COURSE CONTENT

PLC AND INDUSTRIAL AUTOMATION LABORATORY								
VI Semester: EEE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AEED40	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		0	0	2	1	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 45**				**Total Classes: 45**		
Prerequisite: Microprocessors and Microcontrollers, DC Machines								

I. COURSE OVERVIEW:

The objective of this laboratory course is to measure the physical input variables and to analyze and control and output variables 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 implement the software timers, counters and their usage in traffic signal control, sequential control, speed control of motors etc.

II. COURSES OBJECTIVES:

The students will try to learn:

I. The operation of PLCs, its ladder diagram programming and wiring of hardware equipment with PLC.
II. The measurement and control of digital, analog input/output variables using PLC.
III. The use of Human Machine Interface (HMI) to monitor and control the operation of a process

III. COURSE OUTCOMES:

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

CO 1: Use of the PLC logic gates, timers and Counters for delaying a particular control process and counting the production rate in an industrial system.
CO 2: Design a system for starting, speed control and braking of DC/AC motors using PLC digital module.
CO 3: Measure the temperature, speed, voltage and current using PLC analog module to control the operation of motors, relays and circuit breakers.
CO 4: Construct the PLC based automatic traffic signal system to control the vehicle congestion at a three-way or four-way road junction.
CO 5: Develop the ladder diagram logic programs for lift control, water level monitoring and fault annunciation systems.
CO 6: Design a PLC ladder logic program for digital clock and solar tracking system.

IV.COURSE CONTENT:

WEEK - 1: DESIGN OF SIMPLE LOGIC GATES
Design of simple logic gates using a Programmable Logic Controller.

WEEK - 2: EXERCISES ON TIMERS
Implement ON delay timer using Programmable Logic Controller for delaying a particular control process in an industrial system.

WEEK - 3: EXERCISES ON COUNTERS
Implement the Up-counter operation using Programmable Logic Controller for counting the production rate in an industrial system.

WEEK - 4: SEQUENTIAL CONTROL
Implement the PLC program for a sequential control of three motors.

WEEK - 5: DIRECT ONLINE (DOL) STARTER
Implement the direct online (DOL) starter for three phase induction motor using Programmable Logic Controllers.

WEEK - 6: STAR-DELTA STARTER
Implement the Star Delta starter for three phase induction motor using Programmable Logic Controllers

WEEK - 7: AUTOMATIC FORWARD AND REVERSE CONTROL OF MOTOR
Implement an automatic forward and reverse control of three phase squirrel cage induction motor for milling operation using PLC.

WEEK - 8: REVERSE CURRENT BREAKING OF 3-PHASE INDUCTION MOTOR
Implement the reverse current breaking method for three phase induction motor using Programmable Logic Controller.

WEEK - 9: TRAFFC SIGNAL CONTROL
Examine the traffic signal control system for a three-way junction road using Programmable Logic Controller.

WEEK - 10: TEMPERATURE CONTROL IN A ROOM
Examine the temperature control system to monitor the temperature of a room using Programmable Logic Controller

WEEK - 11: SOLAR TRACKING
Implement the solar tracking system using Programmable Logic Controller.

WEEK - 12: DIGITAL CLOCK
Construct a 24-hour digital clock to measure time using Programmable Logic Controller

WEEK - 13: CONTROL OF LIFT
Examine a lift operation used in public buildings using Programmable Logic Controller.

WEEK - 14: FAULT ANNUNCIATION SYSTEM
Implement the fault annunciation system using Programmable Logic Controller.

V. REFERENCE BOOKS:

1. John R. Hack Worth, Frederick D. Hack Worth, Jr., “Programmable Logic Controllers: Programming Methods and Applications”, Pearson Education, 4th Edition, 2008.
2. W Bolton “Programmable logic controllers”, Newnes Elsevier, 4th Edition, 2006.
3. Luis A Bryan, E A Bryan, “Programmable Controllers theory and implementation”, American Technical Publisher, 4th Edition, 2002.
4. Frank D. Petruzella, “Programmable Logic Controllers”, Tata McGraw Hill, 3rd Edition, 2010.

VI. WEB REFERENCES:

1. https://www.gnindia.dronacharya.info/EEEDept/Downloads/Labmanuals/EMI_Lab.pdf
2. https://www.scribd.com/doc/25086994/electrical-measurements-lab

VII. ELECTRONIC RESOURCES:

1. http://DVP-ES2/EX2/SS2/SA2/SX2/SE&TP Operation Manual - Programming (deltronics.ru)
2. http://DELTA_IA-PLC_DVP_TP_C_EN_20231023.pdf (deltaww.com)
3. http://Free PLC Books Download | Ebooks Online Textbooks Tutorials PDF (freebookcentre.net)
4. http://PLC Handbook | Free eBook Download | Library.AutomationDirect.com

VIII. MATERIALS ONLINE

1. Course Description
2. Lab manual.