

Mitsubishi FX5U PLC & LabVIEW

Course Description

This course provides a practical introduction to **Mitsubishi PLC programming and LabVIEW-based industrial monitoring**. Participants will learn PLC fundamentals, hardware, ladder programming using **GX Works3**, digital and analog control, timers/counters, data handling, Ethernet communication, and integration of the PLC with **LabVIEW**.

The course emphasizes hands-on exercises and culminates in an integrated **PLC + LabVIEW automation project**.

Prerequisite Knowledge

- Basic electrical and electronics knowledge
- Basic understanding of sensors and actuators
- Basic computer skills
- Basic logical/mathematical understanding
- No prior PLC or LabVIEW experience required

Suitable Audience

- Engineering freshers
- Diploma holders
- Electrical/Electronics engineers
- Instrumentation engineers
- Mechatronics engineers
- Automation beginners
- Maintenance/production engineers entering automation

Module 1: Industrial Automation & FX5U Fundamentals

1. Industrial automation and PLC fundamentals
2. PLC architecture: CPU, memory and I/O
3. Mitsubishi MELSEC family and iQ-F series
4. FX5U hardware, I/O and expansion modules

5. PLC scan cycle and basic control philosophy

Lab: FX5U hardware identification and basic I/O operation

Module 2: GX Works3 & Basic PLC Programming

1. GX Works3 environment and project creation
2. PLC configuration and device addressing
3. Ladder logic fundamentals: contacts and coils
4. Download, upload, monitoring and diagnostics
5. Online testing and troubleshooting

Lab: Create, download and monitor the first FX5U program

Module 3: Digital I/O & Ladder Logic Applications

1. Digital inputs/outputs and NO/NC logic
2. SET/RESET and latching circuits
3. Interlocking and Start/Stop control
4. Automatic and manual control logic
5. Basic machine-control sequences

Lab: Motor, conveyor and automatic sequence-control exercises

Module 4: Timers, Counters & Sequential Control

1. Timers and practical timer applications
2. Counters and production counting
3. Pulse/edge detection and one-shot operations
4. Sequential machine control
5. Fault and interlock logic

Lab: Conveyor counting and automatic filling sequence

Module 5: Data Handling & Analog Control

1. Data registers, data movement and comparison
2. Mathematical operations and basic data processing
3. Analog signals: 0–10 V and 4–20 mA / Bar code scanner.
4. Analog scaling, limits and alarm generation
5. Introduction to PID/process control

Lab: Tank-level/temperature monitoring and analog signal processing

Module 6: FX5U Ethernet Communication

1. Industrial Ethernet and TCP/IP fundamentals
2. FX5U Ethernet configuration in GX Works3
3. PLC-to-PC communication concepts
4. Introduction to Modbus TCP and industrial protocols
5. Communication diagnostics and troubleshooting

Lab: Configure FX5U Ethernet and establish PC communication

Module 7: LabVIEW Fundamentals

1. LabVIEW environment: Front Panel and Block Diagram
2. Controls, indicators, loops and structures
3. Data handling, graphs and real-time visualization
4. Error handling and debugging
5. Data logging and file handling

Lab: Build a LabVIEW process-monitoring application

Module 8: PLC + LabVIEW Integration & Project

1. PLC–LabVIEW communication architecture
2. Reading/writing FX5U data from LabVIEW
3. Real-time monitoring, alarms and trends
4. Process data logging and analysis

5. Integrated industrial automation project