POWER SYSTEM OPTIMIZATION

Course Code: 15EE2109

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Pre requisites: Optimization techniques, Power system operation and control.

Course Outcomes:

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

CO1: To solve economic load dispatch problem to calculate power transmission loss coefficients in power systems.

CO2: To solve economic load dispatch problem in thermal generating systems.

CO3: To solve optimal hydrothermal scheduling problem in power systems.

CO4: To solve Multi-objective optimization problems of any utility or industry.

CO5: To use evolutionary programming for solving generation scheduling problem.

UNIT-I (10-Lectures)

ECONOMIC LOAD DISPATCH OF THERMAL GENERATING 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 - Loss Coefficients Calculation Using Y BUS - Transmission Loss Coefficients Transmission Loss Formula: Functions of Generation and Loads.

UNIT-II (10-Lectures)

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.

UNIT-III (10-Lectures)

Optimal Hydrothermal Scheduling: Introduction - Hydro Plant Performance Models - Short-Range Fixed-Head Hydrothermal Scheduling - Newton-Raphson Method for Short-Range Fixed-Head Hydrothermal Scheduling - Short-Range Variable-Head Hydrothermal Scheduling Problem - Hydro Plant Modelling for Long-Term Operation.

UNIT-IV (10-Lectures)

Multi-objective Generation Scheduling: Introduction - Multi-objective Optimization- State-of-the-Art - 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 (10-Lectures)

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 – Evolutionary search method for Economic Dispatch.

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. OlleI. Elewgerd, " Electrical Energy System: An Introduction ".TMH Publication, New Delhi, 2005.
3. John J. Grainger, Wuliam D. Stevenson, “Power System Analysis”, Second Edition, TMH Publication, New Delhi, 1994.