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COURSE BROCHURE

Transmission and Distribution Network Fundamentals Training Course

5 – 9 September 2027
Doha

Transmission and Distribution Network Fundamentals Training Course

Ref: 3104_117852 **Date:** 5 – 9 September 2027 **Location:** Doha **Fees:** 6500 GBP

Transmission and Distribution Network Fundamentals is a 1-week training course for newly appointed electrical engineers, technicians and network staff in utilities and large industrial sites, built around a feeder fault response record. Ageing assets, growing demand and new connections from solar and wind plants now test every overhead line, cable and substation, so staff need a firm grasp of how networks behave. Jupiter Prime Training delivers this transmission and distribution network fundamentals course.

Why Transmission and Distribution Network Fundamentals Matters Now

Three forces shape network engineering today. Experienced engineers are retiring faster than their knowledge is passed on, leaving control rooms and field crews with less depth. Renewable plants and battery storage connect at many voltage levels and change power flows on feeders designed for one direction. Customers and industrial users expect fewer and shorter interruptions. A network operator whose new staff read line parameters, protection basics and switching rules correctly restores supply quickly and avoids damaging equipment; one whose staff guess faces longer outages and safety incidents. The course draws on established international electrotechnical practice for network design and operation.

Who Gains Most from Transmission and Distribution Network Fundamentals

- Graduate engineers who calculate loading and voltage on lines and feeders
- Technicians who inspect, test and maintain substation equipment
- Control room staff who switch circuits and isolate faulted sections
- Field crews who restore cables and overhead spans after faults
- Industrial site electrical staff who manage incoming supplies and internal distribution

A new intake of network staff from one operator gains most when attending as a group.

Transmission and Distribution Network Fundamentals Capabilities

Participants leave able to read a network diagram, size its circuits and respond to its faults with sound engineering reasoning.

- Identify voltage levels and the role of each from bulk transmission to low voltage service — network planning conversations
- Calculate resistance, reactance and capacitance effects on lines and cables — conductor and cable selection
- Assess substation layouts and the function of each item of switchgear — safe isolation decisions
- Apply overcurrent and earth fault protection principles to radial feeders — protection setting requests
- Build switching sequences for planned outages and fault restoration — control room instructions

- Communicate fault findings clearly to engineers, crews and customers — restoration priorities

Key Transmission and Distribution Network Fundamentals Terms

- Feeder — a circuit leaving a substation that carries power to a group of distribution transformers or customers.
- Single-line diagram — a simplified drawing showing network connections, equipment and switching points using one line per circuit.
- Line reactance — the opposition an overhead line or cable offers to alternating current because of its magnetic field.
- Busbar — a conductor arrangement inside a substation joining incoming and outgoing circuits.
- Earth fault — an unintended connection between a live conductor and earth that causes abnormal current flow.
- Switching sequence — the ordered list of operations used to isolate, earth and restore part of the network safely.

Transmission and Distribution Network Fundamentals Day by Day

Day 1: How Power Moves from Generator to Customer

- Voltage Level Hierarchy — Matching Transmission and Distribution Roles
- Single-Line Diagram Reading — Tracing Supply Paths Through the Network
- Radial, Ring and Meshed Arrangements — Supply Security and Cost Trade-Offs
- Load Profiles of Homes and Factories — Sizing Feeders for Demand
- Renewable and Storage Connections — Effects on Feeder Power Flow

Day 2: Overhead Line and Cable Behaviour

- Conductor Resistance and Thermal Rating — Setting Safe Loading Limits
- Line Reactance and Voltage Drop — Keeping Customer Voltage Within Limits
- Cable Construction and Insulation Types — Choosing Buried or Overhead Routes
- Cable Capacitance and Charging Current — Effects on Long Underground Circuits
- Per-Unit Calculations — Comparing Circuits Across Voltage Levels

Day 3: Substations and Switchgear

- Busbar Arrangements — Flexibility for Maintenance and Faults
- Power Transformer Basics and Tap Changers — Regulating Network Voltage
- Circuit Breakers, Disconnectors and Earth Switches — Isolation Responsibilities
- Instrument Transformers — Feeding Accurate Signals to Meters and Relays
- Substation Automation and Remote Signalling — Remote Monitoring Choices

Day 4: Protection and Fault Handling

- Fault Types and Short Circuit Levels — Rating Equipment Correctly
- Overcurrent and Earth Fault Relays — Clearing Feeder Faults Selectively
- Fuses, Reclosers and Sectionalisers — Limiting Customers Affected by Faults
- Fault Location Methods on Cables and Lines — Speeding Crew Dispatch
- Switching Safety Rules and Permits — Protecting Crews During Restoration

Day 5: Practising the Feeder Fault Response Record

- Urban Cable Feeder Case — Applying Day Two Voltage Drop Checks
- Rural Overhead Line Case — Applying Day Four Protection Principles
- Industrial Substation Outage Case — Applying Day Three Isolation Steps
- Restoration Switching Sequence Drill — Restoring Healthy Sections in Order
- Feeder Fault Response Record — Documenting Findings and Next Actions

Applying Transmission and Distribution Network Fundamentals After the Course

- Trace one live feeder on its single-line diagram and check its voltage drop against measured readings.
- Draft a restoration switching sequence for a recent fault and compare it with the one actually used.

Transmission and Distribution Network Fundamentals Questions FAQ

What are transmission and distribution network fundamentals, and why do they matter now?

They are the core engineering of the lines, cables, substations and feeders that carry power to customers. They matter now because experienced staff are retiring while renewable connections make network behaviour harder to predict.

Which roles gain most from transmission and distribution network fundamentals?

Graduate engineers, substation technicians, control room staff, field restoration crews and industrial site electrical staff gain most.

How do transmission and distribution network fundamentals differ from power system overview courses for non-engineers?

This is an engineering course with calculations, diagrams and switching practice. Overview courses explain the electricity business to commercial staff, while specialist courses go deeper into protection settings or design.

What do you bring back from transmission and distribution network fundamentals?

You bring back a completed feeder fault response record with traced diagrams, voltage checks and a restoration switching sequence you can reuse on your own network.

Transmission and Distribution Network Fundamentals: The Way Forward

The feeder fault response record first informs how a new engineer or technician handles the next feeder trip on shift. Control room staff and field crews use it to agree isolation points and restoration order. After its first use, revisit the protection grading assumptions and the voltage drop figures, since renewable connections can shift both over time.