No	Course Information (2019-2020)	
1	Unit name:	PLC Programming Methods and Techniques
2	Code:	EcE-51033
3	Classification:	Engineering subject
4	Credit value:	3 (2-0-2)
5	Semester/ Year Offered:	1/5
6	Pre-requisite:	Digital Control System, Industrial Electronic & Control, Modern Control System, Modeling and Control, Digital Electronics, Fundamental of Electronic Circuit, Technical programming
7	Mode of delivery:	Lecture, Computer application, Demonstration
8	Assessment system and breakdown of marks:	Practical and Lab report, Tutorial/Assignment Exam
	Practical and lab report	20%
	Tutorial/Assignment	10%
	Examination	70%
9	Academic staff teaching unit:	Department of Electronic Engineering
10	Course outcome of unit: In this course, students will be able to (1) Apply the PLC information and techniques (2) Design the system using PLC programming methods and techniques (3) Follow the simulation using TIA portal including PLCSIM, by building the logical programs for the Industrial Automation System	
11	Synopsis of unit: The course introduces students to the study of the control system, its methods and logical programming. Course covers the designing program with the programmable logic controller. This course can be applied in automation and any other various applications.	
12	Topic: 1 Programmable Logic Controller 2 Input – output devices 3 Digital systems 4 I/O processing 5 Ladder and functional block programming 6 IL, FSC and ST programming methods 6.1 Instruction lists 6.1.1 Ladder programs and instruction lists 6.1.2 Branch codes 6.1.3 More than one rung 6.1.4 Programming examples 6.2 Sequential function charts 6.2.1 Branching and convergence 6.2.2 Actions 6.3 Structured text 6.3.1 Conditional statements	

	6.3.2 Iteration statements 6.3.3 Structured text program 7 Internal relays 7.1 Internal relays 7.2 Ladder programs 7.2.1 Programs with multiple input conditions 7.2.2 Latching programs 7.3 Battery-backed relays 7.4 One-shot operation 7.5 Set and reset 7.5.1 Program examples 7.6 Master control relay 7.6.1 Examples of programs 8 Jump and call 8.1 Jump 8.1.1 Jumps within jumps 8.2 Subroutines 9 Timers 9.1 Types of timers 9.2 Programming timers 9.2.1 Sequencing 9.2.2 Cascaded timers 9.2.3 On-off cycle timer 9.3 Off-delay timers 9.4 Pulse timers 9.5 Programming examples 10 Counters 10.1 Forms of counter 10.2 Programming 10.2.1 Counter application 10.3 Up and down counting 10.4 Timers with counters 10.5 Sequencer
	Main references: Programmable Logic Controller, 4th edition, W. Bolton, Jordan Hill, 2006
15	Additional references: 1. S7-1200 Easy Book Manual, Siemen 2. S7 -1200 Programmable Controller, System Manual, Siemen 3. Sysmac CP1L/CP1E Introduction Manual, Omron

Lab	Information on Practical (PLC Programming Methods and Techniques)
1	Topic: How to use **TIA Portal** Task: ❖ To use the TIA Portal software Resource: **Computer, TIA Portal v13 Software**
2	Topic: How to use TIA Portal including **PLCSIM** Task: ❖ To use the TIA Portal including PLCSIM software ❖ To follow the simulation to use the ladder programming language with the PLC software (TIA Portal) Resource: **Computer, TIA Portal software, PLCSIM**
3	Topic: Siemens TIA Portal Tutorial (AND & OR Program) (Logic gates) Task: ❖ To follow the simulation to use the ladder programming language with the PLC software (TIA Portal) Resource: **TIA Portal v13, PLCSIM, S7-1200 CPU module**
4	Topic: Siemens TIA Portal Tutorial (TON & TOF Program) Task: ❖ To get the concept of the timer ❖ To follow the simulation to use the ladder programming language with the PLC software (TIA Portal) Resource: **TIA Portal v13, PLCSIM**
5	Topic: Siemens TIA Portal Tutorial (CTU & CTD Program) Task: ❖ To get the concept of the counter ❖ To follow the simulation to use the ladder programming language with the PLC software (TIA Portal) Resource: **TIA Portal v13, PLCSIM**

Approved by:

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