

# NCCER Electrical Level 2 - Control Systems and Fundamental Concepts (Module 26211-23) 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. What is one key benefit of performing a systematic test of a motor control circuit after changes?**
  - A. It reduces risk of overlooking a fault and confirms safe operation**
  - B. It guarantees no faults exist**
  - C. It speeds up the motor start**
  - D. It increases power efficiency**
  
- 2. How do a short circuit and an overload differ in a circuit?**
  - A. A short circuit causes an overload without changing resistance; an overload creates near-zero resistance.**
  - B. A short circuit causes a near-zero resistance path with excessive current; an overload draws more current than the circuit rating under normal resistance.**
  - C. A short circuit reduces voltage; an overload increases voltage.**
  - D. A short circuit and an overload are the same condition.**
  
- 3. Increasing the armature spring force or magnet gap in a relay results in higher pull-in voltage or current values and higher drop-out values. Choose the correct action that causes this change.**
  - A. Decreasing**
  - B. Increasing**
  - C. Increasing the coil resistance**
  - D. Increasing the contact area**
  
- 4. What components comprise a magnetic reversing starter?**
  - A. A Timer and a Relay**
  - B. A Starter and a Set of Contactors with Interlocking**
  - C. A Transformer and a Relay**
  - D. A Single Contactor**
  
- 5. How do you calculate electrical power in a DC circuit?**
  - A.  $P = I \times R$**
  - B.  $P = V - I$**
  - C.  $P = V^2 / R$**
  - D.  $P = V \times I$**

- 6. What happens to a normally closed contact when its coil is energized?**
- A. It opens.**
  - B. It closes.**
  - C. It remains the same.**
  - D. It shorts the circuit.**
- 7. How do thermal overloads protect motors and what characteristic can trigger them?**
- A. They monitor motor current or temperature and trip if the current or temperature exceeds the rated limit for a period.**
  - B. They monitor ambient temperature and trip on high humidity.**
  - C. They monitor motor vibration and trip on excessive vibration.**
  - D. They trip only when manually reset.**
- 8. An opto-isolated relay uses \_\_\_\_ to control the relay?**
- A. A Light beam**
  - B. A Magnetic field**
  - C. A Hydraulic signal**
  - D. A Mechanical action**
- 9. A solid-state relay is commonly used for PLC I/O to allow the controller to be reprogrammed without rewiring.**
- A. It's used for measurement**
  - B. Only used in DC**
  - C. True**
  - D. False**
- 10. Mechanically held relays are used where the hum of electrically held devices is objectionable, such as:**
- A. Audio equipment**
  - B. Control panels in factories**
  - C. Medical devices**
  - D. All of the above**

## Answers

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

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## **Explanations**

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**1. What is one key benefit of performing a systematic test of a motor control circuit after changes?**

- A. It reduces risk of overlooking a fault and confirms safe operation**
- B. It guarantees no faults exist**
- C. It speeds up the motor start**
- D. It increases power efficiency**

Systematic testing after changes helps ensure safe operation by catching issues you might miss and confirming the circuit behaves correctly before it handles real loads. By stepping through the control circuit methodically, you verify wiring matches the schematic, confirm correct coil voltages and interlocks, validate the start/stop sequence, and test safety features like overload protection and emergency stops. This approach reduces the chance of an overlooked fault and gives confidence that the motor control will operate safely under normal and fault conditions. It's important to note that testing this way does not guarantee that no faults exist—some problems may only appear under load or after extended operation. It also isn't meant to promise faster starts or greater efficiency; its primary goal is safety and correct operation after changes.

**2. How do a short circuit and an overload differ in a circuit?**

- A. A short circuit causes an overload without changing resistance; an overload creates near-zero resistance.**
- B. A short circuit causes a near-zero resistance path with excessive current; an overload draws more current than the circuit rating under normal resistance.**
- C. A short circuit reduces voltage; an overload increases voltage.**
- D. A short circuit and an overload are the same condition.**

Key idea: understand how resistance and current behave in a circuit. A short circuit creates a path of very low resistance, so the current surges high because the source voltage pushes as much current as the near-zero resistance allows. This sudden, excessive current is what triggers protective devices and can cause damage or overheating. An overload happens when the circuit carries more current than its rating but the resistance remains as designed for the load; the current is simply higher than intended, leading to heating over time rather than an immediate surge. So the best description is that a short circuit creates a near-zero resistance path with excessive current, while an overload draws more current than the circuit rating under normal resistance. The other statements misstate how resistance or voltage behaves in these conditions.

**3. Increasing the armature spring force or magnet gap in a relay results in higher pull-in voltage or current values and higher drop-out values. Choose the correct action that causes this change.**

- A. Decreasing**
- B. Increasing**
- C. Increasing the coil resistance**
- D. Increasing the contact area**

When a relay moves, it must overcome opposing forces on the armature—the spring pushing it back and any air-gap reluctance from the magnet gap. If you increase the armature spring force or widen the magnet gap, the coil must produce more magnetic pull to overcome those opposing forces. That raises the current or voltage needed to pull in (pull-in) and also raises the current/voltage at which the armature releases (drop-out) because the magnetic force must still exceed the stronger opposing force to hold or release the contact. So the action that causes this change is increasing the opposing forces. Decreasing them would lower the thresholds, and the other options don't directly cause higher pull-in or drop-out values.

**4. What components comprise a magnetic reversing starter?**

- A. A Timer and a Relay**
- B. A Starter and a Set of Contactors with Interlocking**
- C. A Transformer and a Relay**
- D. A Single Contactor**

A magnetic reversing starter accomplishes motor reversal by using two contactors to swap the motor windings, all controlled by a magnetic starter that provides overload protection. The interlocking between the contactors prevents both from closing at the same time, which would create a direct short or damage the windings. So, when you want forward rotation, one contactor energizes and the other remains de-energized; for reverse, the roles switch. This setup—one starter plus a set of interlocked contactors—is what makes reversing possible and safe. The other options don't provide the required switching of winding connections or the necessary interlock to prevent simultaneous operation of both paths.

## 5. How do you calculate electrical power in a DC circuit?

- A.  $P = I \times R$
- B.  $P = V - I$
- C.  $P = V^2 / R$
- D.  $P = V \times I$**

Power is the rate at which electrical energy is delivered or consumed. In a DC circuit, the universal way to calculate it is by multiplying the voltage across an element by the current through it:  $P = V \times I$ . This definition comes from how voltage drives current and how that flow does work on the circuit component. If the component follows Ohm's law ( $V = IR$ ), you can rewrite the same power in other useful forms:  $P = I^2R$  or  $P = V^2/R$ . These are helpful in special cases— $P = I^2R$  applies when you know current and resistance, and  $P = V^2/R$  applies when you know voltage and resistance. The other expressions aren't generally correct for power.  $P = I \times R$  would give a quantity with voltage units, not watts.  $P = V - I$  isn't a meaningful way to compute power in a circuit context.

## 6. What happens to a normally closed contact when its coil is energized?

- A. It opens.**
- B. It closes.
- C. It remains the same.
- D. It shorts the circuit.

When the coil is energized, the magnetic field pulls the armature and moves the contact away from its seated position, causing the normally closed contact to open the circuit. This is why NC contacts conduct when de-energized and interrupt the circuit when energized. The coil's action doesn't create a short; it just changes the contact state. (A normally open contact would behave oppositely, closing when energized.)

## 7. How do thermal overloads protect motors and what characteristic can trigger them?

- A. They monitor motor current or temperature and trip if the current or temperature exceeds the rated limit for a period.**
- B. They monitor ambient temperature and trip on high humidity.
- C. They monitor motor vibration and trip on excessive vibration.
- D. They trip only when manually reset.

Thermal overloads protect motors by watching the heat generated in the windings from the current the motor is drawing. If the current is higher than what the motor is designed to carry for too long, or if the winding temperature gets too high, the protective element trips and disconnects power to prevent insulation damage or overheating. The important part is the time element: a short spike doesn't trip, but sustained overcurrent or rising temperature beyond the rated limit will. This protection can be provided by a bimetal element that heats up with current or by electronic sensors that monitor current and temperature, both aiming to prevent damage by keeping the winding within safe temperatures. What triggers it is the current or winding temperature exceeding the rated limit for a period of time. Ambient conditions or vibration aren't the signals these protections use, and while some overload devices can be auto-reset or require manual reset after tripping, the trigger remains the overheating condition, not the reset method.

**8. An opto-isolated relay uses \_\_\_\_ to control the relay?**

- A. A Light beam**
- B. A Magnetic field**
- C. A Hydraulic signal**
- D. A Mechanical action**

The signal is transferred optically. An opto-isolated relay uses a light-emitting diode on the input side; when the control signal energizes the LED, it emits light that crosses a nonconductive barrier to a photosensitive device on the output side, which then drives the relay coil. This light-based coupling provides electrical isolation between the control circuitry and the load while still enabling the signal to switch the relay. The other methods—magnetic field, hydraulic signal, or mechanical action—do not provide this optical isolation mechanism, so they're not how an opto-isolated relay is controlled.

**9. A solid-state relay is commonly used for PLC I/O to allow the controller to be reprogrammed without rewiring.**

- A. It's used for measurement**
- B. Only used in DC**
- C. True**
- D. False**

Solid-state relays provide fast, wear-free switching with electrical isolation between the PLC and field devices. Because the wiring between the PLC I/O points and the field loads can stay the same, you can reassign or reprogram which outputs drive which loads without physically rewiring. The SSRs handle the switching under software control, so changing the PLC program changes the control logic without touch-up to the wiring. This is a practical reason SSRs are favored in PLC I/O, offering reliability and easy reconfiguration. They're not primarily about measurement, and they can be used for different load types depending on the SSR, but the core idea—reprogramming with no rewiring—is why the statement is true.

**10. Mechanically held relays are used where the hum of electrically held devices is objectionable, such as:**

- A. Audio equipment**
- B. Control panels in factories**
- C. Medical devices**
- D. All of the above**

Mechanically held relays avoid continuous coil energization by using a mechanical latch to stay in the selected position after a brief pulse. This means they don't produce the audible hum or heat associated with coils that must stay energized to remain actuated. That quiet operation is valuable in environments where noise is noticeable or disruptive. Audio equipment benefits because sensitive signal paths can pick up hum from nearby magnetic fields; quiet relays help prevent that interference. Control panels in factories often operate in environments with many relays, so reducing audible hum and heat improves overall comfort and reliability. Medical devices require quiet, non-disruptive operation to avoid patient or operator disturbance and to prevent interference with sensitive electronics. Since all of these scenarios call for minimizing hum and energy use, the best choice is all of the above.

## 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://nccerelectricallevel22621123.examzify.com>**

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

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