BELL INSTITUTE OF TECHNOLOGY

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Duration: 30 Hrs (3 weeks at 2 hrs per Day or One week at 4 Hrs per Day or 1 week at full day Training) . Corporate Organization training also available

Training is vital for the effective use of any software. Properly trained users will have increased productivity and will gain greater confidence with the software. It is a worthwhile investment to train new users to overcome their initial hesitancy and existing users to increase their depth of knowledge. PLC course has been designed by experts for anyone new to PLC

PLC COURSE OUTLINE

1. Overview of PLCs
2. Central Processing Unit
3. I/O System
4. Programming Terminals and Peripherals
5. Installation and Maintenance of PLCs
6. Ladder Logic
7. Timers
8. Counters

Modules
Module 1 - Overview of PLCs

This module provides a general overview of PLCs and their application in industry. The origins of the PLC and its evolution are covered in detail. The advantages of PLCs are also outlined, and the main components associated with PLC systems are explored. An introduction to ladder logic is presented and the most common types of PLC signals are covered with an emphasis on practical application.

Learning Outcomes:

Upon completion of this module the student will be able to:

- Describe the purpose of a control panel.
- Define a programmable controller.
- List six factors affecting the original design of programmable controllers.
- Name three advantages of PLCs compared to relay logic systems.
- List the three main components in a PLC system.
- Understand the term ladder logic.
- Describe the application of PLC signals.
- Explain the difference between a bit and a word

Module 2 - Central Processing Unit

This course is intended to familiarize the student with the most important aspects of the PLC's central processing unit. Topics covered in the course include memory devices and memory storage, as well as an introduction to data storage and processing. In addition to covering memory utilization and memory mapping, the course also provides detailed information on multiprocessing and PLC scan functions.

Learning Outcomes:

Upon completion of this module the student will be able to:

- Define the term CPU.
- Explain the purpose of the executive program.
- Understand the application of buses in a CPU.
- List two types of CPU diagnostics.
- Differentiate between fatal and non-fatal errors.
- Explain the advantage of multiprocessing.
- Describe the two general classes of memory devices.
- Name four types of memory.
- Define memory protect.
- Explain the purpose of memory utilization and how it applies to PLC systems.
- Describe the scan function.

Module 3 - I/O System

This course covers all aspects of the Input/Output system for PLCs including discrete, analog, and data I/O. In addition, the course also presents an overview of I/O addressing and an introduction to Allen-Bradley I/O parameters. Course topics also include the principles of remote I/O and an introduction to scaling and resolution of analog devices and signals.

Learning Outcomes:

Upon completion of this module the student will be able to:

- Explain the purpose of the I/O system
- Describe how I/O addressing is accomplished.
- Define discrete inputs.
- List four tasks performed by an input module.
- Describe the basic operation of a discrete output.
- Explain the purpose of data I/O interfaces.
- Define analog I/O.
- Describe the resolution of an analog I/O module.
- List three applications for advanced I/O.
- Explain the purpose of remote I/O.

Module 4 - Programming Terminals and Peripherals

This course is intended to provide students with an overview of the wide range of programming terminals currently in use and to outline some of the key differences between them. In addition, the course covers topics such as hand-held programming terminals and computer-based software packages. The operation of host computer-based systems is also covered as well as the application of peripheral devices in a PLC network.

Learning Outcomes:

Upon completion of this module the student will be able to:

- Define the term programming terminal.
- Describe the application of dedicated programming terminals.
- List the two types of programming terminals.
- Describe the purpose of mini-programmers.
- Define computer-based programming terminals .
- Differentiate between programming software and documentation software.
- Describe the function of a host computer-based PLC system.
- Explain the purpose of peripheral devices.

Module 5 - Installation and Maintenance of PLCs

The purpose of this course is to provide the student with a thorough coverage of the various safety precautions, preventative maintenance, and troubleshooting techniques associated with a typical PLC system. In addition, the course also covers proper grounding techniques, sources of electrical interference, and I/O installation techniques. Field checkout and troubleshooting with an emphasis on practical troubleshooting and problem-solving strategies.

Learning Outcomes:

Upon completion of this module the student will be able to:

- List three safety precautions when installing PLC systems.

- Define system layout.
- List three safety measures for PLC installations in control panels.
- Describe proper grounding techniques for PLCs.
- Name three precautions to avoid electrical interference.
- Define cross-talk interference.
- Explain I/O installation.
- Describe the need for I/O documentation.
- Define leakage current and explain the purpose of bleeder resistors.
- Explain the field checkout of PLC systems.
- Provide periodic maintenance for a PLC system.
- Troubleshoot PLCs.
- Describe redundant PLC architecture.

Module 6 - Ladder Logic

This course provides an introduction to ladder logic programming techniques using laboratory simulation software. The lab component of the course provides the student with an opportunity to write ladder logic programs and test their operation through PLC simulation. Topics covered in the course include I/O instructions, safety circuitry, programming restrictions, and I/O addressing.

Learning Outcomes:

Upon completion of this module the student will be able to:

- Define ladder logic.
- Explain the purpose of I/O addresses.
- Describe the function of softwiring, branches, and rungs.
- Write a ladder logic program.
- Run a ladder logic program using lab simulator.
- Define the terms examine on and examine off'.
- Explain the purpose of a latching relay instruction.
- Differentiate between an internal output and an actual I/O output.
- Describe the operation controller scan.
- Name two programming restrictions.
- Define nesting.
- Explain why safety circuitry is important in ladder logic systems.
- List three types of I/O addressing.

Module 8 - Timers

This course is intended to provide students with an overview of PLC timers and their application in industrial control circuits. Allen-Bradley timing functions such as TON, TOF, and RTO are discussed in detail and the theory is reinforced through lab projects using lab simulation software. In addition, students will learn practical programming techniques for timers including cascading and reciprocating timing circuits.

Learning Outcomes:

Upon completion of this module the student will be able to:

- Name two types of relay logic timers.
- List the four basic types of PLC timers.
- Describe the function of a time-driven circuit.
- Differentiate between an ON-delay and an OFF-delay instruction.
- Write a ladder logic program using timers.
- Describe the operating principle of retentive timers.
- Explain the purpose of cascading timers.
- Define reciprocating timers.

Module 9 - Counters

This course provides students with a broad overview of PLC counters and their application in control systems. Allen-Bradley counting functions such as CTU and CTD are presented in detail and the theory is reinforced through lab projects using lab simulation software. In addition, students will learn practical programming techniques for counters including cascading counters and combining counting and timing circuits.

Learning Outcomes:

Upon completion of this module the student will be able to:

- Name two types of mechanical counters.
- Define the two basic types of PLC counters.
- Write a ladder logic program using CTU, CTD, and RES.
- Explain the terms underflow and overflow.
- Describe the function of an event-driven circuit.
- Design an up/down counter.
- Define cascading counters.
- Explain the advantages of combining timers and counters.