

S. No.	Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
								Sessional	Final Exam	Total
3	ECE-403	Introduction to PLC and SCADA	ESC	4	3	1	0	50	100	150

Course Outcomes:

At the end of the course the student will be able to: -

CO1	Compare conventional sequential control with programmable logic control system
CO2	Develop programs using PLC programming language for sequential and continuous process
CO3	Interface analog and digital input/ output devices with PLC using different communication protocol
CO4	Test the PLC based system and troubleshoot the errors associated with it
CO5	Apply the knowledge of PLC in developing industrial applications.

Detailed Syllabus**Section A**

Unit 1: Programmable Logic Controllers (PLCs): Introduction; definition & history of the PLC; Need of automations in industries; Principle of operation; various components of PLC: CPU & programmer/ monitors; PLC input & output modules; the processor; power supplies, PLC wiring. PLC advantages & disadvantages; PLC versus Computers, PLC Applications. Programming equipment; proper construction of PLC ladder diagrams; process scanning consideration, Introduction to PLC Trainer Device and PLC Software, Fundamental Commands of PLC

(8 Hrs)

Unit 2: PLC Hardware Components: The I/O section, Discrete I/O Modules, Analog I/O Modules, Special I/O Modules, I/O specifications, sourcing and sinking concept. CPU, Memory Types, Programming Devices. Fundamentals of Logic: The Binary Concept, AND, OR and NOT functions, Boolean Algebra, developing circuits from Boolean expressions, Producing the Boolean equation from given circuits, Hardwired logic versus programmed logic, Programming word level logic instructions. Converting Relay schematics and Boolean equations into PLC Ladder Programs, Writing a ladder logic program directly from a narrative description.

(12 Hrs)

Unit 3: Programming Timers, Mechanical Timing relay, Timer instructions, ON delay timer instruction, Off-delay timer instruction, Retentive Timer, Cascading Timers, examples of timer function industrial application; industrial process timing application. PLC Networking: Introduction, Levels of Industrial Control, Types of Networking, Network communications. Analog PLC Operation, Analog PLC Application Examples

(8 Hrs)**Section-B**

Unit 4: Programming Counters: Up-counter, down counter, Up-Down counter, Cascading counters, Incremental encoder counter applications, combining counter and timer functions, examples of counter function with industrial application, Cascading of Timers and Counters. Various Brands of PLCs and their evaluation. Overview of Siemens PLC, Allen Bradley PLC, Schneider electric PLC, Omron PLC, Mitsubishi PLC. Comparison of various instructions.

(10 Hrs)

Unit 5: PLC Networking Introduction, Levels of Industrial Control, Types of Networking, Network communications. Analog PLC Operation, Types of Analog PLCs, PLC Analog Signal Processing, PLC Analog Application Examples. SCADA: Introduction, Fundamental Principles of Modern SCADA System, Advantages and Disadvantages, SCADA Hardware and Software, Remote Terminal Unit (RTU), Local Area Network & Modems, Emerging New Technologies in SCADA System.

(10 Hrs)**Text Books**

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Introduction to Programmable Logic Controllers	Gary Dunning	Thomson	2 nd (2002)
2	Programmable Logic Controllers: Principles and Application	John W. Webb, Ronald A. Reis,	PHI Learning, New Delhi	5 th (2002)
3	SCADA supervisory control and data acquisition	Stuart A Boyer	ISA	4 th (2016)