Level 1: Fundamentals

Electricity—Alternating Current (AC)

Level 1

Reduce production downtime, boost efficiency, and enhance output through a comprehensive understanding of alternating current (AC) electricity and safe operational practices. These industry-recognized certifications are tailored to equip students with the vital knowledge and skills necessary for handling AC electricity safely and effectively. The practical lab components of the training enable students to construct, test, and troubleshoot AC circuits, utilizing various instruments to measure and calculate operating voltages and currents, ensuring optimal circuit functionality. This certification is derived from comprehensive content on the subject of industrial electricity.

Industry Recognized Certification Topics

- Safety
- Basic concepts of electrical circuits
- Ohm's and Kirchhoff's laws
- Using measuring instruments (voltmeters, ammeters, ohmmeters, etc.)
- Solving series and parallel circuits
- Electromagnetism
- Electrical distribution
- Troubleshooting electrical circuits
- Exploration of common electrical components such as power sources, resistors, inductors, capacitors, transformers, switches, relays and motors
- Electricity Basics
- Basics of AC Capacitors
- Electrical Measurement Equipment
- Basic Electrical Wiring
- Basics of the Inductor, Transformers, Relays, Contactors, and Circuit Breakers
- Basics of Electrical Panels
- Basics of Fuses
- Basics of Distribution Network
- Basics of Troubleshooting

Units - 6 / Labs - 6

Industry Recognized Certification Competencies

- Follow safety rules
- Describe the history and fundamentals of electricity
- Define and explain the working principles of an electrical circuit
- Understand and apply the concepts of current, voltage, electrical power, and resistance
- Interpret and read symbols and circuit diagrams
- Design and build series and parallel AC circuits using Kirchhoff's laws
- Implement circuits for controlling indicator lights and motors using relays
- Connect and troubleshoot circuits with capacitors, inductors, and transformers
- Measure current, voltage, and resistance using an ammeter, voltmeter, and ohmmeter
- Operate multimeters for comprehensive electrical measurements
- Measure circuit parameters in AC circuits
- Calculate reactance of series and parallel capacitors and inductors
- Identify and connect electrical power sources and loads
- Explore and apply electromagnetism and electromagnets
- Explore applications and operations of AC capacitors, inductors, and transformers
- Use capacitors to store electrical energy and explore RC circuits
- Apply Ohm's law, power calculations, and voltage dividers in circuit design
- Differentiate conductors and insulators
- Explain AC voltage and current sine waves
- Operate transformers, including step-up and step-down transformers
- Explain the power network and distribution network
- Understand and apply electrical panels
- Operate circuit breakers and fuses
- Implement and troubleshoot contactors and AC relays
- Troubleshoot complex AC circuits using ohmmeters and voltmeters
- Troubleshoot transformers and other AC components

Level 1: Fundamentals

Electricity—Direct Current (DC)

Level 1

Decrease production downtime, improve efficiency, and increase output with a solid understanding of direct current (DC) electricity and safe working practices. These industry-recognized certifications are designed to provide students with the essential knowledge and skills to handle DC electricity safely and effectively. The hands-on lab components of the training allow students to build, test, and troubleshoot DC circuits, using various instruments to measure and calculate operating voltages and currents, ensuring optimal circuit performance. This certification is derived from comprehensive content on the subject of industrial electricity.

Industry Recognized Certification Topics

- Safety
- Electrical Engineering History
- Electricity Basics
- Basic Electrical Wiring
- Ohm's Law
- Kirchhoff's Voltage and Current Laws
- Using Measuring Instruments (voltmeters, ammeters, ohmmeters, etc.)
- Solving Series and Parallel Circuits
- Basics of DC Capacitors
- Basics of DC Relays
- Basics of Electromagnetism
- Basics of Magnetism
- Basics of the DC Motor
- Basics of the Solenoid
- Electrical Components (power sources, resistors, inductors, capacitors, transformers, switches, relays, motors)
- Electrical Measurement Equipment
- Electrical Resistance
- Troubleshooting Electrical Circuits

Units - 10 / Labs - 10

Industry Recognized Certification Competencies

- Follow safety rules
- Describe the history and fundamentals of electricity
- Define and explain the working principles of an electrical circuit
- Interpret and read symbols and circuit diagrams
- Identify and connect different types of electrical power sources and loads
- Understand and apply the concepts of current, voltage, electrical power, and resistance
- Connect and troubleshoot various DC power circuits with different switches and loads
- Design and build series and parallel circuits, and calculate equivalent resistance using Kirchhoff's laws
- Implement circuits with specific applications, such as car horn, interior lights, three-way switch, and car fan, light, and horn
- Control indicator lights and motors using relays
- Explore and apply electromagnetism and electromagnets
- Measure current, voltage, and resistance using an ammeter, voltmeter, and ohmmeter
- Introduce and operate multimeters for comprehensive electrical measurements
- Charge, discharge, and measure capacitors in various configurations
- Explore applications and operations of DC capacitors and relays
- Understand and connect circuits containing solenoids and DC motors
- Differentiate and configure different types of switches
- Identify and troubleshoot short circuits, open circuits, and continuity issues
- Use capacitors to store electrical energy and explore resistor-capacitor (RC) circuits
- Apply Ohm's law, power calculations, and voltage dividers in circuit design
- Explore and differentiate conductors and insulators