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INDUSTRIAL AUTOMATION AND ROBOTICS LEVEL 6

ENG/OS/IA/CR/02/6

Install and Maintain Automation System Components

July/August 2025

TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL (TVET CDACC)

PRACTICAL ASSESSMENT

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Time: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. You are required to install, calibrate, and program an automated system that monitors the water level in a tank and controls a solenoid valve using a float sensor**.** The system must function according to the following sequence:
    a. System start:
        - The system starts when the start button is pressed
    b. Level sensing:
        - The tank has a one, dual-position float sensor, capable of detecting two distinct levels;
            - Low-level position: Detects when the water level drops below the minimum threshold.
            - High-Level position: Detects when the tank is full.
        - The float sensor must be correctly installed and wired to the appropriate PLC input terminals**.**

c. Solenoid valve control logic:
    - A solenoid valve is used to control the inflow of water into the tank or bucket
    - The solenoid valve must:
        - Open automatically when the float sensor detects the Low-Level condition
        - Remain open until the float sensor detects the High-Level condition.
        - Close automatically when the High-Level is reached.

d. Stop condition:
    - Pressing the Stop button must immediately stop the system and halt all operations.

Tasks:

i. **Task 1:** Install the system
    - Gather all necessary tools and components
    - Install the system according to the instructions provided above

ii. **Task 2:** Calibrate the float sensor
    - Identify and mark the correct Low and High level positions in the tank
    - Fill the tank/bucket and monitor the float sensor's response using a multimeter
    - Adjust the sensor's position to match the expected water levels

iii. **Task 3**: Develop the PLC program
    - Create the I/O distribution list
    - Develop a PLC program to implement the logic described in the system operation section

iv. **Task 4**: Test and operate the system
    - Power up the system
    - Perform all relevant system tests
    - Upload the developed program to the PLC
    - Run and observe the system operation

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2. You have been provided with the following resources for the practical tasks:
    - Start/Stop Buttons
    - Cables (Red, Yellow, Blue)
    - 1 Float sensor
    - Solenoid valve
    - Relay/Contactor
    - PC installed with relevant software
    - PLC
    - PLC Programming Cable
    - Terminal Blocks
    - DIN Rail
    - Equipment labeler
    - Multimeter
    - Installation Board
    - Electronics toolkit
    - M.C.B
    - Binding wire
    - 240V AC Power supply
    - 24V DC industrial power supply
    - Rectangular Water tank
    - Source of water

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