

# **CETPA INFOTECH PVT. LTD.**

## **CURRICULUM FOR INDUSTRIAL AUTOMATION**

### **MODULE : 1** **(PLC & SCADA)**

#### **INTRODUCTION TO AUTOMATION**

- Brief Description of a Control System
- Pneumatic Controller, PID Controller, PLC Controller
- History & Need of Industrial Automation
- Application of Industrial Automation
- Basic Components of Automation
- Hardware Classification of Automation

#### **GETTING FAMILIAR WITH PLC OF ALLEN BRADLEY**

- Type of PLC
- Hardware & Architecture of PLC
- Application and Advantage of PLCs
- Sourcing and Sinking concept
- Programming Language of a PLC
- Introduction to field Device(Input/output)
- Data files in PLC Programming
- Brief Description of a Logic Gates
- Simulator analysis of a PLC Programming
- Communication with PLC
- Wiring different field device to PLC
- Uploading, Downloading & Monitoring programs
- Introduction to SFC
- Introduction to Instruction List
- Introduction to Ladder Logic

#### **ADVANCE PROGRAMMING IN PLC**

- Introduction to jump and label instruction.
- Introduction to SBR and JSR instruction.
- Forcing of I/O
- Monitoring/Modifying Data table values
- Hands on experience on real time applications
- Fault finding/troubleshooting and documentation
- Interfacing proximity sensor with PLC
- Interfacing with Relay
- Control circuit designing with feedback concept.

#### **LADDER LOGIC PROGRAMMING**

- Comparison b/w Gates, Relay Logic & ladder logic
- Description of using Memory bit in a programming
- Mathematical Concept ADD, SUB, MUL, DIV and etc
- Logical Concept AND, ANI, OR, ORI, EXOR, NOT etc
- Special Function MOV, SET, RST, CMP, INC, DEC
- Programming based on Timer And Counter

#### **GETTING FAMILIAR WITH SCADA OF WONDERWARE**

- Introduction to SCADA Software
- Creating new SCADA Project
- GUI Designing
- Tag Substitutions
- Dynamic Process Mimic
- Real Time Trend
- Historical Trend
- How to create Alarms & Event
- Recipe Management
- Introduction to graphic Properties like Sizing, Blinking, Filling, Analog Entry, Movement of Objects, Visibility etc.
- Net DDE Communication
- Application of scripts
- Communication with PLC

## **MODULE 2** **(RELAY & SENSOR INTERFACING)**

### **RELAY LOGIC**

- Basic principle of Relay working
- Making AND ,OR gate ,NOT gate logic circuit
- Interfacing relay with sensor
- Relay based Control designing
- Interconnection between Different Relay & Switch`s

### **CONTACTOR WORKING**

- DOL Starter
- Forward And Reverse DOL
- Star Delta Starter(including timer)
- Interlocking Circuit
- Inching process
- Contactor Based control Diagram

### **TIMER INTERFACING**

- Basic Principle of Industrial Timer
- Delay generation
- Wiring connection of timer to the different device
- Controlling switching between different devices
- Interfacing with relay and contactor
- Alarm generation

## **SENSOR AND PROCESS** **INSTRUMENTATION**

- Introduction to various Sensors/Instrumentation used in a Industry
- Temperature measurement (Thermocouple, RTD, thermistor )
- Working on the proximity sensor
- Introduction to limit switch
- Working on the photo electric sensor
- Temperature controller
- Level sensor
- Flow measurement and its working principle
- Pressure measurement and its working principle
- LVDT Displacement Sensor
- Load and level measurement
- Solenoid valve working and it`s Principle
- Making Switches by using Sensor
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## **MOTION CONTROL SYSTEM(VFD OF ALLEN BRADLEY))**

- AC Motor and its working
- Introduction to Stepper and Servo motor
- Motor control circuit, interlocking circuit
- Introduction to AC Drives & application
- Drive Parameter programming
- VFD controlling through Keypad ,External switch and PLC
- Basic Criteria for drives selection
- Drive Control Panel system designing

## **AUTOCAD DESIGNING ( 2D Drafting)**

- Creating and managing workspace
- Erasing Object,Cancelling & Undoing a command
- Object selection method
- Setting unit and limits
- Drawing arc,rectangle,ellipses,polygon
- Edit ,Move,copy& paste command
- Offset,rotate,&scale,fillet,Chamfering,trim , ExtendStretch & lengthen command
- Zooming & Panning drawing
- Electrical Wiring Designing through Autocad
- Control panel designing through Autocad

## **HMI (HUMAN MACHINE INTERFACE) OF ALLEN BRADLEY**

- Getting started with HMI
- Creating applications, creating tags
- Downloading and uploading Programs
- Creating GUI screen on the HMI
- Alarm Messages
- Communicating with PLC

Fault diagnostics and Troubleshooting

## **CONTROL PANEL DESIGNING**

- Discussion on Type of Switches;- PB, E- PB, Toggle Switches, Selector switches, Limit Switches
- Introduction to Contactor and it's Working
- Miniature Circuit Breaker
- Molded Case Circuit Breaker
- Over Load Relay
- Motor Protection Circuit Breaker
- Basic of Control & power drawing
- General wiring guidelines in a panel Designing
- Panel Indicator (Multifunction meter ,ammeter, Voltmeter)
- Preparation of general arrangement diagrams, busbar sizing
- Electrical Protection
- General wiring guidelines / practices
- Load management (connected load, running load ,load factor)
- Maintenance & troubleshooting of control circuit in live panels.

## **INDUSTRIAL NETWORKING**

- Taking different device through network
- Different Networking Topologies and their importance
- Communicating with Nodes, Ports, drivers and Hardware
- DH-485, Ethernet , DeviceNet , ControlNet, Modbus, Profibus, fieldBus

## MODULE 3:

### HMI (HUMAN MACHINE INTERFACE) OF DELTA

- Getting started with HMI
- Creating applications, creating tags
- Downloading and uploading Programs
- Creating GUI screen on the HMI
- Alarm Messages
- Communicating with PLC

Fault diagnostics and Troubleshooting

### MOTION CONTROL SYSTEM(VARIABLE FREQUENCY DRIVE OF DELTA)

- AC Motor and its working
- Introduction to Stepper and Servo motor
- Motor control circuit, interlocking circuit
- Introduction to AC Drives & application
- Drive Parameter programming
- VFD controlling through Keypad , External switch and PLC
- Basic Criteria for drives selection
- Drive Control Panel system designing

### AUTOCAD DESIGNING ( 2D ADVANCE)

- Arraying ,Mirroring, Breaking, dividing & joining
- Hatch and gradient
- Tool palette
- Region , explode

### WORKING WITH OTHER PLC'S(DELTA AND MITSUBISHI)

- Working with number of other PLC
- Hardware overview of that PLC
- Description of Programming language
- Uploading /Downloading and Monitoring the program
- Data files in used in a PLC
- Interfacing with Relay
- Control circuit designing with feedback concept
- Interfacing proximity sensor with PLC
- Communication with PC
- Wiring different field device to PLC
- Simulator analysis of a PLC Programming
- Fault finding and Troubleshooting
- Description of using Memory bit in a programming
- Mathematical & logical concept
- Compare and jump statement
- Advance control function operation
- Fault diagnostics and Troubleshooting

### WORKING WITH DIFFERENT SCADA TOOLS (RS VIEW 32 – ALLEN BRADLEY )

- Introduction to other SCADA
- Communication through DDE/OPC/DIRECT driver
- Various other related properties
- Features – recipe , security, trends, data Base connectivity, alarm

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