GLOBAL LEARNING INSTITUTE

Course: **Certificate in Programmable Logic Controllers**

Guided Learning Hours: **30**

Pre-requisite: **Basic knowledge of Computers and Microsoft Windows software**

Abstract

The Certificate in Programmable Logic Controllers course will provide you with the basic technical skills and knowledge necessary to work with electrical control systems typically found in an industrial environment. It investigates the operation of various control systems using discrete and analogue control devices.

Knowledge of PLCs is a real asset to employers in many industries and commercial enterprises where automatic controls are employed. It is invaluable if you are venturing into the process control field. Learning will take place through a combination of lectures and laboratory sessions.

Target Audience

Electricians, engineers, technicians and maintenance personnel.

Learning outcomes

On completion of this course, learners will be able to:

1. Describe PLCs and details of their development and construction
2. Describe Relay Logic and its application to industry
3. Use Zeliologic software implementation of ladder logic to demonstrate PLC program design and simulation
4. Design ladder logic programs of common real world control applications.

Course Content

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1. **Describe PLCs and details of their development and construction**

   What is a PLC; early PLCs; Automation of electromechanical processes; PLC control versus hard-wired control; Construction of PLCs. – memory, processor, input and output interfaces, power supply; Use of programming terminal and software

2. **Describe Relay Logic and its application to Industry**

   Starter, relay and contactor ratings and construction; Effect of voltage drop and response time; Common type of electromechanical timers and limitation of usage; Use of pilot devices – limit switches, level switches, proximity switches, solenoid, motor, buzzers, alarms; Use of relays and contactors for relatively simple controls; use of relays and contactors as pre-actuators in PLC systems.

3. **Use Zeliologic software implementation of ladder logic to demonstrate PLC program design and simulation**

   Presence and absence of signal (Binary 1 and 0); Logic gates (AND, OR, NOT, NAND, XOR); Basic ladder logic instructions – Normally open (examine on), normally closed (examine off); Contacts and coils; Ladder rungs and PLC scan process; Implementation of timers and counters in Zeliologic software – time delay off, time delay on, symmetric and asymmetric flashing timer, down and up counter; Design and transfer of Zeliologic programs.

4. **Design ladder logic programs of common real world control applications**

   Simple programming exercises utilizing timers and counters; Traffic light simulation; Two-way switching simulation; 3-way switching simulation; Reversing starter simulation; Semi-automatic drill project; Conveyor project; Duplex pumping controller.

Assessment Criteria

In order to achieve Learning Outcome…	The Learner must…
1. Describe PLCs and details of their development and construction	1.1 Understand the invention of the PLC as a replacement device for the Control Relay 1.2 Compare the PLC with PC. 1.3 Compare how discrete and continuous function variables are handled by the PLC. 1.4 Explain how scan time of the PLC determines its suitability for application with rapidly changing signals.
2. Introduction to Relay Logic and application to Industry	2.1 Explain how electromechanical relays, timers, contactors and Starters work. 2.2 Describe the function of Pilot devices 2.3 Describe various types of sensors and detectors and how they operate. 2.4 List the advantages and disadvantages of the PLC and compare PLC and Hard-wired relay systems.
3. Use Zeliologic software implementation of ladder logic to demonstrate PLC program design and simulation	3.1 Describe the types of memory used in the PLC and understand the basics of the CPU. 3.2 Define what are inputs and outputs, and how they are connected to the PLC. 3.3 Compare the difference between analog and digital signals 3.4 Describe how analog and digital signals are processed by the PLC. 3.5 Compare the difference between 'Brick' and Modular type PLCs 3.6 Describe applications for both 'Brick' and Modular type PLCs.
4. Design ladder logic programs of common real world control applications	4.1 Describe the basic elements of the ladder logic language (Zeliologic implementation), Examine ON, Examine OFF and Coils. 4.2 Explain the function of common function blocks (timers and counters); Set/Reset coils, Soft coils.

Essential Learning Resources:

Learners will need access to a wide range of publications relating to Programmable Logic Controllers and a suitably equipped laboratory for practical training. Various manufacturer products, specifications and reference data would also be beneficial to learners.

Textbooks and Manuals

1. Zeliologic software
2. Programmable Logic Controllers – Hugh Jack