**Nirma University**
**School of Technology, Institute of Technology**
**B. Tech (Instrumentation and Control Engineering)**

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**(Open Elective for other than IC Engineering branch)**

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| **Course Code** | **OExxx** |
| **Course Title** | **Programmable Logic Controller** |

**Course Learning Outcome:**
At the end of the course, students will be able to -

- recognize the fundamental principles of programmable logic controller
- program PLC using standard programming techniques
- develop and design PLC based application

| **Syllabus** | **Teaching Hours** |
|---|---|
| **UNIT 0: Introduction** | **03** |
| Definition, advantages and Importance of PLC, Evolution history of PLC, architecture and block diagram. | |
| **UNIT 1: PLC hardware** | **07** |
| Types of PLC, CPU unit architecture, Memory classification, Input/output devices and it's interfacing, Digital-Analog modules. Communication modules, Special function modules. | |
| **UNIT 2 : PLC operation** | **04** |
| Basic Ladder logic, logic functions, electrical wiring diagram, scan cycle. | |
| **UNIT 3: PLC Ladder Programming** | **08** |
| Programming languages for PLC, PLC module addressing, registers basics, basic relay instructions, timer-counter instructions, arithmetic functions, comparison functions, data handling, data move functions, input-output instructions, sequencer instructions, Case studies | |
| **UNIT 4: PLC Communication protocol** | **08** |
| Interface Standard, Modbus and Modbus plus Protocols, CC-Link overview, HART, AS-interface (AS-i), DeviceNet overview, ProfiBus PA/DP/FMS protocol, Foundation Fieldbus, Industrial Ethernet overview, TCP/IP overview, OPC server client | |

**Self-Study:**

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

**Laboratory Work:**
Laboratory work will consist of minimum 12 experiments based on the above syllabus.

**References:**


1. Frank Petruzzula, Programmable Logic Controllers, Tata Mc-Graw Hill Edition
2. John W. Webb, Ronald A. Reis, Programmable Logic Controllers Principles and Applications, PHI publication
3. Madhuchannd Mitra and Samerjit Sengupta, Programmable Logic Controllers Industrial Automation an Introduction, Penram International Publishing Pvt. Ltd.
4. J. R. Hackworth and F. D. Hackworth, Programmable Logic Controllers Principles and Applications, Pearson publication.