ISET-2500: PROGRAMMABLE LOGIC CONTROLLERS MAINTENANCE I

Cuyahoga Community College

Viewing: ISET-2500 : Programmable Logic Controllers Maintenance I

Board of Trustees:
September 2023

Academic Term:
Fall 2024

Subject Code
ISET - Integrated Systems Engineering

Course Number:
2500

Title:
Programmable Logic Controllers Maintenance I

Catalog Description:
Fundamental concepts of Programmable Logic Controllers (PLCs) Maintenance including applications of industrial type PLCs requiring motion control, automated manufacturing and the functions PLCs serve in that environment. Extensive guided instruction and practice provided.

Credit Hour(s):
3

Lecture Hour(s):
2

Lab Hour(s):
2

Requisites

Prerequisite and Corequisite
ISET-2200 Industrial Motor Controls or concurrent enrollment.

Outcomes

Course Outcome(s):
Explain the architecture of a Programmable Logic Controller (PLC), and explain the concept and use of inputs, outputs, instructions, and Decimal, Binary, and Hexadecimal numbering systems in PLC Ladder Logic.

Objective(s):

1. Explain the architecture of a programmable logic controller including the Central Processing Unit, memory and inputs/outputs.
2. Explain relay type instructions, internal bits, ladder logic diagrams and rung notation.
3. Explain the different types of input and output devices and their use.
4. Explain the use of basic instructions such as inputs, outputs, internal bits, timers, and counters.
5. Explain decimal, Binary and Hexadecimal numbering systems, and their application and use in PLC Ladder logic.

Course Outcome(s):
Given a written sequence of Operations or a Relay Logic Diagram, and a data set where applicable, be able to program that data into PLC Ladder Logic such that it will control a physical process.

Objective(s):

1. Demonstrate the ability to apply and use Boolean Logic.
2. Demonstrate through programming on a PLC the proper use and proper function of inputs, outputs and internal bits.
3. Demonstrate through programming on a PLC the application and use of Decimal, Binary, and Hexadecimal numbering systems.
4. Demonstrate through programming on a PLC the ability to take a written Sequence of Operations or a Relay Logic Diagram and control a process using all of the following instruction types: inputs, outputs, internal bits, timers, counters.
5. Demonstrate the ability to troubleshoot a PLC and PLC Ladder Logic program.

Methods of Evaluation:

1. Completion of assigned homework
2. Periodic quizzes
3. Exams
4. Simulations and Applied Demonstrations

Course Content Outline:

1.Overview of programmable logic controller

1. Architecture of Programmable Logic Controller (PLC)
2. Central Processing Unit
3. Inputs/outputs
4. Memory

2.Number systems and codes

1. Decimal system
2. Binary system
3. Hexadecimal system
4. ASCII code

3.Logic fundamentals

1. AND function
2. OR function
3. INVERT function
4. Boolean logic and equations
5. Conversion of relay type logic to ladder logic

4.Programming of PLC

1. Programming languages
2. Relay type instructions
3. Ladder diagrams
4. Memory
5. Internal bits

5.Input output devices

1. Control relay
2. Contactor
3. Motor starter
4. Manual switches
5. Transducers and sensors
6. Latching relay
7. Analog input output
8. 7 segment displays

6.Timers

1. ON delay timer
2. OFF delay timer

3. Presentative timer
4. Cascading timer

7.Counters

1. UP counter
2. DOWN counter
3. Encoder counter applications

Resources

Petruzella, F. *Programmable Logic Controllers*. 5th ed. McGraw-Hill Publishing Company, Columbus, OH, 2017.

Glen Mazur. *Electrical Motor Controls*. 5th ed. American Technical Publishers, 2014.

Miller, Charles R. *Ugly's Electrical Reference*. 2020 ed. Burlington, MA: Jones & Bartlett Learning, 2019.

Herman, Stephen. *Delmar's Standard Book of Electricity*. 7th ed. Delmar Publishing Inc. Cliffton Park, NY, 2018.

Resources Other

1. Amatrol Software

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