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INDUSTRIAL AUTOMATION AND ROBOTICS LEVEL 6

ENG/OS/IA/CR/10/6

Install and Maintain Distributed Control Systems (DCSs)

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 control a single motor via a Variable Frequency Drive (VFD) using two PLCs. One PLC will be the primary controller, the other the redundant controller (takes over control if the primary controller fails)

   Your system should accomplish the sequence of events outlined below:

   a. Start pushbutton starts the system
   b. The motor runs at the default speed for 1 minute
   c. After 1 minute, the speed of the motor increases
   d. Motor runs at the new speed for 1 minute
   e. After 1 minute, the motor returns to the default speed
   f. The sequence repeats until the stop pushbutton pressed

Tasks:

i. **Task 1: Install the System**
   - Install the primary controller
   - Install the redundant controller
   - Install the Variable Frequency Drive
   - Install the motor
   - Install the start and stop pushbuttons

ii. **Task 2: Develop the PLC Program**
   - Develop a PLC program that will accomplish the sequence of events outlined above
   - Simulate and debug the program

iii. **Task 3: Maintain and Commission the System**
   - Power the system as per the Standard Operating Procedures
   - Download the developed program to the PLC modules
   - Run the system and observe the operational results
   - Introduce a fault (switch off) to the primary controller to allow the redundant controller to take over

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2. You have been provided with the following resources for the practical tasks:
    - A computer installed with software
    - 2 PLCs
    - Programming cable
    - 3 Ethernet cable
    - MCB
    - Power supply
    - 3 phase induction motor
    - Variable Frequency Drive (VFD)
    - Start Pushbutton
    - Stop pushbutton
    - Managed switch
    - Connecting cables
    - Electronics toolkit
    - Multimeter
    - Wire stripper
    - Side cutter
    - Zip ties

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