
Q654 - Electrical, Electronic, & Control Engineering

1. Why are nickel-cadmium batteries superior to lead-acid batteries for standby service?

- **they are able to hold their charge for long periods of time without recharging**
- they need fewer cells connected in series for the same voltage and require less mounting space
- they have higher output voltages for the same number of cells and require no maintenance
- they have a lower cost of acquisition

Note:
Nickel-cadmium batteries are preferred for standby service due to their ability to retain charge over extended periods without frequent recharging, unlike lead-acid batteries.

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2. A salinity indicator system such as that used to measure the salt content of potable water systems and boiler feed and condensate systems uses what technology?

- a salinity cell that senses the pH of water
- a salinity cell that senses the brine density of water
- **a salinity cell that senses the electrical conductivity of water**
- a salinity cell that senses the optical refraction of water

Note:
Salinity indicator systems measure electrical conductivity to determine salt content. Dissolved salts increase the water's ability to conduct electricity, and a salinity cell directly measures this conductivity to provide a salinity reading.

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3. When the control handle is in the "off" position, what is the status of the solenoid actuated brake of an electric winch?

- de-energized and the brake is released
- energized and the brake is released
- energized and the brake is set by a spring
- **de-energized and the brake is set by a spring**

Note:
When the control handle is off, the solenoid is de-energized, and the spring sets the brake.

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4. In the event of a power failure during cargo loading operations, the movement of an electric powered cargo winch will be stopped by what means?

- the weight of the load on the boom
- **a spring set brake**
- a hand-operated band brake
- a manual override switch

Note:
Electric cargo winches utilize a spring-set brake that automatically engages upon power loss, ensuring a fail-safe stopping mechanism.

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5. In an impressed current cathodic hull protection system, what statement is true concerning the composition and arrangement of the anodes?

- The protective anodes are made of zinc and are electrically insulated from the hull.
- **The protective anodes are made of lead or platinized titanium and are electrically insulated from the hull.**
- The protective anodes are made of lead or platinized titanium and are electrically bonded to the hull.
- The protective anodes are made of zinc and are electrically bonded to the hull.

Note:
In an impressed current cathodic protection system, anodes are inert materials like lead or platinized titanium and are electrically insulated from the hull to ensure current flows through seawater.

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6. While monitoring an impressed current cathodic hull protection system, which of the following measurements should remain constant in a properly operating electronically regulated system?

- **Reference electrode voltage**
- Control amplifier output voltage
- Individual anode currents
- Total anode current

Note:
In an electronically regulated impressed current cathodic protection system, the reference electrode voltage remains constant as the system maintains a consistent hull potential by adjusting current and output voltage.

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7. Before any work on electrical or electronic equipment is performed, which of the following precautions should be carried out?

- Bypass the interlocks.
- Station a man at the circuit supply switch.
- De-energize the applicable switchboard bus.
- **Secure and tag the supply circuit breaker in the open position.**

Note:
To ensure safety when working on electrical or electronic equipment, secure and tag the supply circuit breaker in the open position to prevent accidental re-energization. This practice involves physically isolating the equipment and implementing lockout/tagout procedures, which are superior to relying on personnel or bypassing safety interlocks. Proper precautions include opening the circuit breaker, securing it to prevent closure, and tagging it to warn others, ensuring a de-energized state and preventing accidental power restoration.

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8. Which of the following fixed temperature heat-actuated fire detectors can be reused after it has detected a fire?

- **bimetallic snap-disc**
- thermostatic cable
- liquid expansion
- fusible metal

Note:
Bimetallic snap-disc detectors reset and return to their original state upon cooling, allowing for reuse after a fire event; fusible metal, liquid expansion, and thermostatic cable detectors require replacement after activation due to permanent damage or melting.

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9. Which of the following fixed temperature heat-actuated fire detectors is the most prone to false alarms?

- fusible metal detector
- liquid expansion detector
- snap-action bimetallic disc
- **bimetallic strip detector**

Note:
Bimetallic strip detectors are more susceptible to false alarms due to their continuous flexing with minor temperature changes, which can repeatedly trigger the circuit.

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10. An unintended path of low resistance bypassing the intended path and allowing passage of an abnormally high amount of current is known as what?

- **short circuit**
- polarized ground
- ground reference point
- open circuit

Note:
A short circuit is defined as an unintended, low-resistance path that allows excessive current to bypass the intended load. This condition directly matches the question's description of an unintended path with low resistance allowing abnormally high current. Open circuits interrupt current flow, while ground references describe system voltage referencing, making 'short circuit' the correct answer.
