



Electrical Engineering

Industrial Power Distribution Systems Optimization

Course Introduction

Special Protection Systems (SPSs).

Power system at distribution Optimization level should be planned and designed with consideration for ease of operation. Such considerations include, but are not limited to Optimization/ utilization of standard components, facilitate availability of spare parts, optimization of post contingency switching operations, reduction of operational risks and use of special protection systems (SPSs). Also, to achieve the required power supply reliability, power system Optimization / planning-particularly for medium-voltage system must consider not only the system configuration and earthing, etc.

but also the arrangement of the stations, the choice of equipment and so on. The decisions taken contribute substantially to both the design reliability and the operational reliability, and also influence each other. The course will discuss how future electrical loads can be integrated in the existing power utilities networks, industrial as well as oil and gas plants to meet high quality of supply. The quality of electrical power must guarantee the continuity of supply, fixed frequency, non-violation of voltage limits, cleanness of supply voltage signal, non-harmful motor starting currents and smooth operation of power electronic devices.

Target Audience

- Electrical Engineers
- Electrical Supervisors
- Maintenance Technicians
- Managers in-charge of Instrument Installations
- Project Engineers

Learning Objectives

- Distribution System Network configuration
- Explain standards and regulations as well as electric power .
- Normal and emergency power sources for industrial loads
- Protection devices selection and calculations
- Distribution systems related studies with target Optimization
- Optimization operation of power distribution system

Course Outline

• DAY 01

Moduel 1

- PRE-TEST
- Power System Component and configuration
- Power distribution system standard voltage according to IEEE/IEC
- Electrical Distribution System Network Components
- Transformers
- Cables & OHTL
- Circuit breakers
- Switchboards
- Types of distribution system and its Optimization
- Radial Distribution system
- Ring Distribution system
- Parallel feeder Distribution system
- Advantage and dis-advantage of each type
- Operation characteristics of radial Distribution power system
- Operation characteristics of parallel feeder radial Distribution power system
- Operation characteristics of ring Distribution power system
- Factors effect in Optimization Distribution system
- Voltage droop and Distribution system (Optimization)
- Short circuit level and Distribution system
- Meaning of industrial loads

- Classifications of loads

Module 2

- Power transformers systems
- Optimization of Distribution transformers operation
- Distribution transformers component
- Magnet wires & bars of transformer
- Coil / Winding Connections
- Transformer Core-type
- Transformer Shell-type
- Transformer Core lamination
- Bushing
- Oils
- Gauges (Level, Temp., Pressure,.....)
- Overloading of transformers
- Transformer types
- Self-air cooled Transformer
- Forced Air Cooled Transformer
- Oil-Immersed Self cooled Transformer (ONAN)
- Oil-Immersed forced air cooled Transformer (ONAF)
- Oil-Immersed Forced water cooled forced Transformer (OFWF) Transformers maintenance and troubleshooting
- Distribution transformers protection
- Connection of transformer
- Delta
- Star
- Open Delta Configuration

• Day 02

Module 3

- Optimization of Power cables
- Low Voltage level power cables
- Medium Voltage level power cables
- Power cables testing
- Megger test
- High pot test
- Power cables splicing
- Cold shrank type
- Hot shrank type
- Testing of power cables
- Basic introduction of switchgear

- Distribution panels component
- Distribution panel rating selection
- Distribution panel operation (isolation- control & protection)

• Day 03

Module 4

- Optimization of Circuit breakers and fuses types & operation
- Circuit breaker types
- MCB Miniature Circuit breaker
- MCCB Molded case circuit breaker
- Air Blast Circuit breaker
- Air Circuit breaker
- Vacuum Circuit breaker
- Oil Circuit breaker
- SF6 Circuit breaker
- Circuit breakers main component
- Close coil
- Trip coil
- Charge coils
- Motors applications for industrial loads
- Motors types and selection
- Motors controllers and drives

• Day 04

Module 5

- Power distribution quality and effect on Optimization
- Power distribution Quality Standards
- Power System distribution Quality
- Harmonics.
- Power Factor.
- Reactive power sources
- Effect of reactive power in power system
- Introduction of harmonics
- Source of harmonics
- Causes of harmonics

• Day 05

Module 6

- Dis-advantage of harmonics
- Power system distribution harmonics level
- Reducing Harmonics IEEE519-1992

- Measure Harmonics Values
- Reducing harmonics values
- Power distribution Design
- Use rectifier with more pulses
- Delta-Delta and Delta-Wye Transformers
- Isolation Transformers
- Line Reactors
- Harmonic Trap Filters
- Harmonic filter types
- Passive filter
- Active filter
- Power Factor meaning
- Effect of low power factor
- Disadvantages of Low Power Factor
- Leading and lagging power factor:
- Causes Low Power Factor
- Correct Power Factor
- Power Factor meaning
- Relation between loads and power factor
- Effect of low power factor on
- Generators
- Transformer
- Cables
- Electronics Devices
- Relation between VSD & ESP on Power factor values
- Disadvantages of Low Power Factor
- Leading and lagging power factor
- Causes Low Power Factor
- Relation between Harmonics and power factor
- Power Factor correction PFC
- Capacitors banks
- Synchronous Motors
- FACTS devices

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
June 16, 2025	June 20, 2025	5 days	4250.00 \$	UAE - Dubai
Sept. 8, 2025	Sept. 12, 2025	5 days	5950.00 \$	USA - Los Angeles
Oct. 20, 2025	Oct. 24, 2025	5 days	4250.00 \$	UAE - Dubai