

PROGRAMMABLE LOGIC CONTROLLERS AND AUTOMATION LABORATORY

VI Semester: EEE								
Course Code	Category	Hours / Week			Credit	Maximum Marks		
AEE110	Core	L	T	P	C	CIA	SEE	Total
		-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 42			Total Classes: 42			
<p>I. COURSE OVERVIEW: The objective of this laboratory course is to measure, analyze and control the physical input and outputs like temperature, speed, voltage, current, etc., in an industrial automation process using programmable logic controllers (PLCs). The lab emphasizes on the software and hardware skills to design and realize an automation process. The lab is mainly intended to give hands-on skills on PLCs to implement software timers, counters and their usage in traffic signal control, lift control, sequential control, solar tracking, starting and braking of electrical machines.</p> <p>II. OBJECTIVES: The course should enable the students to:</p> <ul style="list-style-type: none"> I The functioning of programmable logic controller (PLC), its I/O modules and usage of these devices in an automation system. II The interfacing of input and output devices of a process with PLC and control of these devices automatically. III The programming of PLC using relay ladder diagram programming method and interfacing of PLC with Human Machine Interface (HMI) and Variable Frequency Drive (VFD). <p>III. COURSE OUTCOMES: After successful completion of the course, students should be able to:</p> <ul style="list-style-type: none"> CO 1 Use PLC timers and Counters for delaying a particular control process and counting the production rate in an industrial system.. Analyze CO 2 Design a system for starting, speed control and braking of DC/AC motors using PLC digital module. Apply CO 3 Measure the temperature, speed, voltage and current using PLC analog module to control the operation of motors, relays and circuit breakers. Analyze CO 4 Construct PLC based automatic traffic signal system to control the vehicle congestion at a three-way or four-way road junction. Apply CO 5 Develop the ladder diagram logic programs for lift control, solar tracking and fault annunciation systems. Apply <p>IV. SYLLABUS:</p>								
LIST OF EXPERIMENTS								
Expt. 1	STAR DELTA STARTER							
Star delta starter for three phase squirrel cage induction motor using programmable logic controller.								
Expt. 2	AUTOMATIC FORWARD AND REVERSE CONTROL							
Automatic forward and reverse control of three phase squirrel cage induction motor for milling operation using programmable logic controller.								

Expt. 3	FAULT ANNUNCIATION SYSTEM
Fault annunciation system using programmable logic controller.	
Expt. 4	TEMPERATURE CONTROL SYSTEM
Temperature control system using programmable logic controllers and PT100 using programmable logic controller.	
Expt. 5	PLUGGING
Starting, stopping, reversing and braking by plugging of a squirrel cage induction motor using programmable logic controller.	
Expt. 6	CONTROL OF LIFT
Control of lift using programmable logic controller.	
Expt. 7	TRAFFIC SIGNAL CONTROL
Traffic signal control using programmable logic controller.	
Expt. 8	IMPLEMENTATION OF TIMERS
Implementation of ON-delay and OFF – delay timers using PLC	
Expt. 9	SOLAR TRACKING
Solar tracking using programmable logic controller.	
Expt. 10	DIRECT ONLINE STARTER
Direct online starter for AC motor implementation using programmable logic controller.	
Expt. 11	UP DOWN COUNTER
Implementation of up down counter to count the objects in a store using programmable logic controller.	
Expt. 12	DIGITAL CLOCK
Implementation of 24 hour digital clock using programmable logic controller.	
Expt. 13	TIMERS
Implementation of on delay, off delay and retentive timer using programmable logic controller.	
Expt. 14	SEQUENTIAL CONTROL
Sequential control of three motors to start one after the other with a time delay using programmable logic controller.	
Reference Books:	
<ol style="list-style-type: none"> 1. L A Bryan, E A Bryan, “Programmable Controllers: Theory & Implementation”, Industrial Text Company Publications, 2nd Edition, 1997. 2. John R Hackworth & Frederick D. Hackworth Jr., “Programmable Logic Controllers: Programming methods and applications”, Pearson education, 2008. 	

Web References:

1. <https://www.igniteengineers.com>
2. <https://www.ocw.nthu.edu.tw>
3. <https://www.uotechnology.edu.iq>
4. <https://www.iare.ac.in>

Course Home Page:**LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 36 STUDENTS:**

SOFTWARE: WPL soft programmable logic controller software

HARDWARE: Desktop Computers (04 nos)