

FE Electrical and Computer Practice Exam (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. In terms of phase relationships, what does a capacitive circuit typically exhibit?**
 - A. A lagging current**
 - B. A leading current**
 - C. A constant current**
 - D. No phase difference**
- 2. Which of the following represents the relationship between apparent power, real power, and reactive power?**
 - A. $P = S + Q$**
 - B. $S = P + Q^2$**
 - C. $S^2 = P^2 + Q^2$**
 - D. $P = S - Q$**
- 3. What is the effect of connecting capacitors in series?**
 - A. The equivalent capacitance decreases**
 - B. The equivalent capacitance increases**
 - C. Capacitance remains unchanged**
 - D. Only one capacitor determines the overall capacitance**
- 4. What is the mathematical expression for Joule's law of the heating effect?**
 - A. $P = VI$**
 - B. $P = I^2R$**
 - C. $P = IR^2$**
 - D. $P = V^2/R$**
- 5. In a BJT circuit, which factor primarily impacts the collector current (IC)?**
 - A. Base resistance**
 - B. Emitter voltage**
 - C. Load resistance**
 - D. Collector voltage**

6. What unit is equivalent to J/C?

- A. Ohm**
- B. Farad**
- C. Volt**
- D. Watt**

7. What equation calculates the equivalent capacitance for n capacitors in series?

- A. $C_{eq} = C_1 + C_2 + \dots + C_n$**
- B. $C_{eq} = 1/[(1/C_1) + (1/C_2) + \dots + (1/C_n)]$**
- C. $C_{eq} = (C_1 * C_2) / (C_1 + C_2)$**
- D. $C_{eq} = C_1 * C_2 * \dots * C_n$**

8. What characterizes a bit slice processor?

- A. It reduces the overall system size significantly**
- B. It integrates smaller self-contained components**
- C. It primarily operates in a single core manner**
- D. It only processes binary data**

9. What does UDP stand for in network communications?

- A. Uniform Data Protocol**
- B. User Datagram Protocol**
- C. Universal Data Protocol**
- D. Undirected Data Packet**

10. What equation represents the maximum energy-transfer condition?

- A. $R(\text{load}) = R(\text{source})$**
- B. Lenz's law**
- C. $Z(\text{load}) = Z^*(\text{load})$**
- D. $V(\text{Phase}) = V(\text{Line})/\sqrt{3}$**

Answers

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

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Explanations

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1. In terms of phase relationships, what does a capacitive circuit typically exhibit?

- A. A lagging current**
- B. A leading current**
- C. A constant current**
- D. No phase difference**

In a capacitive circuit, the current leads the voltage in terms of phase relationship. This means that when an alternating current (AC) voltage is applied across a capacitor, the current reaches its peak value before the voltage does. This phenomenon occurs because a capacitor stores energy in the form of an electric field, and it takes time for this storage to happen when the voltage changes. The leading behavior of current in a capacitive circuit is crucial for understanding how such circuits operate within AC systems. It affects how capacitors are used for power factor correction and in filtering applications. In contrast, inductive circuits typically demonstrate a lagging current, where the current peak follows the voltage peak. Understanding this phase relationship is important in applications such as circuit design, signal processing, and power systems, where the timing of current and voltage is critical for efficient operation.

2. Which of the following represents the relationship between apparent power, real power, and reactive power?

- A. $P = S + Q$**
- B. $S = P + Q^2$**
- C. $S^2 = P^2 + Q^2$**
- D. $P = S - Q$**

The relationship between apparent power, real power, and reactive power is accurately represented by the equation where the square of the apparent power equals the sum of the squares of the real power and reactive power. In mathematical terms, this is often expressed as $(S^2 = P^2 + Q^2)$, where S is the apparent power, P is the real power, and Q is the reactive power. This equation arises from the geometric representation of power in AC circuits, often referred to as the power triangle. In this triangle, the real power (the horizontal side) represents the actual power consumed by the load, the reactive power (the vertical side) represents the power stored and released by the inductive and capacitive components, and the apparent power (the hypotenuse) is a combination of both real and reactive power. This fundamental relationship is key in understanding power flow in electrical systems and is critical for power factor analysis and improving energy efficiency in electrical engineering applications. Other options do not correctly represent the relationship between these types of power. For instance, stating that P equals S plus Q would suggest that real power is a sum of apparent and reactive power, which is not physically meaningful within the context of AC circuits.

3. What is the effect of connecting capacitors in series?

- A. The equivalent capacitance decreases**
- B. The equivalent capacitance increases**
- C. Capacitance remains unchanged**
- D. Only one capacitor determines the overall capacitance**

When capacitors are connected in series, the overall behavior of the circuit changes in a specific way. The key effect is that the equivalent capacitance of the series combination is less than the capacitance of the smallest capacitor in the series. This occurs because, in a series arrangement, the charge on each capacitor is the same, and the voltage across the series combination is the sum of the voltages across each capacitor. The relationship for determining the equivalent capacitance (C_{eq}) in a series configuration is given by the formula: $\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \dots$ Where (C_1, C_2, C_3, \dots) are the capacitances of the individual capacitors. As you can see from the formula, when you take the reciprocal of the individual capacitances, the result is always a value that is greater than zero, leading to an overall equivalent capacitance that is smaller than each individual capacitor's capacitance. Therefore, the correct understanding is that connecting capacitors in series results in a

4. What is the mathematical expression for Joule's law of the heating effect?

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

Joule's law describes the heating effect of electric current flowing through a conductor. The expression given by $P = I^2R$ indicates that the power (P) dissipated as heat in a resistor is proportional to the square of the current (I) that flows through it and the resistance (R) of the conductor. This relationship highlights the fact that as the current increases, the power loss due to heat increases with the square of that current, which means small increases in current can lead to significant increases in heating. This equation is derived from the fundamental relationship between voltage, current, and resistance (Ohm's law: $V = IR$). Substituting Ohm's law into the power equation $P = IV$ (where P is power, I is current, and V is voltage), we can replace V with IR, leading to $P = I(IR) = I^2R$. This shows that the energy converted to heat in a resistor due to electrical energy depends primarily on the current passing through it. Understanding Joule's law is crucial for applications in electrical engineering, as it helps in designing circuits and managing thermal effects in electrical components. The other options do not directly represent Joule's law as they either describe power in different contexts (like using voltage

5. In a BJT circuit, which factor primarily impacts the collector current (IC)?

- A. Base resistance**
- B. Emitter voltage**
- C. Load resistance**
- D. Collector voltage**

In a Bipolar Junction Transistor (BJT) circuit, the collector current (IC) is primarily influenced by the base current (IB) due to the transistor's current amplification properties. The relation can be defined by the equation $I_C = \beta I_B$, where β (beta) is the current gain of the transistor. As base resistance impacts the amount of base current flowing into the transistor, it directly affects the collector current. Increasing base resistance can lead to a reduced base current, which will subsequently decrease the collector current. Conversely, eliminating or reducing base resistance can increase base current and therefore increase the collector current, showcasing the strong dependence of IC on the conditions at the base. While emitter voltage, load resistance, and collector voltage also influence the overall behavior of the circuit, they have indirect impacts compared to the more direct relationship between base resistance and base current, which ultimately determines the collector current. Therefore, base resistance is the critical factor influencing IC in a BJT circuit.

6. What unit is equivalent to J/C?

- A. Ohm**
- B. Farad**
- C. Volt**
- D. Watt**

The unit J/C, which represents joules per coulomb, is equivalent to the volt. This relationship stems from the definition of electric potential. A volt is defined as the difference in electric potential energy (measured in joules) per unit charge (measured in coulombs). Therefore, when one joule of energy is transferred per coulomb of electric charge, the potential difference is one volt. Understanding this conversion is crucial when dealing with circuits and electrical components, as it helps to relate energy transferred in terms of electric current and voltage in various applications. Other options, such as ohm, farad, and watt, represent different electrical concepts: ohms measure resistance, farads measure capacitance, and watts measure power. Each of these units serves distinct roles in electrical engineering, but they do not relate directly to energy per charge like the volt does. Thus, the only correct correlation with J/C is the volt.

7. What equation calculates the equivalent capacitance for n capacitors in series?

- A. $C_{eq} = C_1 + C_2 + \dots + C_n$
- B. $C_{eq} = 1/(1/C_1) + (1/C_2) + \dots + (1/C_n)$**
- C. $C_{eq} = (C_1 * C_2) / (C_1 + C_2)$
- D. $C_{eq} = C_1 * C_2 * \dots * C_n$

The equivalent capacitance for capacitors connected in series can be calculated using the formula where the inverse of the equivalent capacitance is equal to the sum of the inverses of the individual capacitances. This relationship arises from the definition of capacitors in series: when capacitors are connected in series, the charge on each capacitor remains the same, but the voltage across the total arrangement becomes the sum of the voltages across each individual capacitor. This is represented mathematically as follows: the total voltage (V_{total}) is equal to the sum of the voltages across each capacitor (V_1, V_2, \dots, V_n), which means $(V_{total}) = V_1 + V_2 + \dots + V_n$. The capacitance is defined as $(C = Q/V)$, where Q is the charge and V is the voltage across the capacitor. For capacitors in series, the same charge Q appears on each capacitor. Consequently, the formula for the total capacitance takes the form: $\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} + \dots + \frac{1}{C_n}$

8. What characterizes a bit slice processor?

- A. It reduces the overall system size significantly
- B. It integrates smaller self-contained components**
- C. It primarily operates in a single core manner
- D. It only processes binary data

A bit slice processor is characterized by its modular design, where smaller self-contained components, or "slices," are combined to create a complete processor. Each slice typically includes a portion of the operations that a full processor would handle, such as arithmetic or control functions, allowing for flexibility and scalability in processing width. This modularity means that additional bits can be added to increase the data width capability of the processor, making it possible to customize the processor according to specific application requirements. This approach allows system designers to develop systems with varying bit widths without having to design a completely new processor from scratch, thereby enhancing adaptability and efficiency in development. The use of smaller logically independent units also enables parallel operation and can facilitate improvements in speed and performance depending on how many slices are employed simultaneously. In contrast, although a bit slice processor can reduce overall system size by allowing for specific configurations, the primary defining characteristic is its architecture of smaller, self-contained components.

9. What does UDP stand for in network communications?

- A. Uniform Data Protocol
- B. User Datagram Protocol**
- C. Universal Data Protocol
- D. Undirected Data Packet

UDP stands for User Datagram Protocol, which is a core protocol of the Internet Protocol Suite used for sending messages, called datagrams, across a network. One of the key features of UDP is that it is a connectionless protocol, meaning it does not establish a connection before sending data and does not guarantee the delivery of packets. This makes it suitable for applications where timely delivery is more critical than reliability, such as video streaming, online gaming, and voice over IP (VoIP). In contrast to other protocols like TCP (Transmission Control Protocol), which provides error checking and guarantees delivery, UDP operates with lower overhead and enables faster data transmission. This classifies it as a lightweight protocol, catering to applications that can tolerate some data loss but require low latency. Thus, the term "User Datagram Protocol" accurately reflects its design intended for user-level applications sending discrete messages in an efficient manner.

10. What equation represents the maximum energy-transfer condition?

- A. $R(\text{load}) = R(\text{source})$
- B. Lenz's law
- C. $Z(\text{load}) = Z^*(\text{load})$**
- D. $V(\text{Phase}) = V(\text{Line})/\sqrt{3}$

The maximum energy-transfer condition in an electrical system occurs when the load impedance matches the complex conjugate of the source impedance. This principle is key in maximizing the power transferred from the source to the load. Specifically, when the load impedance equals the complex conjugate of the load's impedance, it ensures that the conditions are optimal for power transfer. By defining the load and source impedances in complex form, matching the load impedance, $Z(\text{load})$, to the conjugate of the source impedance, $Z^*(\text{source})$, results in the maximum real power transfer. This is derived from the concept known as the "maximum power transfer theorem," which indicates that for a given network, the load must have an impedance that allows it to draw maximum power from the source. In the context of the choices provided, the specified condition in the correct answer encapsulates this optimal scenario effectively, leading to the maximum energy being transferred in the circuit. This principle is widely applied in electrical engineering, particularly in communications and power systems, to optimize performance. Other provided options do not pertain to the condition of energy transfer in relation to impedance: the matching of resistances or reactances outlined in those choices does not inherently lead to the maximum energy transfer as effectively as the matching of complex

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://feeleccomputer.examzify.com>

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

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