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and Operation of an Electricity Market -- Pricing, Modeling, and Simulation of an Electricity Market -- Evaluation of an Electricity Market -- Transmission Planning Under Electricity Market Regime -- Electricity Market under a Future Grid -- IEEE Press Series on Power Engineering Electricity Markets; Contents; About the Authors; Preface; 1 Introduction; 1.1 Electric Power System; 1.2 Electricity Industry Restructuring in the United States; 1.2.1 Key Drivers for Electricity Industry Restructuring; 1.2.2 Pre-Federal Energy Regulatory Commission Order 2000; 1.2.3 Post-Federal Energy Regulatory Commission Order 2000; 1.2.4 Regional Transmission Organization; 1.2.5 Post-Regional Transmission Organization; 1.3 Electricity Industry Restructuring in Latin America; 1.3.1 Chile; 1.3.2 Argentina; 1.3.3 Brazil; 1.3.4 Mexico; 1.4 Electricity Industry Restructuring in Europe 1.4.1 The United Kingdom1.4.2 Nordic Countries; 1.4.3 France; 1.5 Electricity Industry Restructuring in Asia; 1.5.1 South Korea; 1.6 Reliability as a Paramount Goal; 1.6.1 Reliability via the Electricity Market Mechanism; 1.7 Further Discussions; Further Reading; 2 Electric Power System; 2.1 Electric Power System Components; 2.2 Electricity Generation; 2.3 Power System Load; 2.4 Transmission Lines; 2.4.1 Structures and Types of Transmission Lines; 2.4.2 Electrical Parameters of Transmission Lines; 2.4.3 Electric Network Models of Transmission Lines; 2.5 Power Transformers

2.6 Synchronous Generators2.7 Network Analysis; 2.7.1 Impedance Diagram; 2.7.2 Bus Admittance Matrix; 2.7.3 Power Flow Analysis; 2.7.4 Control of Power Flow; Further Reading; 3 Microeconomic Theories; 3.1 Preliminaries; 3.2 Theory of Consumer Behavior; 3.2.1 Individual and Market Demand; 3.2.2 Consumer Surplus; 3.3 Theory of a Firm; 3.3.1 Profit Maximization Assumption; 3.3.2 Cost of Production; 3.3.3 Demand and Marginal Revenue for a Competitive Firm; 3.3.4 Choosing Output in the Short Run; 3.3.5 Producer Surplus; 3.3.6 Social Welfare; 3.4 Theory of a Market; 3.4.1 Perfect Competition 3.4.2 Pure Monopoly3.4.3 Monopolistic Competition; 3.4.4 Monopsony; 3.5 Game Theory; 3.5.1 Nash Equilibrium; 3.5.2 Bayesian Nash Equilibrium; 3.6 Oligopoly; 3.6.1 Cournot Model; 3.6.2 Stackelberg Model; 3.6.3 Bertrand Model; 3.6.4 Collusion Model; 3.7 Auction Theory; 3.8 Further Discussions; Further Reading; 4 Power System Unit Commitment; 4.1 Introduction; 4.2 Unit Commitment; 4.3 Mathematical Formulation for Unit Commitment; 4.4 Numerical Methods for Unit Commitment Problem; 4.4.1 Heuristic Methods; 4.4.2 Dynamic Programming; 4.4.3 Dual Methods: Lagrange Relaxation 4.4.4 Mixed Integer Programming Method4.5 New Challenges for UC Problem; Further Reading; 5 Power System Economic Dispatch; 5.1 Introduction; 5.2 Generation Cost; 5.2.1 Input-Output Curve; 5.2.2 Fuel Cost Curve; 5.2.3 Heat Rate Curve; 5.2.4 Incremental Cost Curve; 5.3 Mathematical Formulation for Economic Dispatch; 5.4 Economic Dispatch Problem; 5.5 Lossless Economic Dispatch Formulation; 5.6 Numerical Methods for Economic Dispatch; 5.6.1 Lambda Iteration Method; 5.6.2 Newton-Raphson Method; 5.6.3 Reduced Gradient Methods; 5.7 Inclusion of Transmission Losses

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## Sommario/riassunto

A comprehensive resource that provides the basic concepts of electric power systems, microeconomics, and optimization techniques Electricity Markets: Theories and Applications offers students and practitioners a clear understanding of the fundamental concepts of the economic theories, particularly microeconomic theories, as well as information on some advanced optimization methods of electricity markets. The authors - noted experts in the field - cover the basic drivers for the transformation of the electricity industry in both the United States and around the world and discuss the fundamentals of

power system operation, electricity market design and structures, and electricity market operations. The text also explores advanced topics of power system operations and electricity market design and structure including zonal versus nodal pricing, market performance and market power issues, transmission pricing, and the emerging problems electricity markets face in smart grid and micro-grid environments. The authors also examine system planning under the context of electricity market regime. They explain the new ways to solve problems with the tremendous amount of economic data related to power systems that is now available. This important resource: . Introduces fundamental economic concepts necessary to understand the operations and functions of electricity markets. Presents basic characteristics of power systems and physical laws governing operation. Includes mathematical optimization methods related to electricity markets and their applications to practical market clearing issues Electricity Markets: Theories and Applications is an authoritative text that explores the basic concepts of the economic theories and key information on advanced optimization methods of electricity markets.

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