CUET 2026 May 30 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. A galvanometer of resistance $50\,\Omega$ gives full-scale deflection when a current of $2\,\text{mA}$ passes through it. The value of shunt resistance required to convert it into an ammeter of range $2\,\text{A}$ is

(A) $0.05\,\Omega$

(B) $0.5\,\Omega$

(C) $5\,\Omega$

(D) $50\,\Omega$

Correct Answer: (A) $0.05\,\Omega$

Solution:

Step 1: Recall the shunt formula for ammeter conversion.

$$S = \frac{I_g G}{I - I_g}$$

where

$$I_g = 2 \times 10^{-3}\,\text{A}$$

$$G = 50\,\Omega$$

$$I = 2\,\text{A}$$

Step 2: Substitute the values.

$$S = \frac{(2 \times 10^{-3})(50)}{2 - 0.002}$$

$$S = \frac{0.1}{1.998}$$

$$S \approx 0.05\,\Omega$$

Step 3: Identify the correct option.

$$\boxed{S = 0.05\,\Omega}$$

Therefore,

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

is the correct answer.

Quick Tip: To convert a galvanometer into an ammeter:

$$\boxed{S = \frac{I_g G}{I - I_g}}$$

Ammeter $\Rightarrow$ Low resistance

Hence a small shunt resistance is connected in parallel.

---

2. In an AC circuit containing a pure resistor, the phase difference between voltage and current is

(A) 90°

(B) 180°

(C) 45°

(D) 0°

Correct Answer: (D) 0°

Solution:

Step 1: Recall the AC behavior of a resistor.

For a pure resistor:

$$V = IR$$

At every instant, voltage and current vary together.

Step 2: Determine the phase relation.

The current reaches its maximum value at the same instant as the voltage.

Hence,

$$\phi = 0^\circ$$

Step 3: Choose the correct option.

$$\boxed{\phi = 0^\circ}$$

Therefore,

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

is the correct answer.

Quick Tip: Phase differences in AC circuits:

$$\boxed{\text{Resistor } \rightarrow 0^\circ}$$

$$\boxed{\text{Inductor } \rightarrow 90^\circ}$$

$$\boxed{\text{Capacitor } \rightarrow 90^\circ}$$

Remember:

$$\boxed{\text{V and I are in phase in a pure resistor}}$$

---

3. Two coils have mutual inductance $0.5\,\text{H}$. If the current in the primary coil changes at the rate of $4\,\text{A s}^{-1}$, the induced emf in the secondary coil is

(A) $0.5\,\text{V}$

(B) $1\,\text{V}$

(C) $2\,\text{V}$

(D) $4\,\text{V}$

Correct Answer: (C) $2\,\text{V}$

Solution:

Step 1: Recall the formula for induced emf due to mutual inductance.

$$e = M\frac{dI}{dt}$$

where

$$M = 0.5\,\text{H}$$

and

$$\frac{dI}{dt} = 4\,\text{A s}^{-1}$$

Step 2: Substitute the values.

$$e = 0.5 \times 4$$

$$e = 2\,\mathrm{V}$$

Step 3: Choose the correct option.

$$\boxed{e = 2\,\mathrm{V}}$$

Therefore,

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

is the correct answer.

Quick Tip: For mutual induction:

$$\boxed{e = M\frac{dI}{dt}}$$

Larger mutual inductance or faster current change produces greater induced emf.

---

4. Match the electromagnetic waves in Column I with their common applications in Column II.

Column I		Column II	
(A)	Gamma rays	(I)	Radar communication
(B)	X-rays	(II)	Cancer treatment
(C)	Microwaves	(III)	Bone imaging
(D)	Radio waves	(IV)	Broadcasting

Choose the correct answer from the options given below:

(A) A-II, B-III, C-I, D-IV

(B) A-I, B-II, C-IV, D-III

(C) A-II, B-IV, C-I, D-III

(D) A-III, B-II, C-IV, D-I

Correct Answer: (A) A-II, B-III, C-I, D-IV

Solution:

Step 1: Recall applications of EM waves.

$$\text{Gamma rays} \longrightarrow \text{Cancer treatment}$$

$$\text{X-rays} \longrightarrow \text{Bone imaging}$$

$$\text{Microwaves} \longrightarrow \text{Radar communication}$$

$$\text{Radio waves} \longrightarrow \text{Broadcasting}$$

Step 2: Match the columns.

$$A \to II$$

$$B \to III$$

$$C \to I$$

$$D \to IV$$

Step 3: Identify the correct option.

$$\boxed{A-II,\ B-III,\ C-I,\ D-IV}$$

Therefore,

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

is the correct answer.

Quick Tip: Important EM Wave Applications:

$$\boxed{\text{Radio Waves} \longrightarrow \text{Broadcasting}}$$

$$\boxed{\text{Microwaves} \longrightarrow \text{Radar}}$$

$$\boxed{\text{X-rays} \longrightarrow \text{Medical Imaging}}$$

$$\boxed{\text{Gamma Rays} \longrightarrow \text{Cancer Therapy}}$$

---

5. According to Bohr's atomic model, the angular momentum of an electron in the n^{th} orbit is

(A) $\frac{nh}{2\pi}$

(B) $\frac{h}{2\pi n}$

(C) $\frac{n^2h}{2\pi}$

(D) $\frac{h}{n}$

Correct Answer: (A) $\frac{nh}{2\pi}$

Solution:

Step 1: Recall Bohr's quantization condition.

According to Bohr,

$$mvr = \frac{nh}{2\pi}$$

where

$$n = 1, 2, 3, \ldots$$

Step 2: Identify the angular momentum.

Angular momentum of the electron is:

$$L = mvr$$

Hence,

$$L = \frac{nh}{2\pi}$$

Step 3: Choose the correct option.

$$\boxed{L = \frac{nh}{2\pi}}$$

Therefore,

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

is the correct answer.

Quick Tip: Bohr's most important postulate:

$$\boxed{mvr = \frac{nh}{2\pi}}$$

For the first orbit:

$$L = \frac{h}{2\pi}$$

This is a frequently asked CUET question.

---

6. A photon has energy $6\,\text{eV}$. The corresponding work function of a metal is $2\,\text{eV}$. The maximum kinetic energy of the emitted photoelectron is

(A) $2\,\text{eV}$

(B) 4 eV

(C) 6 eV

(D) 8 eV

Correct Answer: (B) 4 eV

Solution:

Step 1: Recall Einstein's photoelectric equation.

$$K_{\text{max}} = h\nu - \phi$$

where

$$h\nu = 6\,\text{eV}$$

and

$$\phi = 2\,\text{eV}$$

Step 2: Substitute the values.

$$K_{\text{max}} = 6 - 2$$

$$K_{\text{max}} = 4\,\text{eV}$$

Step 3: Identify the correct option.

$$\boxed{K_{\text{max}} = 4\,\text{eV}}$$

Therefore,

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

is the correct answer.

Quick Tip: Photoelectric equation:

$$\boxed{K_{max} = h\nu - \phi}$$

where

$$\phi = \text{Work Function}$$

and

$$h\nu = \text{Photon Energy}$$

Remember:

$$\boxed{\text{Photon Energy} = \text{Work Function} + \text{Kinetic Energy}}$$

---

7. A long straight conductor carries a current of $10\,\text{A}$. The magnetic field at a point $20\,\text{cm}$ away from the conductor is ($\mu_0 = 4\pi \times 10^{-7}\,\textbf{TmA}^{-1}$)

(A) $1 \times 10^{-5}\,\text{T}$

(B) $2 \times 10^{-5}\,\text{T}$

(C) $5 \times 10^{-6}\,\text{T}$

(D) $4 \times 10^{-5}\,\text{T}$

Correct Answer: (A) $1 \times 10^{-5}\,\text{T}$

Solution:

Step 1: Recall the magnetic field due to a long straight conductor.

$$B = \frac{\mu_0 I}{2\pi r}$$

Given:

$$I = 10\,\text{A}$$

$$r = 20\,\text{cm} = 0.2\,\text{m}$$

Step 2: Substitute the values.

$$B = \frac{(4\pi \times 10^{-7})(10)}{2\pi(0.2)}$$

$$B = \frac{4 \times 10^{-6}}{0.4}$$

$$B = 1 \times 10^{-5}\,\mathrm{T}$$

Step 3: Identify the correct option.

$$\boxed{B = 1 \times 10^{-5}\,\mathrm{T}}$$

Therefore,

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

is the correct answer.

Quick Tip: Magnetic field due to a long straight wire:

$$\boxed{B = \frac{\mu_0 I}{2\pi r}}$$

Important observations:

$$B \propto I$$

$$B \propto \frac{1}{r}$$

Doubling the distance halves the magnetic field.

---

8. An object is placed $30\,\mathrm{cm}$ in front of a concave mirror of focal length $20\,\mathrm{cm}$. The image distance is

(A) $-60\,\mathrm{cm}$

(B) $+60\,\mathrm{cm}$

(C) $+30\,\text{cm}$

(D) $-30\,\text{cm}$

Correct Answer: (A) $-60\,\text{cm}$

Solution:

Step 1: Use the mirror formula.

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

For a concave mirror:

$$f = -20\,\text{cm}$$

$$u = -30\,\text{cm}$$

Step 2: Substitute the values.

$$\frac{1}{-20} = \frac{1}{v} + \frac{1}{-30}$$

$$\frac{1}{v} = -\frac{1}{20} + \frac{1}{30}$$

$$\frac{1}{v} = -\frac{3}{60} + \frac{2}{60}$$

$$\frac{1}{v} = -\frac{1}{60}$$

$$v = -60\,\text{cm}$$

Step 3: Identify the correct option.

$$\boxed{v = -60\,\text{cm}}$$

The negative sign indicates that the image is real and formed in front of the mirror.

Therefore,

$$\boxed{(A)}$$

is the correct answer.

Quick Tip: Mirror formula:

$$\boxed{\frac{1}{f} = \frac{1}{v} + \frac{1}{u}}$$

For a concave mirror:

$$f < 0$$

Real image:

$$v < 0$$

Virtual image:

$$v > 0$$

Always follow the New Cartesian Sign Convention.

---

9. In a semiconductor, the conductivity increases with increase in temperature because

(A) Resistance increases

(B) Number of free charge carriers increases

(C) Mobility becomes zero

(D) Band gap increases

Correct Answer: (B) Number of free charge carriers increases

Solution:

Step 1: Recall the behavior of semiconductors.

Semiconductors have a small energy band gap.

At room temperature, only a limited number of electrons are available for conduction.

Step 2: Understand the effect of temperature.

When temperature increases, more electrons gain sufficient energy to jump from the valence band to the conduction band.

Thus:

$$\text{Number of electrons} \uparrow$$

$$\text{Number of holes} \uparrow$$

Step 3: Determine the effect on conductivity.

Since conductivity depends on the number of charge carriers,

$$\sigma \propto n$$

an increase in charge carriers increases conductivity.

Therefore,

$$\boxed{\text{Number of free charge carriers increases}}$$

Hence, the correct answer is:

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

Quick Tip: For semiconductors:

$$\boxed{\text{Temperature} \uparrow \Rightarrow \text{Conductivity} \uparrow}$$

This is opposite to metals where:

$$\boxed{\text{Temperature} \uparrow \Rightarrow \text{Resistance} \uparrow}$$

CUET frequently asks this comparison.

---

10. Two capacitors of capacitances $6\,\mu F$ and $3\,\mu F$ are connected in series across a battery. The

equivalent capacitance of the combination is

(A) $9\,\mu F$

(B) $2\,\mu F$

(C) $4.5\,\mu F$

(D) $18\,\mu F$

Correct Answer: (B) $2\,\mu F$

Solution:

Step 1: Recall the formula for capacitors in series.

$$\frac{1}{C_{\text{eq}}} = \frac{1}{C_1} + \frac{1}{C_2}$$

Given:

$$C_1 = 6\,\mu F$$

$$C_2 = 3\,\mu F$$

Step 2: Substitute the values.

$$\frac{1}{C_{\text{eq}}} = \frac{1}{6} + \frac{1}{3}$$

$$\frac{1}{C_{\text{eq}}} = \frac{1}{6} + \frac{2}{6}$$

$$\frac{1}{C_{\text{eq}}} = \frac{3}{6} = \frac{1}{2}$$

$$C_{\text{eq}} = 2\,\mu F$$

Step 3: Identify the correct option.

$$\boxed{C_{\text{eq}} = 2\,\mu F}$$

Therefore,

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

is the correct answer.

Quick Tip: Capacitors in series:

$$\boxed{\frac{1}{C_{\text{eq}}} = \frac{1}{C_1} + \frac{1}{C_2}}$$

Capacitors in parallel:

$$\boxed{C_{\text{eq}} = C_1 + C_2}$$

Remember:

$$\boxed{\text{Series} \Rightarrow \text{Capacitance decreases}}$$

$$\boxed{\text{Parallel} \Rightarrow \text{Capacitance increases}}$$
