POWER SYSTEM OPTIMIZATION

Course Code: 13EE2112 **L P C**
4 0 3

Pre requisites: Optimization techniques,
Power System Operation & Control.

Course Outcomes:

After completion of the course, the student will be able to:

CO 1: Solve economic load dispatch problem by using newton raphson method and to calculate power transmission loss coefficients in power systems by using classical method.

CO 2: Solve economic load dispatch problem in thermal generating systems by using gradient Method.

CO 3: Solve optimal hydrothermal scheduling of short range fixed and variable problems in power system.

CO 4: Solve Multi-objective optimization problems of any utility or industry.

CO 5: Use evolutionary programming for solving generation scheduling problem.

UNIT-I

ECONOMIC LOAD DISPATCH OF THERMAL GENERATING UNITS-I: Introduction Generator Operating Cost Economic Dispatch Problem on a Bus Bar - Optimal Generation Scheduling Economic Dispatch Using Newton - Raphson Method - Economic Dispatch Using the Approximate Newton-Raphson Method - Economic Dispatch using Efficient Method Classical Method to Calculate Loss Coefficient Loss Coefficients Calculation Using Y BUS Loss Coefficients Using Sensitivity Factors - Transmission Loss Coefficients Transmission Loss Formula: Functions of Generation and Loads.

UNIT-II

ECONOMIC LOAD DISPATCH OF THERMAL GENERATING UNITS-II : Economic Dispatch Using Exact Loss Formula - Economic Dispatch Using Loss Formula which is a function of Real and Reactive Power - Economic Dispatch for Active and Reactive Power Balance - Evaluation of Incremental Transmission Loss - Economic Dispatch Based on Penalty Factors - Optimal Power Flow Based on Newton Method - Optimal Power Flow Based on Gradient Method.

UNIT-III

OPTIMAL HYDROTHERMAL SCHEDULING: Introduction – Hydro Plant Performance Models - Short-Range Fixed-Head Hydrothermal Scheduling - Newton-Raphson Method for Short-Range Fixed-Head Hydrothermal Scheduling - Approximate Newton-Raphson Short-Range Fixed-Head - Hydrothermal Scheduling Problem, Short-Range Variable-Head Hydrothermal Scheduling Problem- Classical Method - Approximate Newton-Raphson Method for Short-Range Variable-Head Hydrothermal Scheduling Problem - Hydro Plant Modelling for Long-Term Operation - Long-Range Generation Scheduling of Hydrothermal Systems

UNIT-IV

MULTI-OBJECTIVE GENERATION SCHEDULING: Introduction - Multi-objective Optimization- State-of-the-Art - Fuzzy Set Theory in Power Systems, The surrogate Worth Trade-off Approach for Multi-objective Thermal Power Dispatch Problem - Multi-objective Thermal Power Dispatch Problem- Weighting Method - Multi-objective Dispatch for Active and Reactive Power Balance - Multi-objective Short-Range Fixed-Head Hydro-thermal Scheduling-Approximate Newton-Raphson Method.

UNIT-V

EVOLUTIONARY PROGRAMMING FOR GENERATION SCHEDULING: Introduction - Fitness Function - Genetic Algorithm Operators - Random Number Generation - Economic Dispatch Problem - Genetic Algorithm Solution Methodology - Genetic Algorithm Solution Based on Real Power Search - Economic Dispatch with valve point loading, Economic dispatch with Ramp Rate Limits and Prohibited Operating Zones – Evolutionary search method for Economic Dispatch – Evolutionary Programming for Economic Dispatch – I & II – Anti-Predatory Particle Swarm Optimization – Differential Evolution for Economic Dispatch – Real Coded Genetic Algorithm.

TEXT BOOK:

1. D. P. Kothari and J. S. Dhillon, "*Power System Optimization*", Second Edition-PHI Learning Private Limited- 2011.

REFERENCES:

1. Hadi Saadat, "*Power System Analysis* ", Second Edition , TMH Publication New Delhi,1999.

2. Olle I.Elewgerd, " *Electrical Energy System : An Introduction* ". TMH Publication, New Delhi,2005.

3. S.S.Rao,"*Engineering optimization: Theory and practice*", 4th edition, New Age International (P) Limited, 2009.

4. John J. Grainger, Wuliam D. Stevenson, "*Power System Analysis*", Second Edition , TMH Publication, New Delhi, 1994.