SEMESTER	DEPARTMENT	COURSE TITLE
Sixth	*Power Engineering*	*Programmable Logic Controller*
COURSE CODE	**HOURS:** 3	**COURSE SPECIFICATIONS**
EC607	**UNITS:** 3	*Theoretical Content*

1. ***Concepts' Revision:***

- Revision of Logic Gates.
- Revision of the Concept of Closed Loop and Open Loop Control.

2. ***PLC Overview:***

- Introduction (Comparison of PLC and Relays).
- PLC Parts, PLC Modules and Cards.
- PLC Memory Types.
- PLC Selection Criteria.

3. ***PLC Hardware:***

- PLC Internal Hardware Architecture.
- Internal Architecture of Input and Output modules/parts.
- Digital and Analog Sensors/ Actuators.
- Source and Sink Concept.
- Signal and Data Conditioning.
- PLC Memory Addressing.
- PLC Wiring.

4. ***PLC Software:***

- Overview on Programming Methods' Types:
  - Structured Text Language (STL).
  - Function Block Diagram (FBD).
  - Ladder Diagram (LD)
- Programming Basics of Ladder Diagram.
- Logic Inputs & Outputs in LD.
  - Start and Stop Circuit (Latching Circuit).
  - Implementing Logic Functions such as: AND Gate, OR Gate, and XOR Gate.

Prepared by: Mohamed M. Elmajbrie;MSc.
Reviewed by: Z. T. Jawad; MSc.

- Implementing Boolean's Functions in Ladder Diagram.
- Rising Edge and Falling Edge Circuit.

- On-Delay Timer / Off-Delay Timer Instructions in LD.
- Up/Down Counter Instructions in LD.
- Data Transfer Instructions in LD.
- Arithmetic Instructions in LD.
  - Add, Subtract, Multiply, and Divide Instructions and their effect on Flag registers.
- Special Purpose Flags like: Zero Flag, First Cycle Scan Flag, Always-ON-Flag, Always-off-Flag, and etc...
- Data Comparison Instructions in LD and their effects on Flags.
- Shift and Rotate Instructions in LD and their effects on Flags.
- Subroutine Instructions in LD.
- Types of Contactors.

5. Applications (Such as :)

- Traffic Light Control.
- Tank Level Control.
- Conveyer Built Control.
- Starting of 3- phase motor.
- Star Delta Starter.
- Mixer for Liquids Control.

References:

1. ***Programmable Logic Controllers***, W. Bolton, 4th ed. 2006.
2. ***Programmable Logical Controller***, J. W. Wabb, 1994.
3. ***Programmable Logic Controller***, C. Simpson, 1993.
4. ***PLC and their applications,*** A. Crispin, 1990.