CUET 2026 May 15 Shift 1 Physics

Question Paper (Memory-Based) with Solutions

Conducted by National Testing Agency (NTA)

General Instructions

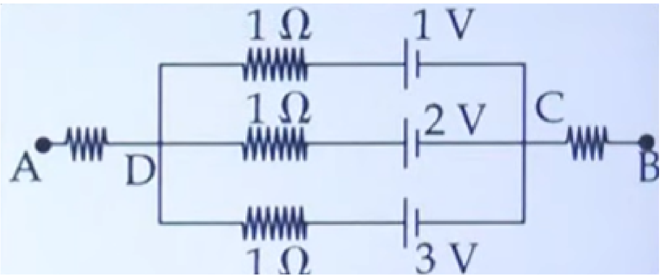
(i) The examination will be conducted in Computer-Based Test (CBT) mode.

(ii) Each question carries +5 marks for correct answer and -1 mark for wrong answer.

(iii) The total number of questions are 50.

(iv) Duration of the exam is 1 hour (60 minutes).

1. In the circuit shown below, the potential difference between A and B is:



(A) 6 V

(B) 3 V

(C) 2 V

(D) 1 V

Correct Answer: (C) 2 V

Solution:

Step 1: Observe the arrangement of cells and resistors.

The three branches between points D and C are connected in parallel.

Each branch contains:

$$1\Omega \text{ resistor}$$

and cells of emf:

$$1V,\ 2V,\ 3V$$

Step 2: Find the equivalent emf between D and C.

Since all resistances are equal, the equivalent emf is the average of the emfs:

$$E_{\text{eq}} = \frac{1+2+3}{3}$$

$$E_{\text{eq}} = \frac{6}{3}$$

$$E_{\text{eq}} = 2V$$

Step 3: Determine the potential difference between A and B.

The outer resistors carry no current because the circuit is balanced.
Hence, there is no voltage drop across them.
Therefore:

$$V_{AB} = V_{DC}$$

Thus:

$$V_{AB} = 2V$$

Step 4: Identify the correct option.

Hence, the correct answer is:

$$\boxed{2V}$$

Therefore:

$$\boxed{\text{(C)}}$$

Quick Tip: For parallel cells with equal internal resistances:

$$E_{\text{eq}} = \frac{E_1 + E_2 + E_3 + \cdots}{n}$$

2. The frequency of revolution of the electron in Bohr's orbit varies with n, the principal quantum number as

(A) $\frac{1}{n}$

(B) $\frac{1}{n^3}$

(C) $\frac{1}{n^4}$

(D) $\frac{1}{n^2}$

Correct Answer: (B) $\frac{1}{n^3}$

Solution:

Step 1: Write the expression for frequency of revolution.

$$f = \frac{v_n}{2\pi r_n}$$

where:

$$v_n = \text{velocity in } n^{th} \text{ orbit}$$

and

$$r_n = \text{radius of } n^{th} \text{ orbit}$$

Step 2: Use Bohr model relations.

For Bohr orbits:

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

and

$$r_n \propto n^2$$

Step 3: Substitute into frequency formula.

$$f \propto \frac{\frac{1}{n}}{n^2}$$

$$f \propto \frac{1}{n^3}$$

Step 4: Identify the correct option.

Therefore:

$$\boxed{f \propto \frac{1}{n^3}}$$

Hence, the correct answer is:

$$\boxed{(2)}$$

Quick Tip:

$$r_n \propto n^2$$

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

$$f_n \propto \frac{1}{n^3}$$

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3. Which of the following phenomena cannot be explained by wave theory of light?

(A) Reflection of light

(B) Diffraction of light

(C) Refraction of light

(D) Compton effect

Correct Answer: (D) Compton effect

Solution:

Step 1: Understand wave theory of light.

Wave theory successfully explains:

- Reflection
- Refraction
- Diffraction
- Interference

because these are wave phenomena.

Step 2: Analyze the given options.

Reflection of light

Can be explained using wave theory.

$$\Rightarrow \text{Explained}$$

Diffraction of light

A pure wave phenomenon.

$$\Rightarrow \text{Explained}$$

Refraction of light

Explained by wave propagation in different media.

$$\Rightarrow \text{Explained}$$

Compton effect

Compton effect involves collision between photons and electrons and supports particle nature of light.

Wave theory fails to explain it.

$$\Rightarrow \text{Not Explained}$$

Step 3: Identify the correct option.

Therefore, the phenomenon that cannot be explained by wave theory is:

$$\boxed{\text{Compton Effect}}$$

Hence, the correct answer is:

$$\boxed{\text{(D)}}$$

Quick Tip: Wave theory explains:

$$\text{Reflection, Refraction, Diffraction}$$

Particle theory explains:

$$\text{Photoelectric Effect, Compton Effect}$$

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4. A parallel plate capacitor with air between the plates has a capacitance of $6pF$. What will be the capacitance if the distance between the plates is reduced to half and the space between them is filled with a substance of dielectric constant 5?

(A) $30pF$

(B) $60pF$

(C) $15pF$

(D) $120pF$

Correct Answer: (B) $60pF$

Solution:

Step 1: Write the capacitance formula.

For a parallel plate capacitor:

$$C = \frac{\varepsilon_0 A}{d}$$

When dielectric is introduced:

$$C' = K\frac{\varepsilon_0 A}{d'}$$

where:

$$K = 5$$

Step 2: Identify the changes given.

Initial capacitance:

$$C = 6pF$$

Distance is reduced to half:

$$d' = \frac{d}{2}$$

Dielectric constant:

$$K = 5$$

Step 3: Calculate new capacitance.

Since capacitance is inversely proportional to distance:

$$\frac{1}{d'} = \frac{1}{d/2} = \frac{2}{d}$$

Thus:

$$C' = K \times 2C$$

$$C' = 5 \times 2 \times 6$$

$$C' = 60pF$$

Step 4: Identify the correct option.

Therefore:

$$\boxed{60pF}$$

Hence, the correct answer is:

$$\boxed{\text{(B)}}$$

Quick Tip: For a capacitor:

$$C \propto \frac{K}{d}$$

Reducing distance increases capacitance.

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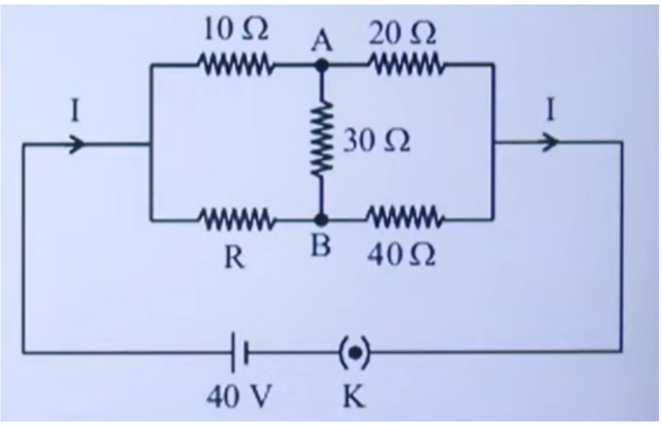
5. The value of current I in the electrical circuit as given below, when potential at A is equal to the potential at B, will be _____ A.



(A) $2A$

(B) $3A$

(C) $4A$

(D) $5A$

Correct Answer: (A) $2A$

Solution:

Step 1: Use the condition $V_A = V_B$.

Since:

$$V_A = V_B$$

no current flows through the 30Ω resistor.

Hence, the bridge is balanced.

Step 2: Apply Wheatstone bridge condition.

For balanced bridge:

$$\frac{10}{20} = \frac{R}{40}$$

$$\frac{1}{2} = \frac{R}{40}$$

$$R = 20\Omega$$

Step 3: Find equivalent resistance.

Upper branch resistance:

$$10 + 20 = 30\Omega$$

Lower branch resistance:

$$20 + 40 = 60\Omega$$

These two branches are in parallel.

So:

$$R_{eq} = \frac{30 \times 60}{30 + 60}$$

$$R_{eq} = \frac{1800}{90}$$

$$R_{eq} = 20\Omega$$

Step 4: Apply Ohm's Law.

Given battery voltage:

$$V = 40V$$

Current:

$$I = \frac{V}{R_{eq}}$$

$$I = \frac{40}{20}$$

$$I = 2A$$

Step 5: Identify the correct option.

Therefore:

$$\boxed{I = 2A}$$

Hence, the correct answer is:

$$\boxed{\text{(A)}}$$

Quick Tip: For a balanced Wheatstone bridge:

$$\frac{P}{Q} = \frac{R}{S}$$

No current flows through the middle branch.

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6. In a hydrogen atom an electron makes a transition from $n_1 \rightarrow n_2$, where n_1 and n_2 are the principal quantum numbers of these two states. Assuming Bohr's model to be valid, if the time period of electron in the initial state is eight times of that in the final state, the possible values of n_1 and n_2 are:

(A) $n_1 = 8,\ n_2 = 4$

(B) $n_1 = 4,\ n_2 = 8$

(C) $n_1 = 8,\ n_2 = 2$

(D) $n_1 = 2,\ n_2 = 8$

Correct Answer: (A) $n_1 = 8,\ n_2 = 4$

Solution:

Step 1: Write relation for time period in Bohr orbit.

In Bohr model:

$$T_n \propto n^3$$

where:

$$T_n = \text{time period of electron in } n^{th} \text{ orbit}$$

Step 2: Use the given condition.

Given:

$$T_1 = 8T_2$$

Using:

$$T \propto n^3$$

we get:

$$\frac{T_1}{T_2} = \frac{n_1^3}{n_2^3}$$

Thus:

$$\frac{n_1^3}{n_2^3} = 8$$

$$\left(\frac{n_1}{n_2}\right)^3 = 2^3$$

$$\frac{n_1}{n_2} = 2$$

Step 3: Check the options.

Option (A):

$$\frac{8}{4} = 2$$

satisfies the condition.

Other options do not satisfy:

$$\frac{n_1}{n_2} = 2$$

Step 4: Identify the correct option.

Therefore:

$$\boxed{n_1 = 8,\ n_2 = 4}$$

Hence, the correct answer is:

$$\boxed{\text{(A)}}$$

Quick Tip: In Bohr model:

$$T_n \propto n^3$$

$$r_n \propto n^2$$

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

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7. An electric dipole of moment P is placed along the direction of electric field E. The work done in deflecting the dipole through 180° is equal to

(A) PE

(B) $+2PE$

(C) $-2PE$

(D) Zero

Correct Answer: (B) $+2PE$

Solution:

Step 1: Write the potential energy formula for dipole.

Potential energy of an electric dipole in electric field is:

$$U = -PE\cos\theta$$

where:

$$\theta = \text{angle between } \vec{P} \text{ and } \vec{E}$$

Step 2: Find initial potential energy.

Initially dipole is along the field:

$$\theta_i = 0^\circ$$

Thus:

$$U_i = -PE\cos 0^\circ$$

$$U_i = -PE$$

Step 3: Find final potential energy.

After deflection through:

$$180^\circ$$

$$\theta_f = 180^\circ$$

Thus:

$$U_f = -PE\cos 180^\circ$$

$$U_f = +PE$$

Step 4: Calculate work done.

Work done:

$$W = U_f - U_i$$

$$W = PE - (-PE)$$

$$W = 2PE$$

Step 5: Identify the correct option.

Therefore:

$$\boxed{W = +2PE}$$

Hence, the correct answer is:

$$\boxed{\text{(B)}}$$

Quick Tip: Potential energy of dipole:

$$U = -PE\cos\theta$$

Stable equilibrium:

$$\theta = 0^\circ$$

Unstable equilibrium:

$$\theta = 180^\circ$$

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8. What is the unit of electric flux in terms of the base units of SI?

(A) $kg^{-1}m^3s^{-3}A^{-1}$

(B) $kg\,m^3s^3A^{-1}$

(C) $kg\,m^3s^{-3}A^1$

(D) $kg\,m^3s^{-3}A^{-1}$

Correct Answer: (D) $kg\, m^3 s^{-3} A^{-1}$

Solution:

Step 1: Write the formula for electric flux.

Electric flux is:

$$\Phi_E = E \times A$$

where:

$$E = \text{electric field}$$

and

$$A = \text{area}$$

Step 2: Write SI unit of electric field.

Electric field:

$$E = \frac{F}{q}$$

Unit of force:

$$[N] = kg\, m s^{-2}$$

Unit of charge:

$$[C] = As$$

Thus:

$$[E] = \frac{kg\, m s^{-2}}{As}$$

$$[E] = kg\, m s^{-3} A^{-1}$$

Step 3: Multiply by area.

Area unit:

$$[m^2]$$

Therefore:

$$[\Phi_E] = kg\, m s^{-3} A^{-1} \times m^2$$

$$[\Phi_E] = kg\, m^3 s^{-3} A^{-1}$$

Step 4: Identify the correct option.

Hence:

$$\boxed{kg\, m^3 s^{-3} A^{-1}}$$

Therefore, the correct answer is:

$$\boxed{\text{(D)}}$$

Quick Tip: Electric flux:

$$\Phi_E = EA$$

SI unit:

$$N\, m^2 C^{-1}$$

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9. In terms of Bohr radius a_0, the radius of 2^{nd} Bohr orbit of Hydrogen is:

(A) $4a_0$

(B) $8a_0$

(C) $\sqrt{2}a_0$

(D) $2a_0$

Correct Answer: (A) $4a_0$

Solution:

Step 1: Write the formula for Bohr orbit radius.

Radius of n^{th} Bohr orbit is:

$$r_n = n^2 a_0$$

where:

$$a_0 = \text{Bohr radius}$$

Step 2: Substitute $n = 2$.

For second orbit:

$$r_2 = (2)^2 a_0$$

$$r_2 = 4a_0$$

Step 3: Identify the correct option.

Therefore:

$$\boxed{r_2 = 4a_0}$$

Hence, the correct answer is:

$$\boxed{(A)}$$

Quick Tip: Radius of Bohr orbit:

$$r_n = n^2 a_0$$

Thus:

$$r_1 = a_0, \qquad r_2 = 4a_0, \qquad r_3 = 9a_0$$

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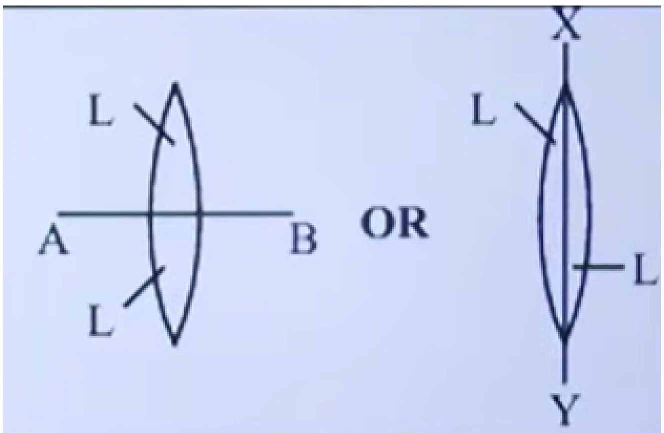
10. Two identical symmetric double convex lenses of focal length f are cut into two equal parts L_1, L_2 by AB plane and L_3, L_4 by XY plane as shown in figure respectively. The ratio of focal lengths of lenses L_1 and L_3 is



(A) 1 : 4

(B) 1 : 1

(C) 2 : 1

(D) 1 : 2

Correct Answer: (B) 1 : 1

Solution:

Step 1: Analyze cutting by plane AB.

Plane AB cuts the lens perpendicular to the principal axis.
The resulting parts:

$$L_1, \ L_2$$

retain:

$$\text{same radii of curvature}$$

and:

$$\text{same refractive index}$$

Only aperture changes.
Using lens maker formula:

$$\frac{1}{f} = (\mu - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

Since:

$$R_1, \ R_2, \ \mu$$

remain unchanged,

$$f_{L_1} = f$$

Step 2: Analyze cutting by plane XY.

Plane XY cuts the lens along the principal axis.
Again:

$$\text{radii of curvature remain unchanged}$$

Hence focal length also remains same.
Thus:

$$f_{L_3} = f$$

Step 3: Find the ratio of focal lengths.

$$\frac{f_{L_1}}{f_{L_3}} = \frac{f}{f} = 1$$

Therefore:

$$f_{L_1} : f_{L_3} = 1 : 1$$

Step 4: Identify the correct option.

Hence:

$$\boxed{\text{(B) } 1 : 1}$$

Quick Tip: Cutting a lens changes:

aperture

but focal length remains unchanged if:

$$R_1,\ R_2$$

remain same.
