PE ELECTRICAL POWER PRACTICE TEST (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. For a generator operating as a motor, how does rotor speed n relate to the synchronous speed ns?

A. n > ns

B. n < ns

C. n = ns

D. n is independent of ns

2. For a given frequency, what is the effect of increasing the number of poles on synchronous speed?

A. Increases

B. Decreases

C. No change

D. Depends on load

3. Maintaining a constant volts-per-hertz ratio helps prevent which phenomenon in magnetic devices?

A. To prevent magnetic saturation

B. To prevent overheating

C. To prevent leakage

D. To prevent dielectric breakdown

4. Which starting method is typically the cheapest option for starting large motors?

A. Direct On-Line/Across the Line/Full Voltage Starting

B. Reduced Voltage Resistor Starting

C. Reduced Voltage Autotransformer Starting

D. Soft-start with VFD

5. What must be done to safely operate a 60 Hz transformer using 50 Hz power supply?

A. No precautions are required; the transformer will be able to safely deliver approx. 17% more power

B. Install a 17% reactance reactor in parallel with the transformer to filter harmonics

C. Increase applied voltage by approx. 17%

D. Decrease the applied voltage by approx. 17%

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6. In NEC 430.7(B), does the locked rotor code letter equal the NEMA design letter?

A. It depends on the motor

B. Yes

C. No

D. They are unrelated to each other

7. Which table provides the Full Load Current in Amps for DC motors?

A. NEC Table 430.52.

B. NEC Table 430.247.

C. NEC Table 430.248.

D. NEC Table 430.250.

8. Exact moment fault is cleared: which condition occurs?

A. Pe > Pm; Torque angle = Torque Clearing Angle; rotor speed > ns

B. Pe < Pm

C. Torque angle = Initial Torque Angle

D. Pe equals ns

9. The term NEMA designation for Torque vs Speed curve slip characteristics describes which motor behavior?

A. Maximum efficiency

B. Insulation class

C. Torque vs speed behavior

D. Physical size

10. Synchronous Generator: E LAGS E0; Torque Angle > 0.

A. E Leads E0; Torque Angle < 0

B. E Lags E0; Torque Angle > 0

C. E Leads E0; Torque Angle > 0

D. E Lags E0; Torque Angle < 0

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Answers

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

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Explanations

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1. For a generator operating as a motor, how does rotor speed n relate to the synchronous speed ns?

A. n > ns

B. n < ns

C. n = ns

D. n is independent of ns

The key idea is that a generator when used as a motor runs in step with the stator's rotating magnetic field. The speed of that field, the synchronous speed, is determined by the supply frequency and the machine's pole count: ns = 120 f / P (rpm). For steady-state motor operation, the rotor must lock to this rotating field, so its mechanical speed matches ns. If the rotor tried to run faster or slower, it would fall out of step with the field and lose synchronism, which isn't how a synchronous motor operates. Therefore, the rotor speed equals the synchronous speed.

2. For a given frequency, what is the effect of increasing the number of poles on synchronous speed?

A. Increases

B. Decreases

C. No change

D. Depends on load

The speed at which a synchronous machine must run to stay in step with the stator field is set by the frequency and the number of poles. For a fixed frequency, the synchronous speed is inversely proportional to the number of poles (Ns = 120 f / P). So, increasing the number of poles reduces the synchronous speed. For example, at 60 Hz, moving from 2 poles to 4 poles halves the speed from about 3600 rpm to about 1800 rpm, and so on. The actual speed doesn't depend on load in steady operation of a true synchronous machine; it's determined by f and P, though large disturbances can affect whether the machine remains in synchronism.

3. Maintaining a constant volts-per-hertz ratio helps prevent which phenomenon in magnetic devices?

A. To prevent magnetic saturation

B. To prevent overheating

C. To prevent leakage

D. To prevent dielectric breakdown

The key idea is that the magnetic flux in a core is driven by the applied voltage relative to frequency. For a transformer or similar device, the instantaneous voltage V is proportional to the rate of change of flux: V dΦ/dt. With sinusoidal excitation, this means the peak flux Φmax is tied to the volts-per-hertz ratio. If V/f is kept constant, Φmax stays within the same range, keeping the core operating in its linear, non-saturated region. When V/f is too high, Φmax increases toward the material's saturation point, where the core's permeability drops, magnetizing current shoots up, distortions appear, and losses rise. By maintaining a constant V/f, you prevent reaching that saturation. Other options aren't the direct outcome of a constant V/f ratio: leakage is about imperfect coupling, and dielectric breakdown involves insulation strength; overheating can result from saturation, but the fundamental protection provided by a constant V/f is avoiding magnetic saturation in the core.

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4. Which starting method is typically the cheapest option for starting large motors?

A. Direct On-Line/Across the Line/Full Voltage Starting

B. Reduced Voltage Resistor Starting

C. Reduced Voltage Autotransformer Starting

D. Soft-start with VFD

Direct On-Line starting is typically the cheapest way to start large motors because it requires no extra starting equipment beyond the motor itself. There's no resistor bank, transformer, or drive to purchase, install, and wire, which keeps initial costs and installation labor to a minimum. The trade-off is a high inrush current and greater mechanical stress during starting, along with potential voltage dips on the supply, but those concerns don't add hardware costs. Reduced voltage methods and soft-start drives add hardware and complexity, raising upfront and lifecycle costs even though they can reduce inrush, torque shock, and energy use.

5. What must be done to safely operate a 60 Hz transformer using 50 Hz power supply?

A. No precautions are required; the transformer will be able to safely deliver approx. 17% more power

B. Install a 17% reactance reactor in parallel with the transformer to filter harmonics

C. Increase applied voltage by approx. 17%

D. Decrease the applied voltage by approx. 17%

The key factor is how magnetic flux in the transformer core depends on voltage and frequency. Flux is roughly proportional to V / f. A transformer designed for 60 Hz will have its rated flux at that frequency with the rated voltage. If you apply the same voltage at 50 Hz, the flux increases by a factor of 60/50 = 1.2, pushing the core toward saturation. To keep the flux at its design level, you must reduce the applied voltage in the same proportion as the frequency change: V_new ≈ V_rated × (50/60) ≈ 0.833 × V_rated, which is about 17% lower. Increasing voltage would worsen saturation; adding a reactor wouldn't fix the core flux issue. So the safe approach is to decrease the applied voltage by about 17%.

6. In NEC 430.7(B), does the locked rotor code letter equal the NEMA design letter?

A. It depends on the motor

B. Yes

C. No

D. They are unrelated to each other

The thing being tested is that these two letters come from different reference points and serve different purposes. The NEMA design letter describes the motor's inherent starting and running characteristics built into the machine's design. The locked-rotor code letter in NEC 430.7(B) is a protection/installation designation that maps the motor's actual locked-rotor current (as a multiple of its full-load current) to a letter used for selecting protective devices and conductor sizing. Because the two letters are derived from different tables and describe different aspects of the motor's behavior, they do not have to match. So a motor can have one NEMA design letter and a different locked-rotor code letter.

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7. Which table provides the Full Load Current in Amps for DC motors?

A. NEC Table 430.52.

B. NEC Table 430.247.

C. NEC Table 430.248.

D. NEC Table 430.250.

DC motors have their own full-load current values tabulated separately in the NEC. The table you use to find the full-load current in amperes for a DC motor is Table 430.247. This separation is necessary because DC motors have different voltage, current, and starting characteristics than AC motors, so their FLC data isn't in the AC tables. Use that table to look up the motor's full-load amperes based on its horsepower and operating voltage, which then informs conductor sizing and protection. The other tables listed are for different motor types or data sets and don't provide the DC motor FLC values.

8. Exact moment fault is cleared: which condition occurs?

A. Pe > Pm; Torque angle = Torque Clearing Angle; rotor speed > ns

B. Pe < Pm

C. Torque angle = Initial Torque Angle

D. Pe equals ns

The moment a fault is cleared is when the rotor has already accelerated during the fault and then the system transitions to the post fault network. At that instant the rotor angle has advanced to the torque clearing angle, which is the angle where the post fault power transfer begins to balance or oppose the mechanical input. The rotor speed is still above the synchronous speed because it has been speeding up while the fault was active. Right after clearance, the electromagnetic power tends to be larger than the mechanical input (Pe > Pm), creating a braking torque that will slow the rotor back toward synchronous speed. This combination—Pe exceeding Pm, the angle having reached the torque-clearing value, and the speed remaining above synchronous—describes the exact moment of fault clearance.

9. The term NEMA designation for Torque vs Speed curve slip characteristics describes which motor behavior?

A. Maximum efficiency

B. Insulation class

C. Torque vs speed behavior

D. Physical size

Torque versus speed behavior is what the NEMA designation captures. In an induction motor, the rotor never reaches synchronous speed; the difference is slip, and torque depends on how much slip there is. The NEMA designations (A, B, C, D) summarize the typical torque–speed curve a motor will exhibit—the starting torque, the torque available at full load, and how the speed climbs toward synchronous speed as load changes. This is about how torque changes with speed (the slip relationship), not about insulation class, physical size, or efficiency. So the designation describes the motor's torque–speed behavior.

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10. Synchronous Generator: E LAGS E0; Torque Angle > 0.

A. E Leads E0; Torque Angle < 0

B. E Lags E0; Torque Angle > 0

C. E Leads E0; Torque Angle > 0

D. E Lags E0; Torque Angle < 0

In a synchronous generator, how much real power you're delivering depends on the angle between the internal generated emf E and the reference emf (often tied to the bus or no-load condition, E0). When the machine is supplying load, the current and armature reaction cause voltage drops that pull E back from its no-load value, so E lags E0. At the same time, the rotor angle shifts in a way that makes the torque angle positive, which corresponds to power flowing from the generator into the grid. So the correct description is that E lags E0 while the torque (power) angle is greater than zero. If E were to lead E0 or if the torque angle were negative, the direction or amount of power transfer would correspond to a different operating condition.

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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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