

4/4 B.Tech. EIGHTH SEMESTER**EE8T3B REAL TIME CONTROL OF POWER SYSTEMS****Credits: 3****Lecture: 3 periods/week****Internal assessment: 30 marks****Tutorial: 1 period /week****Semester end examination: 70 marks****Course Objective:**

This course introduces the need of power system state estimation, security measurement and assessment. It emphasis on the concept of SCADA, voltage stability, application of AI, ANN and PMU techniques in power systems.

Course Outcomes:

After completion of course, student will be able to

1. Understand the different types of state estimation, bad data detection and elimination.
2. Understand the security and contingency analysis.
3. Understand the need of computer control of power system in real time using SCADA system.
4. Analyze voltage stability problems and application of AI, ANN and PMU techniques in power systems.

Unit I**State Estimation**

Different types of State Estimations, Theory of WLS state estimation, sequential and non-sequential methods to process measurements. Bad data Observability, Bad data detection, identification and elimination.

Unit II**Security and Contingency Evaluation**

Security concept, Security Analysis and monitoring, Contingency Analysis for Generator and line outages by iterative linear power flow method, Fast Decoupled model and network sensitivity methods.

Unit III**Computer Control of Power Systems**

Need for real time and computer control of power systems, operating states of a power system, SCADA - Supervisory control and Data Acquisition systems implementation considerations, energy control centres, software requirements for implementing the above functions.

Unit IV**Voltage Stability**

What is voltage stability, voltage collapse and voltage security. Voltage stability analysis, 'P-V' curves and 'Q-V' curves, power flow analysis for voltage stability – research areas.

Unit V**Application of AI and ANN in Power System**

Basic concepts and definitions, algorithms for load flow, short term load forecasting. Applications of PMU in power systems.

Learning Resources

Text Books:

1. Power System Stability and Control by Prabha Kundur – Tata McGraw-Hill Edition 2006
2. Power System Analysis by John J.Grainger and William D.Stevenson , Jr- Tata McGraw-Hill Edition 2003
3. Computer Modelling of Electrical Power Systems by Arilaga J., Arnold C.P. and Horker B.J., Wiley, 1984.

Reference Books:

1. Power system Generation, Operation and Control by Allen J. Wood and Bruce F. Wollenberg, Wiley India Edition 2010
2. Power systems voltage stability by C.W.Taylor McGraw Hill, 1994
3. Real Time Control of Electric Power Systems by Handschin, E., Elsevier, 1972.