

4/4 B.Tech. SECOND SEMESTER

E85T4 A REAL TIME CONTROL OF POWER SYSTEMS (Elective –IV) Credits: 4

Lecture: 4 periods/week
Tutorial: 1 period /week

Internal assessment: 30 marks
Semester end examination: 70 marks

Objectives:

To understand the need for power system security, security measurement and assessment. To study the techniques for security enhancement, understand the use of SCADA, voltage stability and application of AI and ANN techniques in power systems.

Learning outcomes:

1. After completing the course student understand the different types of state estimation, security and contingency evaluation, monitoring.
2. Understand need of computer control of power system in real time
3. Understand SCADA system, voltage stability and application of AI and ANN 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.

Unit II

Bad data Observability, Bad data detection, identification and elimination.

Unit III

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 IV

Computer Control of Power Systems : Need for real time and computer control of power systems, operating states of a power system,

Unit V

SCADA - Supervisory control and Data Acquisition systems implementation considerations, energy control centres, software requirements for implementing the above functions.

Unit VI

Voltage Stability : What is voltage stability, voltage collapse, and voltage security, relation of voltage stability to rotor angle stability.

Unit VII

Voltage stability analysis Introduction to voltage stability analysis 'P-V' curves and 'Q-V' curves, voltage stability in mature power systems, long-term voltage stability, power flow analysis for voltage stability, voltage stability static indices and Research Areas

Unit VII

Application of AI and ANN in Power System : Basic concepts and definitions, algorithms for load flow, short term load forecasting, fault diagnosis and state estimation.

Learning resources

Text books:

1. Power System Stability and Control 'Prabha Kundur '-, Tata McGraw Hill,
2. Advanced Power System Analysis and Dynamics, L.P.Singh ,Wiley Eastern Ltd. 1986

Reference books:

1. John J.Grainger and William D.Stevenson, Jr. : Power System Analysis, McGraw-Hill, 1994, International Edition
2. R.N.Dhar : Computer Aided Power Systems Operation and Analysis, Tata McGraw Hill, 1982
3. P.D.Wasserman : 'Neural Computing : Theory and Practice' Van Nostrand - Feinhold, New York.