AUTODESK.
Authorized Training Center

CERTIPORT
AUTHORIZED TESTING CENTER

Institute of Architectural Graphics

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PLC & SCADA SYLLABUS

Institute of Architectural
Graphics, Nagpur.

Course Details

PLC & SCADA

Module	Topic
1.	Industrial Automation
2.	Overview of PLC
3.	CPU
4.	I/O System & wiring
5.	Prog Terminal & Peripherals
6.	Ladder Logic Creation & examples
7.	NO / NC Logic Building
8.	Forcing
9.	Timer Instructions
10.	Counter & Compare Instructions
11.	Introduction to SCADA
12.	Graphics Designing & its Tools
13.	Trends & Connectivity
	Left overs

* Computer Lab machines should have Operating system **WinXP SP2 / Win7**

Projector for presentation of programs will be in client scope.

Training will be provided on PLC Software:- Rslogix 500 & SCADA Software:- InTouch

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Module 1- Industrial Automation

This module provides an overview of automation concepts and its constitutes. History of Automation and its various types in the market. Advantages & Benefits to working engineers.

Learning Outcomes:

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

- Importance of Automation
- Its various modules/aspects
- Need of automation in today market
- Understand the benefits.

Module 2 - 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 participant 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 3 - Central Processing Unit

his course is intended to familiarize the participant 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 CPU types and PLC scan functions.

Learning Outcomes:

Upon completion of this module the participant 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.
- Explain the purpose of memory utilization and how it applies to PLC systems.
- Describe the scan function.

Module 4 - I/O System

This course covers all aspects of the Input/Output system for PLCs including discrete, analog, and data I/O. 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 participant 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.
- Explain the purpose of remote I/O.

Module 5 - Programming Terminals and Peripherals

This course is intended to provide participants 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 Participant will be able to:

- Define the term programming terminal.
- Describe the application of dedicated 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 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 participant 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 participant will be able to:

- Define ladder logic.
- Explain the purpose of I/O addresses.
- Describe the function of soft wiring, 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 7 – NO/NC Logic

This course provides a thorough treatment of logic and its application in PLC programming and control. In addition, the participant will become adept at converting control logic to ladder logic.

Learning Outcomes:

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

- Apply NO/NC to troubleshooting
- List five logic gates.
- Describe the basic operation of an inverter.
- Explain the purpose of No/Nc diagrams.
- Apply logic gate combinations to PLC control.
- Convert digital logic to ladder logic.

Module 8 - FORCE Instructions

This course is intended to provide an overview of forcing control techniques. Force instructions are presented and demonstrated through lab simulation software. The simulation software also allows the participant to program and observe branching operations.

Learning Outcomes:

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

- Describe the purpose of first failure annunciators.
- Explain the advantage of using forcing
- How to manage output energizing through software.
- Use the FORCE instruction for troubleshooting

Module 9 - Timers

This course is intended to provide participants with an overview of PLC timers and their application in industrial control circuits. 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, participants will learn practical programming techniques for timers including cascading and reciprocating timing circuits.

Learning Outcomes:

Upon completion of this module the participant 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.

Module 10 - Counters

This course provides participants with a broad overview of PLC counters and their application in control systems. 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, participants will learn practical programming techniques for counters & Compare including cascading counters and combining counting and timing circuits.

Learning Outcomes:

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

- Define the two basic types of PLC counters.
- Write a ladder logic program using CTU, CTD, and RES.
- Design an up/down counter.
- Define cascading counters.
- Explain the advantages of combining timers and counters.
- Comparing the counter values.

Module 11 – Introduction to SCADA

This course provides details of SCADA existence in this world. SCADA usage and its abilities will be clear and various options available in the software.

Learning Outcomes:

- Concepts of SCADA
- Implementations of SCADA
- Features and its abilities in Industry.
- Difference between HMI and SCADA.
- SCADA as a automation tool.

Module 12 – Graphic Designing & Its Tools

The course explains to participants about SCADA designing tools. Software interaction and its various option availability. Creating new designs or process images according to the industrial need. Building tags and symbols in software.

Learning Outcomes:

- What is graphic and how to build it.
- Functions of tools available in toolbar
- How tag is formed and images made in SCADA.

Module 13 – Trends & Connectivity

The course provides knowledge of logging methods and reports generation. Participant will know about connectivity of SCADA symbols to PLC addresses.

Learning Outcomes:

- Trending types and creation
- Online monitoring of tags.
- How to monitor PLC tags on SCADA online.
- Basic steps for PLC connectivity.

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