

ETA Electronics Certification Practice Exam (Sample)

Study Guide



Everything you need from our exam experts!

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Questions

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- 1. Watt's law states that power is the product of current and voltage. How could the power be determined if resistance and current are known?**
 - A. Current squared times the resistance**
 - B. Voltage squared times the resistance**
 - C. Current times voltage**
 - D. Resistance plus current**
- 2. What type of electricity is generated by the triboelectric effect?**
 - A. AC Electricity**
 - B. Static Electricity**
 - C. Direct Current**
 - D. Alternating Current**
- 3. What is the primary purpose of an RF amplifier?**
 - A. To increase voltage levels of signals**
 - B. To enhance low-level radio frequency signals**
 - C. To convert RF signals to audio**
 - D. To decrease interference in circuits**
- 4. What role does an anode play in electronic devices?**
 - A. It is the negative terminal**
 - B. It stores electrical charge**
 - C. Conventional current enters through it**
 - D. It converts AC to DC**
- 5. Which electrical component can store energy in an electric field?**
 - A. Resistor**
 - B. Capacitor**
 - C. Inductor**
 - D. Fusible Link**

- 6. What type of reading does the ammeter setting on a multimeter indicate?**
- A. Resistance**
 - B. Voltage**
 - C. Current**
 - D. Power**
- 7. What does Ohm's Law express in relation to electrical circuits?**
- A. Voltage = Current \times Resistance**
 - B. Current = Resistance \times Voltage**
 - C. Resistance = Voltage + Current**
 - D. Power = Voltage \times Current**
- 8. What class of fire extinguisher is specifically suited for an oil fire?**
- A. A**
 - B. B**
 - C. C**
 - D. D**
- 9. What does a circuit breaker do?**
- A. It increases current flow in a circuit**
 - B. It regulates voltage levels in a circuit**
 - C. It protects against circuit overload**
 - D. It joins electronic components together**
- 10. What does a logic gate do?**
- A. A logic gate converts analog signals into digital form**
 - B. A logic gate takes one or more binary inputs and produces a single binary output based on a specific logical operation**
 - C. A logic gate amplifies signals for processing**
 - D. A logic gate stores binary information**

Answers

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

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Explanations

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1. Watt's law states that power is the product of current and voltage. How could the power be determined if resistance and current are known?

A. Current squared times the resistance

B. Voltage squared times the resistance

C. Current times voltage

D. Resistance plus current

Watt's law provides a fundamental relationship in electrical engineering that relates power, voltage, current, and resistance. When you know both resistance and current, you can determine power using one of the forms derived from Ohm's law ($V = I \times R$). In this case, if you know the current (I) and resistance (R), you can derive the voltage (V) using Ohm's law as $V = I \times R$. Once you have determined the voltage, you can apply Watt's law: Power (P) = Voltage (V) \times Current (I). By substituting the expression for voltage into the power formula, it becomes: Power (P) = $(I \times R) \times I = I^2 \times R$. This shows that when resistance and current are known, the power can be calculated by taking the current squared and multiplying it by the resistance, confirming that current squared times the resistance is the correct way to determine the power in this scenario. This principle is widely used in electrical calculations and helps engineers design and analyze electrical systems effectively.

2. What type of electricity is generated by the triboelectric effect?

A. AC Electricity

B. Static Electricity

C. Direct Current

D. Alternating Current

The triboelectric effect refers to the phenomenon where certain materials become electrically charged after they come into contact with each other and subsequently separate. This process generates static electricity, which is a type of electricity that is not flowing like current electricity but is instead accumulated on the surface of materials. When two different materials come into contact, electrons may transfer from one material to another, creating an imbalance of electrical charge. This can often be observed in everyday life, such as when rubbing a balloon on your hair results in the balloon becoming charged, allowing it to stick to walls or attract other lightweight objects. This demonstrates how static electricity arises as a direct result of the triboelectric effect. The other types of electricity, such as AC and DC, involve the continuous flow of electric charge, either in one direction (DC) or alternating directions (AC). However, these forms of electricity do not emerge from the contact and separation processes characteristic of the triboelectric effect, reinforcing that the correct answer is indeed static electricity.

3. What is the primary purpose of an RF amplifier?

- A. To increase voltage levels of signals
- B. To enhance low-level radio frequency signals**
- C. To convert RF signals to audio
- D. To decrease interference in circuits

The primary purpose of an RF amplifier is to enhance low-level radio frequency signals. This function is critical in various applications such as communications, broadcasting, and signal processing, where weak RF signals need amplification to ensure they can be processed or transmitted effectively. RF amplifiers are designed specifically to handle frequency ranges associated with radio frequencies, which can often be quite weak when received by antennas. By boosting these signals, RF amplifiers help improve the overall signal-to-noise ratio, making it easier to discriminate useful signals from background noise and other interference. The amplification process does not solely relate to voltage increase; it focuses on enhancing the signal strength to a usable level while maintaining the signal's integrity. Thus, option B accurately reflects the essential role of RF amplifiers in electronic systems, facilitating clearer reception and transmission of signals in communication devices and systems.

4. What role does an anode play in electronic devices?

- A. It is the negative terminal
- B. It stores electrical charge
- C. Conventional current enters through it**
- D. It converts AC to DC

The anode plays a crucial role in electronic devices primarily as the terminal through which conventional current enters an electrochemical cell or diode. In the context of semiconductor devices like diodes, the anode is the positively charged side that allows current to flow into the device when it is forward-biased. This is foundational to the operation of many electronic components and systems, as it facilitates the movement of charge carriers. In contrast to the function of the anode, the negative terminal is associated with the cathode, which is where current exits the device. Similarly, while some components can store electrical charge (like capacitors), this is not a function of the anode itself. Additionally, the conversion of AC to DC is typically handled by rectifiers or other dedicated components, rather than by the anode. Therefore, recognizing the anode's specific role in permitting current flow enhances understanding of fundamental electronic principles.

5. Which electrical component can store energy in an electric field?

A. Resistor

B. Capacitor

C. Inductor

D. Fusible Link

A capacitor is the electrical component specifically designed to store energy in an electric field. This occurs when a voltage is applied across its terminals, causing positive and negative charges to accumulate on its plates. The amount of stored energy can be described mathematically by the equation $E = \frac{1}{2} C V^2$, where E represents energy, C is capacitance, and V is voltage. This ability to store electric energy allows capacitors to play crucial roles in various applications, such as filtering, smoothing voltage fluctuations, coupling signals, and timing applications in electronic circuits. In contrast, resistors are components that oppose the flow of electric current and dissipate energy as heat, rather than storing it. Inductors store energy in a magnetic field when an electric current flows through them, which is a different mechanism compared to how capacitors store energy. Fusible links, on the other hand, are safety devices that protect against overcurrent by melting if the current exceeds a certain level; they do not store energy. Thus, the distinct property of capacitors for energy storage in an electric field makes them the correct choice.

6. What type of reading does the ammeter setting on a multimeter indicate?

A. Resistance

B. Voltage

C. Current

D. Power

The ammeter setting on a multimeter is specifically designed to measure current, which is the flow of electric charge in a circuit. When the multimeter is set to the ammeter mode, it allows the device to measure how much electric current (measured in amperes) is flowing through the circuit at any given moment. This is crucial for various applications in electronics, as knowing the current helps assess the performance and safety of circuits. Measuring voltage is done in a different mode, which typically involves connecting the probes in parallel with a circuit. Resistance measurements require a separate setting, where the multimeter sends a known current through a resistor and measures the resulting voltage drop to calculate the resistance. Power measurement, on the other hand, involves both current and voltage calculations to determine how much energy is being consumed or produced in a circuit. Thus, in the context of the question, the ammeter setting directly correlates with the measurement of current.

7. What does Ohm's Law express in relation to electrical circuits?

A. Voltage = Current × Resistance

B. Current = Resistance × Voltage

C. Resistance = Voltage + Current

D. Power = Voltage × Current

Ohm's Law is fundamentally a principle that describes the relationship between voltage, current, and resistance in an electrical circuit. The correct expression, $\text{Voltage} = \text{Current} \times \text{Resistance}$, indicates that the voltage (measured in volts) across a conductor is directly proportional to the current (measured in amperes) flowing through it, provided that the temperature and material properties of the conductor remain constant. This relationship highlights that as the current increases, the voltage also increases if the resistance is kept constant. Conversely, if the resistance increases while the current remains the same, the voltage will also increase. This law is crucial for analyzing circuits, allowing engineers to calculate how much voltage is needed for a certain current to flow based on the resistance present in the circuit. The other options do not correctly represent Ohm's Law. The second choice presents an incorrect formulation of Ohm's Law by switching the roles of voltage and current. The third choice combines terms in a way that doesn't relate to the established definition provided by Ohm's Law. The last choice describes the relationship between power, voltage, and current, which is not the essence of Ohm's Law but is instead known as the power formula in electrical circuits. This highlights the distinction between power, which involves the

8. What class of fire extinguisher is specifically suited for an oil fire?

A. A

B. B

C. C

D. D

The class of fire extinguisher specifically suited for an oil fire is Class B. This class is designed for fires involving flammable liquids such as oil, gasoline, and grease. Class B extinguishers use extinguishing agents that effectively suppress fires fueled by these types of materials, often through smothering or cooling methods that eliminate the fire's heat source or cut off its oxygen supply. Class B extinguishers typically contain materials like foam, carbon dioxide, or dry chemical agents, which are effective against flammable liquid fires without causing additional hazards. Choosing a Class B extinguisher for an oil fire is crucial because using the wrong type of extinguisher, such as those meant for Class A (ordinary combustibles), Class C (electrical fires), or Class D (combustible metals), could be ineffective or even dangerous. Understanding the classification of fire extinguishers helps ensure that individuals can respond appropriately to different fire scenarios, minimizing danger and potential damage.

9. What does a circuit breaker do?

- A. It increases current flow in a circuit
- B. It regulates voltage levels in a circuit
- C. It protects against circuit overload**
- D. It joins electronic components together

A circuit breaker serves the critical function of protecting a circuit from overloads or faults that can lead to excessive current flow. When the current exceeds a predetermined level, indicating a potential overload or a short circuit, the circuit breaker automatically interrupts the flow of electricity, preventing damage to the circuit and reducing the risk of fire or other hazards. This safety mechanism is integral to electrical systems, ensuring that equipment and wiring are safeguarded against conditions that could lead to failure. Its role is specifically geared toward disruption of current flow in response to fault conditions rather than altering the circuit characteristics, such as increasing current flow, regulating voltage, or connecting components.

10. What does a logic gate do?

- A. A logic gate converts analog signals into digital form
- B. A logic gate takes one or more binary inputs and produces a single binary output based on a specific logical operation**
- C. A logic gate amplifies signals for processing
- D. A logic gate stores binary information

A logic gate is fundamental in digital electronics and has a specific role that involves processing binary information. It operates by taking one or more binary inputs and performing a logical operation on them to produce a single binary output. The logical operations performed by these gates include AND, OR, NOT, NAND, NOR, XOR, and XNOR, each defining a different way in which inputs can be combined to yield an output. For instance, in an AND gate, the output is only high (or '1') when all inputs are high, while an OR gate will output high when at least one input is high. This ability to process and manipulate binary information allows them to perform computational and decision-making tasks in circuits, making them essential components in everything from simple circuits to complex microprocessors. The other options do not accurately reflect the core function of a logic gate. While analog-to-digital conversion, signal amplification, and data storage are important concepts in electronics, they are not functions performed by logic gates. Instead, these functions are handled by other types of components in an electronic system.