
Q615 - Electrical, Electronic, & Control Engineering

1. 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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2. 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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3. 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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4. 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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5. 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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6. How may the unit "hertz" be best described?

- **cycles per second**
- revolutions per minute
- revolutions per second
- coulombs per second

Note:
Hertz is defined as cycles per second, representing the SI unit of frequency.

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7. The multiplier prefix "giga" (G) such as used in "gigabytes" represents what multiplication factor?

- thousand (10 to the 3rd power)
- million (10 to the 6th power)
- **billion (10 to the 9th power)**
- trillion (10 to the 12th power)

Note:
The prefix "giga" (G) represents a factor of one billion, or 10 to the 9th power.

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8. Before working on an electric cargo winch master switch or controller, what should be done?

- heat the switch box to remove any moisture
- spray the gasket surface with a solvent
- drain condensate from the box
- **open the circuit breaker in the power supply and tag-out**

Note:
De-energize and tag-out the power supply breaker before working on an electric cargo winch master switch or controller to prevent electric shock or arc flash.

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9. Contact with any energized electrical system conductor is potentially hazardous and precautions should be taken to prevent exposure. With all other factors considered equal (such as voltage, conducting path through the body and the duration of contact), contact with an energized electrical system conductor of which system type would produce the most damaging effect?

- DC systems
- **60 Hz AC systems**
- 10 kHz AC systems
- All the above systems would be equally as damaging

Note:
Contact with energized electrical systems is hazardous. Among DC, 60 Hz AC, and 10 kHz AC systems, 60 Hz AC is most damaging because it most efficiently disrupts the heart and nervous system at lower currents, given equal voltage, conducting path, and contact time.

10. Which of the following devices would be forbidden to use as a primary means of electrical isolation?

- fused disconnect switch
- **start/stop push button station**
- circuit breaker
- non-fused disconnect switch

Note:
A start/stop push button station is a control device that does not physically isolate power conductors and therefore cannot be used as the primary means of electrical isolation.