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Course Name

Advancement in RTU communication and Automation systems

Sector Name

Electrical Engineering

Document Type

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Advancement in RTU communication and Automation systems

Course Introduction

Supervisory Control And Data Acquisition

This training program provides an in-depth understanding of Remote Terminal Units (RTUs), their role in modern industrial control systems, and how they integrate with SCADA (Supervisory Control and Data Acquisition) systems.

Participants will learn about the design, functionality, and troubleshooting of RTUs, covering topics from the basic principles of automation and data acquisition to advanced RTU configuration and communication protocols.

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Target Audience

- ✓ Electrical Engineer
- ✓ Electrical Project Engineer
- ✓ Electronics-research engineer

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Learning Objectives

- ✓ Understand the principles of RTU operation and how they interact within industrial networks.
- ✓ Configure, maintain, and troubleshoot RTUs in real-world environments.
- ✓ Gain practical experience in setting up RTUs and connecting them to SCADA systems.
- ✓ Be familiar with RTU communication protocols and data exchange methods.
- ✓ Be proficient in the installation, configuration, and troubleshooting of RTUs.
- ✓ Understand various RTU communication protocols and how to integrate RTUs with SCADA and control systems.
- ✓ Gain hands-on experience in working with RTU hardware and software in practical scenarios.
- ✓ Be prepared to implement RTUs in a variety of industries, ensuring their optimal performance.

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Course Outline

✓ DAY 01

Introduction to Remote Terminal Units (RTUs)

- ✓ Overview of RTUs.
- ✓ Definition and purpose of RTUs.
- ✓ Role of RTUs in industrial automation and SCADA systems.
- ✓ Importance of data acquisition and remote control in various industries.
- ✓ RTU Components and Functions.
- ✓ Basic components of RTUs: Sensors, controllers, and communication interfaces.
- ✓ Types of RTUs: Compact vs. modular.
- ✓ Data acquisition process and its relation to control systems.

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Course Outline

✓ Day 02

RTU Architecture and Communication Systems

- ✓ RTU Hardware Architecture.
- ✓ CPU, I/O modules, and communication interfaces.
- ✓ Power supply and backup options.
- ✓ Environmental considerations for RTUs (e.g., temperature, humidity, protection from physical damage).
- ✓ RTU Communication Protocols.
- ✓ Introduction to communication protocols: Modbus, DNP3, IEC 60870, OPC, and others.
- ✓ Advantages and disadvantages of various protocols.
- ✓ RTU communication via serial, Ethernet, and wireless networks.
- ✓ Integration with SCADA Systems.
- ✓ How RTUs communicate with SCADA servers.
- ✓ Data exchange between RTUs and central monitoring stations.
- ✓ RTU network configurations.

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Course Outline

✓ Day 03

RTU Configuration and Setup

- ✓ RTU Configuration Basics.
- ✓ Setting up the RTU's hardware.
- ✓ Defining input/output channels and calibrating sensors.
- ✓ Programming and Parameter Configuration.
- ✓ Software tools for RTU configuration.
- ✓ Setting communication parameters (baud rate, address, protocol).
- ✓ Creating and managing data points (e.g., digital inputs/outputs, analog inputs).
- ✓ Field Testing and Validation.
- ✓ Performing field tests to ensure correct RTU setup.
- ✓ Verifying communication with SCADA or the central system.
- ✓ Troubleshooting common configuration issues.

Data Acquisition and Monitoring

- ✓ Data Collection and Transmission.
- ✓ Types of data gathered by RTUs (e.g., temperature, pressure, flow rates).
- ✓ Analog vs. digital data processing.
- ✓ Methods of data transmission (polling, event-driven, time-based sampling).
- ✓ Real-time Monitoring and Control.
- ✓ Displaying and interpreting data on SCADA systems.
- ✓ Alarm management and notification systems.

✓ RTU-based control actions (e.g., on/off control, setpoint adjustments).

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Course Outline

✓ Day 04

RTU Maintenance and Troubleshooting

- ✓ Common RTU Issues and Solutions.
- ✓ Communication failures: Cable, protocol, and network issues.
- ✓ Power supply problems and backup strategies.
- ✓ Environmental damage (e.g., extreme temperatures, humidity, dust).
- ✓ Diagnosing Hardware Failures
- ✓ How to identify and repair hardware failures in the field.
- ✓ Using diagnostic tools (e.g., multimeters, oscilloscopes).
- ✓ Software and Firmware Troubleshooting.
- ✓ Handling configuration errors and software bugs.
- ✓ Upgrading RTU firmware and troubleshooting post-upgrade issues.
- ✓ Preventative Maintenance.
- ✓ Regular inspection and calibration.
- ✓ Firmware and software updates.

Advanced RTU Topics and Industry Applications

- ✓ RTU Security Considerations.
- ✓ Cybersecurity risks and solutions for RTUs.
- ✓ Securing communication channels (encryption, authentication).
- ✓ Monitoring and logging access to RTUs.
- ✓ RTUs in Industry.

- ✓ RTU applications in energy (power plants, substations).
- ✓ RTU use in water/wastewater systems, oil & gas, and manufacturing.
- ✓ Case studies of RTU implementation in different industries.
- ✓ Emerging Trends and Future of RTUs.
- ✓ Integration with IoT (Internet of Things) devices.
- ✓ Cloud-based monitoring and analytics.
- ✓ Smart grid and smart city applications.

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Course Outline

✓ Day 05

Hands-on Training and Practical Applications

- ✓ RTU Setup and Configuration Exercises.
- ✓ Hands-on exercises with RTU hardware and software.
- ✓ Configuration of RTUs for various scenarios (e.g., analog, digital, mixed signals).
- ✓ Integration of RTUs into a SCADA system.
- ✓ Troubleshooting Simulations.
- ✓ Simulated failures and troubleshooting exercises.
- ✓ Practice diagnosing communication, hardware, and software issues.

Review and Certification:

- ✓ Review of Key Concepts.
- ✓ Recap of all the modules covered.
- ✓ Q&A session for clarification of complex topics.
- ✓ Final Assessment.
- ✓ Practical and theoretical tests to assess knowledge and skills.
- ✓ Certification exam (optional, depending on course setup).

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Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
June 13, 2027	June 17, 2027	5 days	4250.00 $	KSA , Riyadh
Sept. 6, 2027	Sept. 10, 2027	5 days	4950.00 $	England , London
Nov. 30, 2026	Dec. 4, 2026	5 days	4250.00 $	UAE , Dubai
Jan. 17, 2027	Jan. 21, 2027	5 days	4250.00 $	KSA , Riyadh

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