

BASIC INDUSTRIAL AUTOMATION COURSE

Sequence of commencement of Classes

➤ **Introduction of Technology**

- Basic Engineering Definitions
- Electrical
- Electronics
- Instrumentation
- Industrial Automation
- **1 (2 Hour 30 Minutes)**

➤ **Types of Automation**

- Tools of Industrial Automation
- Similarities between Human body and Industrial Automation,
- Difference between Scientist and Engineers
- Difference between
- Electrical and Electronics
- **1 (2 Hour 30 Minutes)**

➤ **Relay Logics and interlocks**

- Logic gates (AND, OR, NOT, NAND, NOR ETC.)
- Implementation (Using NO, NC , NO&NC)
- RELAY HOLDING CIRCUIT
- OTHER INTERLOCKS I
- **(2 Hour 30 Minutes)**

➤ **PLC Introduction**

- Definition, Types, Brands, Catalog number decoding,
- Architecture(overview and internal)
- Sink and Source,
- Introduction to Software's (Communication and Programming),
- GUI interface of Programming Software (How to use it),
- Uploading and Downloading of programs (define it and show the operation)
- **(2 Hour 30 Minutes)**

➤ **(Allen Bradley, Rockwell Automation, Micrologix 1000 Basic PLC Programming**

- Introduction about Data Files
- Addressing Format of Micrologix Series PLC
- Instructions to be covered:
 - Bit instructions: (XIC, XIO, OTE, OTL, OTU),
- Programs to be covered:
 - Logic gates,
 - Holding logic
- **8 (20 hours)**

➤ **(Allen Bradley, Rockwell Automation, Micrologix 1000 Basic PLC Programming**

- Instructions to be covered: (Timer instructions: TON, TOF, RTO)
- Programs to be covered:
- Basic TON based star delta operation and use of EN, TT & DN bit,
- Blinking of LED
- Automatic Sequence of operation of LED's, and other interlocks using timers only

OTHER BRANDS OF PLC

➤ **SIEMENS S7-200**

- Siemens Theory, Addressing Format
- Memory Overlapping Concept, Basic Programming:
 - Logic gates,
 - Holding and toggle
- **3 (7 Hour 30 minutes)**

➤ **SIEMENS S7-200**

- Timers
- Counters
- Compare
- Jump and Move and other miscellaneous
- **3 (7 Hour 30 minutes)**

➤ **SIEMENS S7-300**

- Siemens Theory,
- Addressing Format,
- Memory Overlapping Concept,
- Types of Programming blocks: OB, FC, FB, DB
- Work on Basic Programming Block (OB):
- Logic gates
- Holding and toggle
- Timers
- Counters
- Compare
- Jump and Move and other miscellaneous
- **3 (7 Hour 30 minutes)**

➤ **SIEMENS S7-300**

- Work on Other Programming Block (FC, FB, DB)
- **3 (7 Hour 30 minutes)**

➤ **MITSUBISHI & DELTA**

- Mitsubishi & Delta Theory,
- Addressing Format, Memory Overlapping Concept, Basic Programming:
 - Logic gates
 - Holding and toggle
- **3 (7 Hour 30 minutes)**

➤ **MITSUBISHI & DELTA**

- Timers
- Counters
- Compare
- Jump and Move and other miscellaneous
- **3 (7 Hour 30 minutes)**

➤ **OMRON**

- OMRON Theory,
- Addressing Format,
- Memory Overlapping Concept,
- Basic Programming:
 - Logic gates
 - Holding and toggle

- **8 (20 hours)**

➤ **(Allen Bradley, Rockwell Automation, Micrologix 1000**

- Instructions to be covered:
- (Counter instructions: CTU, CTD; Compare instruction: LES, GRT, LEQ, NEQ, MEQ, LIM (for limit))
- Move instructions: MOV, MVM; Jump and Control instructions: JMP, LBL, TND, MCR, JSR etc.)
- Programs to Basic PLC Programming be covered: Counting of bottles, Car parking- Automated Entry and Exit with boom barrier control, etc.

- **8 (20 hours)**

➤ **Allen Bradley, Rockwell Automation, Micrologix 1000 Basic PLC Programming**

- Revision class and Doubt Session of all Earlier classes (Introduction, Relay, PLC and Automation)
- OTHER BRANDS OF PLC
- **8 (20 hours)**

TEST AND EVALUATION OF COVERED TOPICS (Introduction, Relay, PLC and Automation)

➤ **SCADA Introduction**

- Definition
- Types of Scada
- BRANDS of SCADA
- Types of Window
- Types of Tags
- Types of Animation
- **1 (2 Hour 30 Minutes)**

➤ **SCADA Development Program**

- Animation Properties: Slider based -Location/Movement
- Visibility, Orientation, Filling, Color
- Change
- Blinking
- Height and width
- enable & disable
- **4 (10 Hours)**

➤ **SCADA Development Program**

- Features:
 - Alarm
 - Recipe
 - trends
 - Scripting
 - Security
 - Screen Switching
 - Excel Connection
- **4 (10 Hours)**

➤ **SCADA-PLC Communication**

- Digital buttons
- LED
- Analog Value,
- Preset of timer (USER INPUT)
- Accumulator of timer

- **3 (7 Hour 30 minutes)**

➤ **OMRON**

- Timers
- Counters
- Compare
- Jump and Move and other miscellaneous
- **3 (7 Hour 30 minutes)**

TEST AND EVALUATION OF COVERED TOPICS (ELECTRICAL and MOTOR DRIVES)

➤ **Process Control and Instrumentation**

- Definition (Control Systems, Instrumentation, Sensors)
- Types of Sensors
- Meters and Transmitters
- Signal Conditioner
- Calibrator
- Repeaters and Duplicators
- **3 (7 Hour 30 minutes)**

➤ **Process Control and Instrumentation**

- Temperature Sensors: RTD
- Thermocouple
- Thermister
- Thermostat
- Pyrometer etc.
- Pressure
- Sensors: Bourdent Tube
- Ballows
- Diaphragm
- Piezoelectric, etc
- **3 (7 Hour 30 minutes)**

➤ **Process Control and Instrumentation**

- Level Sensors:
 - Dip Stick
 - Capacitive
 - Optical
 - Ultrasonic, etc.
- Flow Meters:
 - Pitot Tube
 - Orific plate
 - Venturi Tube
 - Rota meter
 - Turbine type etc.
 - Other
- Sensors:
 - LVDT
 - Anemometer
 - pHmeter
 - Hygrometer. Load cells, etc
- **3 (7 Hour 30 minutes)**

- (VALUE DISPLAY)
- **2 (5 Hours)**
- **HMI**
 - Digital buttons
 - LED
 - Analog Value
 - Preset of timer (USER INPUT)
 - Accumulator of timer
 - (VALUE DISPLAY)
 - Alarm
 - Security and Screen Switching
- **2 (5 Hours)**

TEST AND EVALUATION OF COVERED TOPICS (SCADA, HMI)

- **Electrical Basic Concepts**
 - KVL
 - KCL
 - Ohms Law
 - Faradays Law of electromagnetism
 - Lenz Law
 - R
 - L
 - C based circuits
 - Motors Concept (AC, DC ;single phase and three phase)
- **1 (2 Hour 30 Minutes)**
- **Motor Starting Methods**
 - Direct On Line (DOL)
 - Reverse Direct On Line (RDOL)
 - Star-Delta, Soft starter
- **1 (2 Hour 30 Minutes)**
- **Motor Drives**
 - Definition and types of Motor Drives
 - Concept of Variable Frequency Drive
- **2 (5 Hours)**
- **Motor Drives**
 - Parameters (Basic Operations, Two wire, Three wire, Display and Fault)
- **2 (5 Hours)**

TEST AND EVALUATION OF COVERED TOPICS (AutoCAD, Panel designing, Panel & Field Wiring & Project)

- **Basic Industrial Networking**
 - Definition, Types of Networking
 - Protocol definition and its type
 - Topology Definition and types of topologies
- **2 (5 Hours)**
- **Basic Industrial Networking**
 - OSI Model
 - TCP/IP model

TEST AND EVALUATION OF COVERED TOPICS (Process Control and Instrumentation)

- **AutoCAD**
 - Basic 2d
 - CCD
 - PCD
 - Panel Drawing
 - Dimensioning
 - Mounting (Front & Rear View)
- **6 (15 Hours)**
- **AutoCAD**
 - Basic 2d
 - CCD
 - PCD
 - Panel Drawing
 - Dimensioning
 - Mounting (Front & Rear View)
- **6 (15 Hours)**
- **Industrial Panel Designing**
 - Definition of Panel
 - Some basic Electrical Concepts
 - Types of Signaling, Types of Panel
- **6 (15 Hours)**
- **Industrial Panel Designing**
 - Types of Safety
 - PPE
 - Types of Testing
 - Wiring and Mounting Method
 - Load Calculation and
 - Load balancing methods
- **6 (15 Hours)**
- **Panel & Field Wiring & Project**
 - Relay Holding
 - Sensor Wiring
 - Meters Connection
 - PLC Internal Wiring
- **6 (15 Hours)**
- **Panel & Field Wiring & Project**
 - PLC based motor connection (Using relay and contactor interface, and using VFD)
- **6 (15 Hours)**

- Types of IP
- Command line Interface
- BOOTP/DHCP Server
- **2 (5 Hours)**

➤ **Distributed Control Systems**

- Definition
- Difference between PLC and DCS
- Types of DCS
- Advantages of DCS
- Generic Architecture of DCS
- Components of DCS
- Features of DCS
- **3 (7 Hour 30 minutes)**

➤ **Distributed Control Systems**

- Tagging and Logic of DCS
- Hardware types and its interfacing with software
- **3 (7 Hour 30 minutes)**

➤ **Distributed Control Systems**

- Program creation in DCS and types of signalling in DCS
- **3 (7 Hour 30 minutes)**

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LEARN. APPLY. EVOLVE.