

# Laboratory for the First course on Power Systems

## Lab Manual - Experiments

1. Visit to a Local Substation/Generating Plant
2. Familiarization with PSCAD/EMTDC
3. Obtaining Parameters of a 345 kV Transmission Line and Modeling it in PSCAD/EMTDC
4. Power Flow using MATLAB and PowerWorld
5. Including Transformers in Power Flow using PowerWorld and Confirmation by MATLAB
6. Including an HVDC Transmission Line for Power Flow Calculations in PowerWorld and Modeling of Thyristor Converters in PSCAD/EMTDC
7. Power Quality
8. Synchronous Generators
9. Voltage Regulation
10. Transient Stability using MATLAB
11. AGC using *Simulink* and Economic Dispatch using *PowerWorld*
12. *Transmission Line Short Circuit Faults using MATLAB and PowerWorld, and Overloading of Transmission Lines using PowerWorld*
13. Switching Over-Voltages and Modeling of Surge Arresters using PSCAD/EMTDC

- Textbook: First Course in Power Systems by Ned Mohan, [www.mnpere.com](http://www.mnpere.com)
- **Simulation Files:** The simulation files mentioned in this lab manual are taken from the CD that accompanies the above Textbook.

## Software

- MATLAB/Simulink
- PowerWorld
- EMTDC

## 18 Video Clips on a CD

1. Installation of PowerWorld and PSCAD-EMTDC
2. Familiarization with using PSCAD-EMTDC
3. Obtaining Parameters of Transmission Line using PSCAD/EMTDC
4. Simulating a Transmission Line in a Power System using PSCAD/EMTDC
5. Power Flow using PowerWorld
6. Power Flow using MATLAB
7. Including Off-Nominal Turns-Ratio and Phase-Shifting Transformers in Power Flow using PowerWorld
8. Including an HVDC Transmission Line for Power Flow in PowerWorld
9. Modeling of Thyristor Converters in PSCAD-EMTDC
10. Power Quality Calculations using PSCAD-EMTDC
11. Modeling of Synchronous Generators using PSCAD-EMTDC
12. Voltage Regulation by Thyristor Controlled Reactors (TCR) using EMTDC
13. Thyristor Controlled Series Capacitors (TCSC) using PSCAD-EMTDC
14. Transient Stability using MATLAB
15. AGC using *Simulink*
16. Transmission Line Short Circuit Faults using PowerWorld
17. Tripping of Transmission Lines due to Overloads using *PowerWorld*
18. Switching Over-Voltages and Modeling of Surge Arresters using EMTDC

