POWER SYSTEM CONTROL

Course Code: 15EE2101

L	P	C
3	0	3

Pre requisites: Power Generation Engineering, Power Transmission Engineering and Power System Operation and Control.

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

CO1: Solve Unit Commitment problem using simple priority list scheme and dynamic programming technique for a given power system.

CO2: Estimate the frequency deviation for a given change of load and design control systems for making steady-state frequency error to zero.

CO3: Select appropriate voltage control techniques for improving voltage profile in a transmission system.

CO4: Estimate system security level using contingency analysis and understand state estimation.

CO5: Solve optimal power flow problem using Gradient Method and Newton's Method.

UNIT-I (10-Lectures)

UNIT COMMITMENT - Introduction, Constraints in Unit Commitment - Spinning Reserve, Thermal Unit Constraints, Other Constraints, Hydro-Constraints, Must Run, Fuel Constraints; Unit Commitment Solution Methods - Priority-List Methods, Forward Dynamic Programming Approach, Backward Dynamic Programming Approach.

UNIT-II (10-Lectures)

CONTROL OF ACTIVE POWER

Active Power and Frequency Control, Control of Generating Unit Power Output, Composite Characteristics of Power Systems, Response Rates of

Turbine-Governing Systems, Fundamentals of Automatic Generation Control, Implementation of AGC.

UNIT-III (10-Lectures)

CONTROL OF RECTIVE POWER

Reactive Power and Voltage Control – Production and Absorption of Reactive Power, Methods of Voltage Control, Shunt Reactors, Shunt Capacitors, Series Capacitors, Synchronous Condensers, Static Var Systems;

UNIT-IV (10-Lectures)

POWER SYSTEM SECURITY

Introduction, factors Affecting Power System Security, Contingency Analysis: Detection of Network Problems - Overview of Security Analysis, Linear Sensitivity Factors, AC Power Flow Methods, Contingency Selection.

UNIT-V (10-Lectures)

OPTIMAL POWER FLOW

Introduction, Solution of the Optimal Power Flow, The Gradient Method, Newton's Method; Linear Sensitivity Analysis. – Sensitivity coefficients of an AC Network Model.

TEXT BOOKS:

1. Allen J.Wood and Bruce F.Wollenberg, "*Power Generation, Operation and Control*", 2nd Edition, John Wiley & Sons Inc, 1996.
2. P.Kundur, "*Power System Stability and Control*", McGraw-Hill Inc, 1997.

REFERENCES:

1. OlleE.Elgerd, "*Electrical Energy Systems Theory – An introduction*" 2nd Edition, Tata McGraw Hill, 1983.
2. T.J.E.Miller, "*Reactive Power Control in Electric Systems*", Wiley, 1982.