

**Module 1**

**Chapter 1 : Load Flow Studies 1-1 to 1-97**

**Syllabus** : Introduction, network model formulation, formation of Y bus using step by step method, formation of Y bus by singular transformation, Load flow problem, Load flow Equation and methods of solution, Approximate Load flow study, Gauss-Seidel method, Newton - Raphson method, Decoupled load flow method, Fast decoupled load flow method, comparison of load flow method. (Numerical)

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**Module 2**

**Chapter 2 : Economic Operation of Power System 2-1 to 2-44**

**Syllabus** : Optimal operation of generators in thermal power station, heat rate curve, input-output curve, IFC curves, optimum generation scheduling neglecting Transmission losses (coordinate equation), optimum generation scheduling considering transmission losses (Exact coordinate equation), Transmission loss formula,  $B_{mn}$  coefficient, Inherent procedure of solving co-ordination equation, optimal unit commitment : dynamic programming method, Reliability considerations (Numerical).

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### Module 3

## Chapter 3 : Automatic Generation and Voltage Control 3-1 to 3-23

**Syllabus :** Introduction, Basic control loops in generator, AVR loop, Thermal control, speed governing system and transfer function, steam turbine and power system transfer function, Load frequency control(single area),state and dynamic response. Load frequency control of Two area system, static and dynamic response analysis of two area system, Load frequency control with generation rate constraints, Dead band and its effect on AGC(Numerical).

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### Module 4

## Chapter 4 : Power System Stability 4-1 to 4-64

**Syllabus :** Introduction to stability, types of stability, Power angle curve, dynamics of synchronous machine, power angle equation, steady state stability, swing equation, transient stability, equal area criterion, application of equal area criterion, point by point solution of swing equation, some techniques for improving transient stability.(Numerical)

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### Module 5

## Chapter 5 : Voltage Stability 5-1 to 5-27

**Syllabus :** Introduction, definitions, short circuit capacity, comparison of rotor angle and voltage stability, reactive power flow and voltage collapse, voltage stability. Surge impedance loading, PV and V-Q curves, Various methods of voltage control, shunt compensation, series compensation, and comparison of series and shunt compensation.

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| <b>Module 6</b> |
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**Chapter 6 : Power System Security and Interchange of Power 6-1 to 6-18**

**Syllabus :** Power system security : Introduction, System state classification, security analysis, contingency analysis, sensitivity factor.

Interchange of power : Interchange of power between interconnected utilities, types of interchange, capacity and diversity interchange, energy banking, power pools.

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