Introduction to Power Systems

14-15 Dec 2016 | Hotel Bangi-Putrajaya, Bandar Baru Bangi

This course introduces the building blocks for power systems. Electric power has become increasingly important as a way of transmitting and transforming energy in all industries. The course presents the power systems fundamentals in light of regulatory changes and penetration of new technology such as power electronics and renewable energy.

The main take-away from this course resides in clearly define building blocks of the power system from its fundamentals to all aspects of power system operation:

- **This course is addressed to a wide range of practitioners, from engineers to any professional engaged in the power industry.**
- **The course is interactive and dynamic. It provides participants an overview of the power system as pertaining to generating plants, transmission models and distribution systems.**
- **The participants will gain a better understanding of the design, operation and economics of the power system. The course presents a solid summary of the technical issues in the operation of the power system.**

BE: 60406963

Course Outline

1. Introduction to Rotating Machines
   - Synchronous generators
   - Motor/generator sets for pumped storage
   - Synchronous motors materials to electric machinery
   - Electrical machinery theory
2. Introduction to Transformers
   - Power Transformers
   - Distribution Transformers
   - Conceptual Diagrams for Solid State Transformer
3. Transmission of Electrical Power
   - AC transmission and distribution facilities
   - Lightning phenomena and insulator performance
   - Overhead line conductors: thermal and mechanical aspects
   - Corona, electric, and magnetic fields
   - Towers, poles, and hardware
   - Capacitors, shunt and series capacitor banks, and harmonic filter banks HVDC transmission and distribution,
   - FACTS and power electronic applications to AC transmission Harmonics and power quality
4. Basics of Load Flow
   - Review of Electromagnetic Concepts
5. Power Generation Technology
   - Fossil Generating Plants
   - Hydroelectric Generating Plants
   - Nuclear Power Plants
   - Renewable Generation
   - Wind Power
   - Solar Power
6. Unit Commitment
   - Objective Function
   - Basics of Lagrange Relaxation
   - Gas Unit Commitment Coordination Intraday Cost Schedule
   - Major generation planned outages included in Unit Commitment
7. Stability Transient and Harmonic Studies
8. Power System Operation
   - Power System Operations
   - Power system dynamic modelling: components and systems
   - Power system stability: phenomena, analysis, and techniques
   - Energy control centres
   - Distribution operation
   - System control
   - Operating economics and pricing
9. Congestion Management Due to Transmission and External Constraints
   - Non Economic Dispatch and Congestion Credits
   - Calculating Generation Ramp Down Settlements
   - Congestion Management Settlements Credits
   - Overview of Settlements Credits
   - Payment Errors
10. Reliability: Regulatory Framework
    - Reliability: Regulatory Framework
    - North American Electricity Reliability Corporation (NERC)
    - Loss of Load Probability (LOLP), Loss of Load Expectation (LOLE)
    - Generation Reserve Requirements
    - Operating Reserve
11. Market Economics: Examples from Canada, Europe, USA
    - Example : Design of the Ontario Electricity Market
    - Real Time Market
    - Day Ahead Market
    - Market Clearing Price
    - Economic Dispatch
    - Unconstrained Price
    - Constrained Price
    - Bidding Strategy
    - Interjurisdictional Trading
12. Reliability Assessment
    - Resource Adequacy
    - Transmission Adequacy
    - Demand Forecast
    - Outage Management

2 renowned speakers for the price of 1!

Your Investment: RM7,200.00/pax*

Or RM7,000/pax* for 3 & above

*excluding 6% GST

Introduction to Power Systems

14-15 Dec 2016 | Hotel Bangi-Putrajaya, Bandar Baru Bangi

BE: 60406963

Trainers' Profile

Dr. Prabha Kundur

Honorary Degrees: Doctor Honoris Causa, University Politechnica of Bucharest, Romania, 2003 & Doctor of Engineering, Honoris Causa, University of Waterloo, Canada, 2004

For over 40 years worked at the leading edge in the development and application of technologies related to power system design and operation; contributed to improved security of system operation, economy and flexibility of power system design, and minimization of adverse impact on the environment. These technologies have been used on power systems worldwide.

Internationally recognized engineering accomplishments:

- Recipient of the 1997 IEEE NIKOLA TESLA Award for "Contributions to Power System Controls and Stability Analysis".
- Recipient of the 2005 IEEE PES Charles Concordia Power Systems Engineering Award for "Outstanding Contributions to Power System Modelling, Control, Monitoring, Enhancement of System Dynamic performance, and Leadership in Technical Activities Leading to Industry Practice".
- Recipient of the 2010 IEEE Medal in Power Engineering for "Leadership in the development and application of analytical methods, tools and techniques for modelling, simulation and control of large-scale interconnected power systems".
- Recipient of the 1999 CIGRE Technical Committee Award for "Contributions to Power System Analysis and Techniques".
- Recipient of the CIGRE Medal in 2014 for "Outstanding technical contributions to CIGRE, and proven leadership for the benefit of the organization".
- Inducted as a Fellow of the Canadian Academy of Engineering in 2003.
- Inducted as a Foreign Associate of the US National Academy of Engineering in 2011.

Through extensive participation in IEEE and CIGRE committee activities, contributed to the Electric Power Industry in the following areas:

- Improved common understanding of emerging technical problems and effective methods of resolving them; -Development of industry standards, guidelines, and accepted practices
- Modelling and identification of dynamic characteristics of Synchronous Machines, Excitation Systems, Prime Mover and Energy Supply Systems, and Loads
- Analytical tools for comprehensive analysis of power system stability: rotor angle stability, voltage stability, and frequency stability
- Development and application of control techniques for enhancement of power system dynamic performance
- Development of control and protection schemes for enhancement power plant performance during emergency conditions

External consultant to the following international clients in power system stability and control: State Energy Commission of Western Australia, Australia; Volta River Authority, Ghana; Taiwan Power Company, Taiwan; People's Republic of China; New Brunswick Power, Canada; WAPDA, Pakistan; Government Economic Planning Unit, Malaysia; Entergy, USA; Transpower, New Zealand; EirGrid, Ireland; National Grid Corporation, Philippines.

Puica Nitu is an energy leader who has a passion for bringing people together and delivering above expectations. Puica has a tremendous experience in the electrical utility space: carried large power systems studies, derived system reliability criteria, was involved in the risk management of energy markets from front mid back office. Puica holds a Masters in Science with major in Power Systems and Economics from the Polytechnic University of Bucharest, Romania. Her Masters Thesis formed the core of her first coauthored book on the Reliability and Security of Nuclear Power Plants. Puica coauthored the first financial engineering course offered to the Power Engineering Society and to Power companies in Japan, South Africa, Romania and Portugal. EDP Portugal, adopted this seminar as mandatory training and asked Puica give a key note address to their executive team.

KEY TOPICS

- ✓ Rotating machines
- ✓ Mutual induction phenomena as it applies to transformers
- ✓ Design, Operation and Analytical Models applied to Transmission and distribution networks.
- ✓ The Generating units are presented from conventional (fossil, hydroelectric), nuclear to renewable generation
- ✓ Optimization methodology of generating units as integrated in the real time Energy Management System. Demonstrate how cost optimization at system level becomes the main tool to derive the spot price in the context of an electricity market.
- ✓ The course introduces the basics of power system stability: inter-area oscillations and damping rate, voltage angle, voltage sensitivities in the PV and QV curves, voltage stability and how these concepts integrate within the ISO situational awareness to prevent or analyze after the fact outages. Impedance changes and stability margins of tie-lines are discussed in the context of interjurisdictional transactions.
- ✓ Operating criteria and reserve margins are introduced from a policy perspective and explained through the system models and reliability indices.
- ✓ The course concludes with examples of the generation mix and market rules in different jurisdictions with focus on wholesale consumers while recognizing the emergence of behind the meter prosumers.

ILSAS
TNB INTEGRATED LEARNING SOLUTION

Tel: (+6)03-8922 7222
Web: http://www.tnbilsas.com.my
E-mail: infoilsas@tnb.com.my