



# JEE (Main)

PAPER-1 (B.E./B. TECH.)

# 2022

## COMPUTER BASED TEST (CBT) Memory Based Questions & Solutions

Date: 26 July, 2022 (SHIFT-2) | TIME : (3.00 p.m. to 6.00 p.m)

Duration: 3 Hours | Max. Marks: 300

**SUBJECT: PHYSICS**

### Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No.: +91-022-39167222

To Know more : sms RESO at 56677 | Website : [www.resonance.ac.in](http://www.resonance.ac.in) | E-mail : [contact@resonance.ac.in](mailto:contact@resonance.ac.in) | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | [facebook.com/ResonanceIndia](https://www.facebook.com/ResonanceIndia) | [twitter.com/ResonanceIndia](https://twitter.com/ResonanceIndia) | [www.youtube.com/resonanceindia](https://www.youtube.com/resonanceindia) | [blog.resonance.ac.in](https://blog.resonance.ac.in)

This solution was download from Resonance JEE (MAIN) 2022 Solution portal

**Resonance** | JEE MAIN-2022 | DATE : 26-07-2022 (SHIFT-2) | PAPER-1 | MEMORY BASED | PHYSICS

### PART : PHYSICS

1. In Atwood machine if  $m_2 = 2m_1$  then acceleration of both mass is  $a_1$ . However when  $m_2 = 3m_1$  then acceleration of both mass is  $a_2$ . Find  $a_1/a_2$



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

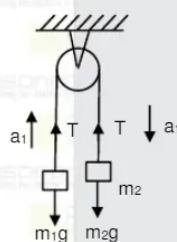
(2)  $\frac{2}{3}$

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

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

Ans. (2)

Sol.



$$m_2g - T = m_2a_1 \quad \dots(1)$$

$$T - m_1g = m_1a_1 \quad \dots(2)$$

from (1) & (2)

$$a_1 = \frac{(m_2 - m_1)g}{m_2 + m_1}$$

for case -2  $a_2 = \left(\frac{3m_1 - m_1}{3m_1 + m_1}\right)g = \left(\frac{2m_1}{4m_1}\right)g = \frac{g}{2}$

for case 1  $a_1 = \left(\frac{2m_1 - m_1}{2m_1 + m_1}\right)g = \left(\frac{m_1}{3m_1}\right)g = \frac{g}{3}$

$$\frac{a_1}{a_2} = \frac{g}{\frac{3}{2}g}$$

$$\frac{a_1}{a_2} = \frac{2}{3}$$

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

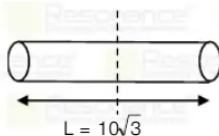
Toll Free : 1800 258 5555 | 7340010333 | facebook.com/Resonanceedu | twitter.com/Resonanceedu | www.youtube.com/resonancewatch | blog.resonance.ac.in

This solution was download from Resonance JEE (MAIN) 2022 Solution portal

PAGE # 1

**Resonance®** Educating for better tomorrow | JEE MAIN-2022 | DATE : 26-07-2022 (SHIFT-2) | PAPER-1 | MEMORY BASED | PHYSICS

2. Find radius of gyration about an axis passing through mid-point of thin rod ( $L = 10\sqrt{3}$  m)



(1) 2 meter

(2) 3 meter

(3) 5 meter

(4) 8 meter

Ans. (3)

Sol.  $I = \frac{m\ell^2}{12} = mk^2$

$$\Rightarrow k^2 = \frac{\ell^2}{12} \Rightarrow k = \frac{\ell}{\sqrt{12}} = \frac{10\sqrt{3}}{\sqrt{12}} = \frac{10\sqrt{3}}{2\sqrt{3}} = 5$$

3. Two particles are projected with same speed  $u$  but different angles of projection  $45^\circ$  and  $30^\circ$  respectively, then ratio of range is:

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

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

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

(4)  $\sqrt{3}$

Ans. (1)

Sol.  $R = \frac{u^2 \sin 2\theta}{g}$

$$\frac{R_1}{R_2} = \frac{\sin 90^\circ}{\sin 60^\circ} = \frac{2}{\sqrt{3}}$$

4. n is degree of freedom of gas, then ratio of  $\frac{C_v}{C_p} = ?$

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

Ans. (2)

Sol.  $1 + \frac{2}{n}$

5. A nucleus of mass m disintegrate into two pieces of mass  $\frac{m}{3}$  and  $\frac{2m}{3}$ . The ratios of their de-Broglie wavelength will be -

- (1)  $\frac{\lambda_1}{\lambda_2} = \frac{1}{2}$  (2)  $\frac{\lambda_1}{\lambda_2} = \frac{2}{1}$  (3)  $\frac{\lambda_1}{\lambda_2} = \frac{1}{1}$  (4)  $\frac{\lambda_1}{\lambda_2} = \frac{4}{3}$

Ans. (3)

Sol. Since their momentum will be same, so  $\lambda_{db} = \text{same}$

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No.: +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | facebook.com/ResonanceEdu | twitter.com/ResonanceEdu | www.youtube.com/resonance | blog.resonance.ac.in

This solution was download from Resonance JEE (MAIN) 2022 Solution portal

PAGE # 2

**Resonance** Educating for better tomorrow | JEE MAIN-2022 | DATE : 26-07-2022 (SHIFT-2) | PAPER-1 | MEMORY BASED | PHYSICS

6. In amplitude modulated wave, the maximum and minimum amplitude of modulated signal are respectively 60 volt and 20 volt, then % modulation will be :

- (1) 50% (2) 60% (3) 75% (4) 33%

Ans. (1)

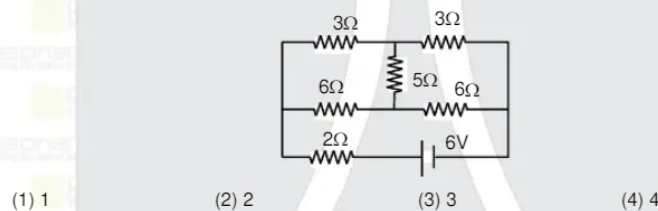
Sol.  $A_c + A_m = 60$

$A_c - A_m = 20$

Solving  $A_c = 40$  volt and  $A_m = 20$  volt

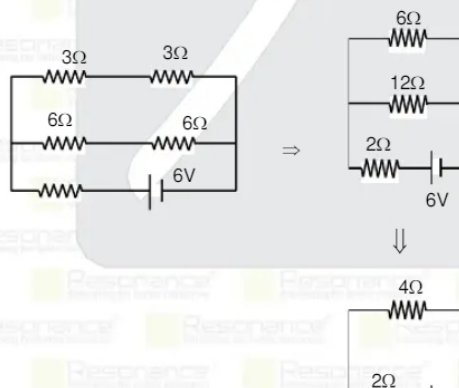
$= \frac{A_m}{A_c} = \frac{20}{40} = \frac{1}{2} = 50\%$

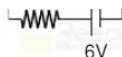
7. Determine current (in Ampere) through cell in the given circuit ?



Ans. (1)

Sol. Circuit is balanced wheat stone bridge





$$R_4 = 2 + 4 = 6$$

$$I = \frac{6}{R_4} = \frac{6}{6} = 1 \text{ Amp.}$$

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No.: +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | facebook.com/ResonanceEdu | twitter.com/ResonanceEdu | www.youtube.com/resonance | blog.resonance.ac.in

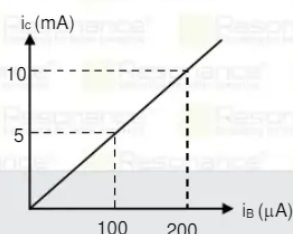
This solution was download from Resonance JEE (MAIN) 2022 Solution portal

PAGE # 3



JEE MAIN-2022 | DATE : 26-07-2022 (SHIFT-2) | PAPER-1 | MEMORY BASED | PHYSICS

8. An n-p-n transistor in common emitter mode is used as an amplifier  $R_{in} = 0.5 \text{ k}\Omega$  and  $R_{out} = 2 \text{ k}\Omega$ . The graph of  $i_c$  v/s  $i_B$  is as shown in the diagram:



The voltage gain for the transistor will be :

- (1) 100 (2) 200 (3) 400 (4) 50

Ans. (2)

Sol.  $\beta_{ac} = \frac{\Delta i_c}{\Delta i_B} = \frac{(10 - 5) \times 10^{-3}}{(200 - 100) \times 10^{-6}} = 50$

$$A_v = \frac{R_{out}}{R_{in}} = 50 \times \frac{2}{0.5} = 200$$

9. A ball of mass  $m = 0.15 \text{ kg}$  moving with speed  $12 \text{ m/s}$  collide elastically perpendicular with wall and rebound with same speed, if force applied by wall is  $100 \text{ N}$ . Then time of collision is :

- (1) 0.025 sec (2) 0.036 sec (3) 0.005 sec (4) 0.018 sec

Ans. (2)

Sol.  $F = \frac{\Delta p}{\Delta t} = \frac{2mv}{\Delta t}$

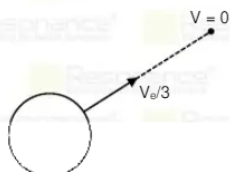
$$\Delta t = \frac{2mv}{F} = \frac{2 \times 0.15 \times 12}{100} = 0.036 \text{ sec}$$

10. A particle is projected with velocity one third of escape velocity at earth surface from earth in direction perpendicular to surface of earth. Determine the maximum height above earth surface upto which it can reach. (Take radius of earth =  $6400 \text{ km}$ )

- (1) 1600 km (2) 700 km (3) 800 km (4) 1000 km

Ans. (3)

Sol.



## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No.: +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | facebook.com/ResonanceEdu | twitter.com/ResonanceEdu | www.youtube.com/resonance | blog.resonance.ac.in

This solution was download from Resonance JEE (MAIN) 2022 Solution portal

PAGE # 4

$$V_0 = \sqrt{\frac{2GM}{R}}$$

Applying mechanical energy conservation :

$$\frac{-GMm}{R} + \frac{1}{2} m V_0^2 = \frac{-GMm}{R+h} + 0$$

$$\frac{-GMm}{R} + \frac{1}{18} m \times \frac{2GM}{R} = \frac{-GMm}{R+h} ; -\frac{1}{R} + \frac{1}{9R} = -\frac{1}{R+h} ; -\frac{8}{9R} = -\frac{1}{R+h}$$

$$8R + 8h = 9R$$

$$h = R/8 = 6400/8 = 800 \text{ km}$$

11. One main scale division of a vernier callipers represents 1 mm and 10 vernier scale divisions matching with 9 main scale divisions. Zero error of the vernier is  $-0.4 \text{ mm}$ . If a sphere is fitted between the jaws, the zero of vernier scale lies between  $30^{\text{th}}$  and  $31^{\text{th}}$  mark of main scale and  $6^{\text{th}}$  vernier scale mark matches with some main scale mark. The diameter of the sphere will be :

- (1) 3.02 cm (2) 3.10 cm (3) 3.06 cm (4) 3.08 cm

Ans. (2)

Sol. 10 VSD \_\_\_\_\_ 9 MSD = 9mm

$$1 \text{ VSD} = \frac{9}{10} \text{ mm} = 0.9 \text{ mm}$$

$$\text{L.C.} = 1\text{MSD} - 1\text{VSD} = 1\text{mm} - 0.9 \text{ mm} = 0.1 \text{ mm}$$

$$\text{Zero error} = -0.4 \text{ mm}$$

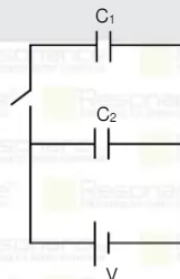
$$\text{Measured diameter} = \text{main scale reading} + (\text{Vernier scale reading} (\text{Least count}))$$

$$= 30 \text{ mm} + (6) (0.1 \text{ mm}) = 30.6 \text{ mm}$$

$$\text{Actual diameter} = (\text{measured diameter}) - \text{Zero error}$$

$$= (30.6 \text{ mm}) - (-0.4 \text{ mm}) = 31.0 \text{ mm} = 3.10 \text{ cm}$$

12. In the circuit containing two capacitor and battery as shown in figure. Initially switch was closed, then energy of system is  $E_1$ . Now switch is opened and dielectric of  $K = 5$  is inserted between the plate of both capacitor. Energy of system is  $E_2$ . If  $C_1 = C_2 = C$ . Determine ratio  $E_1 : E_2$  :



- (1)  $\frac{1}{13}$  (2)  $\frac{2}{13}$  (3)  $\frac{5}{13}$  (4)  $\frac{3}{5}$

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No.: +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | facebook.com/ResonanceEdu | twitter.com/ResonanceEdu | www.youtube.com/resonance | blog.resonance.ac.in

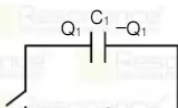
This solution was download from Resonance JEE (MAIN) 2022 Solution portal

PAGE # 5

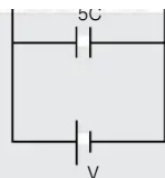
Ans. (3)

Sol. Case-1: Switch has closed  $C_{eq} = C_1 + C_2 = 2C$

$$\text{Energy} = E_1 = \frac{1}{2} C_{eq} V^2 = \frac{1}{2} \times 2CV^2 \Rightarrow CV^2$$

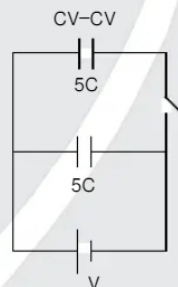






**Case-2:** Now switch is opened and dielectric of  $K = 5$  is filled in both capacitor.

Charge on  $C_1$  before closing of switch =  $CV$  on opening of switch  $C_1$  become isolated so charge on  $C_1$  remain same i.e.  $CV$



$$E_2 = \frac{(CV)^2}{2 \times 5C} + \frac{1}{2} 5C \times V^2$$

$$\Rightarrow CV^2 \left[ \frac{1}{10} + \frac{5}{2} \right]$$

$$\Rightarrow CV^2 \left[ \frac{1+25}{10} \right]$$

$$CV^2 \left[ \frac{26}{10} \right] = \frac{13}{5} CV^2$$

$$\text{Ratio } E_1 : E_2 = \frac{CV^2}{\frac{13}{5} CV^2} = \frac{5}{13}$$

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No.: +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | Facebook.com/ResonanceEdu | Twitter.com/ResonanceEdu | www.youtube.com/reswatch | blog.resonance.ac.in

This solution was download from Resonance JEE (MAIN) 2022 Solution portal

PAGE # 6

**Resonance®** | JEE MAIN-2022 | DATE : 26-07-2022 (SHIFT-2) | PAPER-1 | MEMORY BASED | PHYSICS

13. In a medium speed of light is  $1.5 \times 10^8$  m/s and in another medium speed of light is  $2 \times 10^8$  m/s. Find critical angle for given two media.

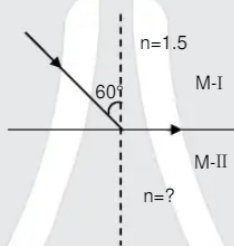
- (1)  $\sin^{-1} \frac{3}{4}$  (2)  $\sin^{-1} \frac{3}{5}$  (3)  $\sin^{-1} \frac{1}{4}$  (4)  $\sin^{-1} \frac{1}{3}$

Ans. (1)

$$\text{Sol. } \sin c = \frac{n_r}{n_d} = \frac{V_d}{V_r} = \frac{1.5 \times 10^8}{2 \times 10^8} = \frac{1.5}{2}$$

$$\Rightarrow \sin c = \frac{3}{4} \Rightarrow C = \sin^{-1} \frac{3}{4} \quad \text{Ans.}$$

14. Find value of  $n$  as shown in figure



- (1)  $n = \frac{\sqrt{27}}{4}$  (2)  $n = \frac{4}{3}$  (3)  $n = \frac{4\sqrt{3}}{3}$  (4)  $n = \frac{5\sqrt{3}}{4}$

Ans. (1)

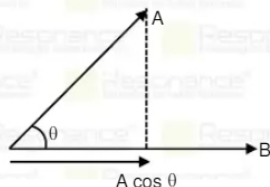
Sol.  $\sin c = \frac{h_r}{h_d} \Rightarrow \sin 60^\circ = \frac{n}{3/2} = \frac{2n}{3}$   
 $\Rightarrow \frac{2n}{3} = \frac{\sqrt{3}}{2} \Rightarrow n = \frac{\sqrt{27}}{4}$

15. There are two vector  $\vec{A} = 2\hat{i} - 3\hat{j} - \hat{k}$  and  $\vec{B} = \hat{i} - 2\hat{j} + 2\hat{k}$ . Determine magnitude of components of A vector along B.

(1) 4 (2) 3 (3) 2 (4) 1

Ans. (3)

Sol.



Component =  $A \cos \theta$

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | Facebook.com/ResonanceEdu | Twitter.com/ResonanceEdu | www.youtube.com/resonancewatch | blog.resonance.ac.in

This solution was download from Resonance JEE (MAIN) 2022 Solution portal

PAGE # 7

where  $\cos \theta = \frac{\vec{A} \cdot \vec{B}}{AB}$

component =  $A \left( \frac{\vec{A} \cdot \vec{B}}{AB} \right)$

$\Rightarrow \frac{\vec{A} \cdot \vec{B}}{B}$

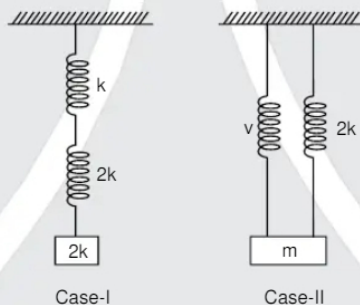
$\vec{A} \cdot \vec{B} = 2 \times 1 + (-3) \times (-2) + (-1) \times (2)$

$\Rightarrow 2 + 6 - 2 \Rightarrow 6$

$|\vec{B}| = \sqrt{1+4+4} \Rightarrow 3$

Component =  $6/3 = 2$

16. In case-I time period of oscillations of block is 3 second, if time period of block is  $\sqrt{x}$  in case-II then find value of x



(1) 2 (2) 4 (3) 6 (4) 8

Ans. (1)

Sol. In case-I  $k_{eq} = \frac{2k \cdot k}{2k + k} = \frac{2k}{3}$

In case-II  $k_{eq} = k + 2k = 3k$

In case-I  $T = 3 = 2\pi \sqrt{\frac{m}{2k/3}} = 2\pi \sqrt{\frac{3m}{2k}}$

In case-II  $T = \sqrt{x} = 2\pi \sqrt{\frac{m}{3k}}$

In case-II  $I = 2\pi\sqrt{\frac{1}{3k}}$

So, dividing the equations

$$\frac{T}{3} = \frac{1}{\sqrt{3}} \times \frac{\sqrt{2}}{\sqrt{3}} \Rightarrow T = \sqrt{2}$$

So,  $x = 2$

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | facebook.com/ResonanceEdu | twitter.com/ResonanceEdu | www.youtube.com/resonance | blog.resonance.ac.in

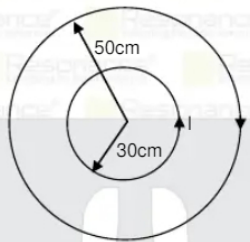
This solution was download from Resonance JEE (MAIN) 2022 Solution portal

PAGE # 8



JEE MAIN-2022 | DATE : 26-07-2022 (SHIFT-2) | PAPER-1 | MEMORY BASED | PHYSICS

17. Two concentric loops of radii 30 cm and 50 cm carrying equal currents  $i = 7$  A in opposite directions are kept in x-y plane as shown in figure find net magnetic moment of the system



- (1)  $-7\hat{k}$  (2)  $-\frac{7}{2}\hat{k}$  (3)  $\frac{7}{2}\hat{k}$  (4)  $7\hat{k}$

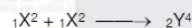
Ans. (2)

Sol. Net magnetic moment

$$M = I\pi(0.5)^2 - I\pi(0.3)^2$$

$$= \frac{4\pi}{25} = 4 \times 7 \times \frac{22}{7} \times \frac{1}{25} = -\frac{7}{2}\hat{k}$$

18. Binding energy per unit nucleon of nucleus  ${}^1_1\text{X}^2$  and  ${}^2_2\text{Y}^4$ , are respectively 1.1 MeV and 7.6 MeV. If two nuclei of  ${}^1_1\text{X}^2$  combine to form a nucleus of  ${}^2_2\text{Y}^4$ , then find the mass loss in amu :



- (1) 0.014 (2) 0.018 (3) 0.039 (D) 0.028

Ans. (4)

Sol.  $BE_1 = (1.1 \text{ MeV}) \times 2 \times 2 = 4.4 \text{ MeV}$

$$BE_2 = (7.6 \text{ MeV}) \times 4 = 30.4 \text{ MeV}$$

$$\text{Energy released} = (-4.4 \text{ MeV}) - (-30.4 \text{ MeV})$$

$$= 26 \text{ MeV} = (931) \Delta m$$

$$\Delta m = \frac{26}{931} = 0.028 \text{ amu}$$

19. Magnetic flux passing through a coil of resistance  $8\Omega$  is given by  $\phi = \frac{2}{3}(9 - t^2)$ . Find total heat dissipated

in Joule till the flux becomes zero

- (1) 2 (2) 4 (3) 5 (4) 6

Ans. (1)

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | facebook.com/ResonanceEdu | twitter.com/ResonanceEdu | www.youtube.com/resonance | blog.resonance.ac.in

This solution was download from Resonance JEE (MAIN) 2022 Solution portal

PAGE # 9



Sol.  $\phi = \frac{2}{3}(9 - t^2) = 0 \Rightarrow t = 3 \text{ sec.}$

Induced EMF in coil is  $\varepsilon = -\frac{d\phi}{dt}$

$$\Rightarrow \varepsilon = -\frac{2}{3}(0 - 2t)$$

$$\Rightarrow \varepsilon = \frac{4t}{3}$$

Now Heat produced  $H = \int \frac{\varepsilon^2}{R} dt$

$$\Rightarrow H = \frac{16}{9 \times 8} \int_0^3 t^2 dt = \frac{16}{9 \times 8} \times \frac{1}{3} \times 27 = 2 \text{ Joule}$$

20. Equation of a linear wave is  $y = 2 \sin(\omega t - kx)$  cm if is given that maximum velocity of particle is equal to wave velocity. Find wave length in cm

- (1)  $4\pi$  (2)  $2\pi$  (3) 2 (4) 4

Ans. (1)

Sol. According to questions

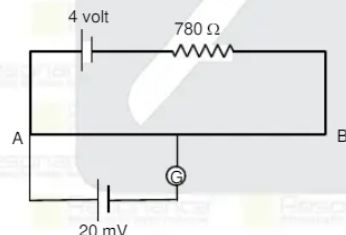
$$V_{\max} = V_{\omega} \Rightarrow A\omega = \omega/k$$

$$\Rightarrow 2 = 1/k \Rightarrow k = 1/2$$

$$\Rightarrow 2\pi/\lambda = 1/2$$

$$\Rightarrow \lambda = 4\pi$$

21.



If length of the potentiometer wire is 300 cm and the balance length is found to be 60 cm for 20 mV cell, then find the total resistance of the potentiometer wire.

- (1)  $40 \Omega$  (2)  $20 \Omega$  (3)  $60 \Omega$  (4)  $80 \Omega$

Ans. (2)

Sol.  $\frac{4}{780 + R} \times \frac{R}{300} \times 60 = 20 \times 10^{-3}$

$$R = 20$$

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No.: +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | facebook.com/ResonanceEdu | twitter.com/ResonanceEdu | www.youtube.com/resonance | blog.resonance.ac.in

This solution was download from Resonance JEE (MAIN) 2022 Solution portal

PAGE # 10

22. Magnetic field in a electromagnetic wave is given by:

$$B = 5 \times 10^{-2} \sin 1000 \pi (4 \times 10^8 t - 5x) \text{ tesla. Find amplitude of electric field (in V/m).}$$

- (1)  $4 \times 10^6$  (2)  $2 \times 10^6$  (3)  $1.5 \times 10^6$  (4)  $3 \times 10^6$

Ans. (1)

Sol.  $V = \frac{\omega}{k} = \frac{4 \times 10^8}{5}$

So, amplitude of electric field

$$E_0 = V B_0$$

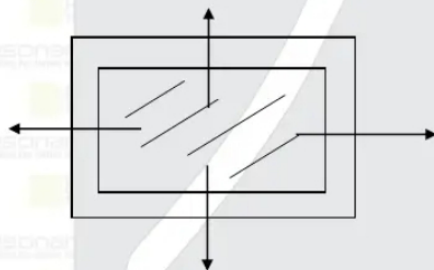
$$= \frac{4 \times 10^8}{5} \times 5 \times 10^{-2} = 4 \times 10^6 \text{ V/m.}$$

23. A cuboid ice piece of dimension 60 cm × 50 cm × 20 cm is packed inside a copper cover of thickness 1 cm. Thermal resistivity of copper is 0.05 m.K/watt, the temperature of the outer surface of copper is 40°C and  $L_f$  for ice is  $3.4 \times 10^5$  J/kg, then the rate of ice melting will be :

(1) 0.14 Kg/sec. (2) 0.24 Kg/sec. (3) 0.35 Kg/sec. (4) 0.47 Kg/sec.

Ans. (2)

Sol.



$$\text{Area} = 2\{(0.6 \times 0.5) + (0.5 \times 0.2) + (0.2 \times 0.6)\}$$

$$\text{Area} = 1.04 \text{ m}^2$$

$$\text{Thermal resistance of Cu layer} = \frac{\rho l}{A} = \frac{(0.05)(1 \times 10^{-2})}{1.04} = 5 \times 10^{-4}$$

$$i_{th} = \frac{\Delta T}{R_{th}} = \frac{40 - 0}{5 \times 10^{-4}} = 8 \times 10^4 \text{ J/sec.} = \frac{dQ}{dt}$$

$$\frac{dQ}{dt} = \left(\frac{dm}{dt}\right) L_f \Rightarrow \frac{dm}{dt} = \left(\frac{dQ/dt}{L_f}\right) = \frac{8 \times 10^4}{3.4 \times 10^5} = 0.24 \text{ kg/sec.}$$

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No.: +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | Facebook.com/ResonanceEdu | Twitter.com/ResonanceEdu | www.youtube.com/resonance | Blog.resonance.ac.in

This solution was download from Resonance JEE (MAIN) 2022 Solution portal

PAGE # 11

24. Two conducting hollow spheres of radius 5 mm and 10 mm respectively are placed such that their center to center distance is 20 cm. If they are connected by a conducting wire, then the ratio of electric field

$\left(\frac{E_1}{E_2}\right)$  just outside the surface will be :

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

Ans. (2)

Sol.



$$\text{Potential } \frac{KQ}{R} = \text{same}$$

$$E = \frac{KQ}{R^2} = \frac{KQ/R}{R} = \frac{\text{constant}}{R}$$

$$\frac{E_1}{E_2} = \frac{R_2}{R_1} = \frac{10}{5} = 2.$$

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No.: +91-022-39167222

To Know more : sms RESO at 56677 | Website : [www.resonance.ac.in](http://www.resonance.ac.in) | E-mail : [contact@resonance.ac.in](mailto:contact@resonance.ac.in) | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | [facebook.com/ResonanceEdu](https://www.facebook.com/ResonanceEdu) | [twitter.com/ResonanceEdu](https://twitter.com/ResonanceEdu) | [www.youtube.com/resonance](https://www.youtube.com/resonance) | [blog.resonance.ac.in](https://blog.resonance.ac.in)

This solution was download from Resonance JEE (MAIN) 2022 Solution portal

PAGE # 12



### JEE (Main) 2022

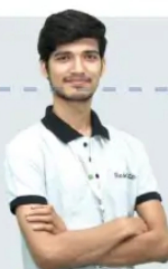
JUNE (SESSION-1) RESULT

लगातार दूसरे वर्ष, कोटा का श्रेष्ठ परिणाम, रेजोनेंस के नाम

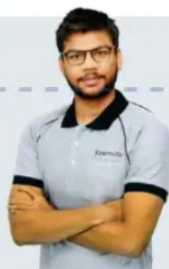
JEE (Main) 2022  
JUNE (Session-1)

OVERALL NTA SCORE\*  
**99.998%ile**

NTA SCORE (%ile)  
**100**  
in CHEMISTRY



VARDAN VERMA  
Classroom Student



CHAITANYA AGGARWAL  
Classroom Student

JEE (Adv.) 2021

AIR  
**8**

**BEST RANK**  
from Kota Classroom among  
all Institutes of Kota

Highest Marks (114/120)  
in Chemistry in India

\* वरदान वर्मा का %ile Score कोटा में रहकर JEE की तैयारी करने वाले सभी संस्थानों के सभी क्लासरूम विद्यार्थियों में से **HIGHEST %ile** है

#As per logical information available in Public Domain till 16<sup>th</sup> July

## ADMISSIONS OPEN: 2022-23

— For Class XII Passed Students —

### TARGET

JEE (Main+Advanced) 2023

COURSE

**VIJAY (JR)**



CLASS STARTS  
1<sup>st</sup> & 16<sup>th</sup> Aug

### TARGET

JEE (Main) 2023

COURSE

**AJAY (ER)**



CLASS STARTS  
1<sup>st</sup>, 16<sup>th</sup> & 29<sup>th</sup> Aug

**Scholarship upto 100%**  
on the basis of JEE (Main) Percentile Score

अपनी **स्कोलरशिप** जानने के लिए **अपनी जेईई (मेन) परसेंटाइल वाट्सअप करें: 73400-10345**

**Resonance Eduventures Ltd.**

Kota Study Centre & Registered Corporate Office: CG Tower, A-46 & 52, IPHA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005  
Tel. No.: 0744-2777777, 2777700 | CIN: U80302RJ2007PLC024029 | [www.resonance.ac.in](http://www.resonance.ac.in) | [contact@resonance.ac.in](mailto:contact@resonance.ac.in)