BAKER COLLEGE
STUDENT LEARNING OUTCOMES

MATT2210 Programmable Logic Controller Application
3 Semester Hours

Student Learning Outcomes & Enabling Objectives

1. Describe and list the consideration for PLC and electrical safety. (CHA 1)
    a. List the considerations associated with PLC safety
    b. Describe the size designations used by PLC manufacturers
    c. Explain electrical shock.
    d. List the electrical properties associated with PLCs.
    e. Describe the grounding of PLCs and PLC systems
    f. Explain static electrical discharges.
    g. Describe the personal protective equipment (PPE) used by technicians when
    h. working on electrical systems

2. Describe and list the electrical principles and PLCs. (CHA 2)
    a. Describe the electrical circuits that connect input devices to the input sections of PLCs and output devices to the output sections of PLCs
    b. Explain why polarity is important when connecting input devices and output devices to some PLCs
    c. Identify the ratings used for the power supply, input sections, and output sections of PLCs
    d. Describe current sinking and current sourcing as they pertain to PLC input sections
    e. Explain the use of Ohm's law in series and parallel circuits

3. Identify the use of symbols in electrical and PLC circuits. (CHA 3)
    a. Identify typical logic gate symbols
    b. Explain normally open (NO) and normally closed (NC) for manual and automatic switches
    c. Identify the use of symbols in software programming diagrams
    d. Define pictorial drawings, wiring diagrams, ladder diagrams, and programming diagrams
    e. Explain and list the common logic functions
    f. Describe direct hardwiring, hardwiring using terminal strips, and PLC wiring

4. Explain the types and functions of generic PLC hardware. (CHA 4)
    a. Explain the functions and different variations of the five sections of a PLC: input section, output section, power supply, CPU, and programming device
    b. List the typical number of I/Os for the various size classifications of PLCs
    c. Explain the different types of PLC memory
    d. Describe the operating cycle of a PLC and how it relates to a PLC's memory

5. Explain and list the visual inspection and use documentation for PLC and system maintenance. (CHA 9)
    a. Explain how a PLC and PLC system is maintained
    b. List the steps involved in safely performing a visual inspection of a PLC as part of hardware maintenance
    c. List the steps involved in safely performing energized maintenance of a PLC as part of hardware maintenance

6. Describe the procedures for the troubleshooting PLC hardware. (CHA 11)
    a. Identify the differences between sag, swell, under voltages, over voltages, and transients.
    b. Describe how to set a test instrument for testing control transformers and how to connect the instrument to determine if the transformer is good or bad
    c. Describe how to set a test instrument for testing input sections or modules and output sections or modules and how to connect the instrument to determine if the sections or modules are good or bad

7. Troubleshoot faulty machine operation on training simulator with instructor induced faults. (CHA 12)
    a. Demonstrate and use of timers and counters instructions files for PLCs
    b. Describe the data structure of timer and counter instructions
    c. Describe the use Delay Timer On, Delay Timer Off, and Retentive timer instructions
    d. Describe how free running timers and cascaded timers are used in
    e. Analyze a problem with a systematic approach to troubleshoot an automated system

8. Demonstrate a systematic approach using observations, test instruments, and software to determine the source of the problem. (CHA 9, 10, 11 and 12)
    a. Identify using a systematic approach specific to mechanical troubleshooting as to the cause and resolution of the problem
    b. Identify using a systematic approach specific to fluidic troubleshooting as to the cause and resolution of the problem
    c. Identify using a systematic approach specific to electrical troubleshooting as to the cause and resolution of the problem
    d. Identify using a systematic approach the cause and resolution of a control problem

Big Ideas and Essential Questions

Big Ideas

- Industrial Safety Foundations of Electricity and PLC's
- The Role of PLC's
- Production Efficiency
- Components

Essential Questions

1. Why is safety the first priority?
2. How do I determine if a process is unsafe?
3. Why is it important to consider process efficiencies?
4. How do I determine what logic to utilize in processes?
5. What impact does an incorrect usage have on a product or process?
6. How are different components used?
7. How does documentation impact industrial communication between shifts?
8. What are the potential uses in the future?

These SLOs are not approved for experiential credit.

Effective: Fall 2017