

# **CAREERS 360**

## **TEST** **Series**

# **NEET UG 2025**

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# **Physics Mock Test**

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CAREERS360

# About

This Physics NEET Mock Test 2025 has been designed to help NEET aspirants assess their understanding of core physics concepts critical for the NEET exam. The mock test includes a range of questions, from theoretical to application-based problems, covering all key topics from mechanics to modern physics. Detailed solutions are provided to help students learn from their mistakes and improve their performance.

## The mock test aims to:

- Familiarize students with the NEET exam pattern.
- Improve time management skills.
- Identify strong and weak areas in physics.
- Build confidence through regular practice.

Here is a structured list of topics or sections covered in the **Physics NEET Mock Test**.

### Mechanics

- Motion and Forces
- Work, Energy, and Power
- Circular Motion
- Gravitation

### Thermodynamics

- Laws of Thermodynamics
- Heat Transfer
- Thermodynamic Processes

### Optics

- Reflection and Refraction
- Wave Optics
- Optical Instruments

### Electromagnetism

- Electrostatics
- Current Electricity
- Magnetic Effects of Current and Magnetism

### Modern Physics

- Photoelectric Effect
- Atomic Structure
- Nuclear Physics

### Waves and Oscillations

- Simple Harmonic Motion
- Wave Motion
- Doppler Effect

### Electronics

- Semiconductors
- Logic Gates
- Communication Systems

### Practice Questions

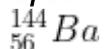
A collection of multiple-choice questions (MCQs) with detailed solutions.

# ***Mock Test***

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**Q. 1** When the uranium isotope  ${}_{92}^{235}\text{U}$  is bombarded with a neutron, it generates  ${}_{36}^{89}\text{Kr}$ , three neutrons and :

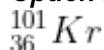
**Option 1:**



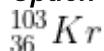
**Option 2:**



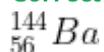
**Option 3:**



**Option 4:**



**Correct Answer:**



**Solution:**

Let the unknown element is  ${}_A\text{X}^Z$



The sum of the atomic number on L.H.S = 92

The sum of the atomic number on R.H.S = 92 = 36 + A

On comparing

$$A = 56$$

Similarly

The sum of the mass number on L.H.S = 235 + 1

The sum of the atomic number on R.H.S = 89 + 3 + Z

On comparing

$$235 + 1 = 89 + 3 + Z$$

$$\text{So, } Z = 144$$

So the known element is  ${}_{56}^{144}\text{Ba}$

Hence, the answer is the option (1).

**Q. 2** An electromagnetic wave of frequency  $\nu = 3\text{MHz}$  passes from a vacuum into a dielectric medium with permittivity  $\epsilon = 4$ . Then

**Option 1:**

wavelength and frequency both become half.

**Option 2:**

wavelength is doubled and frequency remains unchanged.

**Option 3:**

wavelength and frequency both remain unchanged.

**Option 4:**

wavelength is halved and frequency remains unchanged.

**Correct Answer:**

wavelength is halved and frequency remains unchanged.

**Solution:**

The frequency of electromagnetic waves remains unchanged but the wavelength of electromagnetic waves changes when it passes from one medium to another.

$$c = \frac{1}{\sqrt{\mu_0 \epsilon_0}}$$

$$\therefore c \propto \frac{1}{\sqrt{\epsilon_0}} \text{ and } v \propto \frac{1}{\sqrt{\epsilon}}$$

$$\therefore \frac{c}{v} = \sqrt{\frac{\epsilon}{\epsilon_0}} = \sqrt{\frac{4}{1}} = 2; \frac{c}{v} = \frac{v\lambda}{v\lambda'} = \frac{\lambda}{\lambda'} = 2 \text{ or } \lambda' = \frac{\lambda}{2}$$

Hence, the answer is the option (4).

**Q. 3** The dimensional formula of the angular displacement can be represented as:

**Option 1:**

$$[M^0 L^0 T^0]$$

**Option 2:**

$$[M^0 L^0 T^{-1}]$$

**Option 3:**

$$[M^0 L^0 T]$$

**Option 4:**

$$[[M^0 L^0 T^2]$$

**Correct Answer:**

$$[M^0 L^0 T^0]$$

**Solution:**

Angular displacement is defined as the change in the angular position of a rotating body about a fixed axis.

It is a dimensionless quantity, and therefore, its dimensional formula is  $[M^0 L^0 T^0]$ .

The SI unit of angular displacement is the radian (rad), which is also dimensionless.

Hence, the answer is the option (1).

**Q. 4** If  $\hat{i}$  and  $\hat{j}$  are unit vectors along mutually perpendicular directions then the magnitude of  $\hat{i} - \hat{j}$  is

**Option 1:**

0

**Option 2:** $\sqrt{2}$ **Option 3:**

1

**Option 4:**

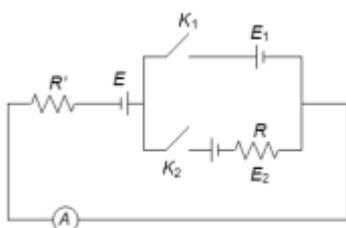
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**Correct Answer:** $\sqrt{2}$ **Solution:**

$$|\hat{i} - \hat{j}| = \sqrt{1^2 + (-1)^2} = \sqrt{2}$$

Hence, the answer is the Option (2).

**Q. 5** In the given arrangement, the reading of ammeter is same in each case when either  $K_1$  or  $K_2$  is closed. The reading of the ammeter is



**Option 1:**  

$$\frac{E_1 + E_2}{R}$$

**Option 2:**  

$$\frac{E_1 - E_2}{R}$$

**Option 3:**  
 Data given is not sufficient

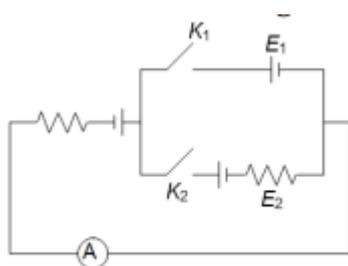
**Option 4:**  
 None of these

**Correct Answer:**  

$$\frac{E_1 - E_2}{R}$$

**Solution:**

$$I = \frac{E - E_1}{R'} = \frac{E - E_2}{R + R'}$$



$$\frac{E - E_2}{E - E_2} = \frac{R'}{R + R'}$$

$$\frac{E - E_2}{E - E_2} = \frac{R}{R'}$$

$$I = \frac{E_1 - E_2}{R}$$

**Q. 6** Which statement is true for heat energy?

**Option 1:**  
 It is a vector quantity

**Option 2:**  
 SI unit of heat is calorie

**Option 3:**  
 For a system, heat is always taken as positive

**Option 4:**

It's dimension is  $[M^1 L^2 T^{-2}]$

**Correct Answer:**

It's dimension is  $[M^1 L^2 T^{-2}]$

**Solution:**

As we learnt

Property of heat -

It is a scalar quantity. It is a form of energy. So its dimension is  $[ML^2T^{-2}]$

SI unit of heat is given as Joule which is equivalent to kilogram meter squared per second.

Hence, the correct answer is the option 4.

**Q. 7** The susceptance of a circuit is

**Option 1:**

$$\frac{1}{R}$$

**Option 2:**

$$\frac{1}{Z}$$

**Option 3:**

$$\frac{1}{X}$$

**Option 4:**

None

**Correct Answer:**

$$\frac{1}{X}$$

**Solution:**

Susceptance is a measure of how easy it is for alternating current to pass through a capacitance or an inductance. Susceptance is **the imaginary part of admittance, whose real part is conductance, which is the inverse of resistance**. So conductance, Susceptance, or Admittance, all have the same unit  $\text{ohm}^{-1}$

Susceptance (S) -The reciprocal of reactance.

$$S = \frac{1}{X}$$

Hence, the answer is the option (3).

**Q. 8** A transverse wave is represented by  $y = A \sin(\omega t - kx)$ . For what value of the wavelength is the wave velocity equal to the maximum particle velocity?

**Option 1:**

$$\pi A/2$$

**Option 2:**

$$\pi A$$

**Option 3:**

$$2\pi A$$

**Option 4:**

$$A$$

**Correct Answer:**

$$2\pi A$$

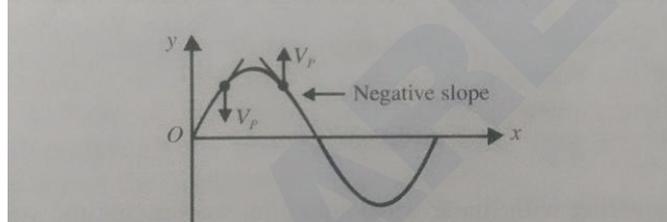
**Solution:**

As we discussed

Relation between phase velocity and wave speed -

$$V_P = -V \frac{dy}{dx}$$

*Particle velocity = - (wave velocity)  $\pm$  slope of wave curve*



- wherein

$V_P$  = particle velocity

$V$  = wave velocity

$\frac{dy}{dx}$  = slope of curve

$$Y = A \sin(\omega t - Kx)$$

$$\text{Particle velocity } V_p = dy / dt = Aw \cos(\omega t - kx)$$

$$\therefore V_{p \max} = AW$$

$$\text{wave velocity} = W / K$$

$$\therefore AW = W / K$$

$$\text{i.e } A = 1/K \text{ where } k = 2\pi/\lambda$$

$$\text{So, } \lambda = 2\pi A$$

- Q. 9** A terrestrial telescope is made by introducing an erecting lens of focal length  $f$  between the objective and eye piece lenses of an astronomical telescope. This causes the length of the telescope tube to increase by an amount equal to

**Option 1:**

$$f$$

**Option 2:**

$$2f$$

**Option 3:**

$$3f$$

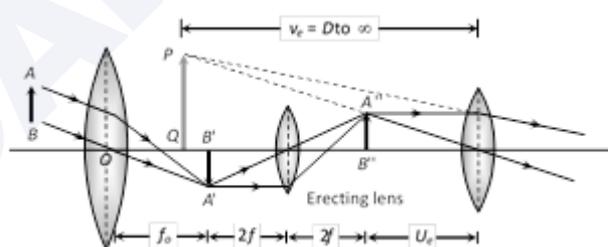
**Option 4:**

$$4f$$

**Correct Answer:**

$$4f$$

**Solution:**



$$L = f_o + f_e + 4f_e$$

Since the length of the astronomical telescope is  $L_{\text{astronomical}} = f_o + f_e$

So increase in the length is  $4f_e$

**Q. 10** A force of 100N is just sufficient to pull a block of mass  $10\sqrt{3}$  kg on rough horizontal surface. What is angle friction? ( $g=10\text{m/s}^2$ )

**Option 1:**

$30^\circ$

**Option 2:**

$45^\circ$

**Option 3:**

$60^\circ$

**Option 4:**

$50^\circ$

**Correct Answer:**

$30^\circ$

**Solution:**

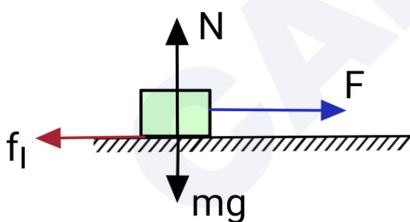
Given-

Applied force,  $F = 100\text{N}$

Mass of the block,  $m = 10\sqrt{3}\text{kg}$

As the Force  $F$  is just sufficient to pull the block, it must be equal to the limiting friction force.

F.B.D of the block-



$$N = mg$$

$$f_l = F$$

Angle of friction ( $\theta$ ) is defined as-

$$\tan\theta = \frac{f_l}{N}$$

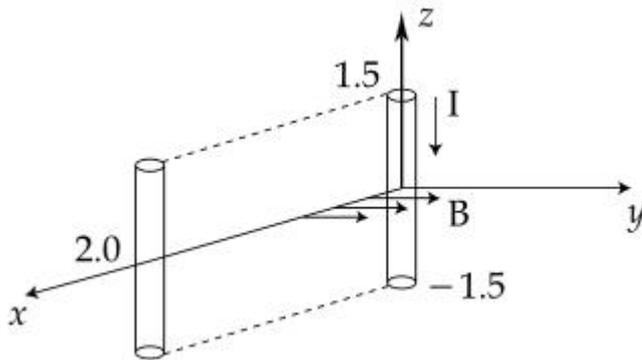
$$\theta = \tan^{-1} \frac{F}{N} = \frac{100}{10\sqrt{3}}$$

$$\Rightarrow \theta = 30^\circ$$

**Q. 11** A conductor lies along the Z-axis at  $-1.5 \leq z < 1.5 \text{ m}$  and carries a fixed current of 10.0 A in  $-\hat{a}_z$  direction (see figure).

for a field  $\vec{B} = 3.0 \times 10^{-4} e^{-0.2x} \hat{a}_y \text{ T}$ , Find the power required to move the conductor at constant speed to  $x=2.0 \text{ m}$ ,

$y = 0 \text{ m}$  in  $5 \times 10^{-3} \text{ s}$ . Assume parallel motion along the x-axis.



**Option 1:**

1.57 W

**Option 2:**

2.97 W

**Option 3:**

14.85 W

**Option 4:**

29.7 W

**Correct Answer:**

2.97 W

**Solution:**

As we discussed in @

$$w = \int_0^2 F \cdot dx = \int_0^2 3 \times 10^{-4} e^{-0.2x} \times 10 \times 3 dx$$

$$w = 9 \times 10^3 \int_0^2 e^{-0.2x} dx = \frac{9 \times 10^{-3}}{0.2} [e^{-0.2 \times 2} + 1]$$

$$\beta = 3.0 \times 10^{-4} e^{-0.2x} = \frac{9 \times 10^{-3}}{0.2} \times [1 - e^{-0.4}] = \frac{9 \times 10^{-3} \times (0.33)}{0.2} =$$

$$\frac{2.97 \times 10^{-3} \text{ J}}{0.2} \therefore P = \frac{w}{f} = \frac{2.97 \times 10^{-3}}{(0.2) \times 5 \times 10^{-3}} = 2.97 \text{ W}$$

**Q. 12** A thin prism having refracting angle  $10^\circ$  is made of glass of refractive index 1.42. This prism is combined with another thin prism of glass of refractive index 1.7. This combination produces dispersion without deviation. The refracting angle of second prism should be :

**Option 1:**

$4^\circ$

**Option 2:**

$6^\circ$

**Option 3:**

$8^\circ$

**Option 4:**

$10^\circ$

**Correct Answer:**

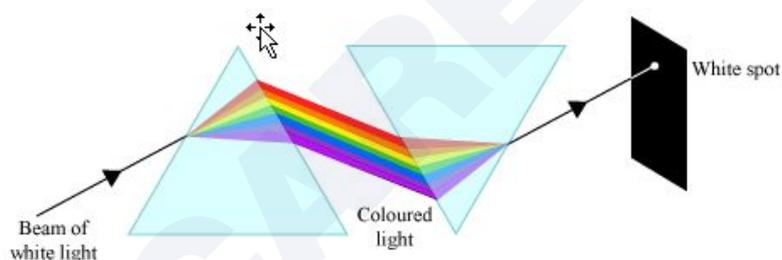
$6^\circ$

**Solution:**

As we learnt in

Condition for deviation without dispersion -

$$(\mu_v - \mu_r) A + (\mu'_v - \mu'_r) A' = 0$$



- wherein

$\mu_v$  = Refractive index of violet ( prism 1)

$\mu_r$  = Refractive index of red ( prism 1)

$\mu'_v$  = Refractive index of violet ( prism 2)

$\mu'_r$  = Refractive index of red ( prism 2)

For dispersion without deviation  $|\delta_1| = |\delta_2|$

$$(\mu_{1-1})A_1 = (\mu_2 - 1).A_2$$

$$\text{or } (1.42 - 1) \times 10 = (1.7 - 1)(A_2)$$

$$\text{or } A_2 = \frac{0.42 \times 10}{0.7} = 6^\circ$$

**Q. 13** The speed of a transverse wave on a straight wire (mass 9 g and length 80 cm) is 120 m/s. If Young's modulus of wire is  $18 \times 10^{12} \text{ N/m}^2$ , the extension of wire over its natural length

**Option 1:**

$$\Delta l = 18 \times 10^7 \text{ m}$$

**Option 2:**

$$\Delta l = 18 \times 10^8 \text{ m}$$

**Option 3:**

$$\Delta l = 20 \times 10^7 \text{ m}$$

**Option 4:**

$$\Delta l = 18 \times 10^5 \text{ m}$$

**Correct Answer:**

$$\Delta l = 18 \times 10^7 \text{ m}$$

**Solution:**

$$v = \sqrt{\frac{T}{\mu}}$$

$$\text{Since, } \frac{T}{A} = Y \frac{\Delta l}{l}$$

$$\text{So, } T = YA \frac{\Delta l}{l}$$

$$v^2 = \frac{1}{M} \times YA \frac{\Delta l}{l}$$

$$\Delta l = \frac{v^2 \mu l}{YA}$$

$$\mu = \frac{m}{l}$$

$$m = \mu l$$

$$\Delta l = \frac{120 \times 120^3 \times 9 \times 10^{-3}}{18 \times 10^{12} \times 4 \times 10^{-6}} \Delta l = 60 \times 30 \times 10^{-3} \times 10^6 \times 10^{-12} \Delta l = 18 \times 10^2 \times 10^{-3} \times 10^6 \times 10^{-12} \Delta l = 18 \times 10^7 \text{ m}$$

Hence, the answer is the option (1).

**Q. 14** Given below are two statements:

**Statement I :** Photovoltaic devices can convert optical radiation into electricity.

**Statement II :** Zener diode is designed to operate under reverse bias in breakdown region.  
In the light of the above statements, choose the most appropriate answer from the options given below :

**Option 1:**

Both **Statement I** and **Statement II** are correct .

**Option 2:**

Both **Statement I** and **Statement II** are incorrect.

**Option 3:**

**Statement I** is correct but **Statement II** is incorrect.

**Option 4:**

**Statement I** is incorrect but **Statement II** is correct.

**Correct Answer:**

Both **Statement I** and **Statement II** are correct .

**Solution:**

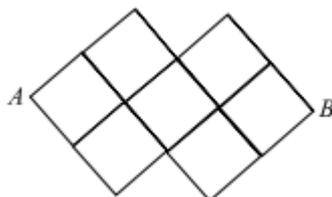
Both Statements I and Statement II are correct.

**(I)** Photo voltaic devices convert EMW into electricity

**(II)** Zener diode works as a voltage stabilizer in the reverse biased breakdown region.

Hence, the answer is the option (1).

**Q. 15** In the shown wire frame, each side of a square (the smallest square ) has a resistance . the equivalent resistance of the circuit between the points  $A$  and  $B$  is



**Option 1:**

R

**Option 2:**

2 R

**Option 3:**

4 R

**Option 4:**

8 R

**Correct Answer:**

2 R

**Solution:**

The circuit can be folded about

**Q. 16** The cylindrical tube of a spray pump has a radius R, one end of which has n fine holes, each of radius r. If the speed of flow of the liquid in the tube is V, the speed of ejection of the liquid through the holes is

**Option 1:**

$$\frac{V}{n} \left( \frac{R}{r} \right)^{1/2}$$

**Option 2:**

$$\frac{V}{n} \left( \frac{R}{r} \right)$$

**Option 3:**

$$\frac{V}{n} \left( \frac{R}{r} \right)^{3/2}$$

**Option 4:**

$$\frac{V}{n} \left( \frac{R}{r} \right)^2$$

**Correct Answer:**

$$\frac{V}{n} \left( \frac{R}{r} \right)^2$$

**Solution:**The cross-sectional area of the tube (A) =  $\pi R^2$ .Crosssectional area of each hole =  $\pi r^2$ .Therefore, the cross-sectional area of n holes (a) =  $n\pi r^2$ .

If v is the speed of ejection of the liquid through the holes, then from the continuity of flow, we have

or

$$av = AV$$

$$v = \frac{AV}{a} = \frac{\pi R^2 V}{\pi n r^2} = \frac{V}{n} \left( \frac{R}{r} \right)^2$$

Hence, the answer is the option (4).

**Q. 17** A certain number of spherical drops of a liquid of radius 'r' coalesce to form a single drop of radius 'R' and volume 'V'. If 'T' is the surface tension of the liquid, then:

**Option 1:**

$$\text{energy} = 4VT \left( \frac{1}{r} - \frac{1}{R} \right) \text{ is released}$$

**Option 2:**

$$\text{energy} = 3VT \left( \frac{1}{r} + \frac{1}{R} \right) \text{ is absorbed}$$

**Option 3:**

$$\text{energy} = 3VT \left( \frac{1}{r} - \frac{1}{R} \right) \text{ is released}$$

**Option 4:**

Energy is neither released nor absorbed.

**Correct Answer:**

$$\text{energy} = 3VT \left( \frac{1}{r} - \frac{1}{R} \right) \text{ is released}$$

**Solution:**

As discussed

Surface Energy -

It is defined as the amount of work done in increasing the area of the liquid against surface tension.

-

As surface area decreases so energy is released, energy released =  $4\pi R^2 T \left[ n^{\frac{1}{3}} - 1 \right]$

$$R = n^{\frac{1}{3}} r$$

$$= 4\pi R^3 T \left[ \frac{1}{r} - \frac{1}{R} \right] = 3v \left[ \frac{1}{r} - \frac{1}{R} \right]$$

**Q. 18** The equation of a wave on a string of linear mass density 0.04 kg/m is given by

$$y = 0.02 \sin W \left[ 2\pi \left( \frac{t}{0.04(s)} - \frac{x}{0.50(m)} \right) \right]$$

Then tension in the string is :

**Option 1:**

4.0 N

**Option 2:**

12.5 N

**Option 3:**

0.5 N

**Option 4:**

6.25 N

**Correct Answer:**

6.25 N

**Solution:**

$$\text{Tension, } T = \mu v^2$$

$$= \mu \frac{w^2}{k^2}$$

$$= 0.04 \frac{(2\pi/0.04)^2}{(2\pi/0.50)^2}$$

$$= 6.25N$$

Hence, the answer is the option (4).

**Q. 19** What is the depth at which the value of acceleration due to gravity becomes  $1/n$  times the value at the surface of the earth? (radius of earth =R)

**Option 1:**

$$R(n-1)/n$$

**Option 2:**

$$Rn/(n-1)$$

**Option 3:**

$$R/n$$

**Option 4:**

$$R/n^2$$

**Correct Answer:**

$$R(n-1)/n$$

**Solution:**

Acceleration due to gravity at depth  $d = g_d = g(1 - \frac{d}{R})$

$$g_d = g/n = g(1 - \frac{d}{R})$$

$$1/n = 1(1 - \frac{d}{R})$$

$$\frac{d}{R} = 1 - 1/n$$

$$d = R(n-1)/n$$

Hence, the answer is the option (1).

**Q. 20** An ideal gas is contained in a cubic container with sides of length 0.1 m. The gas is at a temperature of 400 K. Each gas molecule has a mass of  $2.5 \times 10^{-26}$  kg. Calculate the pressure exerted by the gas molecules on the walls of the container.

**Option 1:**

$$7.45 \times 10^{-19} \text{ Pa}$$

**Option 2:**

$$8.79 \times 10^7 \text{ Pa}$$

**Option 3:**

$$6.14 \times 10^{-17} \text{ Pa}$$

**Option 4:**

$$4.25 \times 10^{-26} \text{ Pa}$$

**Correct Answer:**

$$8.79 \times 10^7 \text{ Pa}$$

**Solution:**

Given data: Side length of the container ( $a$ ) = 0.1 m

Temperature ( $T$ ) = 400 K

Mass of each gas molecule ( $m$ ) =  $2.5 \times 10^{-26}$  kg

Boltzmann constant ( $k$ ) =  $1.38 \times 10^{-23}$  J/K

Step 1: Calculate the RMS speed of the gas molecules using the formula:

$$v_{\text{rms}} = \sqrt{\frac{3kT}{m}}$$

Substitute the given values and solve for  $v_{\text{rms}}$ :

$$v_{\text{rms}} = \sqrt{\frac{3 \times 1.38 \times 10^{-23} \times 400}{2.5 \times 10^{-26}}}$$

$$v_{\text{rms}} \approx 544.16 \text{ m/s}$$

Step 2: Calculate the density of gas molecules ( $\rho$ ) using the formula:

$$\rho = N/V$$

Substitute the given values and solve for  $\rho$ :

$$\rho = \frac{N}{V} = \frac{1.5 \times 10^{24}}{(0.1)^3}$$

$$\rho \approx 1.5 \times 10^{29} \text{ m}^{-3}$$

Step 3: Calculate the pressure ( $P$ ) exerted by the gas molecules on the walls of the container using the formula:

$$P = \frac{2}{3} \rho v_{\text{rms}}^2$$

Substitute the values of  $\rho$  and  $v_{\text{rms}}$  and solve for  $P$ :

$$P = \frac{2}{3} \times (1.5 \times 10^{29}) \times (544.16)^2$$

$$P \approx 8.79 \times 10^7 \text{ Pa}$$

**Hence, the answer is the option (2).**

- Q. 21** Two identical planets each of mass  $m$  are approaching towards each other due to their mutual gravitational field. If the speed of one planet relative to the other is  $v$ , the K.E. of the system is equal to

**Option 1:**  
 $(1/2)mv^2$

**Option 2:**  
 $mv^2$

**Option 3:**  
 $(1/4)mv^2$

**Option 4:**  
 None of these

**Correct Answer:**

$$(1/4)mv^2$$

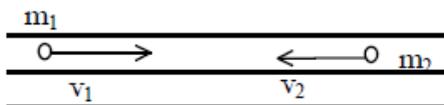
**Solution:**

The K.E. of the system of two mass system moving under their mutual interaction can be given as

$$KE = (1/2)\mu v_{res}^2$$

$$\text{where } \mu = \frac{m_1 m_2}{m_1 + m_2} \& V_{\text{velocity}} = (v_1 + v_2)$$

$$\Rightarrow \mu = \frac{mm}{m+m} = \left(\frac{m}{2}\right) v^2 = \frac{mv^2}{4}$$



Hence option 3 is correct.

**Q. 22** Which of the following is correct?

**Option 1:**

$$\vec{A} + (\vec{B} + \vec{C}) = (\vec{A} + \vec{B}) + \vec{C}$$

**Option 2:**

$$\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$$

**Option 3:**

$$\vec{A} \times (\vec{B} \times \vec{C}) = \vec{B} \times (\vec{A} \times \vec{C})$$

**Option 4:**

None of the above

**Correct Answer:**

$$\vec{A} + (\vec{B} + \vec{C}) = (\vec{A} + \vec{B}) + \vec{C}$$

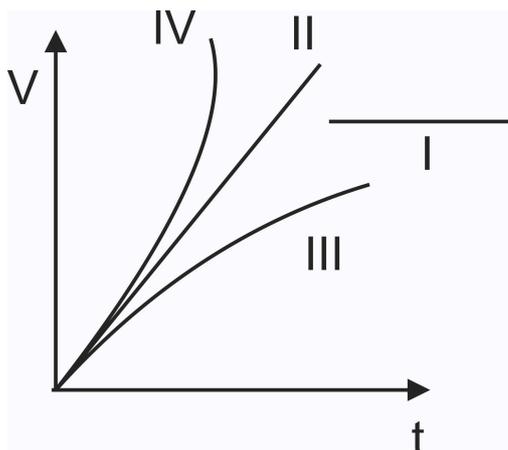
**Solution:**

From the commutative law of vector addition, we know that it does not matter in which order vectors are added.

So if vector A comes first or vector B comes first or vectors in bracket are added in whichever order, the sum of vectors will remain the same.

Hence, the answer is the option 1.

- Q. 23** Four velocity time graph (Namely I , II , III , IV ) are shown in figure. In which case is the accereration uniform and positive



**Option 1:**

I

**Option 2:**

II

**Option 3:**

III

**Option 4:**

IV

**Correct Answer:**

II

**Solution:**

$$a = \frac{dv}{dt} = \text{slope in the V - t graph.}$$

As it is clear II has a uniform and positive slope so it indicates uniform and positive acceleration.

- Q. 24** The difference in the variation of resistance with temperature in a metal and a semiconductor arises essentially due to the difference in the

**Option 1:**

crystal structure

**Option 2:**

variation of the number of charge carriers with temperature

**Option 3:**

type of bonding

**Option 4:**

variation of scattering mechanism with temperature .

**Correct Answer:**

variation of the number of charge carriers with temperature

**Solution:**

As we learnt in

Number of electrons or holes -

$$n_e = n_h = AT^{3/2} e^{-E_g/2KT}$$

- wherein

$E_g$  = Energy gap

K = Boltzmann Constant

T = Temperature in kelvin

On increasing temperature, the number of current carriers increases

**For Conductor**

As we increase the temperature, the frequency of collision increases and hence resistance also increases.

**For Semiconductor**

As we increase the temperature, the frequency of collision increases but the number of free electrons also increases. The dominant factor is the number of free electrons and hence specific resistance of the semiconductor decreases with increasing temperature.

Hence, the answer is the option (2).

**Q. 25** A tank is filled with water up to a height of H. A small hole is made at a depth of h from the free surface of water. The time taken by water to reach the ground is proportional to :

**Option 1:**

$$\sqrt{H}$$

**Option 2:**

$$\sqrt{h}$$

**Option 3:**

$$\sqrt{H - h}$$

**Option 4:**

$$\sqrt{H + h}$$

**Correct Answer:**

$$\sqrt{H - h}$$

**Solution:**

Time to reach the Ground -

$$T = \sqrt{\frac{2(H - h)}{g}}$$

- wherein

→ H - the height of the vessel

→ h - depth below the free surface.

$$T = \frac{\sqrt{2(H - h)}}{g}$$

$$T \propto \sqrt{(H - h)}$$

Hence, the answer is the option (3).

**Q. 26** Which of the following places will have the least variation in the value of "g" due to the shape of the Earth?

**Option 1:**

Equator

**Option 2:**

Tropic of Cancer

**Option 3:**

North Pole

**Option 4:**

None of the above

**Correct Answer:**

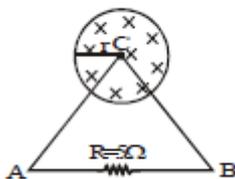
North Pole

**Solution:**

At the poles, the shape of the Earth has the least effect on the value of 'g'. This is because the centrifugal force due to the Earth's rotation is zero at the poles and therefore the effect of the non-spherical shape of the Earth is the least.

Hence, the answer is the option (3).

- Q. 27** A uniform magnetic field of intensity  $B = B_0 \sin(\omega t)$  directed into the plane of the paper exists in the cylindrical region of radius  $r$ . A loop of resistance  $R = 5\Omega$  is folded in the form of an equilateral triangle of side length  $2r$  is placed as shown in the figure. The maximum potential drop in the wire AB is



**Option 1:**

$$\frac{\pi r^2 B_0 \omega}{6} \text{ volt}$$

**Option 2:**

$$\frac{\pi r^2 B_0 \omega}{3} \text{ volt}$$

**Option 3:**

$$\frac{\pi r^2 B_0 \omega}{2} \text{ volt}$$

**Option 4:**

$$\pi r^2 B_0 \omega$$

**Correct Answer:**

$$\frac{\pi r^2 B_0 \omega}{6} \text{ volt}$$

**Solution:**

Potential drop is only across wire AB

$$\phi = B_0 \sin(\omega t) \cdot \left( \frac{\pi r^2}{6} \right)$$

$$\varepsilon = \left| \frac{-d\phi}{dt} \right| = \frac{B_0 \omega \pi r^2}{6}$$

**Q. 28** If the temperature in a region is given as  $T = 2+3x$  then the temperature gradient is given as

**Option 1:**

2 C/m

**Option 2:**

3 C/m

**Option 3:**

4 C/m

**Option 4:**

1 C/m

**Correct Answer:**

3 C/m

**Solution:**

Temperature Gradient -

$$-\frac{\Delta\theta}{\Delta x}$$

- wherein

A negative sign shows that temperature decreases with position x.

$$\frac{dT}{dx} = 3^\circ\text{C/m}$$

Hence, the answer is the option (2).

**Q. 29** What is the potential energy of the two equal positive point charges of  $1\mu\text{C}$  each held 1 m apart in air

**Your Answer:**

Not Answered

**Option 1:**

$9 \times 10^{-3} \text{ J}$

**Option 2:**

$$9 \times 10^{-3} eV$$

**Option 3:**

$$2eV/m$$

**Option 4:**

Zero

**Correct Answer:**

$$9 \times 10^{-3} J$$

**Solution:**

As we have learned,

Electric Potential energy -

Work is done in bringing the given charge from infinity to a point in the electric field.

- wherein

It is denoted by U.

By using

$$U = 9 \times 10^9 \frac{Q_1 Q_2}{r}$$

$$\Rightarrow U = 9 \times 10^9 \times \frac{10^{-6} \times 10^{-6}}{1} = 9 \times 10^{-3} J$$

Hence, the answer is the option (1).

**Q. 30** A solenoid with 7 turns per unit length is carrying a current of 2.5A. What is the magnetic intensity inside the solenoid?

**Option 1:**

1750A/m

**Option 2:**

1850A/m

**Option 3:**

2001A/m

**Option 4:**

1950A/m

**Correct Answer:**

1750A/m

**Solution:**

Turns per unit length,  $n = 7 \text{ cm}^{-1} = 700 \text{ m}^{-1}$

If  $\mu$  be the permeability of the medium inside the solenoid then, magnetic field,  $B = \mu nI$

$\therefore$  Magnetic intensity,

$$H = \frac{B}{\mu} = nI = 700 \times 2.5 = 1750 \text{ Am}^{-1}$$

Hence, the answer is the option (1).

**Q. 31** The orbital speed of an electron in the ground state of a hydrogen atom is  $v$ . What will be its orbital speed when it is excited to the energy state  $-1.51 \text{ eV}$  ?

**Option 1:**

$$\frac{v}{4}$$

**Option 2:**

$$2v$$

**Option 3:**

$$\frac{v}{2}$$

**Option 4:**

$$\frac{v}{3}$$

**Correct Answer:**

$$\frac{v}{3}$$

**Solution:**

Use,  $n^2 = \frac{-13.6}{-n}$

Given,  $E_n = -1.51$  then

$$n^2 = \frac{-13.6}{-1.51} = 9$$

$$n = 3$$

Now,

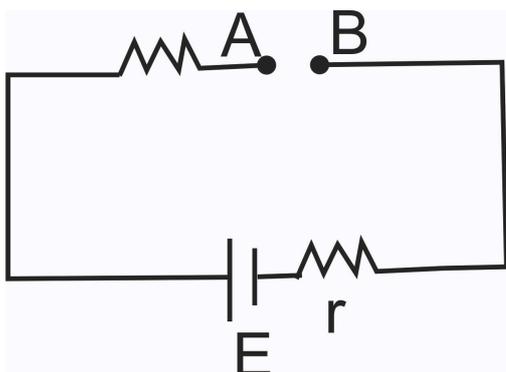
$$v \propto \frac{1}{n}$$

$$\frac{v_3}{v_1} = \frac{1}{3} \Rightarrow v_3 = \frac{v_1}{3}$$

$$v_3 = \frac{v_0}{3}$$

Hence, the answer is the option (4).

**Q. 32** Potential difference between point A and B in the given circuit is



**Option 1:**  
 $V_{AB} = E$

**Option 2:**  
 $V_{AB} = 0$

**Option 3:**  
 $V_{AB} > E$

**Option 4:**  
 $V_{AB} < E$

**Correct Answer:**  
 $V_{AB} = E$

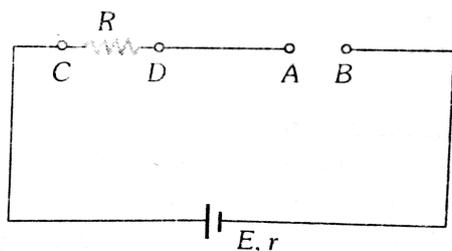
**Solution:**

As we learnt

Potential difference between A and B -

$$V_{AB} = E$$

- wherein



$$I=0$$

P.D. across resistor is zero.

$$V_{AB} = E$$

**Q. 33** Match the corresponding entries of column 1 with column 2 [where m is the magnification produced by the mirror]

Column 1	Column 2
(A) $m = -2$	(a) Convex mirror
(B) $m = -\frac{1}{2}$	(b) Concave mirror
(C) $m = +2$	(c) Real image
(D) $m = +\frac{1}{2}$	(d) Virtual image

**Option 1:**

A → b and c; B → b and c; C → b and d; D → a and d

**Option 2:**

A → a and c; B → a and d; C → a and b; D → c and d

**Option 3:**

A → a and d; B → b and c; C → b and d; D → b and c

**Option 4:**

A → c and d; B → b and d; C → b and c; D → a and d

**Correct Answer:**

A → b and c; B → b and c; C → b and d; D → a and d

**Solution:**

A → b and C

B → b and C

C → b and d

D → a and d

Magnification in the mirror,  $m = -v/u$

$m = -2 \Rightarrow v = 2u$  As v and u have the same signs the mirror is concave and the image formed is real.

$m = -1/2 \Rightarrow v = u/2 \Rightarrow$  concave mirror and real image.

$$m = +2 \Rightarrow v = -2u$$

As  $v$  and  $u$  have different signs but magnification is 2 the mirror is concave and the image formed is virtual.

$$m = +1/2 \Rightarrow v = -u/2$$

As  $v$  and  $u$  have different signs with magnification (1/2) the mirror is convex and the image formed is virtual.

Hence, the answer is the option (1).

**Q. 34** A particle of mass 100 g is thrown vertically upwards with a speed of 5 m/s. The work (in Joule) done by the force of gravity during the time the particle goes up is :

**Your Answer:**

Not Answered

**Option 1:**

0.5

**Option 2:**

-0.5

**Option 3:**

-1.25

**Option 4:**

1.25

**Correct Answer:**

-1.25

**Solution:**

Net work done by all the forces give the change in kinetic energy -

$$W = \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2$$

$$W = k_f - k_i$$

- wherein

$m =$  mass of the body

$v_0 =$  initial velocity

$v =$  final velocity

Work done by force of gravity is a change in kinetic energy while moving up.

$$\therefore W_g = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$$

$$W_g = 0 - \frac{1}{2} \times (0.1\text{kg})(25)$$

$$W_g = -1.25\text{J}$$

Hence, the answer is option(3).

**Q. 35** A metal wire of resistance  $3\ \Omega$  is elongated to make a uniform wire of double its previous length . This new wire is now bent and the ends joined to make a circle . If two points on this circle make an angle  $60^\circ$  at the centre , the equivalent resistance between these two points will be :

**Option 1:**  
 $\frac{12}{5}\ \Omega$

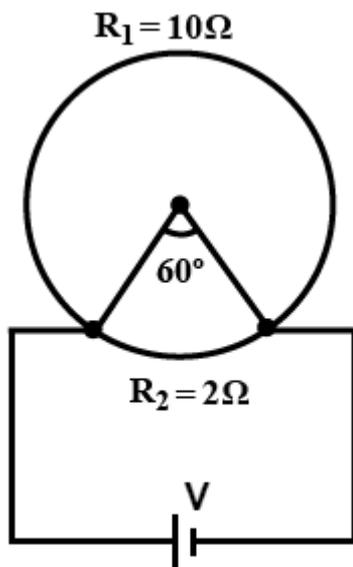
**Option 2:**  
 $\frac{5}{12}\ \Omega$

**Option 3:**  
 $\frac{5}{3}\ \Omega$

**Option 4:**  
 $\frac{7}{2}\ \Omega$

**Correct Answer:**  
 $\frac{5}{3}\ \Omega$

**Solution:**



$$R_{initial} = 3\Omega$$

After elongation

Vol of wire initial = vol of wire final

$$\Rightarrow \pi r_i^2 l_i = \pi r_f^2 2l_i$$

$$\Rightarrow r_f^2 = \frac{r_i^2}{2}$$

$$R_i = \rho \frac{l}{A} = \rho \frac{l_i}{\pi r_i^2}$$

$$R_{final}(\text{after elongation}) = \rho \frac{2l_i}{\pi \frac{r_i^2}{2}} = 4R_i = 12\Omega$$

$$R_1 = \frac{\left(\frac{5\pi}{3}\right)}{2\pi} \times 12 = 10\Omega$$

$$R_2 = \frac{\left(\frac{\pi}{3}\right)}{2\pi} \times 12 = 2\Omega$$

$$R_{eq} = \frac{R_1 R_2}{R_1 + R_2} = \frac{5}{3}\Omega$$

- Q. 36** A particle A is moving along north with a speed 3 m/s and another particle B is moving with a velocity 4 m/s at  $60^\circ$  with north, then the velocity of B as seen by A is

**Your Answer:**

Not Answered

**Option 1:**

5 m/s

**Option 2:**

3.5 m/s

**Option 3:** $\sqrt{13}m/s$ **Option 4:** $\sqrt{15}m/s$ **Correct Answer:** $\sqrt{13}m/s$ **Solution:**Relative velocity of a body, A with respected body B when the to bodies moving at an angle  $\Theta$  is:

$$V_{AB} = \sqrt{V_A^2 + V_B^2 + 2V_A V_B \cos(180 - \theta)}$$

$$= \sqrt{V_A^2 + V_B^2 - 2V_A V_B \cos(\theta)}$$

$$|\vec{V}_{AB}| = \sqrt{V_A^2 + V_B^2 - 2V_A V_B \cdot \cos \theta} = \sqrt{3^2 + 4^2 - 2 \times 3 \times 4 \times \frac{1}{2}} = \sqrt{13} \text{ m/s}$$

Hence, the answer is option (3).

**Q. 37** The wave front of a light beam is given by the equation  $x + 2y + 3z = \text{constant}$ . The angle made by the direction of light with the y-axis is :

**Option 1:**

$$\cos^{-1} \left( \frac{1}{\sqrt{14}} \right)$$

**Option 2:**

$$\sin^{-1} \left( \frac{2}{\sqrt{14}} \right)$$

**Option 3:**

$$\cos^{-1} \left( \frac{2}{\sqrt{14}} \right)$$

**Option 4:**

$$\sin^{-1} \left( \frac{3}{\sqrt{14}} \right)$$

**Correct Answer:**

$$\cos^{-1}\left(\frac{2}{\sqrt{14}}\right)$$

**Solution:**

Here direction of light is given by vector

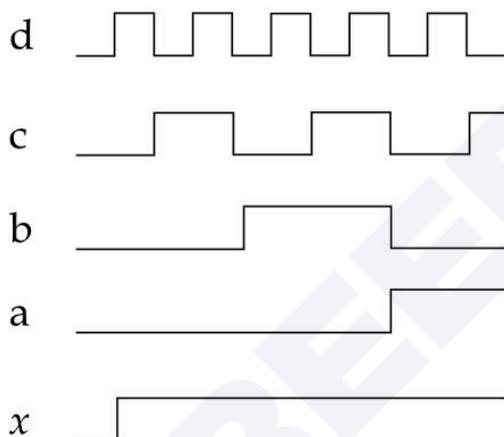
$$\vec{\eta} = i + 2j + 3k$$

Hence angle made by  $\vec{\eta}$  with y-axis is

$$\cos \theta = \left(\frac{2}{\sqrt{14}}\right) \Rightarrow \theta = \cos^{-1}\left(\frac{2}{\sqrt{14}}\right)$$

Hence, the answer is the option (3).

**Q. 38** If a, b, c, d are inputs to a gate and x is its output, then, as per the following time graph, the gate is :



**Option 1:**

NOT

**Option 2:**

AND

**Option 3:**

OR

**Option 4:**

NAND

**Correct Answer:**

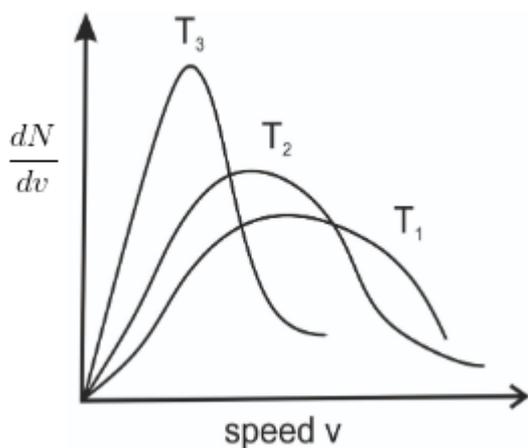
OR

**Solution:**

The output of OR gate is 0 when all inputs are 0 and output is 1 when at least one of the input is 1.

Observing output  $x$  it is 0 when all inputs are 0 and it is 1 when at least one of the inputs is 1 therefore, the gate is OR

**Q. 39** Graph of Maxwell's distribution describe that



- (i)  $T_3 > T_2 > T_1$
- (ii)  $T_3 < T_2 < T_1$
- (iii) Area under distribution curve remain same

**Option 1:**

(i) and (ii)

**Option 2:**

(ii) and (iii)

**Option 3:**

Only (i)

**Option 4:**

Only (iii)

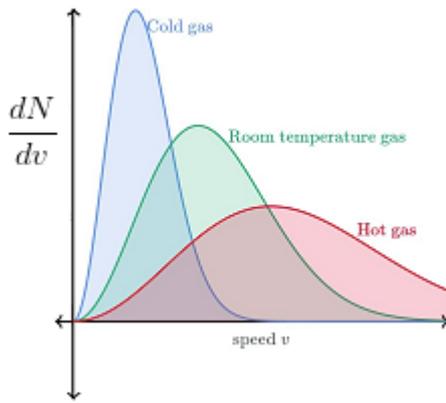
**Correct Answer:**

(ii) and (iii)

**Solution:**

As we learn

Graph of maxwell's distribution -



\* With the increase of temperature most probable speed increases.

\* The area under distribution curve remain the same because the total number of molecules in a given sample of the gas do not change.

**Q. 40** A potential barrier of  $0.50 \text{ V}$  exists across a P – N junction. If the depletion region is  $5.0 \times 10^{-7} \text{ m}$  wide, the intensity of the electric field in this region is

**Option 1:**

$$1.0 \times 10^6 \text{ V/m}$$

**Option 2:**

$$1.0 \times 10^5 \text{ V/m}$$

**Option 3:**

$$2.0 \times 10^5 \text{ V/m}$$

**Option 4:**

$$2.0 \times 10^6 \text{ V/m}$$

**Correct Answer:**

$$1.0 \times 10^6 \text{ V/m}$$

**Solution:**

The formula  $(E = \frac{V}{d})$  represents the electric field ( $E$ ) across a p-n junction, where ( $V$ ) is the applied voltage and  $d$  is the width of the depletion region.

$$E = \frac{V}{d} = \frac{0.5}{5 \times 10^{-7}} = 10^6 \text{ V/m}$$

Hence, the answer is the option (1).

**Q. 41** If velocity of liquid is  $v$  and its critical velocity is  $V_c$  then which of the following represent condition for turbulent flow?

**Option 1:**

$$V = V_c$$

**Option 2:**

$$V > V_c$$

**Option 3:**

$$V < V_c$$

**Option 4:**

None of the above

**Correct Answer:**

$$V > V_c$$

**Solution:**

Turbulent Flow -

When a liquid moves with a velocity greater than its critical velocity

The motion of the particles of liquid becomes irregular and disordered

For velocity greater than critical velocity the flow becomes turbulent.

Hence, the answer is the option (2).

**Q. 42** A series R-C circuit is connected to an alternating voltage source. Consider two situations:

- When capacitor is air filled.
- When capacitor is mica filled.

Current through resistor is  $i$  and voltage across capacitor is  $V$  then :

**Option 1:**

$$V_a > V_b$$

**Option 2:**

$$i_a > i_b$$

**Option 3:**

$$V_a = V_b$$

**Option 4:**

$$V_a < V_b$$

**Correct Answer:**

$$V_a > V_b$$

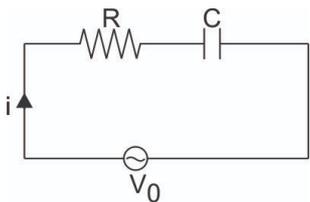
**Solution:**

As we learnt in

Impedence -

$$Z = \sqrt{X_C^2 + R^2} = \sqrt{R^2 + \left(\frac{1}{\omega c}\right)^2}$$

-

Current through resistor  $i$  = current in the circuit

$$\frac{V_o}{\sqrt{R^2 + X_c^2}} = \frac{V_o}{\sqrt{R^2 + \left(\frac{1}{\omega c}\right)^2}}$$

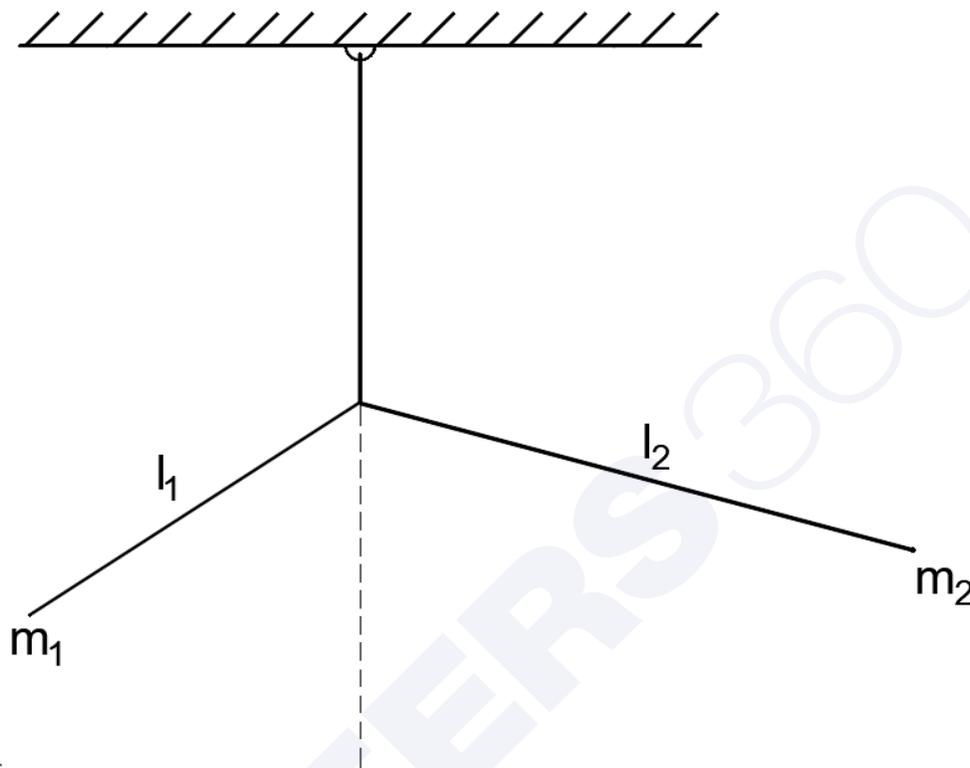
Voltage across capacitor  $V = iX_c$ 

$$= \frac{V_o}{\sqrt{R^2 + \left(\frac{1}{\omega c}\right)^2}} \times \frac{1}{\omega c} = \frac{V_o}{\sqrt{R^2 \omega^2 c^2 + 1}}$$

As,  $C_a < C_b$  $\therefore i_a < i_b$  and  $V_a > V_b$

**Q. 43** Two balls of mass  $m_1 = 1.0 \text{ kg}$  and  $m_2 = 0.5 \text{ kg}$  are suspended on two strings of length  $l_1 = 10 \text{ cm}$  and  $l_2 = 20 \text{ cm}$  at the end of a freely hanging rod.

The rod is rotating with an angular velocity of  $15 \text{ rad/s}$  about the vertical axle such that it remains in the vertical position. If the tension in the strings are  $T_1$  and  $T_2$  respectively, then find the sum of  $T_1$  and  $T_2$ .



**Option 1:**  
22.5 N

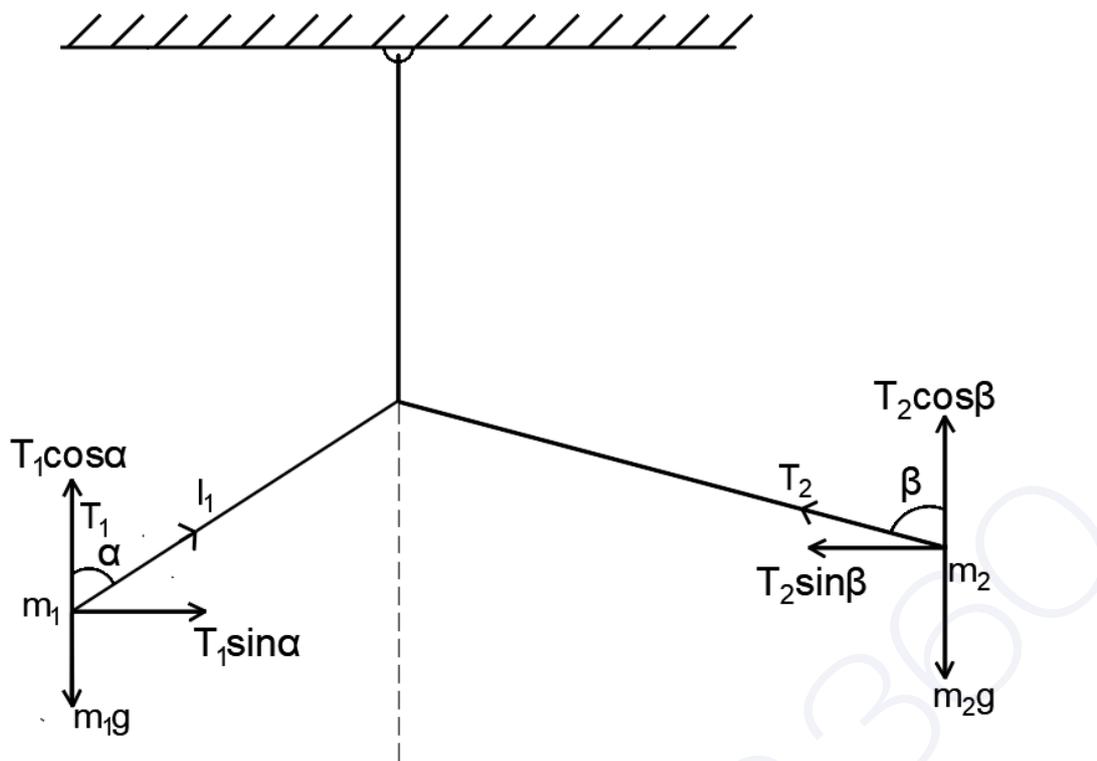
**Option 2:**  
45.0 N

**Option 3:**  
3.0 N

**Option 4:**  
1.5 N

**Correct Answer:**  
45.0 N

**Solution:**



As there is no vertical motion involved,

$$T_1 \cos \alpha = m_1 g$$

$$T_2 \cos \beta = m_2 g$$

$$T_1 \sin \alpha = m_1 \omega^2 l_1 \sin \alpha$$

$$T_1 = m_1 \omega^2 l_1$$

$$T_2 \sin \beta = m_2 \omega^2 l_2 \sin \beta$$

$$T_2 = m_2 \omega^2 l_2$$

$$T_1 + T_2 = \omega^2 (m_1 l_1 + m_2 l_2)$$

$$= (15)^2 [1.0 \times 0.1 + 0.5 \times 0.2]$$

$$= (22.5)(0.1 + 0.1)$$

$$= 225 \times 0.2$$

$$= 45 \text{ N}$$

**Q. 44** The lines joining the zero Angle of declination are :

**Option 1:**

Agonic lines

**Option 2:**

Aclinic lines

**Option 3:**

ISO clinic lines

**Option 4:**

Isogonic lines

**Correct Answer:**

Agonic lines

**Solution:**

Agonic lines -

A line which passes through places having zero declination such lines are agonic lines

Hence, the answer is the option (1).

**Q. 45** The  $k_{\alpha}$  x-Ray emission line of tungsten occurs at  $\lambda = 0.021 \text{ nm}$ . The energy difference between k and L levels in these atoms is about -

**Option 1:**

0.51 MeV

**Option 2:**

59 keV

**Option 3:**

1.2 MeV

**Option 4:**

13.6 eV

**Correct Answer:**

59 keV

**Solution:**

Given,  $\lambda_{k\alpha} = 0.021 \text{ nm} = 0.21 \text{ \AA}$

since,  $\lambda_{k\alpha}$  corresponds to the transition of an electron from L-shell to K-shell therefore,

$$E_L - E_K = \left( \text{inc} \right) = \frac{12375}{\lambda(\text{in \AA})} = \frac{12375}{0.21}$$

$$E_L - E_K = 58928 \text{ eV}$$

$$\Delta E = 59 \text{ keV}$$

Hence, the answer is the option (2).

# Other Useful Resources

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- Careers360 (for test series, study materials, and expert guidance)

By utilising this mock test and the resources mentioned above, students will be able to refine their preparation, work on their weak points, and excel in the NEET physics section.