

Introduction to Optimization Techniques - Importance of Power System Optimization – Linear, Non-linear and Quadratic programming, Gradient Search Algorithm, Mixed Integer Programming –Lagrangian Relaxation - Artificial Intelligence as a New Trend in Optimization - Artificial Intelligence Applications in Power Systems Problems –Swarm Intelligence for Optimization

Economic Dispatch - Generator Incremental Cost Curve - Economic Dispatch Problem Formulation without Regarding Loss - Economic Dispatch Considering Transmission Losses - Economic Dispatch with Ramp Rate Constraint - Fuel Constrained Economic Dispatch - Economic Dispatch Considering Emissions - Economic Dispatch with Transmission Constraint - Economic Dispatch with Non-smooth Cost Functions - Optimal Power Dispatch in a Competitive Electricity Supply Industry

Unit Commitment - Unit Commitment Problem Formulation - Unit Commitment Solution Methods - Constrained Unit Commitment - Security Constrained Unit Commitment - Price-based Unit Commitment - **Optimal Power Flow** - Optimal Power Flow Problem Formulation - Optimal Real Power Dispatch with Network Limit Constraints - Neural Network Application to Optimal Power Flow - Particle Swarm Optimization for Optimal Power Flow

Optimal Reactive Power Dispatch - Reactive Power in Power Systems - Conventional Optimal Reactive Power Dispatch - Optimal Reactive Power Dispatch in Deregulated Electricity Markets–**Optimal Distributed Generation Planning** – Sizing, Siting and Reconfiguration -**Optimal Load Shedding** - Conventional Load Shedding - Intelligent Load Shedding - Formulation of Optimal Load Shedding - Optimal Load Shedding with Network Constraints - Optimal Load Shedding without Network Constraints - Distributed Interruptible Load Shedding (DILS) - Under-voltage Load Shedding - Congestion Management

TEXT BOOKS/REFERENCES:

- 1) Weerakorn Ongsakul and Dieu Ngoc Vo, “*Artificial Intelligence in Power System Optimization*”, First Edition, CRC Press (Taylor & Francis Group), 2013.
- 2) Jizhong Zhu, “*Optimization of Power System Operation*”, Second Edition, Wiley-IEEE Press, 2015.
- 3) Allen J. Wood, Bruce F. Wollenberg and Gerald B. Sheblé, “*Power Generation, Operation, and Control*”, Third Edition, Wiley-Interscience, October 2013.
- 4) D.P Kothari and J.S Dhillon, “*Power System Optimization*”, Second Edition, Prentice Hall India Publications (PHI), 2010.
- 5) Wai Lip Theo, JengShiunLim, WaiShinHo, HaslendaHashim and ChewTinLee, “*Review of Distributed Generation (DG) System Planning and Optimisation Techniques: Comparison of Numerical and Mathematical Modelling Methods*”, Renewable and Sustainable Energy Reviews, Volume 67 (2017), Pages 531-573.