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INDUSTRIAL AUTOMATION AND ROBOTICS LEVEL 6

ENG/OS/IA/CR/05/6

Install and Maintain Stand-Alone Controllers

July/August 2025

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

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PRACTICAL ASSESSMENT

Time: 3 HOURS

INSTRUCTIONS TO CANDIDATE

1. You are required to install, wire, program, and test a lift system using a three-phase asynchronous motor controlled via a PLC using the following control sequence.
    a. Pressing pushbutton PB1, connected to the PLC input, sends an output signal from the PLC to contactor K1. This activates the motor in forward motion and turns on the green indicator lamp**.**
    b. Pressing pushbutton PB2 sends an output signal from the PLC to contactor K2**,** activating the motor in reverse motion and turning on the orange indicator lamp.
    c. Pressing push button PB3 stops the motor in any direction and turns on the red indicator lamp.

Tasks:

i. **Task 1**: Install components and perform diagnostic tests
   - Draw a wiring diagram for the lift system.
   - Install a three-phase asynchronous motor system that enables forward and reverse motion, controlled by PLC output signals.
   - Perform continuity test on the wiring
   - Measure input voltage to the PLC
   - Test output voltages from the PLC to contactors K1 and K2

ii. **Task 2**: Develop a PLC program
   - Develop ladder logic diagram for the system based on the control sequence above

iii. **Task 3**: Perform functionality tests
   - Power the system and verify that it performs as intended in both forward and reverse directions.
   - Confirm correct response to all pushbutton inputs and indicator lamps.

iv. **Task 4**: Prepare a maintenance checklist
   - Identify potential faults or failure points in the system.
   - Create a checklist for routine inspection and preventive maintenance.

v. **Task 5**: Perform housekeeping
   - Tidy up the work area.
   - Organize and secure wiring.
   - Return all tools and equipment to their designated places.

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2. You have been provided with the following resources for the practical tasks:
    - Asynchronous three phase motor
    - PLC
    - PLC programming cable
    - Computer station with installed PLC programming software
    - Electronics toolkit
    - 2 24V TP Contactors
    - 3 Push buttons- 2 Normally Open, 1 Normally Closed
    - Digital Multimeter
    - Clamp meter
    - Thermal overload
    - Three Phase AC power supply
    - 24vdc power supply
    - Connecting cables
    - MCBs
    - indicator lamps; red, orange and green
    - terminal blocks

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