PLC AND INDUSTRIAL AUTOMATION LABORATORY

VI Semester: EEE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEEB26	Core	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 24				Total Classes: 24		

I. COURSE OVRVIEW:

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 todesign 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.

II. OBJECTIVES:

The course should enable the students to:

I The functioning of programmable logic controller (PLC), its I/O modules andusage of these devices in an automation system.

II The interfacing of input and output devices of a process with PLC and control ofthese devices automatically.

III The programming of PLC using relay ladder diagram programming method and interfacing of PLC with Human Machine Interface (HMI) and Variable FrequencyDrive (VFD).

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

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 ofDC/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, solartracking and fault annunciation systems.	Apply

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:	
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 24 STUDENTS:

SOFTWARE : WPL soft programmable logic controller software
HARDWARE : Desktop Computers (24 nos)