Electrical Power System Analysis & Design Training Course

MERCURY

Electrical Power System Analysis & Design Training Course

Introduction

This highly informative electrical power system analysis and design training course covers the essential elements of power system analysis, both from a theoretical perspective and, more importantly, from a practical viewpoint. Methods often covered as abstract mathematical procedures, such as phasors, per-unit, and symmetrical components, are presented straightforwardly and understandably. Modeling and analysis are viewed realistically, not as simply a step-by-step procedure.

After completing this electrical power system analysis and design training course, you will intuitively understand how the power system behaves and how it must be analyzed under normal and contingency conditions. The curriculum is structured to reinforce concepts related to electrical power systems engineering and power systems analysis and design.

Professional Power Systems Integration

Understanding the integration and leveraging of the capabilities of power system analysis tools is essential for modern power engineers. This electrical power system analysis and design course provides insight into how professional power systems work and are trained to secure and enhance the power grid's reliability.

Participants in the electrical power system analysis and design course can merge theoretical knowledge with applied techniques, utilizing the latest in power engineering systems and power systems training to ensure competence in this evolving field.

Targeted Groups

- Engineers and technicians new to the power industry.
- Intermediate-level engineers and technicians are working in planning, designing, and operating power systems.
- Professionals involved with generating, transmitting, distributing, or utilizing electric power.
- Individuals are working on integrating renewable energy resources into the existing power grid.
- Practitioners interested in modernizing and optimizing the performance of the power system.

Course Objectives

At the end of this electric power systems course, participants will be able to:

- Perform three-phase power system calculations using phasor analysis and the per-unit system
- Model key power system components, such as transmission lines, transformers, generators, and loads
- Understand power flow analysis and know the basics of operating a power system
- Use symmetrical component theory and sequence networks to analyze and short-circuit faults.
- Understand the equal-area criterion for transient stability.

MERCURY

Targeted Competencies

In this electrical power system analysis and design course, the target competencies will be able to:

- Phasors, per-unit, and three-phase power concepts.
- Modeling information for transmission lines, transformers, generators, and loads.
- Power flow analysis and system operation.
- Short circuit analysis, including symmetrical components.
- Transient stability analysis.

Course Content

Unit 1: Math Review and System Modeling

- Time domain and phasor domain.
- Phasor math.
- Per-unit calculations.
- Basic three-phase power calculations.
- Transmission line parameter computation.
- Modeling transformers, generators, and loads.

Unit 2: Power Flow Analysis

- Components of AC power.
- Building the Ybus and Zbus matrices.
- Power flow equations.
- Solution methods.
- Software simulations.
- Interpreting power flow results.

Unit 3: Generation Control, Economic Dispatch, and Unbalanced System Analysis

- Load, generation, and Area Control Error ACE.
- Frequency bias.
- Economic dispatch of generation.
- Network behavior and contingencies.
- Analyzing unbalanced power systems.
- Symmetrical component theory.

Unit 4: Symmetrical Components and Sequence Networks

- Development of symmetrical components.
- Sequence current behavior.
- Detailed delta-wye transformer analysis.
- Modeling sequence impedances.
- Construction of sequence networks.
- Analyzing harmonics as sequence currents.

Istanbul - Turkey: +90 539 599 12 06
Amman - Jordan: +962 785 666 966
London - UK: +44 748 136 28 02

MERCURY

Unit 5: Short Circuit Calculations and Transient Stability

- Modeling faults with sequence networks.
- Short circuit current calculations.
- Open circuit current calculations.
- Fault current versus incident energy - arc flash hazard.
- Power system dynamics.
- The equal-area criterion for transient stability.