VALUE ADDED COURSE

25EIVAC01	INDUSTRIAL AUTOMATION	L	T	P
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COURSE OBJECTIVES

- To introduce the fundamental concepts and architecture of industrial automation systems, including levels and components of automation.
- To provide foundational knowledge of data acquisition systems and industrial control, including ADCs, DACs, and industrial sensors.
- To develop an understanding of Programmable Logic Controllers (PLCs) and their application in process control systems.
- To familiarize students with Supervisory Control and Data Acquisition (SCADA), Human-Machine Interfaces (HMIs), and Distributed Control Systems (DCS).
- To provide hands-on experience with automation tools and equipment, including sensors, actuators, PLCs, SCADA, and HMI interfaces.

UNIT I
INTRODUCTION TO AUTOMATION

Automation overview – requirement of automation systems – architecture of industrial automation system – Levels of Automation-basic components of an automated system – Programmable Automation Controllers (PAC).

UNIT II
INTRODUCTION TO DATA ACQUISITION AND INDUSTRIAL CONTROL

Sampling fundamentals, ADC, DAC, Data acquisition interface requirements.Sensors for temperature, pressure, flow and level measurements, smart sensors, Industrial Control Systems, Continuous Verses Discrete Control, Computer Based Industrial Process Control.

UNIT III
PROGRAMMABLE LOGIC CONTROLLERS

PLC Hardware – PLC programming – ladder diagram – sequential flow chart – PLC communication and networking – PLC selection – PLC installation – Advantages – Application of PLC to process control industries.

UNIT IV
INTRODUCTION TO SUPERVISORY CONTROL AND DATA ACQUISITIONS, DISTRIBUTED CONTROL SYSTEM

Computer networks and communication in DCS, different BUS configurations used for industrial automation – GPIB, HART and PROFIBUS. SCADA / HMI Essentials – SCADA Components – SCADA Configuration and Software – HMI hardware and software

UNIT V
HANDS ON TRAINING

Simple experiments on sensors, Actuators, Data acquisition and computer control, PLCs, HMI and SCADA.

TEXT BOOKS

1. S.Mukhopadhyay, S.Sen and A.K. Deb, Industrial Instrumentation Control and Automation, Jaico Publishing House, 2013.
2. Patranabis, Principles of Industrial Instrumentation, McGraw Hill,

REFERENCES

1. R.Krishnan, Electric Motor Drives, Modelling, Analysis and Control, Prentice Hall India, 2002.
2. Biswanath Paul, Industrial Electronics and Control Including Programmable Logic Controller
3. Krishna Kant, "Computer Based Industrial Control" Second edition, Prentice Hall of India, New Delhi,2010, PHI,2014.
4. Lukcas, Distributed Control Systems, Van Nostrand Reinhold Co.,1986.
5. John W Webb, Programmable Logic Controllers: Principles and Applications Pearson, 2015.

COURSE OUTCOMES

At the end of this course, students be able to

1. Explain the structure and components of industrial automation systems, and identify appropriate automation requirements for different processes.
2. Apply principles of data acquisition and industrial control using sensors and signal conversion techniques.
3. Develop and interpret ladder logic and sequential flowcharts for PLC-based control systems.
4. Design and configure basic SCADA and HMI systems, and understand the role of industrial communication protocols like HART, PROFIBUS, and GPIB.
5. Demonstrate practical skills in implementing simple industrial automation tasks using PLCs, sensors, actuators, and SCADA tools in a lab environment.