

## PART : PHYSICS

1. If momentum of a body increased by 50% then percentage increase in kinetic energy will be :  
 (1) 225 %                      (2) 125 %                      (3) 75%                      (4) 25%

Ans. (2)

Sol.  $KE = \frac{p^2}{2m}$

$$KE' = \frac{(1.5p)^2}{2m} = 2.25 \frac{p^2}{2m}; \quad \% \text{ change in KE} = \frac{2.25 - 1}{1} \times 100 = 125\%$$

2. For an electron & Proton ( $m_p = 1847m_e$ ) with same de-Broglie wavelength, the ratio of their linear momentum is equal to :

- (1) 1 : 2                      (2) 2 : 1847                      (3) 1 : 1                      (4)  $\sqrt{1847}$

Ans. (3)

Sol.  $\lambda = \frac{h}{p}$

$\lambda \rightarrow$  same So P will also be same

So  $P_p : P_e = 1 : 1$

3. If the weight of an object on the earth surface is 400 N, then weight of the same object at the depth  $R/2$  from surface would be : (R is Radius of earth)

- (1) 100 N                      (2) 300 N                      (3) 200 N                      (4) 250 N

Ans. (3)

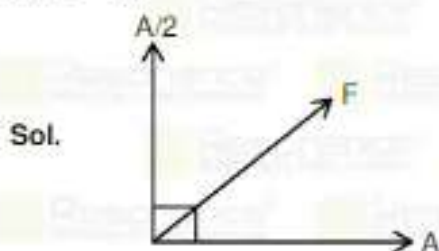
Sol. At a h depth  $g' = g \left(1 - \frac{h}{R}\right) = g \left(1 - \frac{R/2}{R}\right) = \frac{g}{2}$

$$\Rightarrow mg' = \frac{mg}{2} = \frac{400}{2} = 200 \text{ N}$$

4. Two forces of magnitude A & A/2 act Perpendicular to each other, the magnitude of the resultant force is equal to

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

Ans. (2)



$$\text{Net force } F = \sqrt{A^2 + \left(\frac{A}{2}\right)^2} = \sqrt{A^2 + \frac{A^2}{4}} = A\sqrt{1 + \frac{1}{4}} = \frac{\sqrt{5}}{2} A$$

## 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    @resonanceofindia    www.youtube.com/hqwatches    blog.resonance.ac.in

5. Dimensions  $\frac{1}{\mu_0 \epsilon_0}$  are :

- (1)  $L^2 T^{-2}$                       (2)  $LT^{-2}$                       (3)  $LT^{-1}$                       (4)  $MLT^{-2}$

Ans. (1)

Sol. Speed =  $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$

$$\Rightarrow \frac{1}{\mu_0 \epsilon_0} = (\text{Speed})^2$$

$$\& \frac{1}{\mu_0 \epsilon_0} = [LT^{-1}]^2 = L^2 T^{-2}$$

6. Particle of mass 500 g has velocity  $\vec{v} = 2t\hat{i} + 3t^2\hat{j}$  m/s at time t. if force on the particle is  $\vec{F} = \hat{i} + x\hat{j}$  N at time t = 1 then find value of x.

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

Ans. (1)

Sol.  $\vec{v} = 2t\hat{i} + 3t^2\hat{j}$

Acceleration of the particle at time t

$$\vec{a} = \frac{d\vec{v}}{dt} = 2\hat{i} + 6t\hat{j}$$

at time t = 1 sec.  $\vec{a} = 2\hat{i} + 6\hat{j}$

So Force on the particle will be

$$\vec{F} = m\vec{a}$$

$$\Rightarrow \vec{F} = 0.5(2\hat{i} + 6\hat{j})$$

$$\Rightarrow \vec{F} = \frac{1}{2}(2\hat{i} + 6\hat{j})$$

$$\Rightarrow \vec{F} = \hat{i} + 3\hat{j}$$

So value of x is 3.

7. **Statement-1** : The kinetic energy of a satellite is half of its total mechanical energy.

**Statement-2** : Potential energy of a satellite is double of its total mechanical energy

- (1) Statement-1 and statement-2 both are correct  
 (2) Statement-1 and statement-2 both are incorrect  
 (3) Statement-1 is correct but statement-2 is incorrect  
 (4) Statement-1 is incorrect and statement-2 is correct

Ans. (4)

Sol.  $KE = -(M.E.) = -\frac{P.E.}{2}$

## Resonance Eduventures Ltd.

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

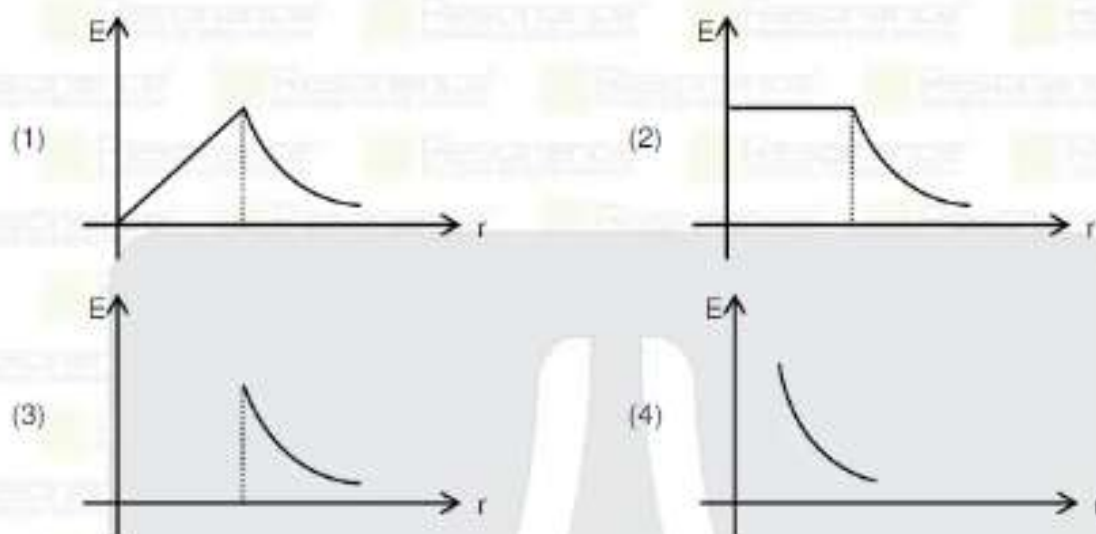
Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

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/reswatch  blog.resonance.ac.in



8. Correct graph between electric field & distance from centre of an insulated uniformly charged solid sphere is



Ans. (1)

Sol.

9. A nucleus X breaks into two equal Nuclei Y ( $X^{242} \rightarrow 2Y^{121}$ ). Binding energy per nucleon of X & Y is 7.6 MeV and 8.1 MeV respectively, then find the gain in binding energy :

(1) 200 MeV                      (2) 75 MeV                      (3) 121 MeV                      (4) 42 MeV

Ans. (3)

Sol. Gain in binding energy =  $242 (8.1 - 7.6)$  MeV  
 $= 242 \times 0.5$   
 $= 121$  MeV

10. An open organ pipe is vibrating in its second mode of vibration. The velocity of sound is 360 m/s. If length of pipe is 40 cm find it's frequency :

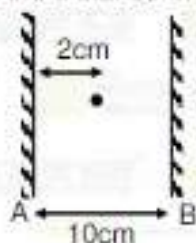
(1) 300 Hz                      (2) 600 Hz                      (3) 900 Hz                      (4) 1200 Hz

Ans. (3)

Sol.  $F = \left(\frac{V}{2L}\right) 2 = \frac{V}{L} = \frac{360}{40 \times 10^{-2}}$

F = 900 Hz

11. An object is placed between two parallel mirror as shown. The distance of object from mirror A is 2 cm & distance between mirror is 10 cm. Find the distance of second image formed by mirror A from A :



(1) 8 m

(2) 12 m

(3) 18 m

(4) 20 m

## Resonance Eduventures Ltd.

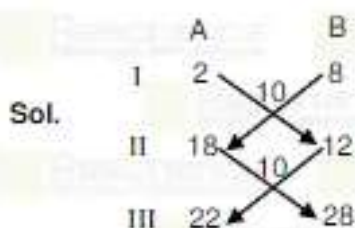
Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

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    [f](https://www.facebook.com/ResonanceEd) [i](https://www.instagram.com/ResonanceEd) [www.youtube.com/resonance](https://www.youtube.com/resonance)    [www.resonance.ac.in](https://www.resonance.ac.in)

Ans. (3)



12. Young's modulus of a wire is  $1.6 \times 10^7 \text{ N/m}^2$  and longitudinal strain is 0.04% after applying load on wire then potential energy stored per unit volume in the wire will be :

- (1)  $4 \text{ J/m}^3$                       (2)  $2.54 \text{ J/m}^2$                       (3)  $1.28 \text{ J/m}^3$                       (4)  $1.8 \text{ J/m}^3$

Ans. (3)

Sol. PE per unit volume =  $\frac{1}{2}$  stress  $\times$  strain

$$= \frac{1}{2} y (\text{strain})^2$$

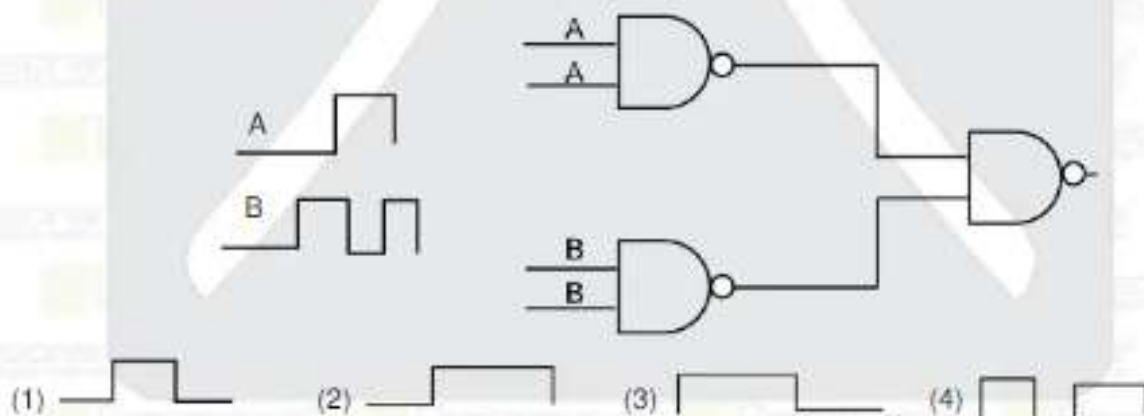
$$= \frac{1}{2} \times 1.6 \times 10^7 \times (.0004)^2$$

$$= \frac{1}{2} \times 1.6 \times 10^7 \times 4 \times 4 \times 10^{-8}$$

$$= 1.6 \times 8 \times 10^{-1}$$

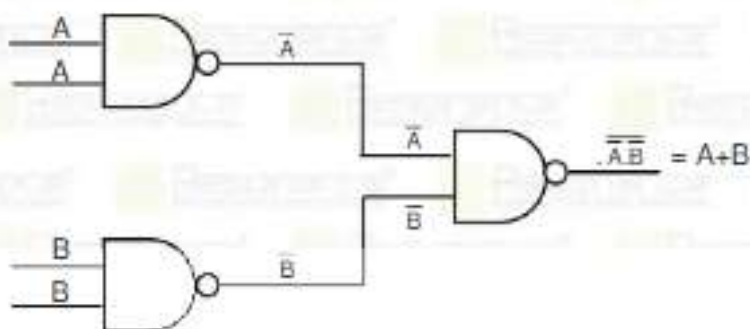
$$= 1.28 \text{ J/m}^3$$

13. Out-put of given logic gate will be



Ans. (2)

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    instg.resonance.ac.in

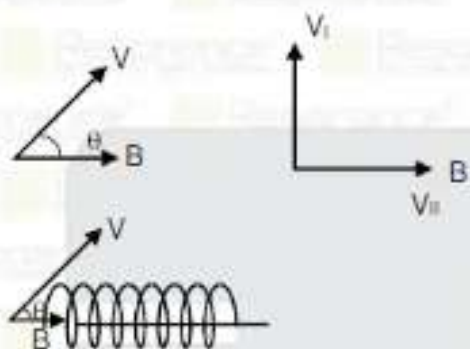


14. If a particle has rectangular components of its velocity along a uniform magnetic field & perpendicular to the magnetic field then path of the particle will be -

(1) Helical (2) Circular (3) Straight line (4) Parabolic

Ans. (1)

Sol.



15. A train is moving towards a stationary observer with speed 120 m/s & blows horn of frequency 300 Hz, wind is also blowing towards observer with speed 10 m/s. If speed of sound in still air is 330 m/s then find frequency of sound observed by observer :

(1) 300 Hz (2) 464 Hz (3) 564 Hz (4) 264 Hz

Ans. (2)

Sol.

$$f' = \frac{(V + V_W)}{(V + V_W) - V_S} \cdot f$$

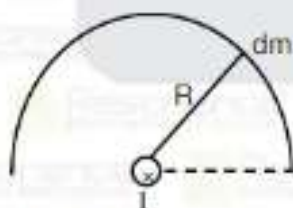
$$= \frac{330 + 10}{330 + 10 - 120} \times 300 = \frac{340}{220} \times 300 = \frac{17}{11} \times 300 = \frac{5100}{11} = 464 \text{ Hz}$$

16. Moment of inertia of a half uniform ring about an axis Perpendicular to its Plane & passing through its centre is  $\frac{1}{x} MR^2$ . Find value of x.

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

Ans. (1)

Sol.



$$I = \int dm R^2$$

$$\Rightarrow I = R^2 \int dm$$

$$\Rightarrow I = mR^2$$

## 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](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://www.blog.resonance.ac.in)

17. The Area covered by a transmitting antenna of height 98 m is :  
 (1) 4250 km<sup>2</sup>                      (2) 8252 km<sup>2</sup>                      (3) 3942 km<sup>2</sup>                      (4) 6324 km<sup>2</sup>

Ans. (3)

Sol.  $d = \sqrt{2Rh}$

$$\begin{aligned} A &= \pi d^2 = \pi(2Rh) = 2\pi Rh \\ &= 2\pi \times 6400 \times 10^3 \times 98 \\ &= 2 \times 22/7 \times 64 \times 98 \times 10^5 \\ &= 39424 \times 10^5 \\ &= 3742.4 \times 10^6 \text{ m}^2 \\ &= 3942 \text{ km}^2 \end{aligned}$$

18. An electric dipole of dipole moment  $P = 6 \times 10^{-6} \text{ C-m}$  is rotated from stable equilibrium to unstable equilibrium in uniform electric field,  $E = 3/2 \times 10^3 \text{ Volt/m}$ . Calculate work done against electric field in this process.

- (1) 6mJ                      (2) 12 mJ                      (3) 18 mJ                      (4) 24 mJ

Ans. (3)

Sol.  $\theta_1 = 0^\circ$

$\theta_2 = 180^\circ$

$$\begin{aligned} W &= U_1 - U_2 = (-PE \cos 180^\circ) - (-PE \cos 0^\circ) \\ &= 2PE \\ &= 2 \times 6 \times 10^{-6} \times 3/2 \times 10^3 \\ &= 18 \times 10^{-3} \text{ J} = 18 \text{ mJ} \end{aligned}$$

19. Two projectiles projected with speed 40 m/s and 60 m/s at an angle of 30° and 60° respectively. Find ratio of horizontal ranges of two projectiles ( $g = 10 \text{ m/s}^2$ ) at the earth surface is :

- (1)  $\frac{4}{9}$                       (2)  $\frac{4}{5}$                       (3)  $\frac{3}{2}$                       (4)  $\frac{5}{4}$

Ans. (1)

Sol. For 1<sup>st</sup> projectile  $R_1 = \frac{2u_x u_y}{g}$

$$\Rightarrow R_1 = \frac{2 \times 20 \times 20\sqrt{3}}{10}$$

For 2<sup>nd</sup> projectile

$$R_2 = \frac{2 \times 30 \times 30\sqrt{3}}{10}$$

$$\text{So } \frac{R_1}{R_2} = \frac{4}{9}$$

## Resonance Eduventures Ltd.

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

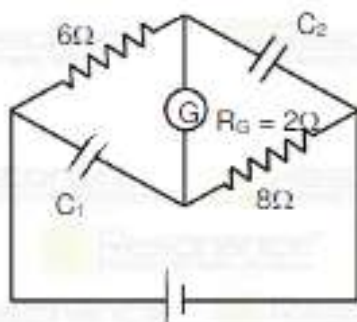
Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

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/resowatch     blog.resonance.ac.in



20.



Find ratio of potential difference across capacitor  $C_1$  and  $C_2$  for given circuit.

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

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

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

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

Ans. (1)

Sol.  $V_{C_1} = i(6 + 2) = 8i$

$V_{C_2} = i(2 + 8) = 10i$

So,  $\frac{V_{C_1}}{V_{C_2}} = \frac{8i}{10i} = \frac{8}{10} = \frac{4}{5}$

21. Magnetic intensity in long solenoid is  $4 \text{ A}\cdot\text{m}^{-2}$ , the number of turns per unit centimetre length is 8. Calculate current in solenoid :

(1) 2.5 mA

(2) 5.0 mA

(3) 7.5 mA

(4) 4.0 mA

Ans. (2)

Sol.  $B = \mu_0 nI$

$nI = B/\mu_0 = H$

$I = H/n = \frac{4}{8 \times 10^2} = 5.0 \text{ mA}$

22. A wire has a mass  $(0.3 \pm 0.003)\text{g}$ , radius  $(0.5 \pm 0.005)\text{ mm}$  and length  $(0.6 \pm 0.006)\text{cm}$ . The maximum percentage error in the measurement of density is :

(1) 1

(2) 2

(3) 3

(4) 4

Ans. (4)

Sol.  $\frac{\Delta \rho}{\rho} = \pm \left[ \frac{\Delta m}{m} + 2 \frac{\Delta r}{r} + \frac{\Delta l}{l} \right] \times 100$

$= \pm \left[ \frac{0.003}{0.3} + 2 \frac{0.005}{0.5} + \frac{0.006}{0.6} \right] \times 100 = \pm [1 + 2 + 1]\% = 4\%$

## 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 | [f](https://www.facebook.com/ResonanceEd) [i](https://www.instagram.com/ResonanceEd) [www.youtube.com/channel/UCR0Z0L0000000000000000](https://www.youtube.com/channel/UCR0Z0L0000000000000000) [info@resonance.ac.in](mailto:info@resonance.ac.in)

23. In L-C oscillator

$L = 1.4 \text{ mH}$  and  $C = 1.2 \mu\text{F}$  If maximum charge on capacitor is  $2.7 \mu\text{C}$  then find maximum current in circuit

- (1) 35 mA                      (2) 65 mA                      (3) 75 mA                      (4) 5mA

Ans. (2)

Sol.  $I_0 = \frac{Q}{\sqrt{LC}}$

$$= \frac{2.7}{\sqrt{1.4 \times 10^{-3} \times 1.2 \times 10^{-6}}} = \frac{2.7}{\sqrt{16.8 \times 10^{-10}}} = \frac{2.7 \times 10^5}{4.1} \mu\text{A}$$

$$\Rightarrow 0.658 \times 10^5 \times 10^{-6} \text{ A} = 65 \text{ mA}$$

24. Current passing in a conductor is 2 ampere. If free electron density is  $n = 2 \times 10^{28}$  per  $\text{m}^3$  and cross-sectional area is  $25 \text{ mm}^2$  then find drift velocity of electrons.

- (1)  $5 \times 10^{-6} \text{ m/s}$                       (2)  $15 \times 10^{-6} \text{ m/s}$                       (3)  $25 \times 10^{-6} \text{ m/s}$                       (4)  $50 \times 10^{-6} \text{ m/s}$

Sol.  $I = neAV_d$

$$V_d = \frac{I}{neA} = \frac{2}{2 \times 10^{28} \times 1.6 \times 10^{19} \times 25 \times 10^{-6}}$$

$$= 25 \times 10^{-6} \text{ m/s}$$

## 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](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)