



GOVERNMENT OF TAMILNADU

DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI-25

STATE PROJECT COORDINATION UNIT

(Established under Canada India Institutional Cooperation Project)

CURRICULUM

| | |
|------------------------------|---|
| Course Name | PLC PROGRAMMING |
| Course Code | EE/2020/001 |
| Course Duration | 50 Hours |
| Minimum Eligibility Criteria | 10 th /+2 /ITI/Diploma/Graduates |
| Pre-requisites (if any) | - |
| Course Objectives | <p>Training module has been designed for the participants to</p> <ul style="list-style-type: none"> • Understand functions of main parts of PLC • Provide knowledge levels needed for PLC Programming and Operating. • Use the computer as a programmer and properly configure communications for “Upload” and “download”. • Interface the field devices with PLC. • Create programs for different applications, utilizing the basic instructions. |
| Course Outcomes | <p>At the end of training, the trainees will be able to</p> <ul style="list-style-type: none"> • Identify the main parts of a Programmable Logic Controller • Explain the features, operation and mode of operation of PLC. • Develop logic gate circuits from Boolean Expression. • Interface Switches, Proximity sensors, Contactors, Motor, Lamps and Buzzers with I/O Module of PLC. • Develop PLC ladder logic programs by incorporating Contacts, Coil and Latches. • Apply PLC Timers, Counters and Math instructions for the control of industrial processes. |
| Expected Job Roles | PLC Programmer |

TEACHING AND SCHEME OF EXAMINATION

| Course Code | Course Name | Hours | | Assessment Marks | | Duration of Examination |
|-------------|-----------------|-----------|----|------------------|-----|-------------------------|
| | | | | Min | Max | |
| EE/2020/001 | PLC PROGRAMMING | Theory | 20 | 10 | 20 | 3 Hours |
| | | Practical | 30 | 40 | 80 | |
| | | Total | 50 | 50 | 100 | |

EE/2020/001- PLC PROGRAMMING

DETAILED SYLLABUS

| Unit No | Modules | No.of.Hours | |
|---|--|-----------------|-----------|
| | | Theory | Practical |
| I | PLC Hardware Components: | 15 Hours | |
| 1.1 | Definition of PLC - Parts of PLC | 10 | 05 |
| 1.2 | Principle of operation - Modes of operation | | |
| 1.3 | Specifications of PLC | | |
| 1.4 | Discrete Input/Output module - Analog Input/Output Module | | |
| 1.5 | PLC Types (Fixed and Modular) | | |
| 1.6 | Interfacing of various sensors/actuator with PLC | | |
| 1.7 | Comparison between hardwire control system and PLC System | | |
| 1.8 | Criteria for selection of suitable PLC – List of various PLCs available | | |
| 1.9 | Advantages and Applications | | |
| II | Introduction To Ladder Logic | 15 Hours | |
| 2.1 | Programming Languages - Ladder Diagram | 05 | 10 |
| 2.2 | Input and Output Addressing scheme in important commercial PLCs | | |
| 2.3 | Creating and Editing Ladder Diagrams in PLC Programming Software | | |
| 2.4 | Communication between PLC and PC – Simple program using Relay type Instructions | | |
| 2.5 | Bit level Programming | | |
| 2.6 | Developing ladder logic for Logic Gate operations and Boolean Expression | | |
| 2.7 | Downloading above programs to PLC and verify the output | | |
| 2.8 | Additional Exercises | | |
| III | Practical: PLC Programming | | |
| 3.1 | Developing Ladder Logic for real time applications using Timer Instructions (TON and TOFF) – Counter Instruction (CTU and CTD) | 05 | 15 |
| 3.2 | Program Control Instructions - Math Instructions | | |
| 3.3 | PLC implementation for Motor starters | | |
| 3.4 | Liquid Filling System - Conveyor Operation | | |
| 3.5 | Traffic Light Control Illumination Control | | |
| 3.6 | Illumination Control - Car Parking Application | | |
| 3.7 | Additional Exercises - Troubleshooting and Diagnostics features of PLC | | |
| Total Theory and Practical Hours | | 20 | 30 |
| Total hours | | 50 | |

HARDWARE REQUIREMENT

| S.NO | LIST OF TOOLS /EQUIPMENTS |
|------|------------------------------|
| 1 | PLC Trainer Kit |
| 2 | PC/Laptop |
| 3 | Interfacing Kits |
| 4 | Proximity Sensors and Motors |
| 5 | Lamps and Buzzers |

SOFTWARE REQUIREMENT

| S.NO | LIST OF TOOLS |
|------|--|
| 1 | RSLogix 500/LOGO Soft Comport/SIMATIC STEP 7 |

REFERENCE BOOKS

| S.NO | NAME OF THE BOOK | AUTHOR | PUBLISHER |
|------|--|------------------------------|-----------------------|
| 1 | Programmable Logic Controllers | By William Bolton | Newnes |
| 2 | Programmable Logic Controllers: A Practical Approach to IEC 61131-3 | Dag H. Hanssen | John Wiley & Sons. |
| 3 | Introduction Practical PLC (Programmable Logic Controller) Programming | Dilip Patel | GRIN Verlag |
| 4 | Programmable Logic Controllers: Principles and Application | John W. Webb, Ronald A. Reis | Prentice Hall, 1999 - |

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 CIICP 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 CIICP 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)Objective and Ladder Diagram / Program | 20 |
| | b)Procedure and Connections / Execution | 20 |
| | c)Result and Viva | 20 |
| | d) Record | 20 |
| Total Marks | | 100 |

THEORY MODEL QUESTION PAPER

EE/2020/001 PLC PROGRAMMING

(Maximum Marks: 20)

(N.B: Answer any Twenty questions)

20x1= 20 Marks

1. Expand the term PLC.
2. What are the parts of PLC?
3. List any two specifications of PLC.
4. What is meant by Input Module in PLC?
5. What is meant by Input Module in PLC?
6. What is meant by sinking input module in PLC?
7. What is meant by sourcing output module in PLC?
8. What are the types of PLC?
9. Suggest suitable type of output module for DC Load?
10. Define PLC SCAN.
11. State any two applications of PLC.
12. State any two advantages of PLC?
13. State any two PLC programming languages.
14. Give the I/O address scheme for any one PLC.
15. State the name any two PLC programming software.
16. What are the communication used in PLC?
17. State any two Relay type instructions used in PLC Program.
18. Develop ladder for AND Gate operation.
19. Develop ladder logic for OR Gate Operation.
20. Draw TON (ON Delay Timer) Timer instruction block and give address system.
21. Draw CTU (UP Counter) Timer instruction block and give address system.
22. State any two Math instructions used in PLC Program.
23. State any two Program Control instructions used in PLC Program.
24. Draw the ladder logic for DOL Starter Operation.
25. State True or False. PLC can be called as Industrial Computer.