

NEIEP Elevator Installation and Maintenance 400 Practice Exam (Sample)

Study Guide



Everything you need from our exam experts!

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Questions

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- 1. What should the resistance of an armature be when measured from commutator to ground with brushes removed?**
 - A. Low resistance**
 - B. Medium resistance**
 - C. High resistance**
 - D. Zero resistance**
- 2. What happens when voltage change in a pole piece doesn't produce a proportional change of magnetic flux?**
 - A. It is considered resistive loss**
 - B. It is considered hysteresis loss**
 - C. It is considered reactive loss**
 - D. It is considered capacitive loss**
- 3. What is the most common cause of commutator problems in electric machines?**
 - A. Brush pressure too light**
 - B. Worn armature winding**
 - C. Excessive heat**
 - D. Faulty power supply**
- 4. When the load on a series generator increases, what is the effect on the output voltage?**
 - A. It decreases**
 - B. It significantly increases**
 - C. It stays the same**
 - D. It oscillates**
- 5. How is AC voltage indicated on a voltmeter?**
 - A. Peak value**
 - B. Average value**
 - C. RMS**
 - D. Max value**

- 6. On the resistance scale of a digital meter, what does the lazy 8 symbol signify?**
- A. High resistance**
 - B. Low resistance**
 - C. Infinity**
 - D. Voltage**
- 7. What type of resistance should a motor or generator commutator ideally show?**
- A. Low resistance**
 - B. Variable resistance**
 - C. High but not infinite resistance**
 - D. Infinite resistance to ground**
- 8. In an electric motor, what role does the stator play?**
- A. It provides mechanical support**
 - B. It generates the rotating magnetic field**
 - C. It houses the rotor**
 - D. It acts as a power supply**
- 9. If an elevator is pulling through the brake after stopping at a floor, what is a likely issue?**
- A. Brake is stuck**
 - B. Power supply failure**
 - C. Suicide circuit open**
 - D. Weight overload**
- 10. What part of the transformer provides the connection for the ends of the armature coils to the commutator?**
- A. Terminal block**
 - B. Riser**
 - C. Connection plate**
 - D. Winding connections**

Answers

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

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Explanations

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1. What should the resistance of an armature be when measured from commutator to ground with brushes removed?

- A. Low resistance**
- B. Medium resistance**
- C. High resistance**
- D. Zero resistance**

The resistance of an armature when measured from the commutator to ground with the brushes removed should be high resistance. This is because a high resistance value indicates that there is no short circuit between the windings and the armature core, which is critical for the proper functioning of the motor. In a properly functioning armature, the insulation between the conductors and the core must be intact. A high resistance reading signifies that the insulation is effective, minimizing the risk of current leakage to the ground which could cause damage or malfunction. If the resistance were low, it would suggest potential insulation failure, leading to possible short circuits, overheating, or unwanted current paths, all of which can be detrimental to the elevator's operation and safety. Therefore, the ideal scenario is to achieve a high resistance reading, confirming the integrity of the armature's insulation and ensuring reliable performance.

2. What happens when voltage change in a pole piece doesn't produce a proportional change of magnetic flux?

- A. It is considered resistive loss**
- B. It is considered hysteresis loss**
- C. It is considered reactive loss**
- D. It is considered capacitive loss**

When there is a change in voltage across a pole piece and it does not result in a proportional change in magnetic flux, this phenomenon is identified as hysteresis loss. Hysteresis loss occurs in magnetic materials when the magnetization of the material lags behind the applied magnetic field due to the material's magnetic properties. This lag creates energy losses as the magnetic domains within the material do not realign perfectly with the alternating magnetic field, leading to frictional losses as the domains are forced into alignment and then return to their original state. In practical applications, hysteresis loss is a critical aspect to consider in electric machines and transformers, as it affects their efficiency and heat generation. This concept is tied closely to the material properties of the core in use, particularly the type of magnetic materials employed and their historical magnetization characteristics. Understanding hysteresis loss is crucial for evaluating the performance of electric equipment and can inform decisions related to material selection and design improvements aimed at minimizing energy losses in electrical systems.

3. What is the most common cause of commutator problems in electric machines?

- A. Brush pressure too light**
- B. Worn armature winding**
- C. Excessive heat**
- D. Faulty power supply**

The most common cause of commutator problems in electric machines is often associated with brush pressure being too light. When the brush pressure is inadequate, it prevents the brushes from maintaining sufficient contact with the commutator. This can lead to poor electrical conductivity, resulting in increased arcing, sparking, and localized heating at the contact points. Over time, this weak contact can also contribute to excessive wear on the commutator surface and the brushes themselves, potentially leading to significant operational issues and the need for maintenance or replacement. Maintaining optimal brush pressure is crucial for ensuring a reliable and efficient operation of electric machines, as it allows for effective current transfer and reduces the likelihood of damage to both the commutator and the brushes. In contrast, while worn armature windings, excessive heat, and a faulty power supply can certainly lead to issues in electric machines, they are not as commonly associated with problems specifically related to the commutator itself compared to the influence of brush pressure.

4. When the load on a series generator increases, what is the effect on the output voltage?

- A. It decreases**
- B. It significantly increases**
- C. It stays the same**
- D. It oscillates**

When the load on a series generator increases, the effect on the output voltage is that it decreases. This phenomenon occurs due to the inherent characteristics of series generators, which have their field windings connected in series with the armature windings. As the load increases, more current flows through the generator. Due to the resistance of the armature winding, an increase in current leads to an increase in the voltage drop across the internal resistance of the generator. This results in a lower output voltage available to the load, even though the input to the generator may remain constant. In a series generator, the output voltage is directly related to the current through the field windings, which generates the magnetic field. However, as more current is drawn by the load, the resulting voltage drop from the internal resistance effectively reduces the output voltage. Therefore, the correct conclusion is that when the load increases, the output voltage decreases.

5. How is AC voltage indicated on a voltmeter?

- A. Peak value**
- B. Average value**
- C. RMS**
- D. Max value**

AC voltage is typically indicated as the RMS (Root Mean Square) value on a voltmeter because this measurement provides a value that accurately represents the effective voltage or power of an alternating current (AC) system. The RMS value is significant because it allows for a comparison between AC voltage and DC (direct current) voltage in terms of how much work can be done by the electrical energy. Unlike various other methods of measuring AC voltage, RMS takes into account the variations in the waveform over time, providing a measurement that corresponds to the amount of heat produced in a resistor by the AC signal, as if it were a direct current. This makes it particularly useful in practical electrical applications where calculations of power and energy consumption are necessary. The peak value represents the maximum instantaneous voltage, while the average value reflects an average over the cycle and does not accurately convey the effective voltage in terms of work done. Similarly, the max value may indicate an extreme point in the waveform but lacks the context of power comparison needed for effective measurement in most real-world scenarios. Thus, the RMS value is the most informative and practical way to indicate AC voltage on a voltmeter.

6. On the resistance scale of a digital meter, what does the lazy 8 symbol signify?

- A. High resistance**
- B. Low resistance**
- C. Infinity**
- D. Voltage**

The lazy 8 symbol on the resistance scale of a digital multimeter represents infinity. This symbol visually resembles the number eight lying on its side and indicates that the resistance is so high that it cannot be measured, effectively meaning an open circuit. When the meter displays this reading, it suggests that there is no continuity in the circuit or component being tested. This concept is crucial in understanding electrical circuits, as identifying open circuits or non-functional components helps in troubleshooting and ensuring proper system operation.

7. What type of resistance should a motor or generator commutator ideally show?

- A. Low resistance**
- B. Variable resistance**
- C. High but not infinite resistance**
- D. Infinite resistance to ground**

The ideal characteristic of a motor or generator commutator is to demonstrate infinite resistance to ground. This means that the commutator should not provide a path for current to flow to the ground under normal operating conditions. If the commutator had any significant resistance to ground, it could lead to losses, overheating, or even cause a short circuit, which compromises the device's efficiency and safety. In a practical sense, this infinite resistance ensures that the electrical circuit operates as designed, without unintended leakage currents that could impact the performance of the motor or generator. It also helps in ensuring the safety of the system, preventing potential electrical hazards. Thus, in the context of maintaining and installing elevator systems, ensuring that the commutator shows infinite resistance to ground is critical for safe and reliable operation.

8. In an electric motor, what role does the stator play?

- A. It provides mechanical support**
- B. It generates the rotating magnetic field**
- C. It houses the rotor**
- D. It acts as a power supply**

The stator in an electric motor is crucial because it generates the rotating magnetic field that is necessary for the motor's operation. This magnetic field is produced by alternating current (AC) supplied to the stator windings, causing the magnetic field to change in direction and strength. This rotating magnetic field interacts with the rotor, which is the component that actually turns and produces mechanical output. The design of the stator, including the arrangement of its windings and the type of materials used, directly affects the efficiency and performance of the motor. While offering mechanical support is important and is indeed one of the functions of the stator, its primary role is more about generating the magnetic field rather than just providing support. Housing the rotor is not a primary function either, as it typically allows for the rotor to rotate freely without being obstructed. Acting as a power supply is also inaccurate; rather, the stator is supplied with power that it uses to create the magnetic field necessary for motor function. Thus, the generation of the rotating magnetic field is the key role of the stator in an electric motor.

9. If an elevator is pulling through the brake after stopping at a floor, what is a likely issue?

- A. Brake is stuck**
- B. Power supply failure**
- C. Suicide circuit open**
- D. Weight overload**

When an elevator is pulling through the brake after stopping at a floor, it indicates an issue related to the elevator's safety mechanisms. A likely reason for this scenario is that the suicide circuit is open. In elevator systems, the suicide circuit functions as a critical safety feature that ensures the elevator's brake engages when the elevator is at rest. If this circuit is open, it means that the system is not receiving the necessary signals to keep the brake engaged, thus allowing the elevator to pull through it instead of holding securely in place. This can lead to unsafe conditions as the elevator could move unexpectedly. Understanding the operation of the suicide circuit is essential for diagnosing problems with elevator braking systems. It safeguards against unintended movements, ensuring passenger safety. Therefore, a failure in this circuit can be particularly serious and often requires immediate attention.

10. What part of the transformer provides the connection for the ends of the armature coils to the commutator?

- A. Terminal block**
- B. Riser**
- C. Connection plate**
- D. Winding connections**

The part of the transformer that provides the connection for the ends of the armature coils to the commutator is known as the connection plate. This component plays a crucial role in ensuring that electrical connections are made effectively, allowing the current generated in the armature coils to be directed to the commutator. The connection plate is designed to facilitate a secure and reliable means to interface the armature's windings with the commutator, ensuring that electricity can flow efficiently and without interruption. Its function is essential for the proper operation of the transformer and its overall performance. The other terms refer to different components or functions. For instance, a terminal block is used for organizing and connecting multiple wires together but is not specifically designed for connecting armature coils to a commutator. The riser is usually associated with the vertical components in elevator systems and does not directly relate to the connection of coils. Lastly, winding connections refer to the various connections within the windings but do not specifically indicate the connection to the commutator, which is distinct.