CUET 2026 May 29 Shift 1 Physics

Question Paper (Memory-Based) with Solutions

Conducted by National Testing Agency (NTA)

General Instructions

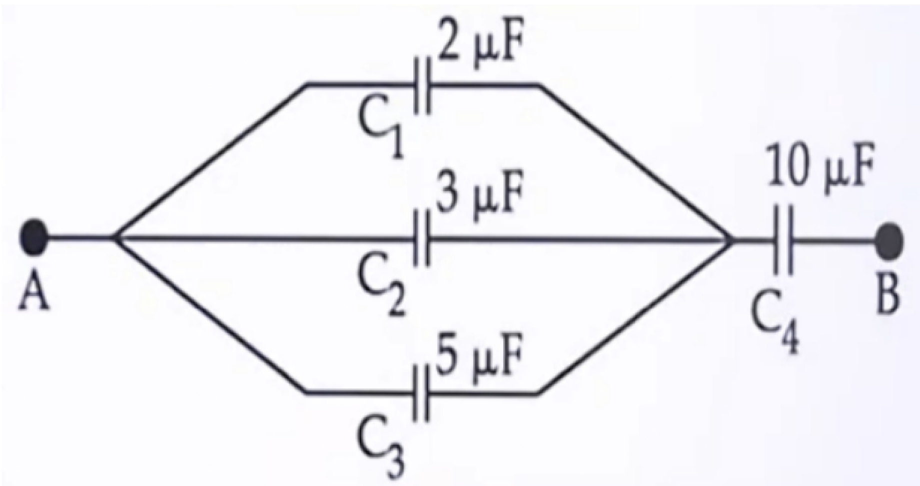
(i) The examination will be conducted in Computer-Based Test (CBT) mode.

(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. Four capacitors are connected as shown in the figure. If $C_1 = 2\,\mu F$, $C_2 = 3\,\mu F$, $C_3 = 5\,\mu F$ **and** $C_4 = 10\,\mu F$**, then the equivalent capacitance between points** A **and** B **is:**



(A) $20\,\mu F$

(B) $5\,\mu F$

(C) $10\,\mu F$

(D) $0\,\mu F$

Correct Answer: (B) $5\,\mu F$

Solution:

Step 1: Identify the parallel combination.

The left and right junctions are common for C_1, C_2, and C_3.

Therefore, these three capacitors are connected in parallel.

Hence,

$$C_p = C_1 + C_2 + C_3$$

$$C_p = 2 + 3 + 5$$

$$C_p = 10\,\mu F$$

Step 2: Identify the series combination.

The equivalent capacitor $C_p = 10\,\mu F$ is in series with

$$C_4 = 10\,\mu F$$

For capacitors in series:

$$C_{\text{eq}} = \frac{C_p C_4}{C_p + C_4}$$

$$C_{\text{eq}} = \frac{(10)(10)}{10 + 10}$$

$$C_{\text{eq}} = \frac{100}{20}$$

$$C_{\text{eq}} = 5\,\mu F$$

Therefore, the equivalent capacitance between A and B is

$$\boxed{5\,\mu F}$$

Quick Tip: For capacitors:

Parallel:

$$C = C_1 + C_2 + C_3 + \cdots$$

Series:

$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \cdots$$

Always simplify parallel combinations first whenever they share the same two nodes.

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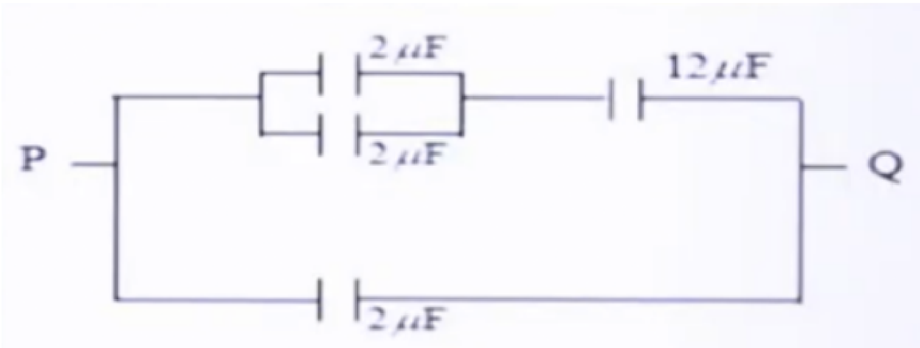
2. Four capacitors are connected in a circuit as shown in the figure. The effective capacitance between P and Q is:



(A) $10\,\mu F$

(B) $5\,\mu F$

(C) $2\,\mu F$

(D) $7.5\,\mu F$

Correct Answer: (B) $5\,\mu F$

Solution:

Step 1: Identify the parallel combination of the two upper capacitors.

The two $2\,\mu F$ capacitors at the top are connected in parallel.

Therefore,

$$C_p = 2 + 2$$

$$C_p = 4\,\mu F$$

Step 2: Find the equivalent capacitance of the upper branch.

The $4\,\mu F$ capacitor is in series with the $12\,\mu F$ capacitor.

Hence,

$$C_{\text{upper}} = \frac{(4)(12)}{4+12}$$

$$C_{\text{upper}} = \frac{48}{16}$$

$$C_{\text{upper}} = 3\,\mu F$$

Step 3: Combine with the lower branch.

The lower branch contains a single

$$2\,\mu F$$

capacitor.

The upper and lower branches are connected in parallel between P and Q.

Therefore,

$$C_{\text{eq}} = 3+2$$

$$C_{\text{eq}} = 5\,\mu F$$

Therefore, the effective capacitance between P and Q is

$$\boxed{5\,\mu F}$$

> **Quick Tip:** For capacitor networks:
>
> $$C_{\text{parallel}} = C_1 + C_2 + \cdots$$
>
> $$C_{\text{series}} = \frac{C_1 C_2}{C_1 + C_2}$$
>
> Always simplify branch-wise and then combine the branches.

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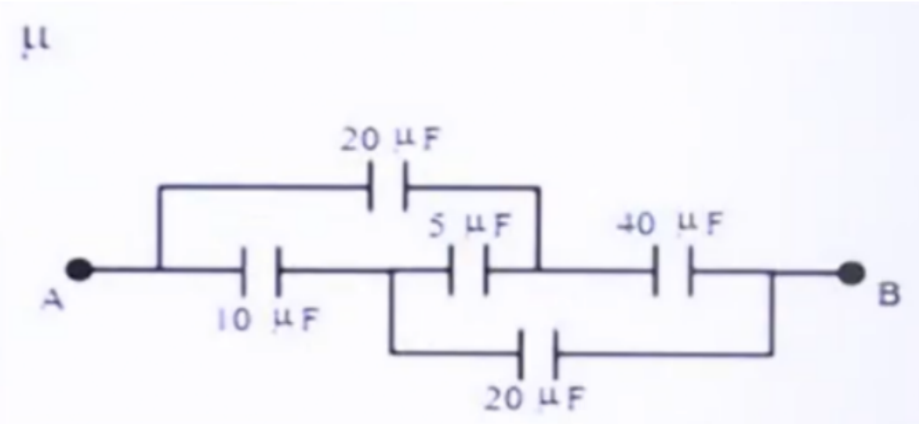
3. In the figure given below, the resultant capacitance between points A and B is:



(A) $20\,\mu F$
(B) $\dfrac{20}{3}\,\mu F$
(C) $\dfrac{40}{3}\,\mu F$
(D) $10\,\mu F$

Correct Answer: (A) $20\,\mu F$

Solution:

Label the junction between $10\,\mu F$ and $5\,\mu F$ as X, and the junction between $5\,\mu F$ and $40\,\mu F$ as Y.

Step 1: Identify the bridge balance condition.

The capacitor network has:

$$\frac{10}{20} = \frac{20}{40} = \frac{1}{2}$$

Since the ratios are equal, the bridge is balanced.

Hence no potential difference exists across the central capacitor.
Therefore the

$$5\,\mu F$$

capacitor can be ignored.

Step 2: Reduce the upper branch.
Upper branch consists of:

$$20\,\mu F$$

in series with

$$40\,\mu F$$

Thus,

$$C_{\text{upper}} = \frac{20 \times 40}{20 + 40}$$

$$= \frac{800}{60}$$

$$= \frac{40}{3}\,\mu F$$

Step 3: Reduce the lower branch.
Lower branch consists of:

$$10\,\mu F$$

in series with

$$20\,\mu F$$

Therefore,

$$C_{\text{lower}} = \frac{10 \times 20}{10 + 20}$$

$$= \frac{200}{30}$$

$$= \frac{20}{3}\,\mu F$$

Step 4: Combine the two branches.

The upper and lower branches are in parallel.

Hence,

$$C_{\text{eq}} = C_{\text{upper}} + C_{\text{lower}}$$

$$= \frac{40}{3} + \frac{20}{3}$$

$$= \frac{60}{3}$$

$$= 20\,\mu F$$

Therefore, the resultant capacitance between A and B is

$$\boxed{20\,\mu F}$$

Quick Tip: For a balanced capacitor bridge:

$$\frac{C_1}{C_2} = \frac{C_3}{C_4}$$

the bridge capacitor carries no charge and can be removed from the circuit.

This greatly simplifies capacitor-network problems.

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4. Three capacitors have capacitances $2\,\mu F$, $4\,\mu F$ and $8\,\mu F$. When they are connected in a way to give minimum capacitance, their effective capacitance is:

(A) $8\,\mu F$

(B) $14\,\mu F$

(C) $1.14\,\mu F$

(D) $11.4\,\mu F$

Correct Answer: (C) $1.14\,\mu F$

Solution:

Step 1: Determine the arrangement for minimum capacitance.

Minimum capacitance is obtained when all capacitors are connected in series.

Therefore,

$$\frac{1}{C_{\text{eq}}} = \frac{1}{2} + \frac{1}{4} + \frac{1}{8}$$

Step 2: Calculate the reciprocal.

$$\frac{1}{C_{\text{eq}}} = \frac{4+2+1}{8}$$

$$= \frac{7}{8}$$

Step 3: Find the equivalent capacitance.

$$C_{\text{eq}} = \frac{8}{7}$$

$$= 1.14\,\mu F$$

Therefore, the effective capacitance is

$$\boxed{1.14\,\mu F}$$

Quick Tip: For capacitors:

Maximum capacitance:

$$C_{max} = C_1 + C_2 + C_3 + \cdots$$

Minimum capacitance:

$$\frac{1}{C_{min}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \cdots$$

Hence, minimum capacitance is always obtained when all capacitors are connected in series.

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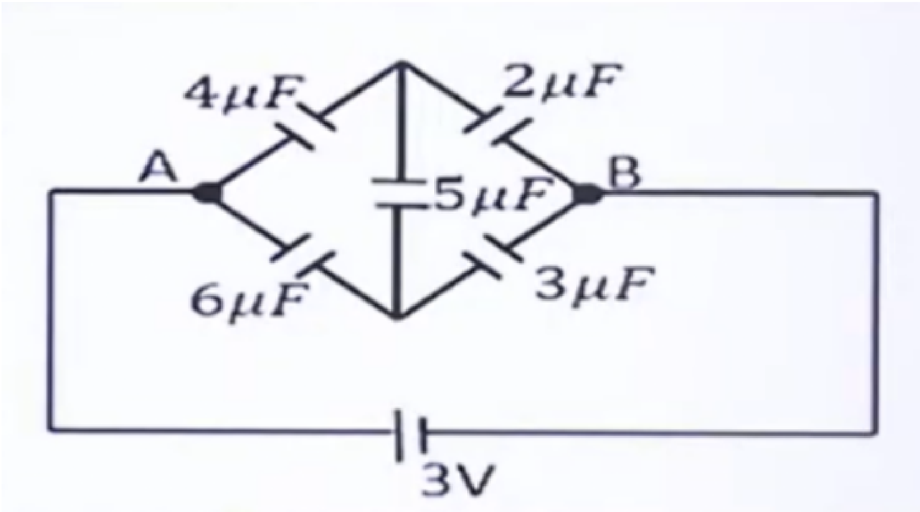
5. A network of five capacitors is shown in the figure. The total charge stored in the network connected between A and B is:



(A) $8\,\mu C$

(B) $10\,\mu C$

(C) $9\,mC$

(D) $10\,mC$

Correct Answer: (B) $10\,\mu C$

Solution:

Step 1: Check whether the bridge is balanced.

The capacitor bridge has:

$$\frac{4}{2} = \frac{6}{3} = 2$$

Since

$$\frac{C_1}{C_2} = \frac{C_3}{C_4},$$

the bridge is balanced.

Therefore, no charge flows through the central capacitor.

Hence, the

$$5\,\mu F$$

capacitor can be ignored.

Step 2: Find equivalent capacitance of the upper branch.

The $4\,\mu F$ and $2\,\mu F$ capacitors are in series.

$$C_{\text{upper}} = \frac{4\times 2}{4+2} = \frac{8}{6} = \frac{4}{3}\,\mu F$$

Step 3: Find equivalent capacitance of the lower branch.

The $6\,\mu F$ and $3\,\mu F$ capacitors are in series.

$$C_{\text{lower}} = \frac{6\times 3}{6+3} = \frac{18}{9} = 2\,\mu F$$

Step 4: Combine the two branches.

The upper and lower branches are in parallel.

$$C_{\text{eq}} = \frac{4}{3} + 2 = \frac{10}{3}\,\mu F$$

Step 5: Calculate total charge stored.

The network is connected across

$$V = 3\,V$$

Therefore,

$$Q = C_{\text{eq}} V$$

$$Q = \left(\frac{10}{3}\right)(3)$$

$$Q = 10\,\mu C$$

Therefore, the total charge stored in the network is

$$\boxed{10\,\mu C}$$

Quick Tip: For a balanced capacitor bridge:

$$\frac{C_1}{C_2} = \frac{C_3}{C_4}$$

the bridge capacitor has zero potential difference across it and can be removed from the analysis. After removing it, reduce the circuit using simple series and parallel combinations.

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6. A $12\,pF$ capacitor is connected to a $50\,V$ battery. The electrostatic energy stored in the capacitor is:

(A) $2.5 \times 10^{-6}\,J$

(B) $3.5 \times 10^{-8}\,J$

(C) $2.5 \times 10^{-8}\,J$

(D) $1.5 \times 10^{-8}\,J$

Correct Answer: (D) $1.5 \times 10^{-8}\,J$

Solution:

Step 1: Recall the energy stored in a capacitor.

$$U = \frac{1}{2}CV^2$$

where

$$C = 12\,pF = 12 \times 10^{-12}F$$

and

$$V = 50V$$

Step 2: Substitute the values.

$$U = \frac{1}{2}\left(12 \times 10^{-12}\right)(50)^2$$

$$= \frac{1}{2}\left(12 \times 10^{-12}\right)(2500)$$

$$= 6 \times 10^{-12} \times 2500$$

$$= 15000 \times 10^{-12}$$

$$= 1.5 \times 10^{-8} J$$

Step 3: Identify the correct option.

$$\boxed{U = 1.5 \times 10^{-8} J}$$

Quick Tip: Energy stored in a capacitor can be written as:

$$U = \frac{1}{2}CV^2$$

$$U = \frac{Q^2}{2C}$$

$$U = \frac{1}{2}QV$$

Use whichever form matches the given data.

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7. A $10\,pF$ capacitor is connected to a $24\,V$ battery. The electrostatic energy stored in the capacitor is:

(A) $11.52 \times 10^{-9} J$

(B) $1.2 \times 10^{-9} J$

(C) $5.76 \times 10^{-9} J$

(D) $2.88 \times 10^{-9} J$

Correct Answer: (D) $2.88 \times 10^{-9} J$

Solution:

Step 1: Recall the energy stored in a capacitor.

$$U = \frac{1}{2}CV^2$$

Given:

$$C = 10\,pF = 10 \times 10^{-12} F$$

$$V = 24V$$

Step 2: Substitute the values.

$$U = \frac{1}{2}\left(10 \times 10^{-12}\right)(24)^2$$

$$= \frac{1}{2}\left(10 \times 10^{-12}\right)(576)$$

$$= 5 \times 10^{-12} \times 576$$

$$= 2880 \times 10^{-12}$$

$$= 2.88 \times 10^{-9} J$$

Step 3: Identify the correct option.

$$\boxed{U = 2.88 \times 10^{-9} J}$$

Quick Tip: For capacitor energy:

$$U = \frac{1}{2}CV^2$$

A quick shortcut:

$$U(\text{J}) = 0.5 \times C(F) \times V^2$$

Always convert pF into farads first:

$$1\,pF = 10^{-12}F$$

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8. A wire of uniform cross-section A, length l and resistance R is bent into a complete circle. The equivalent resistance between any two diametrically opposite points will be:

(A) $\frac{R}{4}$
(B) $\frac{R}{8}$
(C) $4R$
(D) $\frac{R}{2}$

Correct Answer: (A) $\frac{R}{4}$

Solution:

Step 1: Divide the circular wire into two equal halves.

The total resistance of the wire is:

$$R$$

Since diametrically opposite points divide the circle into two equal semicircles, resistance of each semicircle is:

$$R_1 = R_2 = \frac{R}{2}$$

Step 2: Identify the combination.

The two semicircular resistances connect the same pair of points.

Hence they are in parallel.

$$R_{\text{eq}} = \frac{R_1 R_2}{R_1 + R_2}$$

Step 3: Substitute the values.

$$R_{\text{eq}} = \frac{\left(\frac{R}{2}\right)\left(\frac{R}{2}\right)}{\frac{R}{2} + \frac{R}{2}}$$

$$= \frac{\frac{R^2}{4}}{R}$$

$$= \frac{R}{4}$$

Therefore, the equivalent resistance between diametrically opposite points is

$$\boxed{\frac{R}{4}}$$

Quick Tip: For a circular wire of total resistance R:

$$\text{Diametrically opposite points} \Rightarrow \frac{R}{2} \parallel \frac{R}{2}$$

Therefore,

$$R_{\text{eq}} = \frac{R}{4}$$

This is a very common CUET/JEE/NEET formula-based question.

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9. A uniform wire of resistance R is cut into four equal parts. These parts are then connected in parallel. The equivalent resistance of the combination is:

(A) R
(B) $\frac{R}{4}$
(C) $\frac{R}{16}$
(D) $4R$

Correct Answer: (C) $\frac{R}{16}$

Solution:

Step 1: Find resistance of each part.

Resistance is proportional to length.

When the wire is cut into four equal parts:

$$R_{\text{each}} = \frac{R}{4}$$

Step 2: Connect the four parts in parallel.

For n identical resistors r connected in parallel:

$$R_{\text{eq}} = \frac{r}{n}$$

Here,

$$r = \frac{R}{4}$$

and

$$n = 4$$

Therefore,

$$R_{\text{eq}} = \frac{\frac{R}{4}}{4}$$

$$= \frac{R}{16}$$

Step 3: Identify the correct option.

$$\boxed{R_{\text{eq}} = \frac{R}{16}}$$

Quick Tip: If a wire of resistance R is cut into n equal parts:

$$R_{\text{each}} = \frac{R}{n}$$

If all n pieces are connected in parallel:

$$R_{\text{eq}} = \frac{R}{n^2}$$

For $n = 4$:

$$R_{\text{eq}} = \frac{R}{16}$$

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10. Four resistors of $8\,\Omega$ each are connected in parallel. Then five such equivalent combinations are connected in series. What will be the total resistance?

(A) $10\,\Omega$

(B) $2\,\Omega$

(C) $12\,\Omega$

(D) $2.5\,\Omega$

Correct Answer: (A) $10\,\Omega$

Solution:

Step 1: Find the equivalent resistance of four $8\,\Omega$ resistors in parallel.

For n identical resistors R connected in parallel:

$$R_p = \frac{R}{n}$$

Here,

$$R = 8\,\Omega, \qquad n = 4$$

Therefore,

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

$$R_p = 2\,\Omega$$

Step 2: Connect five such combinations in series.

Five equivalent resistances of $2\,\Omega$ each are connected in series.

Hence,

$$R_{\text{total}} = 2 + 2 + 2 + 2 + 2$$

$$R_{\text{total}} = 10\,\Omega$$

Step 3: Identify the correct option.

$$\boxed{R_{\text{total}} = 10\,\Omega}$$

Quick Tip: For n identical resistors:

Parallel:

$$R_{\text{eq}} = \frac{R}{n}$$

Series:

$$R_{\text{eq}} = nR$$

Always simplify the parallel block first and then combine the resulting equivalent resistances.
