



Electrical Engineering Fundamentals for Facilities Engineers

Course Introduction:

Basic Electrical Engineering Fundamentals Course provides a comprehensive exposition of the principles of electrical engineering for both electrical as well as non-electrical engineers. This course is designed to help electric power system engineers understand basic industrial, commercial and institutional power systems design and engineering principles. Also, this course raises the level of competence and electrical safety awareness within the organization and to provide specific guidance to those who must implement and follow the associated procedures. Then they will be able to properly protect their electric power systems and can conduct and implement an effective arc flash study, to properly protect electrical workers and equipment.

Electricity is high-grade energy. Working in the proximity of power distribution systems, however involves danger. All staff managers, administrators, engineers or technicians need to understand the potential dangers and how to keep matters under control in order to avoid injuries or fatalities. All staff must therefore be aware of the protection available and the regulations and advisory information governing this important area of concern.

Course Objectives:

Towards the end of the training, the participants will be able to:

- The key components of facilities electric power distribution, which include circuit arrangements, low and medium voltage switchgear, and single-phase and three phase schemes
- Operation, components, electromotive forces, turns and voltage ratios, losses, efficiency, rating, and connections of transformers
- The difference between direct current, induction and synchronous current motors, motor enclosures, and how to select motors
- The principles of protecting electrical equipment, including time current curves, fuses, circuit breakers, and coordination
- What standby power is, including generators and UPS power systems
- The purpose for power generation, which includes standby, prime, base, peak, and co-generation
- About power factor and correction
- What grounding and bonding systems are, with an overview of ignition sources, separately derived systems, and substation grounding
- Hazardous area identification principles with general information on NEC, IEC, equipment protection, certification, and definitions

Who Should Attend?

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.

Course Outline:

DAY ONE

Introduction

- Basic electrical concepts

Direct Current

- Circuit theory
- Ohm's Law
- Resistivity
- Conductivity
- Current and Current Density

Electrical Quantities

- Energy
- Power
- Electric potential
- Exercises

DAY TWO

AC Circuit Theory

- Single and 3 phase AC power
- Inductance
- Capacitance
- Impedance

Electrical Equipment

- Transformers
- Motors
- Lighting
- Capacitors

• Exercises

DAY THREE

Electrical Distribution Systems

- Wire
- Motor control equipment
- Switchboard

Calculation of Current, Voltage, Power and Efficiency of Circuits

- Wire size-line loss
- Exercises

DAY FOUR

Electrical Safety

- Safety issues, electric shock, precautions
- Safe measurement practices
- Standards and regulations

System Protection

- Types of system disturbances (lightning, switching surges, etc.)
- Fuses
- Circuit protection/ circuit breakers
- Overload relays
- Over voltage protection
- Effective grounding/bonding techniques

Exercises and Case Studies

DAY FIVE

- Grounding and Bonding
- Lighting Hazardous areas
- Emergency Power Generators

Exercises and Case Studies

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts

- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Fees:

To be advised as per course locations. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:30 - 08:50	Morning Coffee/Tea
08:50 - 10:20	First Session
10:20 - 10:40	Recess (Coffee/Tea/Snacks)
10:40 - 12:20	Second Session
12:20 - 12:40	Recess (Coffee/Tea/Snacks)
12:40 - 14:30	Last Session