{k(Q_1+Q_2+Q_3)}{c}$

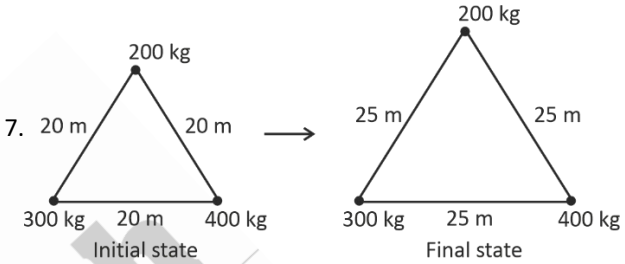
(4) $V_A = \frac{kQ_1}{a} + \frac{kQ_2}{b} + \frac{kQ_3}{c}$

$V_B = \frac{k(Q_1+Q_2)}{a} + \frac{kQ_2}{b}$

$V_C = \frac{k(Q_1+Q_2+Q_3)}{c}$

Answer (2)

Sol. Formula based

7. 

Find the work done.

(Given: $G = 6.67 \times 10^{-11}$ N-m^2/kg^2)

(1) 1.7342×10^{-7} J (2) 1.6253×10^{-7} J

(3) 2.5232×10^{-7} J (4) 6.6325×10^{-7} J

Answer (1)

Sol. $U_i = -\frac{G\times200\times300}{20} - \frac{G\times200\times400}{20} - \frac{G\times300\times400}{20}$

$U_i = -\frac{26\times10^4\times G}{20} = -8.671\times10^{-7}$ J

$U_f = -\frac{G\times200\times300}{25} - \frac{G\times200\times400}{25} - \frac{G\times300\times400}{25}$

$U_f = -\frac{26}{25}\times10^4\times6.67\times10^{-11}$

$U_f = -6.9368 \times 10^{-7}$ J

$W = \Delta U = 1.7342 \times 10^{-7}$ J

8. Match the two lists given below .

	List-I		List-II
a.	Magnetic flux	1.	$M^1L^2T^{-2}A^{-2}$
b.	Magnetic permeability	2.	$M^1L^2T^{-2}A^{-1}$
c.	Magnetic induction	3.	$M^1L^1T^{-2}A^{-2}$
d.	Self-induction	4.	$M^1L^0T^{-2}A^{-1}$

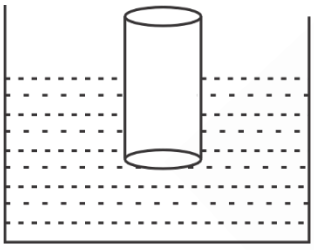
(1) a-2, b-3, c-4, d-1 (2) a-3, b-2, c-1, d-4

(3) a-4, b-3, c-1, d-2 (4) a-1, b-2, c-3, d-4

Answer (1)

Sol. Theoretical

9. A cylinder of mas *m*, length *l* and area of cross section *A* is in equilibrium in liquid of density ρ. Find time period of small vertical oscillations.



(1) $2\pi\sqrt{\frac{mA}{\rho g}}$ (2) $2\pi\sqrt{\frac{mg}{\rho A}}$

(3) $2\pi\sqrt{\frac{m}{\rho A^2 g}}$ (4) $2\pi\sqrt{\frac{m}{\rho A g}}$

Answer (4)

Sol. $F = (\rho A g)x$

$$T = 2\pi\sqrt{\frac{m}{\rho A g}}$$

10. A dipole is placed in uniform magnetic field B = 800 gauss at an angle 30° then it experiences the torque of 16×10^{-3} N-m. Find the work done in slowly moving the dipole from stable equilibrium to unstable equilibrium.

(1) 12.8×10^{-3} J (2) 5×10^{-3} J

(3) 24.5×10^{-3} J (4) 7.6×10^{-3} J

Answer (1)

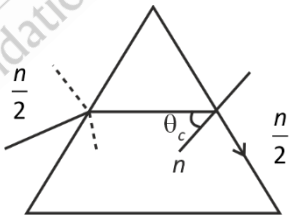
Sol. $\left|\vec{\tau}\right| = \left|\overrightarrow{M} \times \vec{B}\right| = \frac{\left|\overrightarrow{M} \times \vec{B}\right|}{2}$

$$\Rightarrow \left|\overrightarrow{M}\right| = \frac{2 \times 16 \times 10^{-3}}{800 \times 10^{-4}} = \frac{4}{10}$$

$$\text{So } \Delta W = 2\left|\overrightarrow{M}\right|\left|\vec{B}\right| = \frac{2 \times 4}{10} \times 800 \times 10^{-4}$$

$$\Rightarrow \Delta W = 64 \text{ mJ}$$

11. A light ray incident on the prism such that deviation is minimum and angle of incidence on 2nd surface is critical angle. Find prism angle.



(1) 90° (2) 60°

(3) 105° (4) 74°

Answer (2)

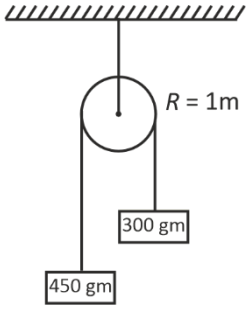
Sol. $\sin\theta_c = \frac{1}{2}$

$\theta_c = 30°$

$r_1 = r_2 = 30°$

$A = 30 + 30 = 60°$

12. When system is released from rest the heavier mass goes 81 cm in 9 sec, find rotational inertia. (g = 10 m/s^2)



(1) 74.25 kg-m^2

(2) 100.25 kg-m^2

(3) 50.25 kg-m^2

(4) 25.25 kg-m^2

Answer (1)

Sol. $s=\frac{1}{2}at^2$

$0.81=\frac{1}{2}a\times 9^2$

a = 0.02 m/s^2

$a=\frac{(0.45-0.3)\times 10}{0.45+0.3+\frac{I}{R^2}}$

$0.02=\frac{0.15\times 10}{0.75+\frac{I}{R^2}}$

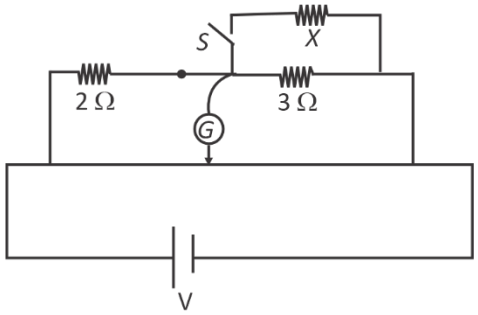
$0.75+\frac{I}{R^2}=75$

$\frac{I}{R^2}=74.25$

I = 74.25 × 1^2

I = 74.25 kg-m^2

13. In meter bridge diagram given below, if S is closed, null point shifts by 25 cm. Find value of resistance X. (in cm).



(1) 4.1 (2) 1.68

(3) 6.28 (4) 5.4

Answer (2)

Sol. $\Rightarrow \frac{2}{3}=\frac{l}{100-l} \Rightarrow l$ = 40 cm

Now $\frac{2(3+x)}{3x}=\frac{65}{35}=\frac{13}{7}$

$\Rightarrow$ 42 + 14x = 39x

$\Rightarrow$ 42 = 25x $\Rightarrow$ x = 1.68 Ω

14. **Statement-1 :** Binding energy per nucleon always increase with mass number.

Statement-2 : Binding energy per nucleon for smaller mass number always performs nucleon fusion.

(1) Statement-1, true Statement-2, false

(2) Statement-1, true Statement-2, true

(3) Statement-1, false Statement-2, true

(4) Statement-1, false Statement-2, false

Answer (3)

Sol. Statement-1 False → Binding energy per nucleons does net always increase with mass number.

Statement-2 : True → Light nuclei with low binding energy per nucleon generally undergo nucleon fusion to become stable by increasing their binding energy per nucleons towards the iron-56 peak.

15. Velocity of electron in n^{th} shell of a hydrogen like atom is 3×10^5 m/s and velocity of electron in m^{th} shell of that atom is 2.5×10^5 m/s. Find ratio of radius of m^{th} shell to n^{th} shell.

(1) $\frac{25}{40}$ (2) $\frac{25}{36}$

(3) $\frac{36}{25}$ (4) $\frac{36}{35}$

Answer (3)

Sol. $V \propto \frac{z}{n}$ and $r \propto \frac{n^2}{z}$

$\frac{V_n}{V_m} = \frac{m}{n} = \frac{6}{5}$

$\frac{r_m}{r_n} = \frac{m^2}{n^2} = \frac{36}{25}$

16.

17.

18.

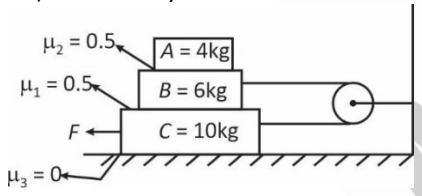
19.

20.

SECTION - B

Numerical Value Type Questions: This section contains 5 Numerical based questions. The answer to each question should be rounded-off to the nearest integer.

21. For the given arrangement find the value of F(in Newton) so that body c moves with constant velocity.



Answer (100)

Sol. $fr_{(max)} = \frac{1}{2} \times 10 \times 10 = 50$ N

Since B also moves with uniform velocity

So, friction between A & B is zero.

Now, $F - T - 50 = 0$

$\Rightarrow \quad F = 50 + T \quad ....(1)$

Also, $T - 50 = 0 \quad T = 50$ N

So, $F = 100$ N

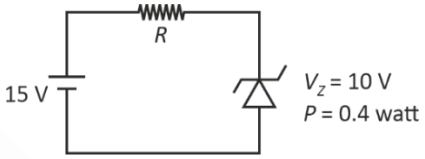
22. For a microscope focal length of objective is 2 cm and focal length of eyepiece is 4 cm. Tube length is L = 10 cm. Magnification for normal adjustment is 5^x. Find the value of x.

Answer (2)

Sol. $M = \frac{1}{fo} \cdot \frac{D}{fe}$

$\mathbf{M} = \frac{10}{2} \cdot \frac{25}{5} = 25 = (5)^2$

23. For the given circuit the breakdown voltage of Zener diode is $V_Z = 10$ volts and it can with-stand the power dissipation of 0.4 watt. Find the value of resistance R (in Ω)



Answer (125)

Sol. Current in Zener diode is

$I_{(Z)} = \frac{4}{10 \times 10} = \frac{4}{100}$ Ampere

So, $R = \frac{(15-10)}{4} \times 100 = 125\,\Omega$

24. If potential varies as distance r as $v(r) = ar^3 + b$. Total magnitude of charge Q inclosed within a sphere of unit radius is $Q = \alpha(\pi a \varepsilon_0)$. Find the value of α.

Answer (12)

Sol. $v(r) = ar^3 + b$

$\Rightarrow E(r) = \frac{-dv}{dr} = -3ar^2$

So $\int E \cdot ds = \frac{|q_{in}|}{\varepsilon_0}$

$\Rightarrow \quad 3ar^2 \cdot 4\pi r^2 = \frac{|q_{in}|}{\varepsilon_0}$

$\Rightarrow \quad |q_{in}| = 12\pi a \varepsilon_0 (1)^4 = 12\pi a \varepsilon_0$

So, $\alpha = 12$

25