28/01/2026
Morning

Aakash
Medical | IIT-JEE | Foundations

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Memory Based
Answers & Solutions

Time : 3 hrs. *for* M.M. : 300

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

(Physics, Chemistry and Mathematics)

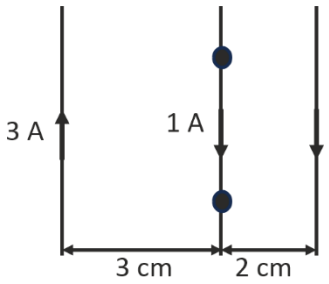
PHYSICS

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. There are three long parallel wires in a plane as shown. Find force on 15 cm of length of middle wire.



(1) 5 μN

(2) 7 μN

(3) 6 μN

(4) 1 μN

Answer (3)

Sol. $B = B_1 + B_2 = \frac{\mu_0(3)}{2(3\times10^{-2})\pi} + \frac{\mu_0(2)}{2(2\times10^{-2})\pi} = \frac{\mu_0\times10^2}{\pi}$

$F = 15\times10^{-2}\times1\times10^{-7}\times10^2\times2 = 6\times10^{-6}$

2. Equation of an EMW in a medium is given by $E = 2\sin(2\times10^{15}t - 10^7 x)$. Find refractive index of the medium.

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

(2) 2

(3) $\frac{5}{3}$

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

Answer (1)

Sol. $v = \frac{2\times10^{15}}{10^7} = 2\times10^8$

$\mu = \frac{c}{v} = 1.5$

3. For a circular coil of radius R, magnetic field at center is B_0 = 16 μT. What will be the magnetic field on axis at a distance $x = \sqrt{3}R$ from center

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

(3) 4 μT (4) 2 μT

Answer (4)

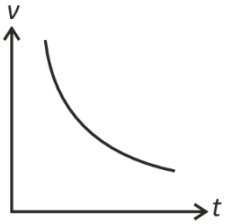
Sol. $B_{(x)} = \frac{\mu_0}{4\pi}\cdot\frac{I\,2\pi R^2}{(x^2+R^2)^{3/2}}$

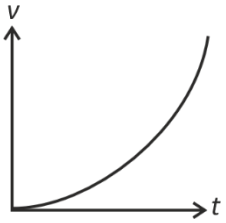
$\Rightarrow \left(B_{(x)}\right) = \frac{\mu_0}{2}\frac{IR^2}{8R^3} = \frac{\mu_0 I}{16R}$

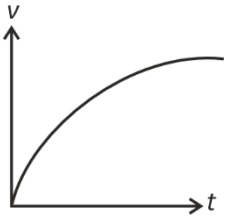
Given $B_0 = \frac{\mu_0 I}{2R} = 16$ μT

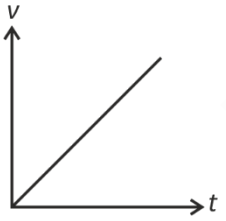
So $B = \frac{1}{8}\cdot16$ μT = 2 μT

4. An object is being dropped from height h above the ground. Apart from force of gravity additional drag force, $F = -kv$ acts on the object. Find the grph of v v/s t.

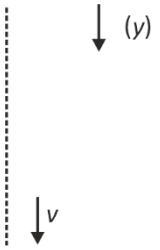
(1) 

(2) 

(3) 

(4) 

Answer (3)

Sol. 

$$m\frac{dv}{dt} = (mg - kv)$$

$$\Rightarrow \frac{dv}{dt} = \left(g - \frac{kv}{m}\right)$$

$$\int_0^v \frac{d_v}{g - \frac{kv}{m}} = \int_0^t dt$$

$$\Rightarrow -\frac{m}{k}\ln\left(g - \frac{kv}{m}\right)\Big|_0^v = t\Big|_0^t$$

$$\Rightarrow \ln\left(\frac{g - \frac{kv}{m}}{g}\right) = -\frac{tk}{m}$$

$$\Rightarrow \left(g - \frac{kv}{m}\right) = ge^{-\frac{kt}{m}}$$

$$\Rightarrow g\left(1 - e^{-\frac{kt}{m}}\right) = \frac{kv}{m}$$

$$\Rightarrow v = \frac{mg}{k}\left(1 - e^{-\frac{kt}{m}}\right)$$

5. Electric current in a circuit is given by $i = i_0\left(\frac{t}{T}\right)$. Find rms current for the period $t = 0$ to $t = T$.

(1) $\frac{i_0}{\sqrt{5}}$ (2) $\frac{i_0}{\sqrt{2}}$

(3) $\frac{i_0}{2}$ (4) $\frac{i_0}{\sqrt{3}}$

Answer (4)

Sol. $$I_{rms}^2 = \frac{\int_0^T \frac{I_0^2 t^2}{T^2} dt}{T}$$

$$= \frac{i_0^2 \cdot \frac{T}{3}}{T} = \frac{i_0^2}{3}$$

$$I_{rms} = \frac{i_0}{\sqrt{3}}$$

6. Position of a particle is given by $x = A\sin(\omega t)$ potential energy is minimum at $t = \frac{T}{2\beta}$ where T is time period. Find maximum value of β.

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

(3) $\frac{1}{3}$ (4) $\frac{1}{6}$

Answer (2)

Sol. At $t = \frac{T}{2}, T, \frac{3T}{2}, 2T, \ldots$

Potential energy is minimum.

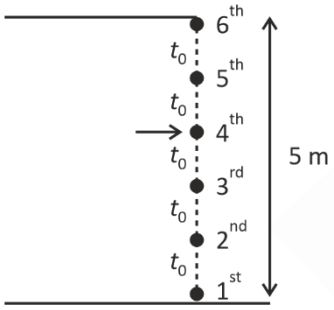
7. A tap is at a height of 5 m from ground. Water drops are falling from it at regular interval. When 1st drop hits the ground 6th droplet is just about to fall. Find the height of 4th droplet from ground when 1st droplet hits the ground.

(1) 4.2 m (2) 3.2 m

(3) 4 m (4) 3 m

Answer (1)

Sol.



$\Rightarrow \frac{1}{2}g(25t_0^2) = 5$

$\Rightarrow gt_0^2 = \frac{2}{5}$

Also $t_1 = 5\,t_0$

$S_4 = \frac{1}{2} \times g \cdot 4\,t_0^2 = 2gt_0^2$

$S_4 = 2 \times \frac{2}{5} = \frac{4}{5}$ m

So, $S_1 - S_4 = 5 - \frac{4}{5} = \frac{21}{5} = 4.2$ m

8. If 10 kg of ice at –10°C is mixed with 100 kg of with at 25°C, then resultant temperature in equilibrium for mixture shall be

$\left(S_i = \frac{1}{2}\text{ cal/gm} - °\text{C}, S_w = 1\text{ cal/gm} - °\text{C}, Lf = 80\text{ cal/gm}\right)$

(1) 0°C (2) 15°C

(3) 12.5° (4) 5°C

Answer (2)

Sol. 10 × 10 × 500 + 10 × 80 × 1000

= 10 kg of water of 0°

10^4 {5 + 80} = 85 × 10^4 cal

100 × 1000 × 1 × 25 = 25 × 10^5 cal

Heat budget

Reserved heat = 25 × 10^5 –85 × 10^4

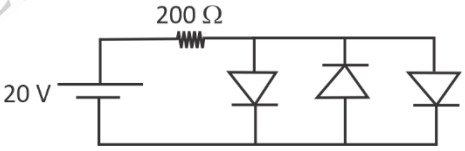
= 10^4(250 – 85)

= 165 × 10^4 Cal

Mass 110 kg of water at 0°C.

$\Delta T = \frac{165 \times 10^4}{110 \times 10^3} = \frac{165\,\phi}{11\,\phi} = 15°$

9. The threshold voltage for the diodes is 0.7 volt. Then current through diodes (from left to right) in given circuit is



(1) Zero, Zero, Zero

(2) 32.23 mA, 32.23 mA, 32.23 mA

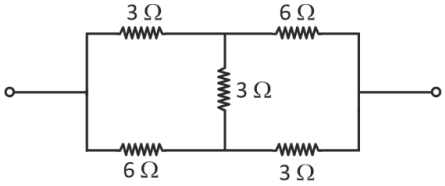
(3) 48.25 mA, zero, 48.25 mA

(4) 50 mA, Zero, 50 mA

Answer (3)

Sol. $i = \frac{20 - 0.7}{200} = \frac{19.3}{200} = 96.5$ mA

10. Find equivalent resistance of the given circuit.

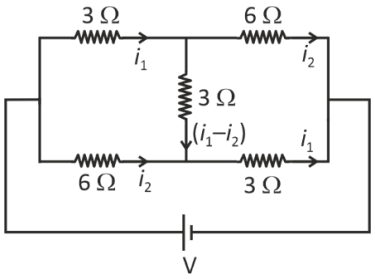


(1) 6.4 Ω (2) 4.2 Ω

(3) 7 Ω (4) 5 Ω

Answer (2)

Sol.



$-3i_1-3(i_1-i_2)+6i_2=0 \quad \ldots(1)$

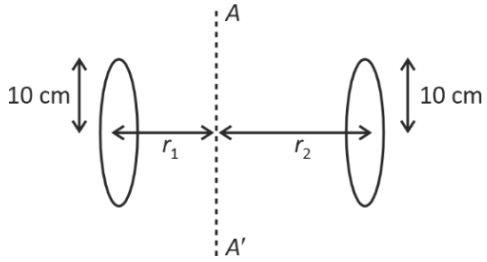
$-3i_1-6i_2+V=0$

$i_1=\frac{V}{7} \qquad i_2=\frac{2V}{21}$

$I=i_1+i_2=\frac{5V}{21}$

$R_{eq}=\frac{V}{I}=\frac{21}{5}=4.2\,\Omega$

11. For the given situation shown in figure two disks each of mass m = 600 grams are rotating about a fixed axis AA'. Radius of each disk is r_0 = 10 cm and they are at distance r_1 = 10 cm and r_2 = 20 cm from the axis AA'. Torque acting about the axis is 45 × 10^5 dyne-cm. Find angular acceleration in rad/sec^2.



(1) $\frac{170}{11}$ rad/sec^2 (2) $\frac{140}{9}$ rad/sec^2

(3) $\frac{150}{11}$ rad/sec^2 (4) $\frac{160}{9}$ rad/sec^2

Answer (3)

Sol. $I=\frac{mr_0^2}{4}+mr_2^2+\frac{mr_0^2}{4}+mr_1^2$

$I=\frac{mr_0^2}{2}+m\left(r_1^2+r_2^2\right)$

$I=m\left[\frac{1}{2\times100}+\frac{1}{100}+\frac{4}{100}\right]=\frac{6}{10}\left[\frac{11}{2}\right]\times\frac{1}{100}$

Also $\tau = 45 \times 10^5$ dyne-cm $= 45 \times 10^{-2}$ N.m

So, $\propto=\frac{45\times100\times2\times10}{100\times6\times11}=\frac{150}{11}$ rad/s^2

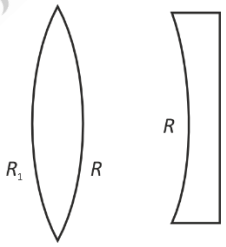
12. A bi-convex lens of refractive index 1.5 and planoconcave lens of refractive index 1.7 have same power. If 2nd radius of curvature of convex lens is equal to radius of curvature of planoconcave less. Find ratio of 1st radius of curvature to 2nd radius of curvature of bi-convex lens.

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

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

Answer (2)

Sol.



$(1.5-1)\left(\frac{1}{R_1}+\frac{1}{R}\right)=\left|(1.7-1)\left(-\frac{1}{R}-\frac{1}{\infty}\right)\right|$

$\frac{1}{2R_1}+\frac{1}{2R}=\frac{7}{10R}$

$$\frac{1}{2R_1}=\frac{2}{10R}$$

$$\frac{R_1}{R}=\frac{5}{2}$$

13. Find the ratio of de-Broglie wavelength associated with deuteron with kinetic energy of K and α-particle with kinetic energy of $2K$.

(1) 2 : 1 (2) $2\sqrt{2}:1$

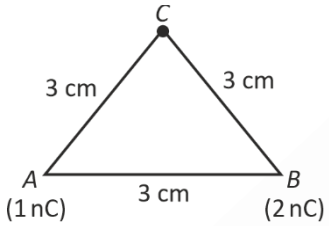
(3) $1:\sqrt{2}$ (4) $\sqrt{2}:1$

Answer (1)

Sol. $\lambda\propto\frac{1}{P}\propto\frac{1}{\sqrt{mK}}$

$$\frac{\lambda_1}{\lambda_2}=\frac{\sqrt{4\times 2K}}{\sqrt{2\times K}}=2$$

14. Find the work done by external agent in moving a 3nC charge from a large separation to point C.



(1) 8.1 μJ (2) 12 μJ

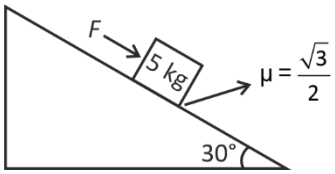
(3) 2.7 μJ (4) 9 μJ

Answer (3)

Sol. $w=\frac{9\times10^9\times1\times10^{-9}\times3\times10^{-9}}{3\times10^{-2}}+\frac{9\times10^9\times2\times10^{-9}\times3\times10^{-9}}{3\times10^{-2}}$

$w = 27\times10^{-7}$ J = 2.7 μJ

15. A block of mass 5 kg is placed on wedge of inclination 30°. Find force applied to move the block downwards with constant speed.



(1) $(\sqrt{3}-1)\frac{25}{2}$ (2) 12.5 N

(3) Zero (4) 25 N

Answer (2)

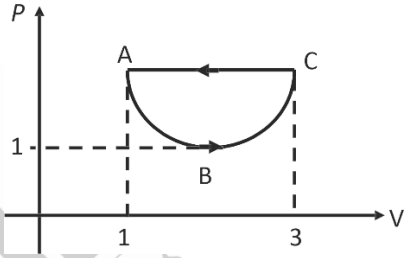
Sol. $F = \mu mg\cos30° - mg\sin30°$

$$=\frac{\sqrt{3}}{2}mg\cdot\frac{\sqrt{3}}{2}-\frac{mg}{2}$$

$$=\frac{mg}{4}$$

F = 12.5 N

16. Process ABC represents a parabolic section given by $(v-2)^2 = 4(P-1)$ in given cyclic process then work done by gas in process is

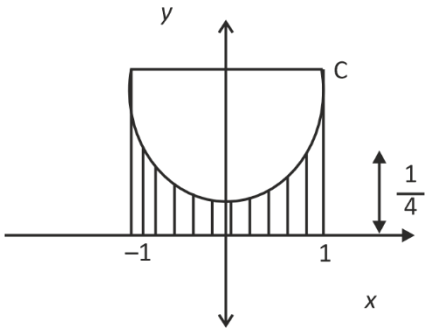


(1) $-\frac{1}{3}$ units (2) $-\frac{1}{6}$ units

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

Answer (1)

Sol. $x^2 = 4y$



Area = $2\int_0^1\frac{x^2}{4}dx = 2\times\frac{1}{12}\times1=\frac{1}{6}$

Required area = rectangle = Shaded area

$= \frac{1}{4} \times 2 - \frac{1}{6}$

$= \frac{1}{3}$ J

17. **Statement-I:** When a planar wavefront passes through a prism then its wavefront doesn't change, but when planar wavefront passes through a smaller slit wavefront becomes cylindrical.

Statement-II: If distance between slits is decreased and screen distance is increased then fringe width increases.

(1) S-I & S-II are both correct

(2) S-I & S-II are both incorrect

(3) S-I is correct & S-II is incorrect

(4) S-I is incorrect & S-II is correct

Answer (1)

Sol. $\beta = \frac{\lambda D}{d}$

18. In a vernier callipers when nothing is placed between the jaws zero of vernier scale is ahead of zero of main scale and 4^{th} division of vernier scale consider with one of the main scale. Now when a thin cylindrical wire is kept in the gaps then main scale reading is 15 and 5^{th} vernier division matches with one of the main scale marking. Find the diameter of wire.

(Main scale marking = 1 mm & LC = 0.1 mm)

(1) 15.9 mm (2) 14.9 mm

(3) 15.8 mm (4) 15.1 mm

Answer (4)

Sol. Zero error = (+0.4 mm)

Reading = (15 + 0.5) mm

So diameter = 15 + 0.5 – 0.4 = 15.1 mm

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. Two identical cells with same emf Σ and internal resistance r respectively are given. When cells are connected in series and when they are in parallel in both cases they drive equal current 'I' in external resistance of 6 Ω. Find the value of internal resistance r.

Answer (6)

Sol. $\frac{2\Sigma}{6+2r} = i$

And $\frac{\Sigma}{\frac{r}{2}+6} = i$

So, $6 + 2r = r + 12 \Rightarrow r = 6\ \Omega$

22. In a potentiometer, when a battery is connected with ext. resistance $R_1 = 4\ \Omega$, the balancing length is found to be 120 cm. Now when R_1 is removed and another ext. resistance $R_2 = 12\ \Omega$ is connected then the balancing length is found to be 180 cm. Find internal resistance (in Ω) of the battery.

Answer (4)

Sol. $\left(\frac{V_0}{l_0}\right) \times 120 = \left(\frac{E}{r+4}\right) 4 \quad \ldots(1)$

And $\frac{V_0}{l_0} \times 180 = \left(\frac{E}{r+12}\right) 12 \quad \ldots(2)$

So, $\frac{12}{18} = \frac{4(r+12)}{(r+4)\times 12} \Rightarrow \frac{2}{3} = \frac{(r+12)}{(r+4)3}$

$\Rightarrow 2r + 8 = r + 12$

$\Rightarrow r = 4\ \Omega$

23.

24.

25.