

# NCCER Introduction to Electrical Circuits (26103-23) Practice Test (Sample)

## Study Guide



**Everything you need from our exam experts!**

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# Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

**Remember:** successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

# How to Use This Guide

**This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:**

## **1. Start with a Diagnostic Review**

**Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.**

## **2. Study in Short, Focused Sessions**

**Break your study time into manageable blocks (e.g. 30 - 45 minutes). Review a handful of questions, reflect on the explanations.**

## **3. Learn from the Explanations**

**After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.**

## **4. Track Your Progress**

**Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.**

## **5. Simulate the Real Exam**

**Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.**

## **6. Repeat and Review**

**Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.**

**There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!**

## Questions

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- 1. Which factor does not affect resistance in the relation  $R = \rho L/A$ ?**
  - A. Temperature**
  - B. Color of insulation**
  - C. Length**
  - D. Material**
  
- 2. What safety device protects circuits by interrupting excessive current?**
  - A. A resistor**
  - B. A switch**
  - C. A diode**
  - D. A fuse or circuit breaker**
  
- 3. Which unit is used to measure resistance?**
  - A. amperes**
  - B. watts**
  - C. volts**
  - D. ohms**
  
- 4. If a current of 3 amperes flows, how much charge passes each second?**
  - A. Three coulombs per second**
  - B. Three hundred coulombs per second**
  - C. Three thousand coulombs per second**
  - D. Three microcoulombs per second**
  
- 5. Which device stores energy electrostatically in a circuit?**
  - A. Inductor**
  - B. Resistor**
  - C. Capacitor**
  - D. Transformer**

- 6. In a simple series circuit with a 12 V source and three resistors in series ( $R_1 = 4 \Omega$ ,  $R_2 = 6 \Omega$ ,  $R_3 = 10 \Omega$ ), what is the total resistance?**
- A. 12  $\Omega$**
  - B. 20  $\Omega$**
  - C. 24  $\Omega$**
  - D. 30  $\Omega$**
- 7. How can power factor be improved in AC circuits?**
- A. Increase reactive power**
  - B. Reduce reactive power**
  - C. Increase voltage**
  - D. Increase real power only**
- 8. Coulombs are a measure of \_\_\_\_.**
- A. electric field**
  - B. electric current**
  - C. electric charge**
  - D. resistance**
- 9. Valence electrons reside in which shell?**
- A. Innermost**
  - B. Middle**
  - C. Outermost**
  - D. Second**
- 10. What is a schematic diagram?**
- A. A drawing of an electrical circuit using standardized symbols.**
  - B. A photographic image of hardware layout.**
  - C. A textual description of circuit operation.**
  - D. A representation of a circuit using colors.**



## Answers

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1. B
2. D
3. D
4. A
5. C
6. B
7. B
8. C
9. C
10. A

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## **Explanations**

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1. Which factor does not affect resistance in the relation  $R = \rho L/A$ ?

- A. Temperature
- B. Color of insulation**
- C. Length
- D. Material

The key idea is that resistance depends on the material's resistivity, the length of the conductor, and its cross-sectional area, as shown by  $R = \rho L/A$ . Temperature can change resistivity, and metals typically have higher resistivity at higher temperatures, so resistance can increase. Length affects resistance directly: longer conductors have more resistance. Material determines the base resistivity: different materials (like copper vs aluminum) conduct differently even with the same size. The color of the insulation, however, does not enter this equation and does not change  $\rho$ ,  $L$ , or  $A$ . It's just an identification or protection feature and has no effect on the conductor's resistance.

2. What safety device protects circuits by interrupting excessive current?

- A. A resistor
- B. A switch
- C. A diode
- D. A fuse or circuit breaker**

Overcurrent protection is about stopping the flow of too much current to prevent overheating and possible fire. A fuse or circuit breaker does exactly that by interrupting the circuit when current exceeds a safe level. A fuse has a thin metal link that melts when the current gets too high, opening the circuit permanently until the fuse is replaced. A circuit breaker senses overcurrent and trips a mechanism to open the circuit, and it can be reset after the fault is cleared. This automatic interruption is what provides safety during faults. In contrast, a resistor simply limits current but doesn't shut the circuit off, a switch is a manual disconnect, and a diode controls current direction rather than providing protection.

3. Which unit is used to measure resistance?

- A. amperes
- B. watts
- C. volts
- D. ohms**

Resistance is measured in the ohm. The ohm (symbol  $\Omega$ ) is defined as one volt per ampere, so if one volt drives one ampere through a component, its resistance is one ohm. This unit specifically describes how much a component resists current flow. The other units represent different quantities: amperes measure current (the flow of charge), volts measure voltage (the electrical pressure pushing the current), and watts measure power (the rate at which energy is used or produced). The relationship  $V = I \times R$  ties these together, making the ohm the specific unit for resistance.

4. If a current of 3 amperes flows, how much charge passes each second?

- A. Three coulombs per second**
- B. Three hundred coulombs per second**
- C. Three thousand coulombs per second**
- D. Three microcoulombs per second**

Current is the rate at which electric charge flows. By definition, 1 ampere equals 1 coulomb per second. So a current of 3 amperes means 3 coulombs of charge pass a point every second. In one second,  $Q = I \times t = 3 \text{ A} \times 1 \text{ s} = 3 \text{ C}$ , which is three coulombs per second. The other options would imply much larger or much smaller currents (hundreds or thousands of coulombs per second, or a few microcoulombs per second).

5. Which device stores energy electrostatically in a circuit?

- A. Inductor**
- B. Resistor**
- C. Capacitor**
- D. Transformer**

Capacitors store energy electrostatically in the electric field between their plates. When a capacitor is charged, positive and negative charges accumulate on opposite plates, creating a strong electric field in the dielectric between them. The energy stored in that field is given by the formula  $E = 1/2 C V^2$ , where  $C$  is the capacitance and  $V$  is the voltage across the plates. This storage is purely electric in nature, not magnetic. In contrast, inductors store energy in a magnetic field around a conductor due to current flow, with energy  $= 1/2 L I^2$ . Resistors don't store energy; they convert it to heat. Transformers rely on magnetic fields to transfer energy between windings, and while they involve energy storage in a magnetic field, that is not electrostatic storage.

6. In a simple series circuit with a 12 V source and three resistors in series ( $R_1 = 4 \Omega$ ,  $R_2 = 6 \Omega$ ,  $R_3 = 10 \Omega$ ), what is the total resistance?

- A. 12  $\Omega$**
- B. 20  $\Omega$**
- C. 24  $\Omega$**
- D. 30  $\Omega$**

In a simple series circuit, the total resistance is found by adding all the resistors along the path because the current flows through each one in sequence. So you simply sum  $R_1$ ,  $R_2$ , and  $R_3$ :  $4 \Omega + 6 \Omega + 10 \Omega = 20 \Omega$ . That  $20 \Omega$  is the resistance the voltage source "sees." The given 12 V source doesn't change the resistance; it would only determine the current with  $I = V / R$ , which would be  $12 \text{ V} / 20 \Omega = 0.6 \text{ A}$ . The correct total resistance is  $20 \Omega$ , matching the sum of the individual resistances in series.

## 7. How can power factor be improved in AC circuits?

- A. Increase reactive power
- B. Reduce reactive power**
- C. Increase voltage
- D. Increase real power only

Power factor shows how much of the supplied power is doing useful work. It's the ratio of real power (the work actually done) to apparent power, and the reactive power part of the current doesn't contribute to that work. When reactive power is present, the current must be larger to get the same real power, which lowers the power factor. Reducing reactive power lowers the amount of current needed for the same real power, so the current and voltage become more in sync and the angle between them shrinks. That pushes the power factor closer to 1, meaning more of the supplied power is being used effectively. In practice, this is done by adding capacitive elements to counteract inductive effects, supplying leading reactive power to cancel the lag from inductive loads. Increasing reactive power would make the current larger and worsen the power factor. Merely increasing voltage doesn't fix the phase relationship between voltage and current, and increasing real power without addressing reactive power doesn't improve the factor unless you also reduce the reactive component.

## 8. Coulombs are a measure of \_\_\_\_.

- A. electric field
- B. electric current
- C. electric charge**
- D. resistance

Coulombs measure the amount of electric charge. A coulomb is a specific quantity of charge, and current relates to charge through time: one ampere means one coulomb passing a point each second. This helps distinguish charge from other concepts—electric field is the force per unit charge, electric current is the flow rate of charge, and resistance is how much a material resists that flow. So, Coulombs are the unit used to quantify electric charge.

## 9. Valence electrons reside in which shell?

- A. Innermost
- B. Middle
- C. Outermost**
- D. Second

Valence electrons are the electrons in the outermost shell of an atom. These are the ones that are least tightly bound to the nucleus and are available to participate in bonding with other atoms. The inner shells are filled and held tightly, so they don't typically take part in bonding. The outermost shell is the energy level that can gain, lose, or share electrons to form bonds or interact in conduction in materials. In metals, these outer electrons can move freely, which is why metals conduct electricity. So valence electrons reside in the outermost shell.

## 10. What is a schematic diagram?

- A. A drawing of an electrical circuit using standardized symbols.**
- B. A photographic image of hardware layout.**
- C. A textual description of circuit operation.**
- D. A representation of a circuit using colors.**

A schematic diagram is a drawing of an electrical circuit that uses standardized symbols to represent components and the connections between them. It shows how the circuit is intended to function, focusing on how the current flows and how parts relate to one another, rather than on the physical layout. This universal set of symbols lets anyone read and analyze the circuit without needing to see how it's wired in real life. It's different from a photographic image of hardware layout, which shows the actual physical arrangement, and from a text description, which explains behavior without a diagram. It also isn't just about using colors to indicate parts; schematics rely on symbols and lines to convey connections and component identities.

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## Next Steps

**Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.**

**As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.**

**If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at [hello@examzify.com](mailto:hello@examzify.com).**

**Or visit your dedicated course page for more study tools and resources:**

**<https://nccerintrotoeleccircuits2610323.examzify.com>**

**We wish you the very best on your exam journey. You've got this!**

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