

071606T4IMT

INDUSTRIAL MECHATRONICS TECHNOLOGY LEVEL 6

ENG/OS/IMT/CR/12/6/A

Maintain Supervisory Control and Data Acquisition (SCADA) Systems

Nov/Dec 2024



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

PRACT MENT
T S

INSTRUCTIONS TO CANDIDATE:

1. Perform installation and maintenance of a model SCADA system for a model conveyor line. The system should operate as follows;
 - i. The virtual lamp L1 on the HMI will light when the virtual start switch PB1 on the HMI device user interface is activated making the motor run clockwise.
 - ii. The physical lamp L1 will light when the virtual start switch PB1 on the HMI device user interface is activated, or when the physical PB1 is activated, making the motor run clockwise.
 - iii. The virtual lamp L2 on the HMI will light when the virtual start switch PB2 on the HMI device user interface is activated making the motor run counterclockwise.
 - iv. The physical lamp L2 will light when the virtual start switch PB2 on the HMI device user interface is activated, or when the physical PB2 is activated, making the motor run counterclockwise.

- v. Lamp L1 and L2 will go off when the virtual stop switch PB3 on the HMI is activated, or when the physical PB3 is activated.
- vi. A virtual stop lamp L3 on the HMI will be activated as an alarm when L1 and L2 are off.
- vii. A physical lamp L3 will be activated as an alarm when L1 and L2 are off.
- viii. An inductive sensor is connected to monitor rotation of the motor.

TASK 1: Wiring the Physical Control System

- i. Observe safety according workshop OSHA
- ii. Connect PB1 and PB2 (push button) to the input terminals of the PLC, designated for switching ON the lamp L1, L2 and the Motor respectively.
- iii. Connect PB3 (push button) to the input terminal of the PLC, designated for switching OFF the lamps and the Motor.
- iv. Connect the inductive sensor to the input terminal of the PLC.
- v. Connect lamps L1, L2, L3 and the Motor to the output terminals of the PLC to turn ON when either virtual devices I or remote devices are activated.
- vi. Connect the PLC to the SC through appropriate communication protocols.

TASK 2: Programming the PLC

- i. Write a PLC program that will enable a user to operate the model conveyor in two ways:
 - a) Virtual mode- through SCADA HMI panel or at computer screen.
 - b) Remote mode- using push buttons and sensors.
- ii. Define input addresses for both remote devices and virtual devices on the HMI and output addresses for lamps and motor control.
- iii. Compile the program and download the program to the PLC.

TASK 3: Configuring the SCADA System

- i. Open the SCADA software and create a new project.
- ii. Configure communication settings to establish a connection with the PLC.
- iii. Create a HMI screen that includes the following components:
 - a) A lamp icon that represents the alarm when lamps are off.
 - b) Start button and stop button.
 - c) Inductive sensor icon

- iv. Configure a virtual Lamp (L1, L2 and L3) at the HMI to display when remote lamps are off.
- v. Configure a virtual button (PB1, PB2 and PB3) to send a signal to the PLC to switch ON respective output as described on Task 1.
- vi. Test and troubleshoot the system to ensure correct functionality.

You are provided with the following resources;

- i. Computer station installed with PLC and SCADA software.
- ii. HMI Module
- iii. PLC to HMI communication cable
- iv. Lamps
- v. PLC Module
- vi. Push button switches
- vii. Contactor
- viii. Indicator lamp
- ix. Motor
- x. Inductive sensor
- xi. PLC and Computer commu
- xii. 24v dc Power supply
- xiii. 240v ac power supply
- xiv. Connecting cables (Red, black and grounding)
- xv. Screw driver Tool set