

PLC, Telemetry, and SCADA Systems: Control and Automation Essentials

Course Description

This comprehensive course delves into the fundamentals of Programmable Logic Controllers (PLCs), telemetry systems, and Supervisory Control and Data Acquisition (SCADA) systems. Participants will explore various control strategies, PLC architectures, radio telemetry systems, PLC programming, analogue I/O processing, and SCADA fundamentals. Through hands-on exercises and real-world examples, attendees will gain the knowledge and skills necessary to design, implement, and maintain efficient control and automation solutions in industrial settings.

Audience

This course is designed for engineers, technicians, and professionals working in industries such as manufacturing, process control, energy, utilities, and automation. Individuals seeking to enhance their understanding of control systems, PLCs, telemetry, and SCADA systems will greatly benefit from this course.

Pre-requisite Knowledge/Skills

Participants should have a basic understanding of electrical circuits, control systems, and industrial automation concepts. Familiarity with programming languages and software tools will be advantageous but not mandatory.

Course Objectives

- Understand the principles and applications of continuous, sequential, and relay-based control systems.
- Differentiate between PLC and relay systems, and comprehend various programming formats and logical continuity in PLCs.
- Explore PLC architecture, including system architecture, memory types, I/O types, and scanning algorithms.
- Gain insights into radio telemetry systems, including elements of a radio link, radio spectrum, and system design considerations.
- Develop proficiency in PLC programming, including analysis, design methodology, timer-based programming, and serial data communications.
- Master analogue I/O processing, A/D and D/A conversion, and advanced instructions for analogue modules in PLCs.
- Acquire knowledge of SCADA system architecture, configuration, operation, and design using industry-standard SCADA software.
- Learn about local area networks (LANs) and their relevance in SCADA implementation.

Course Outline

Module 1: Introduction to Control Strategies

- Continuous Control Systems
- Sequential Control Systems
- Relay-Based Systems
- Relay-Based Programming Examples

Module 2: Introduction to PLC Systems

- PLC vs. Relay Systems
- Programming Formats
- Logical Continuity
- Software Familiarization
- Introduction to Industry Standard PLC Programming Software
- Construction of Test Programme

Module 3: PLC Architecture

- System Architecture
- Memory and I/O Types
- Scanning Algorithms
- Program Scan Cycle

Module 4: Radio Telemetry Systems

- Introduction
- Elements of a Radio Link
- The Radio Spectrum
- Frequency Ranges
- System Design Considerations
- Serial Transfer of Programs

Module 5: PLC Programme Development

- Analysis of PLC Programs
- Design Methodology and Development of PLC Programs

- Timer Method of Program Development
- Program Design of Process Controller
- Serial Data Communications
- Communication Methods (Simplex, Half-Duplex, Full-Duplex)
- RS232 Standard
- RS422 Standard
- RS485 Standard
- Sequence Controller and Application Boards

Module 6: Analogue I/O and Processing

- Analogue Inputs and Outputs
- A/D and D/A Conversion
- Programming Analogue Modules and Advanced Instructions

Module 7: Introduction to SCADA

- System Architecture
- Configuration and Operation
- Introduction to Industry Standard SCADA Software
- Design and Development of a new SCADA Project
- Design and Development of a SCADA Project
- Local Area Networks (LAN's)