

## Faculty of Engineering & Technology

### PLC and Applications

**Information :**

**Course Code :** EPR 473

**Level :** Undergraduate

**Course Hours :** 3.00- Hours

**Department :** Specialization of Electrical Power Engineering

**Instructor Information :**

Title	Name	Office hours
Associate Professor	Sameh Abdelhaleem Mohamed Abdelsalam	14
Teaching Assistant	Mariam Mohamed Ali Ahmed Elshimey	

**Area Of Study :**

1. Develop the student's knowledge about various components of PLCs and PLC systems.
2. Prepare the student to write a PLC ladder diagram for different control systems.
3. Train the student to perform basic experiments using PLCs.
4. Familiarize the students with various network topologies used in industrial control systems

**Description :**

Logic Gates ; Types of control systems, Structure of programmable logic controllers., Basic set of instructions, Timers, Counters, Registers, Applications., Control systems using sequential PLC, Development of step programs, Controllers of displacement, Step function., Programming of different industrial control circuits., Input / Output data handling analysis., Sensors., Interfacing between controllers. Scada system.

**Course outcomes :**

**a. Knowledge and Understanding: :**

1 -	Review of classical industrial control systems and motivation for microprocessor-based systems
2 -	outline the building blocks of a Programmable Logic Controllers/ Microprocessor-based controller and describe the function of its various blocks. Identify various types of input/output modules of a PLC.
3 -	describe various control tasks/processes for industrial control systems using ladder programming language.
4 -	Identify various PLC timers and counters and their main features.
5 -	Describe various types of industrial networking and recognize their unique features.

**b. Intellectual Skills: :**

1 -	Write combinational and sequential control tasks related to industrial processes.
2 -	Create PLC programs for different industrial processes.
3 -	Select appropriate type of timers for a specific industrial process
4 -	Select appropriate type of counters for a specific industrial process.

**c. Professional and Practical Skills: :**

1 -	Examine different control circuits using PLC software programming.
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2 -	Implement simple and complicated different control circuits.
3 -	Select appropriate Control solution techniques on simple industrial control circuits in the lab.
<b>d.General and Transferable Skills: :</b>	
1 -	Work in stressful environment and within constraints.
2 -	Communicate effectively.
3 -	Effectively manage tasks, time, and resources.

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction to the operation of industrial classical control systems	7	3	4
Introduction of modern industrial control systems and motivation for using PLC	3	3	0
Architecture of PLCs	5	3	2
Input / Output devices.	8	6	2
Input / Output modules.	5	3	2
Ladder and Functional Block Programming	12	6	6
Operation and control using Timers, Counters,	12	6	6
Programming of different industrial processes using timers and counters	12	6	6
Process control, Networking	8	6	2
Scada system.	3	3	0

**Teaching And Learning Methodologies :**

Interactive Lecture
Discussion
Problem solving
Experiential learning
Cooperative learning

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
Final exam	40.00	15	to assess the comprehensive understanding of the scientific background of the course, to assess the ability of problem solving with different techniques studied
Mid- Exam I	15.00		
Mid- Exam II	15.00		
o Lab	10.00		
o Participations	10.00		
o Quizzes	10.00		

**Recommended books :**

- (1) W. Bolton, Programmable Logic Controllers, 6th edition, Elsevier, 2015, ISBN 978-0-12-802929-9.
- (2) F. D. Petruzella, Programmable Logic Controllers, 5th edition, McGraw-Hill Education, 2017, ISBN 978-0-07-337384-3.
- (3) Ian G. Warmock, Programmable Controllers Operations and Applications, Prentice Hall 1979