VPM's ADVANCED STUDY CENTRE
C/o. B. N. Bandodkar College of Science
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POST GRADUATE DIPLOMA
IN
INDUSTRIAL AUTOMATION

Course details :
Duration : 9 months
Eligibility : B. Sc. - Physics / I.T. / Computer Science
B. E. / Diploma in Instrumentation, Electrical, Electronics, Telecommunication, Mechanical, Chemical Engineering
Timing : 06:00 p.m. to 08:00 p.m. (maximum 2/3 days a week)

Industrial automation is the need of the hour for students who are Science Graduates, Engineering Graduates and Diploma holders. Most of the industries, be it electronics, chemical or pharmaceutical have gone in for large-scale automation of their plants and factories. Keeping in mind the requirements of the industries, we have designed this Course, which covers the basics of Automation, basics of **Programmable Logic Controller (PLC),** PLC hardware, PLC programming, HMI - Local operator panels and **Supervisory Control & Data Acquisition (SCADA)**.

The candidate will be able to:
1. Use data transfer techniques
2. Describe architecture and operation of micro controller 8051
3. Develop assembly language programme using instruction set of 8051
4. Design and develop micro controller based systems
5. Explain various applications of micro controllers

Syllabus

1 Basics of Automation
1.1 Need of automation
1.2 Benefits of automation
1.3 Programmable Logic Controller (PLC) Overview
1.3.1 Introduction
1.3.2 PLC History
1.3.3 PLC in Industrial Automation
1.3.4 PLC architecture
1.3.5 Ladder Logic and Relays
1.4 Application areas – Process industries, Buildings, Robotics, Infrastructure, Aerospace, Railways, Automobiles, Telecom, Electrical distribution, Medical

2 Programmable Logic Controller (PLC) Basics
2.1 Block Diagram & Principle of Working
2.3 PLC Classification based on Type and size
2.4 PLC characteristics – CPU, Racks, Power Supply, Memory, Input & Output Modules, Application Specific Modules, Speed of Execution, Communication, Redundancy.

3.0 PLC Hardware
3.1 PLC Inputs and Outputs Types
3.2 Source and Sink Concept
3.3 Description and Function of various PLC Modules- I/O Modules and Communication Modules
3.4 PLC Hardware Configuration
3.5 Addressing of PLC I/O

3.6 Diagnostic Features
3.7 PLC Wiring
3.8 Interfacing with Sensors and Actuators

4.0 PLC Programming

4.1 Definition and Use of Bits and Words
4.2 Introduction to PLC Programming Languages- Ladder, Instruction List, Structed Text, Grafcet
4.3 PLC Programming Software, its installation and use with a PC
4.3.1 Ladder Program Development with Software
4.4 Instruction Set in Ladder – NO, NC, Set, Reset, Timers, Counters, Comparison, Arthmetic, Logical, Move, Drum Controller
4.4.1 Programming Examples in Ladder with simple applications
4.5 PLC Instructions
4.5.1 Data Transfer Instruction
4.5.2 Arithmetic Instructions
4.5.3 Data Comparison Instructions
4.5.4 Data Manipulation Instructions
4.5.5 Timer Instructions
4.5.6 Counter Instructions
4.5.7 Program Control Instructions
4.5.8 Pulse Instruction
4.5.9 PID Instruction
4.6 Different Programming Techniques
4.7 Trouble shooting PLC

5 HMI: Local Operator Panels

5.1 Need for HMI
5.2 Types and Characteristics of Local HMI operator panels
5.2.1 Introduction to Programming of HMI Panels
5.2.2 Interface between HMI Panels and PLC

6 HMI: Supervisory Control & Data Acquisition (SCADA)

6.1 Definition of SCADA
6.1.1 Functional Block Diagram
6.1.2 Function of SCADA
  a) Creating static & dynamic objects with animation
  b) SCADA data base configuration
  c) Alarm management
  d) Real time & historical trends.
6.2 Communication between PLC and SCADA
6.3 SCADA Applications

PRACTICALS

1. Use of simulation package for different function
2. Verify function of logic gates by using PLC
3. Write and verify ladder program for motor ON-OFF Control with two push buttons
4. Write and verify the ladder program for analog input (temp.) Measurement.
5. Develop a graphical screen for SCADA based system
6. Measure the frequency measurement by using high-speed counter in PLC
   Water level controller using PLC simulator.
7. Traffic light control using PLC simulator.
8. Horizontal motion of converter belt using limit switches using PLC simulator.
9. Bottling plant with counter simulator.
10. Lift control using PLC simulator.

- **Case study of typical PLC systems like Siemens, Allen Bradley, Schneider, Messung etc. and compare the specification and cost.**