GOVERNMENT OF TAMILNADU
DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI
STATE PROJECT COORDINATION UNIT
(Established under Canada India Institutional Cooperation Project)
CURRICULUM

Course Name	**PLC FOR MECHANICAL ENGINEERS**
Course Code	ME/2020/014
Course Duration	50 Hours
Minimum Eligibility Criteria	ITI/10th/+2/Diploma/Graduates
Pre-requisites (if any)	-
Course Objectives	Training module has been designed to provide the participants to • Understand the need for PLC and architecture of Allen Bradley Micro 800 series PLCs • Get acquaintance with the Micro 800 series PLC programming software Connected Components Workbench (CCW) • Write simple Ladder Programs in Micro 800 series Allen Bradley PLC using the instructions
Course Outcomes	At the end of training, the participants will be able to • Write programs in Allen Bradley Micro 800 series PLCs • Utilize PLC for any industrial application
Expected Job Roles	PLC Technician

TEACHING AND SCHEME OF EXAMINATION						
Course Code	Course Name	Hours		Assessment Marks		Duration of the Examination
				Min	Max	
ME/2020/014	**PLC FOR MECHANICAL ENGINEERS**	Theory	20	10	20	3 Hours
		Practical	30	40	80	
		Total	50	50	100	

ME/2020/014 - PLC FOR MECHANICAL ENGINEERS

DETAILED SYLLABUS

Unit No.	Modules	No. of Hours	
		Theory	Practical
I	**Industrial Automation and introduction to PLC & Introduction to PLC Programming**	**18 Hours**	
1.1	Industrial Automation and introduction to PLC Need for automation in industries – Examples of industrial automation – automation control circuit and power circuit – Field instruments – Automation using Relays and field devices – Need for Programmable Logic Controllers (PLC)– History of PLCs – Architecture of PLC – CPU – I/O Modules – Memory – Power supply – Communication – Input and Output devices – Architecture of Allen Bradley Micro 800 series	04	
1.2	Introduction to PLC Programming Introduction – Types of programming languages – Introduction to PLC programming software – Features of Connected Components Workbench software (CCW) – Ladder logic diagrams – Need for push button – Importance of latching and unlatching concepts – Interlocking and trip concept - Ladder diagram for DOL starter – interfacing push buttons and contactor and a motor with PLC	04	
1.3	**Practical:** ➢ AB Micro 810 and 820 PLC wiring diagram ➢ Installing CCW, PLC programming software and exploring the features ➢ Drawing DOL starter Ladder diagram and interfacing with push button switches, contactor and motor ➢ Ladder diagram for Boolean functions and latching and unlatching concept ➢ Ladder diagram for different types of timers ➢ Ladder diagram for different types of counters		10
II	**PLC Programming – 1 & 2**	**18 Hours**	
2.1	PLC Programming – 1 Input and output , latching and unlatching instructions – timers – on delay and off delay timers – counters – up down counters – example programs for automation using timers and counters – jump and subroutine – importance of loop instruction – example programs	04	
2.2	PLC Programming – 2 Introduction to analog devices – Interfacing analog devices to PLC – Math function – Shift and rotate instructions – compare and compute functions – scaling concept – indexing – PI, PID operations – Example programs for automation	04	
2.3	**Practical:** ➢ Ladder diagram for branching and subroutines ➢ Analog devices interfacing and reading an analog input from external source ➢ Ladder diagram for Math, comparative functions ➢ Ladder diagram for bit, shift and rotate, scaling and indexing instructions		10

III	PLC Programming – 3	14 Hours	
3.1	Programming the above instructions using Script language and Functional Block Diagram (FBD) language	04	
3.2	**Practical:** ➢ Script programming for the above statements ➢ Functional Block diagram programming for above statements ➢ Interfacing Lift working model and Ladder logic for the operations of the lift ➢ Interfacing conveyor working model and Ladder logic for the operations of the conveyer		10
	Total Theory and Practical hours	**20**	**30**
	Total hours	**50**	

HARDWARE REQUIREMENT

S. NO.	LIST OF TOOLS / EQUIPMENTS
1.	Windows 8 or 10 based computer systems
2.	AB PLC Micro 820 PLC Trainer
3.	RTU
4.	Panel View HMI 7”
5.	PLC application modules

SOFTWARE REQUIREMENT

S. NO.	LIST OF SOFTWARE
1.	Operating Systems – Windows 10 Pro 64 bit or above

REFERENCE BOOKS

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
01	Programmable Logic Controllers and Industrial Automation: An Introduction 2nd Edition”	Madhuchhanda Mitra and Samarjt Semgupta	-
02	PLC	Francis G.L	Quick Reference Guide Kindle Edition
03	Programmable Logic Controller	S.C Sharma	-

ASSESSMENT AND CERTIFICATION

S. No.	Criteria for Assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory and Practical.
3.	The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 word/objective type questions)
4.	The assessment for practical part will be based on the marks scored in the end examination conducted by the Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic.
5.	The passing criteria for successful completion of training is every trainee should score 50% of marks in theory and practical examination.
6.	On successful completion of training , Certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.

END EXAMINATION

ALLOCATION OF MARKS

S.NO	Description	Max.Marks
1.	Theory Examination	20
2.	Practical Examination	
	a)Aim and Procedure	20
	b)Demonstration / Execution	25
	c) Result & Viva Voce	15
	d)Record	20
	Total Marks	**100**

THEORY MODEL QUESTION PAPER

ME/2020/014 – PLC FOR MECHANICAL ENGINEERS

(Maximum Marks: 20)

(N.B: Answer any **Twenty** questions) **20x1= 20 Marks**

1. Define PLC.
2. How much voltage requited to operate a PLC?
3. What is meant by Programming scan?
4. What is interlocking? Give an example.
5. What are the components that make the programmable logic controller work?
6. What are the types of programmable logic controllers?
7. How many operation steps does the programmable logic controller have?
8. In which control system feedback is available?
9. Write the name of the PLC programming languages?
10. Which mode accepts and converts signals from sensors into a logic signal?

`11. Draw the ladder logic symbol for NO and NC contacts.

12. Draw the ladder diagram for AND, OR logic.
13. Draw the ladder logic diagram to turn ON a light L1, 15 seconds after switch S1 has been turned ON.
14. Draw the ladder logic diagram that will turn a light ON when a count reaches 20. The light goes off when the count reaches 30.
15. What are different types of PLC timer?
16. What are the different types of PLC counter?
17. What are the different PLC brands known?
18. What is the role of PLC in automation?
19. What is sinking and sourcing?
20. What is UP-DOWN counter?
21. What type of sensor is used to detect the metal objects?
22. What is the function of limit switch?
23. What is ON-delay timer?
24. Write the any four mathematical and relative functions used in PLC.
25. What is retentive timer?