

POWER SYSTEM OPERATION AND CONTROL

III Year B.Tech. II-Sem

Course Code	Category	Hours/ Week			Credits	Maximum Marks		
23EE602	Core	L	T	P	3	CIE	SEE	TOTAL
		3	0	0		40	60	100
Contact Classes: 48	Tutorial Classes: 0	Practical Classes: Nil				Total Classes:48		

Pre-requisites: Power System-I, Power System-II

Course Objectives:

- Understand the principles and significance of real power control, emphasizing the importance of frequency control in power systems.
- Analyze various methods for effective reactive power control in power systems.
- Grasp the concepts of unit commitment, economic load dispatch, and real-time control, highlighting their importance in power system operation.

Course Outcomes: At the end of the course the student will be able to:

- Understand operation and control of power systems.
- Analyze various functions of EMS functions and stability of machines.
- Understand power system deregulation and restructuring
- Analyze whether the machine is in stable or unstable position.
- Test the stability of the power system.

UNIT I

Load Flow Studies: Introduction, Bus classification - Nodal admittance matrix - Load flow equations - Iterative methods - Gauss and Gauss Seidel Methods, Newton-Raphson Method-Fast Decoupled Method-Merits and demerits of the above methods-System data for load flow study

UNIT II

Economic Operation Of Power Systems: Distribution of load between units within a plant-Transmission loss as a function of plant generation, Calculation of loss coefficients-Distribution of load between plants.

UNIT III

PF Control: Introduction, load frequency problem-Megawatt frequency (or P-f) control channel, MVAR voltages (or Q-V) control channel-Dynamic interaction between P-f and Q-V loops. Mathematical model of speed- governing system-Turbine models, division of power system into control areas, P-f control of single control area (the uncontrolled and controlled cases)-P-f control of two area systems (the uncontrolled cases and controlled cases).

UNIT IV Power System Stability: The stability problem-Steady state stability, transient stability and Dynamic Stability-Swing equation. Equal area criterion of stability-Applications of Equal area criterion, Step by step solution of swing equation-Factors affecting transient stability, Methods to improve steady state and Transient stability, Introduction to voltage stability

UNIT-V Computer Control of Power Systems: Need of computer control of power systems. Concept of energy control centre (or) load dispatch centre and the functions - system monitoring - data acquisition and control. System hardware configuration – SCADA and EMS functions. Network topology – Importance of Load Forecasting and simple techniques of forecasting

TEXT BOOKS:

1. C. L. Wadhwa, Electrical Power Systems, 3rd Edn, New Age International Publishing Co., 2001.
2. D. P. Kothari and I. J. Nagrath, Modern Power System Analysis, 4th Edn, Tata McGraw Hill Education Private Limited 2011.

REFERENCE BOOKS:

1. D. P. Kothari: Modern Power System Analysis-Tata Mc Graw Hill Pub. Co. 2003.
2. Hadi Sadat: Power System Analysis –Tata Mc Graw Hill Pub. Co. 2002.