

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE65b- PLC AND ITS APPLICATIONS

(Open Elective-II)

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Course Objectives: The student will be able to:

- Understand the basic functions and types of PLCs
- Get exposure of Easy Veep software, its applications
- Classification of PLCs and applications
- Programming using PLCs
- Troubleshooting aspects using PLCs

UNIT – I: Introduction

Basic functions of PLCs, Mechanical relays versus PLC, Different types of PLC's – Allen- Bradley – Micrologix: ML1000, ML1100, SLC500, Compact Logix, Mitsubishi FX series, HMI's, Processor and I/O cards

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about basic functions of PLCs & classification of PLCs L1
- To distinguish between PLCs and Mechanical relays L2
- To know about Processor and I/O cards

UNIT – II:**10 Hrs**

Introduction to Easy Veep software, Link between mechanical, electrical and programming documentation, Logic diagrams, Flip-Flop Logic, M8000, M8001 internal bits interpretation, Binary code, data table, manipulation and search engine in Mitsubishi environment Communication between PC and PLC, Communication between PC and HMI, PLC and HMI Serial Local network, Introduction to SLC500

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about Easy Veep software & about Logic diagrams L1
- To understand about Search engine & interfacing of PC and PLCs L2

UNIT – III: PLC software and applications**10 Hrs**

Boolean algebra – understanding binary code, ADD and SUB functions, UP and Down Counters, Introduction to k1Y0, MOV function, CPR and ZCP functions, SHWT and SHRD instructions, Introduction to Absolutely Drum Instruction.

Allen Bradley PLC: Introduction to Rockwell Software, Hardware focus, Hardware considerations (Field wiring, Master Control Relay, VFD), Basic programming and applications, Cascade control – subroutine, Different programs.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about basic features of PLCs & various instructions of PLC L1
- To know about various PLC versions & understand about Cascade control and subroutines L2

UNIT – IV: Programming instructions**10 Hrs**

Instructions and binary interpretation, Bit Instruction, Timers and counters, Comparison instructions, Programming Instructions – Math instructions, Move and Logical Instructions, Discussions of programming, communications for PLC-Robotic arm, Exercise of setup and monitoring

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various Programming instructions & understand Math instructions in PLCs **L1**
- To know about Logical instructions & understand about Communications with PLC using set up and monitoring **L2**

UNIT – V: Analog and Digital parameters**10 Hrs**

Analog and Digital parameters by using SLC5/03-VFD-Panel Mate series 1700, Practical Troubleshooting, troubleshooting technique, Control system stability and tuning basics. Applications: Process to rewind, test, and integrate with extrusion process for wiring and fibre optic industries, Food industry – yeast, flour distribution and control. Process Medical equipment Industry – Gas analyzer, Leak tester (using CO₂), plastic wrapping machines etc.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about analog and digital parameters in certain PLCs & apply PLCs for control system stability aspects **L1**
- To know about troubleshooting techniques & identify few applications of PLCs in Science and Technology fields **L2**

Text Books:

1. Automating manufacturing systems with PLCs by Hugh Jack, 2010.
2. PLC Hand Book (Automation direct Siemens)

Reference Books:

1. Programmable Logic Controllers by R. Bliesener, F Ebel, Festo. Didactic publishers, 2002.
2. Programmable Logic Controllers by W. Bolton, 4th Edition, Newnes, 2006.
3. Introduction to PLCs by Jay F. Hooper, 2nd Edition, Carolina Academic Press, 2006.

Course Outcomes:

At the end of this Course the student will be able to

- Understand different types of PLCs **L1**
- Understand the usage of Easy Veep software **L2**
- Understand the hardware details of Allen Bradley PLC **L3**
- Programming of PLCs **L4**
- Know about few applications of PLCs in different fields of Science and Technology **L5**