ISA

ISA-CCST-LEVEL-1

Certified Control Systems Technician - Level 1 (CCST)

Latest Version: 6.0

Question: 1

While auditing a temperature control loop, the technician identifies a consistent high reading compared to the standard reference. What instrument error explains this bias?

A. Calibration drift
B. Zero offset
C. Span error
D. Hysteresis

Answer: B

Explanation:
Zero offset is a constant error that shifts all readings in one direction, causing consistent bias. This can result from improper zero setting or sensor degradation.

Question: 2

A nuclear power plant's feedwater temperature loop employs a Type K thermocouple in a thermowell, calibrated quarterly using a Fluke 9142 furnace at 300°C. Recent data shows 2°C cold junction error during ramp-up. Per ISA-MC96.1-2026 updates, what is the corrective action involving the reference junction simulator?

A. Verify CJC accuracy with precision RTD and apply software offset
B. Replace thermowell and recalibrate in ice bath only
C. Perform fixed-point calibration at copper-freezing point
D. Upgrade to wireless transmitter with auto-CJC compensation

Answer: A

Explanation:
ISA-MC96.1-2026 mandates verifying cold junction compensation by comparing against a traceable RTD in the same bath, then programming the offset in the transmitter; this addresses transient errors without hardware changes, maintaining ±0.5°C accuracy in dynamic processes.

Question: 3

A technician in a wastewater treatment plant's sludge digester area (Class I, Division 2, Group D for methane/H2S, SDS: H2S IDLH 100 ppm) must calibrate a DO probe. What permit/tag sequence and PPE counters the SDS-noted synergistic toxicity?

A. General calibration tag, safety glasses for splashes
B. Toxic gas permit with H2S monitors, Level B with combo cartridges, and "Poison Gas – SCBA Required" tags
C. Confined space permit only, dust masks for odors
D. LOTO tag on pumps, rubber boots for wet floors

Answer: B

Explanation:
Synergistic methane/H2S toxicity in Division 2 requires dedicated permits with real-time monitoring, as SDS IDLH indicates rapid incapacitation. Level B with specific cartridges protects against both, per ANSI/ISA-60079-10-1 and OSHA 1910.146 confined spaces.

Question: 4

In a poorly documented control system, how would ISO 9000 recommend improving process consistency?

A. Allow technicians to document only key steps
B. Develop and implement standardized operating procedures with clear documentation
C. Use verbal instructions to save time
D. Avoid documentation changes until failures occur

Answer: B

Explanation:
ISO 9000 focuses on consistent, documented processes to reduce variability and ensure quality.

Question: 5

A field device is showing erratic signal during process control testing. What initial step should a CCST take based on troubleshooting protocols?

A. Calibrate the device immediately
B. Replace the device on suspected failure
C. Adjust controller setpoint
D. Check wiring and power supply integrity

Answer: D

Explanation:
Checking wiring and power supply is the fundamental initial diagnostic step to eliminate common failure causes before other troubleshooting actions.

Question: 6

During performance qualification of a vaccine storage freezer, the reverse-acting temperature PID shows slow recovery (15 min) from door openings. Using AMIGO tuning rules for $\tau/\theta=5$, what Kc formula yields balanced settings if Kp=2?

A. $K_c = (\tau/\theta) / (4\ K_p)$
B. $K_c = 0.5 / K_p * (\tau/\theta)$
C. $K_c = (1/K_p) * (\tau/\theta +1)/ (1.3 + 0.68/\sqrt{(\tau/\theta)}) \approx 0.58$
D. $K_c = 2 / (\tau/\theta * K_p)$

Answer: C

Explanation:
AMIGO rules for PI: $K_c = (1/K_p) * ((\tau/\theta +1) / (1.3 + 0.68 / \text{sqrt}(\tau/\theta))) \approx 0.58$ for $\tau/\theta=5$, providing robust recovery in reverse-acting temperature control without excessive aggressiveness for door disturbances.

Question: 7

During a fieldbus system configuration, an engineer must assign device addresses. What rule should be followed to avoid network conflicts?

A. Addresses are only relevant to the control system and do not affect network communication
B. Devices can share the same address if they perform different functions
C. Use the default device address assigned by the manufacturer without modification
D. Each device must have a unique address within the fieldbus segment

Answer: D

Explanation:
Unique addresses are mandatory for proper fieldbus communication, ensuring the master can identify and communicate with each device individually.

Question: 8

In a control system using multiple vendors for instruments, what does ISO 9000 require to maintain quality consistency?

A. Using new vendors without qualification to reduce downtime
B. Accepting any vendor with low price regardless of quality
C. Informal communication with vendors without contracts
D. Evaluation and selection of vendors based on documented criteria

Answer: D

Explanation:

ISO 9000 requires organizations to evaluate and select suppliers through documented criteria to ensure purchased products meet quality requirements, maintaining system reliability.

Question: 9

An ultrasonic level transmitter's output drifts slowly over weeks in a storage tank with foam on the surface. What is the best corrective action?

A. Increase the gain setting of the ultrasonic transmitter
B. Use a radar level transmitter to eliminate foam interference
C. Clean the tank surface daily to remove foam
D. Cover the tank to prevent foam formation

Answer: B

Explanation:
Foam causes signal scattering and reflection, leading to drifting measurements. A radar level transmitter uses microwave pulses less affected by foam and is a better solution than adjusting the ultrasonic device, cleaning, or covering the tank.

Question: 10

In troubleshooting a 10 VDC excitation RTD circuit showing erratic readings, what procedure uses a precision decade box per ISA MC1.1-2026?

A. Set to 100 Ω and measure voltage drop across leads
B. Cycle to 138.5 Ω (100°C) and monitor for 0.385 Ω/°C
C. Inject 1 mA and verify resistance with Kelvin clips
D. Parallel 1000 Ω and check for half-scale deflection

Answer: B

Explanation:
ISA MC1.1-2026 specifies simulating operating resistance (e.g., 138.5 Ω for Pt100 at 100°C) with a decade box and verifying linear voltage response, confirming lead wire integrity and excitation stability.

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