NEIEP Mechanics Practice Exam (Sample)

Study Guide

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Questions

1. What type of rectifier uses four diodes to convert AC to DC?

A. Half wave rectifier

B. Full wave bridge

C. Full wave center tap

D. Single phase rectifier

2. What is the minimum percentage of spare wires that should be pulled to the car or controller?

A. 5%

B. 10%

C. 15%

D. 20%

3. What term is used to describe an electrical component's resistance to changes in current?

A. Impedance

B. Reactance

C. Inductance

D. Resistance

4. At full charge, what is the voltage across a capacitor?

A. 50% of the source voltage

B. 75% of the source voltage

C. 100% of the source voltage

D. 25% of the source voltage

5. What type of relay is used to ensure an elevator calls are maintained until manually reset?

A. Normally open relay

B. Latching relay

C. Normally closed relay

D. Series relay

6. What is the required clearance between the car door and the return jamb?

A. 1/2"

B. 1/4"

C. 3/8"

D. 5/8"

7. What is required to ensure safety when working with hoisting equipment?

A. Regular operational checks for functionality

B. A clear communication system between workers

C. Personal protective equipment for all personnel

D. All of the above

8. Which safety feature is critical for dumbwaiters to ensure proper functionality?

A. Overload protection

B. Emergency stop button

C. Locking mechanism for doors

D. Backup battery system

9. How must Class A loading freight elevator loads be manipulated?

A. Automatically loaded on and off

B. Manually loaded on and off

C. Loaded with equipment assistance

D. Pre-loaded at the terminal floor

10. How frequently is a hydraulic cylinder test required to be performed?

A. Every month

B. Every six months

C. Every year

D. Every three years

Answers

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

Explanations

1. What type of rectifier uses four diodes to convert AC to DC?

A. Half wave rectifier

B. Full wave bridge

C. Full wave center tap

D. Single phase rectifier

A full wave bridge rectifier employs four diodes arranged in a specific configuration to effectively convert alternating current (AC) into direct current (DC). This arrangement allows the rectifier to utilize both halves of the AC waveform, which enhances efficiency and reduces ripple voltage compared to half wave rectifiers that only utilize one half of the AC cycle. In a full wave bridge rectifier, during the positive half-cycle of the AC input, two of the diodes conduct current, allowing the voltage to pass through to the load in the same direction. When the input voltage switches to the negative half-cycle, the other two diodes become conductive, again directing the current through the load in the same direction. This continuous conversion process results in a smoother DC output, which is especially beneficial for powering devices requiring stable voltage. Other rectifying options, such as half wave rectifiers and full wave center tap configurations, do not make use of all four diodes. Half wave rectifiers only allow one half of the AC cycle to pass through, leading to greater ripple and less efficiency. Full wave center tap configurations utilize two diodes and require a center tap transformer, limiting their application compared to the more versatile and commonly used bridge rectifier. Single phase rectifiers is a broader

2. What is the minimum percentage of spare wires that should be pulled to the car or controller?

A. 5%

B. 10%

C. 15%

D. 20%

The minimum percentage of spare wires that should be pulled to the car or controller is typically set at 10%. This guideline ensures that there is an adequate supply of spare conductors available for future repairs, modifications, or upgrades without needing to pull additional cables, which can save time and resources during maintenance. Having a sufficient percentage of spare wires is essential for ensuring reliability and flexibility in the system. In many cases, standards reflect not only the current needs but also potential future requirements that might arise due to system expansions or unforeseen issues. Other percentages might be lower or higher, but the 10% threshold is generally recognized as a practical compromise between having enough spare wire to address future needs while avoiding unnecessary costs and complications associated with pulling excess wire.

3. What term is used to describe an electrical component's resistance to changes in current?

A. Impedance

B. Reactance

C. Inductance

D. Resistance

The term that best describes an electrical component's resistance to changes in current is inductance. When a current flows through an inductor, it creates a magnetic field, which then induces a counter electromotive force (emf) that opposes changes in the current. This property is rooted in Faraday's law of electromagnetic induction, which states that a changing current generates a magnetic field that can induce voltage in the opposite direction. Inductance is particularly relevant in AC (alternating current) circuits where currents are constantly changing. The presence of inductance allows it to resist changes in current flow, making it fundamental in applications such as transformers, chokes, and other electromagnetic devices. Impedance is a broader term that encompasses not just inductance, but also resistance and reactance, dealing with the total opposition to alternating current. Reactance specifically refers to the opposition to change in voltage and is frequency-dependent, incorporating both inductive and capacitive elements. Resistance, on the other hand, refers to the opposition to current flow in direct current (DC) circuits, lacking the dynamic response to changes elemental to inductance.

4. At full charge, what is the voltage across a capacitor?

A. 50% of the source voltage

B. 75% of the source voltage

C. 100% of the source voltage

D. 25% of the source voltage

The voltage across a capacitor at full charge will equal the source voltage. When a capacitor is connected to a voltage source, it begins to charge until the voltage across its plates matches the voltage of the source. This is described by the fundamental principles of capacitance, where the voltage across a capacitor can be represented by the equation $V = Q/C$, with V being the voltage, Q the charge, and C the capacitance. As the capacitor charges, it accumulates charge until it can no longer take in more, effectively reaching a steady state at which point the voltage is equal to the voltage of the source. Hence, at full charge, the voltage across the capacitor will be 100% of the source voltage.

5. What type of relay is used to ensure an elevator calls are maintained until manually reset?

A. Normally open relay

B. Latching relay

C. Normally closed relay

D. Series relay

A latching relay is specifically designed to maintain its state after the initial activation until it is manually reset. This characteristic makes it particularly suitable for applications such as elevator call systems, where it is important to ensure that a call is registered and maintained until a user intervenes to reset the system. When the elevator call button is pressed, the latching relay engages and holds that state, allowing the elevator system to recognize that there is a pending call. Once the elevator has responded to the call, the relay will remain in the 'active' state, keeping the call registered until the user clears it, such as when the user exits the elevator. This functionality prevents any loss of calls during the operational cycle, ensuring reliable service. In contrast, the other types of relays do not have this capability of maintaining their state without continuous activation. A normally open relay, for example, only closes its contacts when energized and would not maintain an active call if the button is released. Similarly, a normally closed relay would engage when de-energized but would not hold its state in a user-driven manner. A series relay can indicate conditions in a sequence but is not specifically designed for maintaining states like a latching relay.

6. What is the required clearance between the car door and the return jamb?

A. 1/2"

B. 1/4"

C. 3/8"

D. 5/8"

The required clearance between the car door and the return jamb is typically specified to ensure that there is adequate space for the door to open and close smoothly without any friction or binding that would hinder operation. A clearance of 1/4” strikes a balance between providing enough space to accommodate slight misalignments and the operational growth caused by temperature changes, while still minimizing excessive gaps that could affect the aesthetics and functionality of the installation. When considering the clearance for a car door, it's important for it to comply with standards that promote not only operational efficiency but also safety. This allows for proper air circulation within the vestibule area and minimizes noise during operation—significant factors in lift design and maintenance. Having a larger clearance might create potential problems such as increased wind noise or drafts, which could lead to occupant discomfort or decreased energy efficiency within controlled environments. Conversely, a smaller clearance could result in the door binding against the jamb, leading to operational issues or increased wear over time. Therefore, the 1/4" clearance is both practical and widely accepted in the industry.

7. What is required to ensure safety when working with hoisting equipment?

A. Regular operational checks for functionality

B. A clear communication system between workers

C. Personal protective equipment for all personnel

D. All of the above

To ensure safety when working with hoisting equipment, it is essential to adopt a comprehensive approach that encompasses multiple safety measures, which is why selecting all of the above is the most appropriate choice. Regular operational checks for functionality are vital to confirm that the hoisting equipment is in good working condition. This involves routine inspections and maintenance to detect any potential malfunctions or wear that could compromise safety. Having a clear communication system between workers is crucial for coordinating activities during hoisting operations. Effective communication prevents accidents by ensuring that all team members are aware of their roles and any changes in the operation, thereby reducing the risk of misunderstandings. Personal protective equipment (PPE) is also necessary for safeguarding all personnel involved in the operation. PPE, such as hard hats, gloves, and safety goggles, protects workers from hazards that may arise during hoisting operations, including falling objects and exposure to pinch points. Integrating these practices creates a robust safety culture when working with hoisting equipment, which significantly reduces the likelihood of accidents and injuries.

8. Which safety feature is critical for dumbwaiters to ensure proper functionality?

A. Overload protection

B. Emergency stop button

C. Locking mechanism for doors

D. Backup battery system

The critical safety feature for dumbwaiters to ensure proper functionality is the locking mechanism for doors. This feature plays a vital role in preventing accidents and ensuring safe operation. When a dumbwaiter is in operation, the locking mechanism ensures that doors cannot be opened while the dumbwaiter is in motion. This minimizes the risk of items falling out or individuals getting injured while the unit is active. A well-designed locking mechanism adds an additional layer of safety by ensuring that both the upper and lower doors remain secured until the dumbwaiter has reached its intended destination and comes to a complete stop. This prevents any potential hazards that could arise from premature door openings. The other choices, while important safety features in their own right, do not have the same direct impact on the operation and safety of the dumbwaiter system. Overload protection protects against excessive weight but does not prevent misuse or injuries associated with door operations. An emergency stop button is critical for halting the device in case of an emergency but does not prevent accidents related to door access during operation. A backup battery system ensures continued operation during power failures but does not address immediate safety concerns related to user access and operation.

9. How must Class A loading freight elevator loads be manipulated?

A. Automatically loaded on and off

B. Manually loaded on and off

C. Loaded with equipment assistance

D. Pre-loaded at the terminal floor

Class A loading freight elevators are designed primarily for the transport of goods and materials, and the method of loading and unloading is dictated by safety and operational standards. When freight is manually loaded on and off, it ensures close attention can be given to the weight distribution and securing of loads, minimizing risks associated with operation. Manual loading allows operators to assess the load's weight and dimensions more effectively, ensuring compliance with the elevator's rated capacity. The other methods suggested, such as automatic loading or loading with equipment assistance, may not provide the necessary oversight and safety precautions required when handling heavy or irregularly shaped cargo that Class A freight elevators typically manage. Pre-loading at the terminal floor also lacks the flexibility needed for varied loads and situations. Thus, the manual handling of loads is the preferred and safest method for ensuring proper protocols are followed during the use of Class A loading freight elevators.

10. How frequently is a hydraulic cylinder test required to be performed?

A. Every month

B. Every six months

C. Every year

D. Every three years

A hydraulic cylinder test is typically required to be performed every year to ensure the safe operation and reliability of hydraulic systems. Conducting these tests on an annual basis allows for the early detection of any potential issues such as leaks, wear, or other forms of degradation that could affect the cylinder's performance. Regular testing helps maintain safety standards and prevents costly downtime by addressing potential problems before they escalate. Testing annually aligns with many industry safety regulations and best practices, ensuring that equipment remains compliant with existing standards. Furthermore, performing these tests regularly supports maintenance scheduling and operational efficiency in systems that rely on hydraulic cylinders for power and motion.