



The Industrial Electricity and Electronics Series consists of 8 core subject areas necessary to achieve the requisite competency for further specialization.

Basic Electricity Principles

Basic Electricity

- Simplified Atomic Theory
- EMF
- Current Flow
- Sources of Voltage

Conductors and Insulators

- Conductivity
- Conductors
- Insulation

Resistors

- Resistor Applications
- Resistor Construction
- Resistor Markings
- How Resistors are Rated

Basic Laws of Electrical Circuits

- Basic Laws of Electrical Circuits
- Using Ohm's Law
- Using Kirchhoff's Current Law

Electrical Power

- Electrical Power
- Unit Conversion
- Electromagnetism
- Permanent Magnets
- Electromagnets

Electromagnetism

- Permanent Magnets
- Electromagnets

DC Circuits

Batteries

- Theory of Operation
- Battery Construction
- Battery Capacity and Ratings

Series Circuits

- Series Circuit Fundamentals
- Calculating Resistance in a Series Circuit
- Calculating Current in a Series Circuit
- Calculating Voltage Drops in a Series Circuit

Parallel Circuits

- Parallel Circuit Fundamentals
- Calculating Resistance in a Parallel Circuit
- Calculating Voltage in a Parallel Circuit
- Calculating Current in a Parallel Circuit

Series-Parallel Circuits

- Series-Parallel Circuit Fundamentals
- Calculating Resistance in a Series-Parallel Circuit
- Calculating Current in a Series-Parallel Circuit
- Calculating Voltage Drops in a Series-Parallel Circuit

Switches and Relays

- Pushbutton and Rotary Switches
- Disconnect and Bus Transfer Switches
- Electromagnetic Relays

AC Circuits

AC Generation and Basic AC

Concepts

- AC Generation Components and Operation
- Development of a Sine Wave Output and AC Generation Analysis
- Three-Phase Circuits
- AC Voltage, Current, and Power

Inductance, Capacitance, and Impedance

- Inductors and Inductance
- Capacitors and Capacitance
- Calculating Circuit Capacitance, Inductance, and Impedance
- Resonant Circuits

Transformers

- Transformer Fundamentals
- Transformer Construction and Connections
- Types of Transformers

Motors and Servos

AC and DC Motors

- Terminology and Definitions
- DC Motors
- AC Motors
- Motor Protection
- Motor Fundamentals

Motor Control Fundamentals

- Types of Controllers
- Control Devices and Electrical Systems
- Magnetic Contactors
- Control Circuits

Servo Drive Fundamentals

- Overview
- Operation
- Servo Motors

Semiconductors

Diodes

- Diode Basics
- Diode Symbols
- Diode Characteristics

Bipolar Transistors

- Transistor Fundamentals
- Transistor Biasing
- Transistor Configuration

Other Semiconductors

- SCRs
- DIACs and TRIACs
- UJTs and FETs

Power Supplies

Power Supplies

- Rectifier Circuits
- Power Supply Filters
- Voltage Regulators

Uninterruptible Power Supplies

- Switching Power Supplies
- Power Switching Circuits
- Battery Charger/Rectifier

Fuses

- Fuses
- Fuse Ratings
- Fuse Holders
- Checking and Replacing Fuses

Circuit Breakers

- Overview
- Circuit Breaker Components
- Circuit Breaker Characteristics

Digital Electronics

Communication and Controls I

- Communications Overview
- Telemetry Concepts
- Protocol

Communication and Controls II

- Communication Networks
- Industrial Protocols
- Working with Communication Cables

Introduction to PLCs

- PLC Components
- Basic Operation
- Scan Cycle
- Ladder Logic

Introduction to VFDs

- Overview and Operational Theory
- VFD Function and Operation
- Human Interface Module

Logic Gates and Number Systems

- Logic Gates
- Number Systems

Work Practices

Print Reading

- Mechanical Drawings
- Electrical Drawings

Grounding Practices

- Grounding Basics
- System Grounding
- Equipment Grounding
- Common Grounding Faults

Test Equipment

- Multimeters
- Common Electrical Testers
- Thermal Imaging

Electrical Safe Work Practices

- Hazards
- Qualifications
- Boundaries
- Personal Protective Equipment

Troubleshooting

- Troubleshooting Fundamentals
- Divide and Conquer
- Seven-Step Process