

M.TECH SECOND SEMESTER

EEPC2T3

REAL TIME CONTROL OF POWER SYSTEMS

Credits: 4

Lecture: 4 periods/week

Internal assessment: 30 marks
Semester end examination: 70 marks

Objective : This subject deals with state estimation, Bad data defection in the network, security and contingency evaluation, real time computer control of power system and SCADA. It also emphasizes on voltage stability analysis and their problems and role of PMU in power systems.

Learning outcomes:

1. After studying the subject, students understands the integral part of real time control of power systems
2. Students understands the role of real time computers control of power systems like SCADA and their operating states.
3. Students knows about the voltage stability analysis and their effects in power systems and role of phasor measuring unit in power systems

Unit 1 : State Estimation : Different types of State Estimations, Theory of WLS state estimation, sequential and non-sequential methods to process measurements.

Unit 2 : Bad data Observability, Bad data detection, identification and elimination.

Unit 3 : 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 4 : Computer Control of Power Systems : Need for real time and computer control of power systems, operating states of a power system,

Unit 5 : SCADA - Supervisory control and Data Acquisition systems implementation considerations, energy control centres, software requirements for implementing the above functions.

Unit 6 : Voltage Stability : What is voltage stability, voltage collapse, and voltage security, relation of voltage stability to rotor angle stability.

Unit 7 : 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 8 : Role of PMU in real time environment of power system operation and control

Reference Books :

1. Allen J.Wood and Bruce F.Wollenberg : Power Generation operation and control, John Wiley & Sons, 1984
2. John J.Grainger and William D.Stevenson, Jr. : Power System Analysis, McGraw-Hill, 1994, International Edition
3. Prabha Kundur : Power System Stability and Control -, McGraw Hill, 1994.