3EC43: INDUSTRIAL AUTOMATION
CREDITS - 4 (LTP: 3,0,1)

Course Objective:
Know general PLC issues, to be able to write simple ladder logic programs, understand the operation of a PLC, Programming of PLCs, and Working with SCADA software, Implementation of Distributed Control Scheme.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				
L	T	P	C	Theory Marks		Practical Marks		Total Marks
				ESE	CE	ESE	CE	
3	0	2	4	60	40	20	30	150

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Introduction to Automation :** Introduction to Automation, Requirement of Automation, Role of Automation, History of Automation, Architecture of Industrial automation system, Industrial Automation vs. Industrial Information Technology	04
2.	**Automation components :** Relays, Switches and its types, Sensors (Liquid and Gases sensor, Motion, level, PH, Humidity measurement sensor), Control Actuators (Solenoids, valve, Hydraulics, Pneumatics),	08
3.	**Programmable logic controller :** Introduction, Advantages of PLC base control system, Architecture of PLC, Working principle of PLC, Types of I/O and Memory, Timers, counters and registers, PLC Scan cycle, Maintenance and troubleshooting of PLC, Selection of PLC.	09
4.	**Instruction set, PLC programming and various design methods:** Data transfer instructions, Arithmetic and Logical instructions, Compare instructions, Timer and counter instructions, Ladder network programming for industry based Applications (Object counter, On-off control, Car parking, Sequential starting of motors, Traffic light control, Motor in forward and reverse direction, Filling of bottles, Room Automation), Other programming methods(Instruction List, Structured Text, Functional Block Diagram, Sequential Function Chart)	10

Unit No.	Topics	Teaching Hours
5.	**Introduction to HMI, DCS and SCADA :** Introduction and architecture of HMI, Overview of DCS, Features of DCS, Advantages of DCS, Introduction to SCADA.Creating new SCADA Project, Introduction to graphic Properties like Sizing, Blinking, Filling, Analog Entry, Movement of Objects, Visibility etc, Application of scripts in SCADA, Communication between SCADA and PLC.	10
6.	**Communication protocol for PLC, SCADA and HMI :** Different types of SCADA protocol, Safety, Security and precautions while dealing with industry project, Current trends in Industry Automation and Industry 4.0.	04
	Total	**45**

List of References:

1. S.K. Singh, "*Industrial Instrumentation and Control*", McGraw Hill Companies, 3rd Edition, 1980.
2. C.D. Johnson, "*Process Control Instrumentation Technology*", PHI, 8th Edition, 2006
3. W. Bolton, "*Programmable Logic Controllers*" ,Newness publications, 4th Edition,2003
4. John W. Webb, Ronald A. Reis, "*Programmable logic controllers, Principles and Applications*", PHI, 5th Edition, 2003.

Course Outcomes (COs) :

By learning this course student will be able to …

1. Understand basics of Industrial Automation system and its requirement
2. Acquire knowledge of various automation components and systems.
3. Analyze architecture and working of PLC.
4. Develop skills for Programming PLC and use it for industrial automation
5. Integrate SCADA with PLC and understand basics of HMI and DCS.