
Certificate Course on Programmable Logic Controller (PLC)
PG Department of Electronics
Sardar Patel University
Vallabh Vidyanagar

Advancement of technology and use of PLC is increasing day by day and hence it is necessary for the student to understand the basic concepts, operation, programming and advance applications of programmable Logic Controller (PLC). These skills developed through this course will help the student to function confidently in his/her career. It is also aimed to expose students to some of the advanced techniques used in Industrial Automation system in different industries.

The theory should be taught and practical/project should be carried out in such a manner that students are able to acquire required learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- ❖ Analyze the major components of a Programmable Logic Controller (PLC)
- ❖ Interpret the operation of PLC modules
- ❖ Execute the PLC programming with different condition.
- ❖ Establish Communication and Networking with PLC
- ❖ Use PLC for industrial process control.

Introduction to PLC

Need of PLC in industrial automation, Different functions of PLC with its advantages, Characteristics, Operation, Function, Types of PLC, Architecture of PLC, Applications of PLC, Development of simple application program for PLC.

Input / Output Modules and Power Supply

Overview of I/O system, Block schematic of I/O system, Input-Output systems, Classification : Serial, Parallel, Discrete, Analog special, Direct I/O, Serial I/O, Discrete input modules : DC input, Ac Input, Rectifier with Filter, Isolation, Logic Section, Discrete Output Modules Operating principles, Analog Input Modules : Single ended, Differential input.

Power supply requirements in PLC, Common AC source, Isolation, Protection, Configuration, Power Line Conditioner.

PLC Programming

Ladder Diagram of : Logic Gates, Multiplexer, Ladder diagram for different Logical Conditions, Logical Equations, Truth Table, Timers : types of Timer, Characteristics, Function of Timer in PLC, Classification of a PLC Timer, Ladder diagram using timer , PLC Counter, Ladder Diagram using Counter.

PLC Software

Connecting PLC with the computer, PLC Software, Uploading and Downloading PLC Application Program, Execution of PLC Program, Communication and Networking

Communication and Networking

Introduction to industrial Networking and RS 232-422-423-485 Standards, industrial Field Buses, MODBUS – Serial / TCP, PROFIBUS –DP, Foundation Field Bus (FF), HART, HMI Development, Data Processing, Control Algorithm programming

Industrial Automation

PLC Suitability, Applications : Thermal Power Plant, Irrigation, Automation in Cement Factory

SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- Students have to find practical applications of various parameters of ladder logical applications.
- Students are instructed to list various practical applications
- Students are instructed to take any one application.

Practical/Exercise

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills so that students are able to acquire the competencies/program outcomes.

Following is the list of practical exercises for guidance

- Assemble various modules and component of PLC to make a PLC system
- Prepare and Execute INPUT-OUTPUT module chart

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- Prepare and Execute ladder diagram of AND, OR, NOT, NAND, NOR, X-OR, X-NOR gate
 - Prepare and Execute ladder diagram for different Arithmetic operations
 - Prepare and Execute ladder diagram for logical operations along with truth table.
 - Prepare and Execute ladder diagram for different logical conditions- for Timer
 - Prepare and Execute ladder diagram for different logical conditions- for Counter
 - Prepare and Execute all over ladder diagram for industrial process and control.
 - Develop ladder diagram for a temperature, level, flow control system
 - HMI Interfacing

Books:

1. Programmable Logic Controllers and Industrial Automation an Introduction
By : Mitra, Madhuchanda, Gupta, Samarjit Sen Param , International Publising (India) Pvt. Ltd ., New Delhi,
2. Programmable logic controllers: principles and applications, By: Webb, John W. Reis, Ronald A. PHI Learning Pvt. Ltd. New Delhi ,.
3. Programmable logic controllers, By W. Bolten

Major Equipment/Materials with Broad Specification

- I. PLC – Siemens, Allen Bradley trainers
- II. Compatible PLC software for the above

Course Fees : Rs.10,000/-

Eligibility

- M. Sc in Electronics/ Instrumentation/ Industrial electronics.
- BE /B. Tech /Diploma passed in the following discipline: Electronics/ Instrumentation/ Industrial electronics

