4th Year Lineman Apprentice Practice Exam (Sample)

Study Guide

Everything you need from our exam experts!

Questions

1. **What is the unit of measure for apparent power?**

   A. Ohms

   B. Watts

   C. Volt-Amps

   D. Amperes

2. **What is the unit of measure for both capacitive and inductive reactance?**

   A. Watts

   B. Ohms

   C. Volt-Amps

   D. Amperes

3. **What is the potential difference between two dissimilar metals in an electrolyte primarily dependent on?**

   A. Temperature of the electrolyte

   B. Kinds of metal

   C. Thickness of the metals

   D. Surface area of the metals

4. **What is the calculated high side coil current for the 50 kVA transformer?**

   A. 11.9 amps

   B. 6.9 amps

   C. 15 amps

   D. 12.5 amps

5. **What is the minimum acceptable test voltage for a good sacrificial anode?**

   A. 400 millivolts

   B. 600 millivolts

   C. 800 millivolts

   D. 900 millivolts

6. **What does a megohmeter specifically measure?**

   A. Voltage

   B. Current

   C. High resistance

   D. Low resistance

7. **Total opposition to current flow in an alternating current circuit is referred to as?**

   A. Resistance

   B. Reactance

   C. Impedance

   D. Capacitance

8. **What type of transformer is used to increase voltage on a feeder by 5 or 10 percent?**

   A. Autotransformer

   B. Booster

   C. Step-down transformer

   D. Isolation transformer

9. **How often should rubber gloves be inspected while in use?**

   A. Once a week

   B. Once a day

   C. Once a month

   D. Once per shift

10. **Which unit of measure represents "real" power?**

   A. Watts

   B. Ohms

   C. Volt-Amps

   D. Hertz

Answers

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

Explanations

1. What is the unit of measure for apparent power?

A. Ohms

B. Watts

C. Volt-Amps

D. Amperes

Apparent power is measured in volt-amperes (VA). It represents the total power flow in an electrical system and incorporates both active (real) power, measured in watts, and reactive power, which is power that oscillates between the source and the load but does no useful work. This makes volt-amperes a crucial measurement in alternating current (AC) systems where both types of power are present. The distinction between apparent power and other measurements lies in the way different types of power are accounted for in a circuit. While watts are strictly the measure of real power that performs useful work, volt-amperes take into account the total power in a circuit without differentiating between the portions that do work and those that do not. Ohms are a unit of resistance, and amperes denote the flow of current. These units do not represent power directly, which is why they are not relevant in the context of measuring apparent power. As a result, volt-amperes is the correct choice for measuring apparent power, making it essential for both understanding and managing the distribution and flow of electrical energy in various applications.

2. What is the unit of measure for both capacitive and inductive reactance?

A. Watts

B. Ohms

C. Volt-Amps

D. Amperes

The unit of measure for both capacitive and inductive reactance is Ohms. Reactance stems from the opposition that capacitors and inductors present to alternating current, and it is specifically measured in Ohms, just like resistance. In an AC circuit, capacitive reactance (represented by XC) and inductive reactance (represented by XL) determine how these components affect the flow of current. While resistance (the real part of impedance) indicates how much current is reduced by a component, reactance reflects the energy storage capabilities of capacitors and inductors, which can delay current flow. This is critical in alternating current systems, particularly in designing circuits and analyzing their behavior at different frequencies. Understanding this distinction is vital for linemen and electricians who work on AC systems, as it aids in properly sizing and selecting components based on their effect on the circuit. Hence, it is essential to recognize that both forms of reactance are quantified in Ohms, similar to how we measure resistance, emphasizing the similar nature of their influence within the same units.

3. What is the potential difference between two dissimilar metals in an electrolyte primarily dependent on?

A. Temperature of the electrolyte

B. Kinds of metal

C. Thickness of the metals

D. Surface area of the metals

The potential difference between two dissimilar metals in an electrolyte is primarily dependent on the kinds of metal involved. Different metals have different electrochemical properties, which contribute to their electrode potentials in a galvanic cell or electrochemical reaction. This means that each metal will have a distinct tendency to either gain or lose electrons when placed in an electrolyte, creating a voltage difference between them. The specific electrochemical series ranks materials based on their ability to donate or accept electrons, giving rise to the potential difference observed when two metals are used in conjunction in an electrolyte. The inherent properties of the metals themselves, such as their electron affinity and reactivity, determine how they interact with the electrolyte and with each other. While factors such as temperature can influence reactions in the electrolyte, and surface area might affect the rate of the reaction or the current flow, the core potential difference owed to the dissimilar metals is fundamentally based on the kinds of metals used. This relationship is intrinsic to the properties of the materials, making it the primary influencing factor for potential difference in electrochemical settings.

4. What is the calculated high side coil current for the 50 kVA transformer?

A. 11.9 amps

B. 6.9 amps

C. 15 amps

D. 12.5 amps

To determine the high side coil current for a 50 kVA transformer, it's important to understand the relationship between power, voltage, and current in a transformer. The formula used to calculate current from the power rating and voltage is: Current (I) = Power (P) / Voltage (V) In this case, the transformer has a power rating of 50 kVA. To proceed with the calculation, the high side voltage of the transformer needs to be known. For this example, if we assume a high side voltage of 7200 volts (which is common for utility transformers), we can calculate the current. First, we convert kilovolts to volts: - 50 kVA = 50,000 VA Now, applying the formula with the assumed voltage (7200 V): I = 50,000 VA / 7200 V = 6.94 A Rounding this value leads us to approximately 6.9 amps, confirming the calculated high side coil current as presented in the correct answer choice. This calculation illustrates that knowing the voltage is crucial for accurately determining the current drawn by the transformer, and a transformer rated at 50 kVA with 7200V on the primary side would indeed result in

5. What is the minimum acceptable test voltage for a good sacrificial anode?

A. 400 millivolts

B. 600 millivolts

C. 800 millivolts

D. 900 millivolts

The minimum acceptable test voltage for a good sacrificial anode is typically 900 millivolts. This threshold is important because it indicates that the anode is still providing adequate protection against corrosion by maintaining a sufficient level of electrochemical potential.   When sacrificial anodes are tested, a reading below this level could suggest that the anode is either insufficiently reactive or has become ineffective due to depletion or coating by corrosion products. The 900 millivolts value serves as a benchmark, providing assurance that the anode still possesses effective cathodic protection capabilities necessary for prolonging the life of the structure it is meant to protect, such as pipelines or storage tanks.   Choosing a lower voltage, such as 400, 600, or 800 millivolts, may not adequately reflect the anode's ability to protect against corrosion, leading to potential failures in the system being protected. Thus, adhering to the standard of 900 millivolts ensures optimal performance and safety in corrosion prevention strategies.

6. What does a megohmeter specifically measure?

A. Voltage

B. Current

C. High resistance

D. Low resistance

A megohmeter is specifically designed to measure high resistance, typically in the range of megohms. It is commonly used in electrical testing to determine the insulation resistance of cables, equipment, and components. By applying a high voltage to the circuit, the megohmeter can accurately assess how much resistance is present, which helps identify potential insulation failures that could lead to short circuits, electrical leakage, or other hazards. The ability to measure high resistance is crucial for ensuring that electrical systems are safe and reliable, particularly in scenarios where insulation can degrade over time or due to environmental conditions. This tool plays a vital role in maintenance and troubleshooting by providing insights into the integrity of the electrical insulation. The incorrect options involve measurements that do not fall within the megohmeter's intended use. Voltage refers to the electrical potential difference between two points, while current measures the flow of electrical charge. Low resistance is not the focus of a megohmeter, as this instrument is specifically calibrated to assess resistance at much higher values, distinguishing it from devices that measure lower resistances directly, such as ohmmeters.

7. Total opposition to current flow in an alternating current circuit is referred to as?

A. Resistance

B. Reactance

C. Impedance

D. Capacitance

Total opposition to current flow in an alternating current (AC) circuit is known as impedance. Impedance encompasses both the resistance and reactance present in the circuit. Resistance is the opposition to direct current and is measured in ohms, while reactance refers to the opposition to current flow caused by the circuit's inductance or capacitance, also measured in ohms but exclusive to AC circuits. In AC circuits, components can store energy in magnetic or electric fields, which affects how the circuit behaves over time. Impedance combines these effects, making it a more comprehensive measure of opposition in AC systems. This aggregation of resistance and reactance is essential for analyzing and designing circuits that operate on alternating current, as it helps predict how current behaves under varying frequencies. The other options, while related to electrical concepts, do not encapsulate the total opposition in the same manner. Resistance pertains exclusively to resistive components, reactance combines only inductive and capacitive opposition, and capacitance specifically refers to the ability of a component to store charge, not directly signifying opposition to current flow. Thus, impedance is the broadest and most fitting term for total opposition to current in an AC circuit.

8. What type of transformer is used to increase voltage on a feeder by 5 or 10 percent?

A. Autotransformer

B. Booster

C. Step-down transformer

D. Isolation transformer

A booster transformer is specifically designed to increase voltage and is commonly employed in electrical systems to adjust voltage levels on feeders. When the voltage on a feeder line is slightly lower than the required level for optimal operation, a booster can elevate that voltage by increments such as 5 or 10 percent, ensuring that the system continues to function efficiently without the need for a complete redesign or major equipment changes. This type of transformer works by taking the input voltage and adding a specific voltage boost, which is particularly useful in scenarios where voltage drops might occur due to long transmission lines or heavy loads. It's designed for voltage regulation rather than isolation or stepping down voltage, making it the correct choice for applications focused on increasing voltage levels in distribution systems. In contrast, other types of transformers serve different functions. An autotransformer primarily adjusts voltage but does not isolate the primary side from the secondary side. A step-down transformer is designed to reduce voltage, which does not align with the requirement to increase voltage. An isolation transformer provides electrical separation between the primary and secondary circuits without altering voltage levels, which again does not meet the need to boost voltage. Therefore, the booster transformer is the ideal solution for the specified requirement in this context.

9. How often should rubber gloves be inspected while in use?

A. Once a week

B. Once a day

C. Once a month

D. Once per shift

Rubber gloves are essential personal protective equipment (PPE) for linemen, providing insulation and protection against electrical shock. Regular inspections while in use are crucial to ensure the integrity of the gloves. Inspecting the gloves once a day allows the lineman to check for any visible signs of wear, damage, or degradation that could compromise safety during operations. Conducting this inspection daily ensures that any potential issues are identified promptly, maintaining a high standard of safety while working with or around electrical systems. Frequent checks can help prevent accidents, as the gloves may be exposed to various environmental factors and wear over time. In contrast, longer intervals between inspections could increase the risk of using compromised equipment, leading to serious safety hazards on the job.

10. Which unit of measure represents "real" power?

A. Watts

B. Ohms

C. Volt-Amps

D. Hertz

The unit of measure that represents "real" power is Watts. Real power, often referred to as active power, is the actual power that performs useful work in a circuit. It is the energy consumed by electrical devices in a given time frame and is calculated in terms of voltage and current in a resistive circuit. In an AC circuit, the concept of real power is especially important because it takes into account the phase difference between voltage and current. The formula for calculating real power is $P = VI\cos(\phi)$, where P is the real power in Watts, V is the voltage, I is the current, and $\cos(\phi)$ is the power factor, which accounts for the phase difference. Watts distinctively represent energy consumption, and understanding this measurement is crucial for evaluating the efficiency and performance of electrical systems. Other units like Ohms measure resistance, Volt-Amps represent apparent power (which does not account for phase differences between voltage and current), and Hertz measures frequency, which are essential concepts but do not give the actual usable power in a circuit.