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INDUSTRIAL AUTOMATION AND ROBOTICS LEVEL 6

ENG/OS/IA/CR/09/6

Install and Maintain Supervisory Control and Data Acquisition

July/August 2025

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

PRACTICAL ASSESSMENT

Time: 3 HOURS

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INSTRUCTIONS TO CANDIDATE:

1. You are required to wire, program, and test a motor control circuit for an automatic sliding gate system according to the following control logic and tasks.
    a. Gate Closing Logic:
    - The gate closes when any of the following occurs:
        - Proximity sensor IP1 detects an object
        - Closing pushbutton switch is pressed
        - HMI "Close" pushbutton is pressed
    - The motor (forward rotation) stops when the closing limit switch is triggered.

    b. Gate Opening Logic
    - The gate opens when any of the following occurs:
        - Proximity sensor IP2 detects an object
        - Opening pushbutton switch is pressed
        - HMI "Close" pushbutton is pressed
    - The motor (reverse rotation) stops when the opening limit switch is triggered.

c. Indicator Lamp Logic

- A green indicator lamp turns ON when the opening limit switch is pressed, and turns OFF when it is released.

Tasks:

i. **Task 1:** Install the SCADA system
   - Install the PLC
   - Install the power supply
   - Connect two proximity sensors to the PLC inputs
   - Connect two contactors to the PLC outputs
   - Connect the motor to the contactors
   - Install pushbuttons to the PLC inputs
   - Install limit switches at both gate end positions

ii. **Task 2:** Configure the PLC
   - Configure the PLC hardware
   - Develop the control program as per the logic described above
   - Debug the program
   - Download the program to the PLC
   - Monitor and verify correct functionality using the PLC interface

iii. **Task 3:** Configure the SCADA system
   - Configure the PC Station
   - Develop the HMI application
   - Configure communication modules for PLC-HMI-PC communication
   - Design and implement HMI screens for system interaction

iv. **Task 4:** Test system functionality
   - Power the system and perform all functional tests to verify that:
     - The gate opens and closes as per the defined logic
     - Sensors and limit switches are correctly detected
     - Indicators respond accurately
     - HMI control reflects the real-time system status

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2. You have been provided with the following resources for the practical tasks:
    - Push button switches
    - Green indicator lamp
    - 24Vdc motor
    - Limit switches
    - Proximity sensors
    - PLC Module
    - PLC communication cable
    - PC with PLC, SCADA and HMI programming software
    - Connecting Cables
    - Relay

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