

## **Electrical Engineering Fundamentals for Facilities Engineers - E-3-**

This course applies fundamental electrical engineering principles to liquid facilities. The course is designed for Facilities Engineers who interface with electrical systems, and provides practical insight and development of new Facilities Electrical Engineers. Through the use of individual and group problem solving, attendees will learn about power transformers, motors, generators, one-line diagram interpretation, protection and coordination of electrical equipment, site and standby generation, electrical safety, and hazardous areas identification. Participants will gain a better understanding of electrical power systems in oil and gas facilities. Note: This course is a more in-depth version of the content of ICE-21. ICE-21 is not a prerequisite for taking this course.

### **Designed For**

Those facilities personnel who interface with facility electrical power systems, including project engineers, operation leads, instrumentation, controls personnel, and electrical engineers who are new to electrical power systems within oil and gas facilities.

### **You will learn**

- Fundamental concepts of electricity including voltage, current, resistance, power, inductance, capacitance, and power factor
- The key components of facilities electric power distribution, which include circuit arrangements, low and medium voltage switchgear, and single-phase and three phase schemes
- Transformer operations, components, turns and voltage ratios, losses, efficiency, rating, and connections
- The difference between direct current, induction and synchronous current motors, motor enclosures, and how to select, start, protect, and control motors
- The principles of protecting electrical equipment, including time current curves, fuses, circuit breakers, and coordination
- The purposes and sizing criteria for backup power, including generators and UPS power systems
- The considerations and sizing criteria for on-site power generation, which includes standby, prime, peak, and co-generation

- What grounding and bonding systems are, with an overview of ignition sources, shock protection, separately derived systems, and substation grounding
- The concepts, terminology and application of hazardous area classification standards, equipment protection methods, and installation requirements for NEC and IEC projects

### **Course Content**

- Fundamentals of insulation and conduction
- Direct current, alternating current
- Transformers power and instrument
- Motors induction and synchronous
- Power distribution
- System protection and coordination
- Standby power systems
- Power generation
- Variable speed drive principles
- Grounding, bonding, and electrical safety
- Hazardous area identification

### **Course Duration:**

5 Days