NEIEP ELECTRICAL THEORY AND APPLICATION (430) PRACTICE EXAM (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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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.

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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!

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Questions

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1. **In an unmarked 9-lead motor, which leads are the two ends of the same coil?**

   A. T1 and T4

   B. T2 and T5

   C. T7 and T8

   D. T9 and T3

2. **Why can't a 9-lead motor be reconfigured from wye to delta?**

   A. The windings can be reconfigured internally for high voltage, enabling delta connections.

   B. It requires a transformer to change between configurations.

   C. Internal connections are fixed for one configuration; leads are brought out for voltage selection, not configuration change.

   D. A 9-lead motor actually has separate windings that can be reconfigured with a jumper set.

3. **What is the rotational speed of the stator's magnetic field called?**

   A. Rotor speed

   B. Electrical speed

   C. Synchronous speed

   D. Pole speed

4. **What is the motor term for a device designed to run on both AC and DC?**

   A. A motor designed to run on AC as well as DC

   B. Induction motor

   C. Synchronous motor

   D. Universal motor

5. **What is the percent slip for an 8-pole, 60 Hz motor with a nameplate speed of 875 RPM?**

   A. ≈5.56%

   B. ≈0%

   C. ≈3.6%

   D. ≈2.78%

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6. For resonance in a series RLC circuit, which condition is true?

A. $X_L = X_C$

B. $X_L = -X_C$

C. $R = 0$

D. $Z = \infty$

7. Which of the following is a motor that can be run on both AC and DC?

A. Universal motor

B. Induction motor

C. Synchronous motor

D. DC motor with separate windings

8. In a split-phase motor, which winding is removed before reaching full speed?

A. Start (auxiliary) winding

B. Run (main) winding

C. Stator winding

D. Rotor

9. What is a key difference between 9-lead and 12-lead motors in terms of configurability?

A. 9-lead motors always have reconfigurable options; 12-lead motors do not.

B. 9-lead motors have fixed internal connections for one configuration, while 12-lead motors can be reconfigured between wye and delta.

C. 9-lead motors can be reconfigured between wye and delta, while 12-lead motors always operate in delta.

D. There is no difference.

10. Which motor type uses permanent magnets on the rotor?

A. Induction motor

B. Synchronous motor

C. Permanent magnet motor

D. Universal motor

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Answers

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

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Explanations

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1. In an unmarked 9-lead motor, which leads are the two ends of the same coil?

A. T1 and T4

B. T2 and T5

C. T7 and T8

D. T9 and T3

In a 9-lead motor, there are three windings, each with two ends and a center tap. The two ends of the same winding show the full winding resistance between them, while each end to its center tap reads about half that resistance, and the center taps themselves are separate leads. Typically the windings are paired as follows: ends T1 and T4 with center tap T7 form one winding; ends T2 and T5 with center tap T8 form another; ends T3 and T6 with center tap T9 form the third. So the two ends of the same coil are T1 and T4.

2. Why can't a 9-lead motor be reconfigured from wye to delta?

A. The windings can be reconfigured internally for high voltage, enabling delta connections.

B. It requires a transformer to change between configurations.

C. Internal connections are fixed for one configuration; leads are brought out for voltage selection, not configuration change.

D. A 9-lead motor actually has separate windings that can be reconfigured with a jumper set.

The ability to change between wye and delta depends on how the windings are interconnected inside the motor. In a nine lead motor, the internal connections are fixed for a single configuration, and the extra leads are provided mainly to select the intended supply voltage by linking certain leads together. They do not provide the alternate interconnection pattern needed to form a delta. Reconfiguring to delta would require changing the internal winding connections, which isn't provided by this design, so you can't switch from wye to delta just by altering the external connections.

3. What is the rotational speed of the stator's magnetic field called?

A. Rotor speed

B. Electrical speed

C. Synchronous speed

D. Pole speed

The rotational speed of the stator's magnetic field is called synchronous speed. This is the speed at which the stator's magnetic field would rotate when powered by the AC supply, determined by the line frequency and the number of poles: ns = 120 f / P (in RPM). For example, at 60 Hz with four poles, the synchronous speed is 1800 rpm. In an induction motor, the rotor actually spins a bit slower than this due to slip, while the stator field keeps turning at ns.

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4. What is the motor term for a device designed to run on both AC and DC?

A. A motor designed to run on AC as well as DC

B. Induction motor

C. Synchronous motor

D. Universal motor

The device designed to run on both AC and DC is the universal motor. It's a series-wound brushed motor with a commutator, so the same current passes through both the field and the armature. On AC, the current and magnetic fields reverse each half cycle, but the construction keeps the torque in one direction, allowing rotation to continue. On DC, the commutator still provides the necessary torque direction as the rotor turns. This combination enables operation from either type of supply, which is why universal motors are common in portable tools and appliances. Induction and synchronous motors, by contrast, are designed for AC only and rely on rotating magnetic fields that don't function with DC.

5. What is the percent slip for an 8-pole, 60 Hz motor with a nameplate speed of 875 RPM?

A. ≈5.56%

B. ≈0%

C. ≈3.6%

D. ≈2.78%

Slip is how far the rotor speed falls behind the synchronous speed, expressed as a percentage of that synchronous speed. For an induction motor, Ns = 120 f / P. With f = 60 Hz and P = 8, the synchronous speed is 900 RPM. The rotor runs at 875 RPM under load, so slip s = (Ns − Nr)/Ns × 100% = (900 − 875)/900 × 100% = 25/900 × 100% ≈ 2.78%. So the percent slip is about 2.78%. For context, zero slip would mean the rotor is turning at 900 RPM; larger slips correspond to more lag (for example, 5.56% implies about 50 RPM slip, giving Nr ≈ 850 RPM).

6. For resonance in a series RLC circuit, which condition is true?

A. $X_L = X_C$

B. $X_L = -X_C$

C. $R = 0$

D. $Z = \infty$

In a series RLC circuit, resonance means the L and C store and return energy in step with each other so their reactive effects cancel out. The total impedance is $Z = R + j(X_L - X_C)$. When the reactive part is zero, $X_L - X_C = 0$, so $X_L = X_C$. That makes the impedance purely real and equal to R, causing the current to be at its maximum for that resistance. Since $X_L = \omega L$ and $X_C = 1/(\omega C)$, this occurs at the resonant frequency $\omega_0 = 1/\sqrt{(LC)}$. The other options don't cancel the reactances: $X_L = -X_C$ leaves a net reactive part; $R = 0$ and $Z = \infty$ describe boundary or non-resonant conditions, not the cancellation that defines resonance.

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7. Which of the following is a motor that can be run on both AC and DC?

A. Universal motor

B. Induction motor

C. Synchronous motor

D. DC motor with separate windings

The universal motor is designed so the field and armature windings are in series, so the same current flows through both. With AC, the current direction alternates, but because the windings are in series and the device uses a brushed commutator, the torque produced stays in the same rotational direction. This lets it run smoothly on alternating current. With DC, the current is unidirectional, and the series windings still produce torque in a consistent direction, so it runs just as a DC motor would. Induction motors need a rotating magnetic field created by AC; if you feed them DC, there's no rotating field to pull the rotor along, so they won't operate properly. Synchronous motors also rely on an AC rotating field to maintain speed in step with the supply frequency, so DC won't do. A DC motor with separate windings is essentially a DC machine; feeding AC isn't typical or practical for normal operation because the commutation and windings aren't arranged for AC torque development. So the motor that can run on both AC and DC is the universal motor. It's favored for small appliances requiring high speed and compact size, despite being noisier and wearing brushes faster.

8. In a split-phase motor, which winding is removed before reaching full speed?

A. Start (auxiliary) winding

B. Run (main) winding

C. Stator winding

D. Rotor

In a split-phase motor, the start (auxiliary) winding is used only to get the rotor moving by creating a phase-shifted magnetic field. As the motor nears full speed, a centrifugal switch or similar starter device disconnects the start winding, and the motor continues to run on the run winding alone. This reduces unnecessary current and heat once the motor is up to speed. The rotor stays in the motor and isn't removed, and the run winding remains energized to maintain operation. So the winding removed before reaching full speed is the start (auxiliary) winding.

9. What is a key difference between 9-lead and 12-lead motors in terms of configurability?

A. 9-lead motors always have reconfigurable options; 12-lead motors do not.

B. 9-lead motors have fixed internal connections for one configuration, while 12-lead motors can be reconfigured between wye and delta.

C. 9-lead motors can be reconfigured between wye and delta, while 12-lead motors always operate in delta.

D. There is no difference.

The key idea is how the windings are accessible for wiring configurations. A 12-lead motor provides extra terminals that let you reconfigure the windings to form either a wye (star) or a delta connection, which is essential for adapting to different supply voltages or starting requirements. The extra taps and center points give you the flexibility to rearrange the windings as needed. In contrast, a 9-lead motor has fewer accessible connections, so its internal windings are arranged for a single configuration and can't be reconfigured between wye and delta in practice. That's why the 12-lead motor is the reconfigurable one, and the 9-lead motor is not.

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10. Which motor type uses permanent magnets on the rotor?

A. Induction motor

B. Synchronous motor

C. Permanent magnet motor

D. Universal motor

When the rotor carries permanent magnets, the rotor's magnetic field is fixed and does not require windings or current to create flux. The stator produces a rotating magnetic field, and the interaction between that rotating field and the fixed magnets on the rotor generates torque. Because the rotor field is fixed, the motor tends to run at synchronous speed with respect to the supply frequency (little to no slip under steady load), which is a hallmark of this type of motor. This is why the best choice is the motor that explicitly uses permanent magnets on the rotor. Induction motors rely on currents induced in rotor conductors, not fixed magnets. Universal motors have wound rotors, not permanent magnets. Synchronous motors can be wound-rotor or permanent-magnet rotor, but the term that directly matches "permanent magnets on the rotor" is the permanent-magnet motor.

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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.

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

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

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