NEIEP Magnetism and Electromagnetism (355) (Sample)

Study Guide

BY EXAMZIFY

Everything you need from our exam experts!

Table of Contents

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

1. **Which protective device opens the circuit by melting when current exceeds its rating?**
   - A. Circuit breaker
   - B. Relay
   - C. Transformer
   - D. Fuse

2. **In an AC motor, three-phase power creates what that induces rotor current?**
   - A. It uses direct current to magnetize the rotor
   - B. It requires windings to be series connected only
   - C. It creates a rotating magnetic field which induces current in the rotor
   - D. It stops the rotor from turning

3. **Outside a magnet, in which direction do the magnetic lines of force travel?**
   - A. From South to North.
   - B. In all directions at once.
   - C. From North to South.
   - D. They do not extend outside the magnet.

4. **What type of switch has an on and off state and maintains contact until it is actuated by passing in close proximity to a magnetic field?**
   - A. Monostable switch
   - B. Toggle switch
   - C. Bistable switch
   - D. Pushbutton

5. **Which statement describes a solenoid?**
   - A. A transformer is a solenoid with multiple windings
   - B. A coil of wire around a uniform core forms a solenoid
   - C. A solid rod magnetizes when heated
   - D. A reed switch acts as a solenoid

6. **How does the magnetizing current relate to core flux and reflected load in a transformer?**
   - A. The magnetizing current is equal to the load current; reflected load has no effect.
   - B. The magnetizing current I_m establishes the core flux Φ; the load on the secondary is reflected to the primary as $Z_{ref} = (N_p/N_s)^2 Z_{load}$, affecting total current.
   - C. The magnetizing current determines the copper losses; reflected load has no effect.
   - D. The magnetizing current depends solely on input voltage; flux is independent.

7. **Which expression represents Faraday's law for induced emf due to a changing magnetic flux?**
   - A. $\varepsilon = d\Phi/dt$
   - B. $\varepsilon = - d\Phi/dt$
   - C. $\varepsilon = - N \, d\Phi/dt$
   - D. $\varepsilon = \Delta\Phi/\Delta t$

8. **The concentration of magnetic flux lines within a material after packing according to its permeability is called what?**
   - A. Flux density
   - B. Magnetic reluctance
   - C. Flux lines
   - D. Magnetic permeability

9. **What happens when current flow exceeds the rating of a fuse in a circuit?**
   - A. The fuse melts and opens the circuit.
   - B. The circuit breaker trips.
   - C. The wire overheats but current continues.
   - D. The fuse strengthens and keeps conducting.

10. **Why should you have a ceramic permanent magnet on an escalator brake?**
    - A. To overcome residual magnetism in the brake core
    - B. To prevent corrosion
    - C. To reduce wear
    - D. To improve thermal conductivity

Answers

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

Explanations

1. **Which protective device opens the circuit by melting when current exceeds its rating?**

   A. Circuit breaker

   B. Relay

   C. Transformer

   D. Fuse

The key idea is overcurrent protection that sacrifices a part of itself to stop the current. A fuse uses a thin metal element that carries the circuit current. When the current exceeds its rating, the element heats up due to I^2R losses and melts, opening the circuit. This makes fuses single-use devices that must be replaced after they operate. Circuit breakers perform protection by tripping a switch—often via a bimetal thermal mechanism or a magnetic trip—so they interrupt the circuit without melting anything. They are resettable after the fault is cleared. Relays are control devices that open or close contacts in response to a signal, not primarily protective devices that melt to interrupt current. Transformers, on the other hand, are energy-transfer devices and do not function as protective elements that open circuits by melting.

2. **In an AC motor, three-phase power creates what that induces rotor current?**

   A. It uses direct current to magnetize the rotor

   B. It requires windings to be series connected only

   C. It creates a rotating magnetic field which induces current in the rotor

   D. It stops the rotor from turning

Three-phase AC feeding the stator windings creates a rotating magnetic field. As this field sweeps around, the magnetic flux linked with the rotor conductors changes continually. That changing flux induces currents in the rotor due to Faraday's law. The currents in the rotor then interact with the stator's rotating field to produce torque, making the rotor turn. The rotor doesn't magnetize with DC or require any special series-winding condition—the key idea is the rotating magnetic field generated by the three-phase supply. It also doesn't stop the rotor; instead, a small slip keeps the rotor currents flowing to sustain motion.

3. **Outside a magnet, in which direction do the magnetic lines of force travel?**

   A. From South to North.

   B. In all directions at once.

   C. From North to South.

   D. They do not extend outside the magnet.

Magnetic field lines show the direction of the magnetic field B. Outside a magnet, the lines leave the north pole and enter the south pole, so they travel from North to South. Inside the magnet, they continue from south to north, forming a continuous loop. This external direction also explains why a compass needle's north end points toward the magnet's south pole. The other statements don't align with how field lines are conventionally drawn: they aren't going in all directions at once, and they do extend outside the magnet.

4. What type of switch has an on and off state and maintains contact until it is actuated by passing in close proximity to a magnetic field?

A. Monostable switch

B. Toggle switch

C. Bistable switch

D. Pushbutton

Two stable states with memory. A bistable switch is designed to stay in either the on or off position after an actuation, and it keeps that contact state even when the actuating signal is removed. In magnetic actuation, a field can flip the contacts from one state to the other, and because it is bistable, it remains in that new state until another magnetic event flips it again. This persistence distinguishes it from a monostable switch, which changes state only briefly and then returns to its resting state once the actuation ends. A pushbutton is typically momentary, making contact only while pressed, and a toggle switch changes state by mechanical movement rather than magnetic proximity. So, the behavior described matches a bistable (latching) switch.

5. Which statement describes a solenoid?

A. A transformer is a solenoid with multiple windings

B. A coil of wire around a uniform core forms a solenoid

C. A solid rod magnetizes when heated

D. A reed switch acts as a solenoid

A solenoid is a coil of wire that, when current flows through it, produces a magnetic field along its length. Putting a uniform ferromagnetic core inside the coil concentrates and strengthens that field, which is what many practical solenoids are. So describing a coil of wire around a uniform core encapsulates the essential setup that makes a solenoid function. The other statements don’t fit because they describe different devices: a transformer uses multiple windings to transfer energy between circuits, not a single coil forming a solenoid; heating a solid rod and magnetizing it isn’t about a coil-produced magnetic field; and a reed switch is a magnetic switch operated by an external field, not a coil-driven device.

6. How does the magnetizing current relate to core flux and reflected load in a transformer?

A. The magnetizing current is equal to the load current; reflected load has no effect.

B. The magnetizing current I_m establishes the core flux Φ; the load on the secondary is reflected to the primary as $Z_{ref} = (N_p/N_s)^2 Z_{load}$, affecting total current.

C. The magnetizing current determines the copper losses; reflected load has no effect.

D. The magnetizing current depends solely on input voltage; flux is independent.

Magnetizing current is the current that flows in the primary to establish the magnetic flux in the core. This flux is created by the applied voltage, turns, and frequency, and the magnetizing current is what provides the magnetizing force needed to set that flux in the core's magnetic path. The secondary load can't be supplied directly from the primary without some coupling effect. The current drawn by the secondary, when referred back to the primary, appears as a transformed impedance: $Z_{ref} = (N_p/N_s)^2$ times the load impedance Z_{load}. This reflected impedance means the primary current includes a portion that feeds the secondary load, even though that current originates on the secondary side. Put together, the total primary current is the phasor sum of the magnetizing current (which establishes the flux) and the current required to feed the reflected load. That's why the reflected load affects the total current the primary must supply. In an ideal transformer, the magnetizing current is small compared to the current drawn to support the reflected load, but it still sets the flux level that enables power transfer. The other options misstate these relationships: the magnetizing current does not equal the load current and the reflected load does have an effect on the primary current; the magnetizing current isn't the sole determinant of copper losses and flux isn't independent of the supplied voltage.

7. Which expression represents Faraday's law for induced emf due to a changing magnetic flux?

A. $\varepsilon = d\Phi/dt$

B. $\varepsilon = - d\Phi/dt$

C. $\varepsilon = - N\, d\Phi/dt$

D. $\varepsilon = \Delta\Phi/\Delta t$

When magnetic flux through a loop changes, an emf is induced and its direction is such that it opposes the change (Lenz's law). The rate at which the flux changes drives the induced emf, and the sign reflects that opposition. For a single loop, the induced emf is the negative time derivative of the flux: $\varepsilon = - d\Phi/dt$. The negative sign is what makes the induced current produce a magnetic field that fights the change in flux. If you have a coil with N turns, you multiply by N to get the total emf: $\varepsilon = - N\, d\Phi/dt$. The other forms either omit the sign, use a rough finite difference rather than the instantaneous rate, or apply the coil case when the problem doesn't specify multiple turns.

8. The concentration of magnetic flux lines within a material after packing according to its permeability is called what?

A. Flux density

B. Magnetic reluctance

C. Flux lines

D. Magnetic permeability

The key idea is flux density. It measures how much magnetic flux passes through a unit area, so it directly reflects how concentrated the magnetic flux lines are inside a material. For a given magnetomotive force, a material with higher permeability μ concentrates more flux, which increases the flux density B, since B = μH. Flux density is the actual density of lines per area, the measure of how densely the lines are packed. Flux lines are a visualization of the field, not a numeric density. Magnetic reluctance describes the opposition to flux, not how tightly the lines are packed. Magnetic permeability is the material's property that relates B to H, but it is not the density itself.

9. What happens when current flow exceeds the rating of a fuse in a circuit?

A. The fuse melts and opens the circuit.

B. The circuit breaker trips.

C. The wire overheats but current continues.

D. The fuse strengthens and keeps conducting.

When current exceeds the fuse rating, the metal link inside the fuse heats up from I^2R losses and eventually melts, opening the circuit. This interruption stops the flow of current to protect wiring and connected devices from overheating or fire. The rating is set so that at that current level, the fuse will blow within a specified time to prevent damage. If the overload is only brief, some fuses may not blow immediately, depending on the fuse type (fast-acting versus slow-blow). The other ideas aren't what a fuse does: a circuit breaker trips as a separate device, the wire overheating with current continuing would defeat protection, and a fuse doesn't strengthen or continue conducting.

10. Why should you have a ceramic permanent magnet on an escalator brake?

A. To overcome residual magnetism in the brake core

B. To prevent corrosion

C. To reduce wear

D. To improve thermal conductivity

Residual magnetism left in the brake core after it releases can cause the brake to stick because the residual magnetic field continues to attract the contact surfaces. A ceramic permanent magnet provides a bias field that opposes and neutralizes that residual magnetization when the brake is not energized. With less residual flux, the brake releases more reliably, reducing sticking, drag, and the associated wear and heat buildup. Ferrite (ceramic) magnets are suitable here because they are inexpensive and have good corrosion resistance and stability in typical escalator temperatures, making them a practical biasing solution. This isn't mainly about preventing corrosion, improving thermal conductivity, or directly reducing wear—the key effect is counteracting residual magnetism to ensure a clean, reliable brake release.

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:

https://neiep355.examzify.com

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