



DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015-2016 onwards

PROGRAMMABLE LOGIC CONTROLLERS

CURRICULAM DEVELOPMENT CENTRE

M-SCHEME

Course Name : ELCTRONICS AND COMMUNICATION ENGINEERING

Subject code : 34272

Semester : V Semester

Subject title : PROGRAMMABLE LOGIC CONTROLLERS

TEACHING AND SCHEME OF EXAMINATION

No. of weeks / Semester: 15 weeks

Subject	Instruction		Examination			
	Hrs./ Week	Hrs./ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
PROGRAMMABLE LOGIC CONTROLLERS	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

UNIT	TOPICS	TIME (Hrs)
I	Architecture and operation of PLC	13
II	Programming of PLC	13
III	PLC Timers and counters	13
IV	Advanced instructions	12
V	I/O Module Communication and networking	12
	Revision – Test	12
	Total	75

RATIONALE:

Programmable Logic Controller is the mandatory for the control Engineers in any Process Industry. As it is the default controller being used in the industries in automation of process such as packing, discrete control etc., It is obvious for the instrumentation and control Engineer to understand Hardware and programming the PLC.

OBJECTIVES:

- To understand the detailed Hardware of PLC and its parts
- To understand the working of PLC and scan cycle
- To understand the program and data memory organization
- To know the Different timers of PLC and programming them
- To know the different counters of PLC and its parameters
- To understand the Ladder logic programming of PLC
- To develop simple ladder programs
- To study the Advanced instructions of PLC
- To understand the communication module of PLC

34272- PROGRAMMABLE LOGIC CONTROLLERS
DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
I	<p><u>ARCHITECTURE AND OPERATION OF PLC</u></p> <p>Evolution of PLCs – Hard-wired control systems. PLC – definition, features, Advantages, Relays .PLC parts and architecture – CPU – I/O section – Programming device - Memory - input field devices – output field devices - input module wiring connections, output module wiring connections- Power Supply -PLC versus computer - Types of PLC – single ended – multitask – control management- unitary - modular- small – medium – large.Developing circuits from Boolean expression – Hardwired logic to programmed logic – programming word level logic instruction – processor memory organization program files – data files – program scan.</p>	13 Hrs
II	<p><u>PROGRAMMING OF PLC</u></p> <p>PLC Programming languages -Standard languages- Ladder diagram (LD) - Function block diagram (FBD) Sequential function chart(SFC)- Statement List(STL) (each one example program)-Symbols of a PLC Input and output contact graphical languages(IES)– program format – Typical Numbering mode – Equivalent ladder diagram of AND, OR, NOT, XOR, NAND AND NOR gate equivalent ladder diagram to demonstrates De Morgan's theorem, Ladder design switches- Develop elementary program design of a 4:1 Multiplexer using ladder logic programming wired level logic instructions input, output, flag, timer, counter, latch.</p>	13 Hrs
III	<p><u>PLC TIMERS AND COUNTERS</u></p> <p>Definition and Classification of a timer. Characteristics of a PLC timer – functions in a timer – resetting –retentive functions and function block format- non-retentive – classification – Timer ON-delay- Timer-OFF delay- Simple problems using timer</p> <p>PLC counter – Operation of a PLC counter – Counter parameters – Format of counter instruction and counter data file - count up (CTU)- count down(CTD) simple</p>	13 Hrs

	problems using counter.	
IV	<p><u>ADVANCED INSTRUCTION</u></p> <p>Introduction - comparison instructions- Addressing format for micro logic system - Different addressing types - Data movement instructions - Mathematical instructions- Program flow control instructions - PID instructions.</p> <p>Program development and execution using Allen bradly PLC. Simplified start up process of a coal feeding to a boiler plant - elevator for 3 floor building - Traffic light control -conveyor belt</p> <p>Selection of PLC - Safety considerations built in the PLC's.</p>	12 Hrs
V	<p><u>I/O MODULE COMMUNICATION AND NETWORKING</u></p> <p>Introduction – classification of I/O Module Input – Output system – Direct I/O, parallel I/O – Sourcing and sinking of serial I/O system. PLC interfacing-Discrete Input module –DC - AC – Discrete output module – Analog input module single ended and output module - RTD input modules- Thermocouple- High speed Encoder-Stepper motor- RS-232 interface module-Differential input module. Types of Communication Interface. Parallel – serial – Parallel – IEEE 488 BUS- Serial _ balanced – unbalanced- communication mode- simplex – Half duplex – full duplex features of good interface. Serial interface RS 232c. DB-9 connection of Rs232C Network Topology, Bus Ring, Star, Tree.</p>	12 Hrs
	Revision and Test	12 Hrs

REFERENCE BOOKS:

- 1.Madhuchhanda Mitra ,Samarjit sen Gupta,"PLC and Industrial Automation an introduction", Penram international Publishing (India) Pvt Ltd.
- 2.Pradeep Kumar Srivastava, "Exploring Programmable Logic Controller with applications", BPB Publication
- 3.W. Bolton," Programmable logic controller" IV Edition Reed Elsevier India pvt ltd.
- 4.Gary Dunning," Introduction to PLC", IIIrd edition Thomson del mar learning