

Capacitors Quiz Answer Key PDF

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What is the basic unit of capacitANCE?

- A. Ohm
- B. Volt
- C. Farad ✓**
- D. AmpERE

Which material is commonly used as a dielectric in capacitors?

- A. Copper
- B. Iron
- C. Ceramic ✓**
- D. Silicon

Which type of capacitor is known for having adjustable capacitANCE?

- A. Ceramic capacitor
- B. Electrolytic capacitor
- C. Film capacitor
- D. Variable capacitor ✓**

What is the primary function of a capacitor in an electrical circuit?

- A. Convert AC to DC
- B. Store electrical energy ✓**
- C. Increase current
- D. Decrease voltage

How does connecting capacitors in parallel affect the total capacitANCE and voltage rating of the circuit?

The total capacitANCE is the sum of the individual capacitances ($C_{\text{total}} = C_1 + C_2 + \dots + C_n$), and the voltage rating remains the same as that of the individual capacitors.

Describe the role of capacitors in power supply smoothing and why it is important.

Capacitors in power supply smoothing act as energy reservoirs that absorb voltage spikes and fill in dips, thereby reducing ripple and providing a more stable DC output.

Explain the concept of the time constant in RC circuits and its practical implications in electronic design.

The time constant (τ) in an RC circuit is defined as $\tau = R \times C$, where R is the resistance and C is the capacitANCE. It represents the time required for the voltage across the capacitor to rise to about 63.2% of its final value during charging or to fall to about 36.8% during discharging. This parameter is essential in determining the speed of response in timing circuits, filters, and other applications where precise control of voltage changes is necessary.

Which factors affect the capacitANCE of a capacitor? (Select all that apply)

- A. Distance between plates ✓
- B. Dielectric material ✓
- C. Plate area ✓
- D. Wire length

What is the effect of connecting capacitors in series on the total capacitANCE?

- A. Increases
- B. Decreases ✓
- C. Remains the same
- D. Doubles

What is the significance of the dielectric material in a capacitor, and how does it affect capacitANCE?

The dielectric material significantly increases the capacitANCE of a capacitor by reducing the electric field strength and allowing more charge to be stored for the same voltage.

What are some applications of capacitors in electronic circuits? (Select all that apply)

- A. Signal filtering ✓**
- B. Power supply smoothing ✓**
- C. Increasing resistance
- D. Energy storage ✓**

Which of the following are common types of fixed capacitors? (Select all that apply)

- A. Ceramic ✓**
- B. Electrolytic ✓**
- C. Trimmer
- D. Film ✓**

Which capacitor type must be connected with the correct polarity?

- A. Ceramic
- B. Electrolytic ✓**
- C. Film
- D. Mica

What happens to a capacitor when it is fully charged?

- A. It stops conducting current ✓**
- B. It explodes
- C. It increases voltage
- D. It decreases resistance

Which configurations can capacitors be arranged in a circuit? (Select all that apply)

- A. Series ✓**
- B. Parallel ✓**
- C. Diagonal
- D. Grid

Explain how a capacitor charges and discharges in a simple RC circuit.

A capacitor charges by allowing current to flow through the resistor, increasing its voltage until it equals the supply voltage, and discharges by releasing stored energy back through the resistor, decreasing its voltage to zero.

What are the characteristics of a polarized capacitor? (Select all that apply)

- A. Can be connected in any direction
- B. Has a positive and negative lead ✓**
- C. Typically an electrolytic capacitor ✓**
- D. Used in AC circuits

Discuss the differences between fixed and variable capacitors and their respective applications.

Fixed capacitors maintain a constant capacitANCE value and are used in applications like filtering and energy storage, while variable capacitors can be adjusted to change their capacitANCE and are typically used in tuning circuits, such as in radios and oscillators.

What are the effects of equivalent series resistance (ESR) in capacitors? (Select all that apply)

- A. Increases efficiency
- B. Causes heat dissipation ✓**
- C. Reduces efficiency ✓**
- D. Affects performance at high frequencies ✓**

What is the time constant of a capacitor defined as?

- A. The time to fully charge
- B. The time to discharge completely
- C. The time to charge to 63.2% of its maximum voltage ✓**
- D. The time to reach 50% of its maximum voltage