



ELECTRICAL POWER System Planning

Course Introduction:

Winston Churchill said, "A plan is nothing. Planning is everything." What one may see as a plan for developing power systems may have little or no value if the conditions and assumptions for the plan do not hold true. This applies even more so today in the era of open access, re-regulation, power markets, merchant power plants and available transfer capability. However, the act of planning in and of itself provides a means for a new plan to be developed quickly out of the ashes of the previous one. As Churchill implied, knowing the process is essential.

That process, known as power system planning, has expanded in breadth and scope in recent times. Although reliability, cost, and optimization remain key aspects, power system must now also address cost recovery, service pricing, new stakeholders and changing regulatory oversight. It must address a larger set of future conditions as competition in the generation market shrinks the pool of available information, and as merchants develop their own plans within plans.

The function of the power system is to deliver electrical energy from generation through transmission and distribution to each customer, transforming to a suitable voltage where necessary. Power system planning is based on the following basic concepts: matching customer demand; satisfying the operating constraints; minimizing investment, operating and power loss costs.

The course commences by reviewing current practice to establish a sound understanding of the underlying principles of power system. Also are considered the developments that are taking place as a result of emissions control (Kyoto), environmental aspects and advances in system innovation.

International Centre For Training & Development

Course Objectives:

Upon the successful completion of this course, each participant will be able to:-

- Understand the main concept of power system planning
- Understand the modern planning and design methodologies in electrical power system
- Learn how power systems are modeled and analyzed for planning and operation purposes
- Learn how to improve the quality of supply. To know how to design, and calculate, of new power plants.
- Understand the modern methods for planning capacity needs of power delivery (Transmission and Distribution).
- Learn the load behavior and load growth characteristics.
- Learn how to forecast energy, maximum demand and number of consumers.
- Learn how to load forecasting in planning of power systems.
- To be familiar with earthing requirements.

Who Should Attend?

The course will be useful for managers, engineers/highly trained technicians and operators and senior technical personnel from generation, operation, control, transmission operation departments who are involved in the planning, operation and analysis of a power system. Such electrical engineers could be working in power utilities, oil and gas production and those involved in consultancy. Participants need no specific requirements, other than a good understanding of electricity and some relevant experience in power engineering.

Course Outline:

Introduction to Industrial Power Systems

- Elements of industrial power systems
- Typical industrial power systems

System Design Considerations:

- Safety
- Reliability
- Flexibility
- Voltage Considerations

System Planning

- Load demand & survey
- Local generation
- Utility service & requirements
- Substation configuration
- Protection consideration
- Special Loads

Equipment Selection:

- Substation transformers
- Switchgears & Circuit breakers
- Fuses & Fuse disconnects
- Power distribution centers
- Motor control centers
- Surge Arresters
- Voltage/Current transformers
- Relays & Protection Schemes

Short Circuit Calculations:

- Short circuit Terminology
- Effects of short circuits
- Sources of Fault currents
- Database & system modeling
- Short circuit results & comparison with equipment ratings
- Limiting short circuit currents
- Fuses, reactors, impedances

System Grounding Design

- Types of system grounding
- Selection of system grounding
- Impact of system grounding

Power Flow Analysis

- Database and system modeling
- Voltage regulation & Voltage control
- Normal & emergency operations
- Motor starting

Protection & Relay Coordination:

- System protection requirements
- Overcurrent protection
- Ground fault protection
- Differential protection
- Transformer Protection
- Motor protection, Cable protection & Bus protection

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:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session