3EE13: INDUSTRIAL AUTOMATION AND CONTROL
CREDITS - 3 (LTP: 3,0,0)

Course Objectives:

1. Understand automation technologies and identify advantages, limitations and applications of the same.
2. Develop ability to recognize, articulate and solve industrial problems using automation technologies.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per Week)			Credits	Assessment Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	CE	ESE	CE	
3	0	0	3	60	40	00	00	100

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Programmable Logic Controller (PLC) :** An overview of PLC, Introduction, definitions and history of PLC, manufacturing and assembly processes, PLC advantages and disadvantages, overall PLC system, CPU, PLC, input and output modules, program recording devices, General programming procedure, Input and Output module interfacing, Relation of digital gate logic to contact / coil logic	6
2	**PLC Programming:** Creating ladder diagrams from process control descriptions, Basics of register.	7
3	**PLC Functions:** Timer function, Counter function, Arithmetic function, Number comparison functions, Numbering systems and number conversion function, Skip and Master control relay functions, Jump functions, PLC data move systems, Digital bit functions and applications, Sequencer function.	9
4	**Analog PLC operations:** Different PLC operations ,Applications of PLCs:Stepper motor control, Speed control of D.C. motor & Induction motor, Lift/Elevator control, Water level control, Traffic control, Temperature control.	6
5	**HMI: A**rchitecture, types and specifications, Interfacing and Networking With PLC. **SCADA**: Introduction, Features and Applications.	5
6	**Introduction to Distributed Control System:** DCS architecture, Communication Protocol.	4
7	**Introduction to Industry 4.0** History of industrial revolutions, Concept of IR4.0, Typical architecture of IR4.0, Design principles and major role players in IR4.0, Advantages and Challenges.	5
	Total	**42**

List of References:

1. John W. Webb, Ronald A. Reis, "Programmable Logic Controllers", 5th Ed., PHI, 2012.
2. John R. Hackworth, Fredrick D. Hackworth Jr., "Programmable Logic Controllers: Programming Methods and Applications", Pearson,
3. William Bolton, "Programmable Logic Controllers", 4th Edition, Elsevier.
4. L.A. Bryan and E. A. Bryan, "Programmable Controllers – Theory and implementation," Second edition, An Industrial text company publication, USA, 1997.
5. Richard L. Shell and Ernest L. Hall, "Handbook of industrial automation," CRC press 2000.

Web Resource:

Video Course on

"Industrial Automation & Control" by Prof Siddhartha Mukhopadhyay (IIT, KHARAGPUR) : https://nptel.ac.in/courses/108/105/108105088/

Course Outcomes (COs):

At the end of this course students will be able to:

1. Understand the basics of PLC programming.
2. Understand the different parameters of PLC.
3. Design different process control applications through ladder logic.
4. Analyze & Explain different functions of PLC.
5. Build and experiment with PLC based SCADA systems for various industrial applications.
6. Implement HMI, Distributed Control System and Industry standard 4.0