

interest. The text begins with a definition of harmonics, along with analytical expressions for electrical parameters under nonsinusoidal situations, and then: Discusses important and widely used industry standards to control harmonic distortion levels Describes methods to mitigate the effects of harmonics, detailing the operation principles and design of passive filters and active filter fundamentals Presents alternative methods, such as stiffer AC sources, power converters with increased number of pulses, series reactors, and load reconfiguration Reviews the elements that play a role in the study of the propagation of harmonic currents in a distribution network Explains how to determine power losses in electrical equipment attributed to harmonic waveform distortion Covers harmonics from solar and wind power converters and power electronics in FACTS and HVDC technologies Explores harmonics from electric vehicles connected to the grid, superconductive fault current limiters, and electric vehicle charging stations Featuring three new chapters, a number of new examples and figures, and updates throughout, Harmonics, Power Systems, and Smart Grids, Second Edition provides a comprehensive reference on harmonic current generation, propagation, and control in electrical power networks, including the broadly cited smart grid.

Springer Handbook of Power Systems Konstantin O. Papailiou 2021-04-12 This handbook offers a comprehensive source for electrical power professionals. It covers all elementary topics related to the design, development, operation and management of power systems, and provides an insight from worldwide key players in the electrical power systems industry. Edited by a renowned leader and expert in Power Systems, the book highlights international professionals' longstanding experiences and addresses the requirements of practitioners but also of newcomers in this field in finding a solution for their problems. The structure of the book follows the physical structure of the power system from the fundamentals through components and equipment to the overall system. In addition the handbook covers certain horizontal matters, for example "Energy fundamentals", "High voltage engineering", and "High current and contact technology" and thus intends to become the major one-stop reference for all issues related to the electrical power system.

Shipboard Electrical Power Systems Mukund R. Patel 2021-07-19 The second edition of Shipboard Electrical Power Systems addresses new developments in this rapidly growing field. Focusing on the industry trend toward electric propulsion for cruise, navy, and commercial ships, the book aids new or experienced engineers in mastering the cutting-edge technologies required for power system design, control, protection, and economic use of power. Covering the latest emission standards on ships, and the clean power technologies necessary to meet such stringent regulations, the book compiles essential information on power system design, analysis and operation, uniquely bringing all three together under one cover. Beginning by covering power system basics, the book goes on to detail power generation, electrical machines and batteries, with new chapters on electric propulsion, shipboard emission regulations, and clean power technologies. Updated throughout to reflect this rapidly changing field, the second edition clearly explains complicated electrical concepts using mechanical and hydraulic analogies to aid marine engineers in understanding difficult elements of the field. The book is an indispensable resource for well-rounded engineering students and professional engineers. This textbook is essential reading for students of marine engineering, electrical power systems, and electrical engineering, alongside engineers working on commercial and navy ships, on ports, on land, and offshore rigs.

Electric Machines Charles A. Gross 2006-10-20 The two major broad applications of electrical energy are information processing and energy processing. Hence, it is no wonder that electric machines have occupied a large and revered space in the field of electrical engineering. Such an important topic requires a careful approach, and Charles A. Gross' Electric Machines offers the most balanced, application-oriented, and modern perspective on electromagnetic machines available. Written in a style that is both accessible and authoritative, this book explores all aspects of electromagnetic-mechanical (EM) machines. Rather than viewing the EM machine in isolation, the author treats the machine as part of an integrated system of source, controller, motor, and load. The discussion progresses systematically through basic machine physics and principles of operation to real-world applications and relevant control issues for each type of machine presented. Coverage ranges from DC, induction, and synchronous machines to specialized machines such as transformers, translational machines, and microelectromechanical systems (MEMS). Stimulating example applications include electric vehicles, wind energy, and vertical transportation. Numerous example problems illustrate and reinforce the concepts discussed. Along with appendices filled with unit conversions and background material, Electric Machines is a succinct, in-depth, and complete guide to understanding electric machines for novel applications.

Electrical Machines with MATLAB Turan Gonen 2011-11-16 Electrical Machines with MATLAB encapsulates the invaluable insight and experience that eminent instructor Turan Gonen has acquired in almost 40 years of teaching. With simple, versatile content that separates it from other texts on electrical machines, this book is an ideal self-study tool for advanced students in electrical and other areas of eng

Energy Storage, Grid Integration, Energy Economics, and the Environment Radian Belu 2019-09-27 The book covers energy storage systems, bioenergy and hydrogen economy, grid integration of renewable energy systems, distributed generation, economic analysis, and environmental impacts of renewable energy systems. The overall approaches are interdisciplinary and comprehensive, covering economic, environmental, and grid integration issues as well as the physical and engineering aspects. Core issues discussed include mechanical, electrical, and thermal energy storage systems, batteries, fuel cells, biomass and biofuels, hydrogen economy, distributed generation, a brief presentation of microgrids, and in-depth discussions of economic analysis and methods of renewable energy systems, environmental impacts, life-cycle analysis, and energy conservation issues. With several solved examples, holistic material presentation, in-depth subject matter discussions and self-content material presentation, this textbook will appeal strongly to students and professional and nonprofessional readers who wish to understand this fascinating subject. Readers are encouraged to solve the problems and questions, which are useful ways to understand and apply the concepts and the topics included.

Transient Analysis of Power Systems Juan A. Martinez-Velasco 2020-02-10 A hands-on introduction to advanced applications of power system transients with practical examples Transient Analysis of Power Systems: A Practical Approach offers an authoritative guide to the traditional capabilities and the new software and hardware approaches that can be used to carry out transient studies and make possible new and more complex research. The book explores a wide range of topics from an introduction to the subject to a review of the many advanced applications, involving the creation of custom-made models and tools and the application of multicore environments for advanced studies. The authors cover the general aspects of the transient analysis such as modelling guidelines, solution techniques and capabilities of a transient tool. The book also explores the usual application of a transient tool including over-voltages, power quality studies and simulation of power electronics devices. In addition, it contains an introduction to the transient analysis using the ATP. All the studies are supported by practical examples and simulation results. This important book: Summarises modelling guidelines and solution techniques used in transient analysis of power systems Provides a collection of practical examples with a detailed introduction and a discussion of results Includes a collection of case studies that illustrate how a simulation tool can be used for building environments that can be applied to both analysis and design of power systems Offers guidelines for building custom-made models and libraries of modules, supported by some practical examples Facilitates application of a transients tool to fields hardly covered with other time-domain simulation tools Includes a companion website with data (input) files of examples presented, case studies and power point presentations used to support cases studies Written for EMTP users, electrical engineers, Transient Analysis of Power Systems is a hands-on and practical guide to advanced applications of power system transients that includes a range of practical examples.

Intelligent Systems and Signal Processing in Power Engineering Abhisek Ukil 2007-09-23 This highly experienced author sets out to build a bridge between two inter-disciplinary power engineering practices. The book looks into two major fields used in modern power systems: intelligent systems and the signal processing. The intelligent systems section comprises fuzzy logic, neural network and support vector machine. The author looks at relevant theories on the topics without assuming much particular background. Following the theoretical basics, he studies their applications in various problems in power engineering, like, load forecasting, phase balancing, or disturbance analysis.

Electrical Power System Essentials Pieter Schavemaker 2008-04-30 Much of the basic hardware that generates, transmits and distributes electricity has changed little over the past century. However, the techniques applied in the power system have advanced, leading to greater transformer efficiency and more economic transmission and distribution. As the demand for electricity in both the developed and developing world increases, governments and electricity providers continue to look for alternative means of creating energy through renewable sources. Today's needs also include well-designed systems that are capable of producing large quantities of electricity in the safest, most cost-effective way for the benefit of both individuals and industry. This book provides an accessible introduction to the interesting world of alternating current (AC) power systems, focusing on the system as a whole. After laying out the basics for a steady-state analysis of three-phase power systems, the book examines: the generation, transmission, distribution, and utilization of electric energy; the principles of thermal, nuclear and renewable energy plants; power system control and operation; the organization of electricity markets, the changes currently taking place, and the developments that could lead to alternative power systems in the future. Inside, you will find appendices that support the key text, supplying information on the modeling of power system components and including basic equations derived from Maxwell's laws. Numerous practical examples, case studies and illustrations, demonstrate the theory, techniques and results presented in the text, and accompanying Powerpoint slides are available on a supplementary website. With its pragmatic approach, Power System Essentials is ideal for senior undergraduate students in electrical engineering who require an up-to-date overview of the subject. This book also acts as a concise reference, suitable for postgraduates and professionals from a range of disciplines who would like to work in this field.

Electric Power Systems Syed A. Nasar 2018-12-13 The field of electrical engineering has become increasingly diversified, resulting in a spectrum of emerging topics - **Electric Power Systems** Syed A. Nasar 2018-12-13 The field of electrical engineering has become increasingly diversified, resulting in a spectrum of emerging topics - **Electric Power Systems** Syed A. Nasar 2018-12-13 The field of electrical engineering has become increasingly diversified, resulting in a spectrum of emerging topics -

Building Electrical Systems and Distribution Networks Radian Belu 2020-03-10 This book covers all important, new, and conventional aspects of building electrical systems, power distribution, lighting, transformers and rotating electric machines, wiring, and building installations. Solved examples, end-of-chapter questions and problems, case studies, and design considerations are included in each chapter, highlighting the concepts, and diverse and critical features of building and industrial electrical systems, such as electric or thermal load calculations; wiring and wiring devices; conduits and raceways; lighting analysis, calculation, selection, and design; lighting equipment and luminaires; power quality; building monitoring; noise control; building energy envelope; air-conditioning and ventilation; and safety. Two chapters are dedicated to distributed energy generation, building integrated renewable energy systems, microgrids, DC nanogrids, power electronics, energy management, and energy audit methods, topics which are not often included in building energy textbooks. Support materials are included for interested instructors. Readers are encouraged to write their own solutions while solving the problems, and then refer to the solved examples for more complete understanding of the solutions, concepts, and theory.

Smart Grid Fundamentals Radian Belu 2022-02-18 The textbook provides a comprehensive overview of smart grids, their role in the development of electricity systems, as well as issues and problems related to smart grid evolution, operation, management, control, protection, entities, and components. The book is divided in eleven chapters, covering core topics such as energy, and environmental issues, basic of power systems, and introduction to renewable energy, distributed generation and energy storage, smart grid challenges, benefits, and divers, smart power transmission and distribution. It includes chapters focusing on smart grid communication, power flow analysis, smart grid design tools, energy management and microgrids. Each chapter ends with several practical and advanced problems that instilling critical thinking and applies to industrial applications. The book can be used as an introductory and basic textbook, reference and training resource by engineers, students, faculty, and interested readers to gain the essential knowledge of the power and energy systems, smart grid fundamentals, concepts and features, as well as the main energy technologies, including how they work and operate, characteristics, and they are evaluated and selected for specific applications.

The Electrical Engineering Handbook - Six Volume Set Richard C. Dorf 2018-12-14 In two editions spanning more than a decade, The Electrical Engineering Handbook stands as the definitive reference to the multidisciplinary field of electrical engineering. Our knowledge continues to grow, and so does the Handbook. For the third edition, it has grown into a set of six books carefully focused on specialized areas or fields of study. Each one represents a concise yet definitive collection of key concepts, models, and equations in its respective domain, thoughtfully gathered for convenient access. Combined, they constitute the most comprehensive, authoritative resource available. Circuits, Signals, and Speech and Image Processing presents all of the basic information related to electric circuits and components, analysis of circuits, the use of the Laplace transform, as well as signal, speech, and image processing using filters and algorithms. It also examines emerging areas such as text to speech synthesis, real-time processing, and embedded signal processing. Electronics, Power Electronics, Optoelectronics, Microwaves, Electromagnetics, and Radar delves into the fields of electronics, integrated circuits, power electronics, optoelectronics, electromagnetics, light waves, and radar, supplying all of the basic information required for a deep understanding of each area. It also devotes a section to electrical effects and devices and explores the emerging fields of microlithography and power electronics. Sensors, Nanoscience, Biomedical Engineering, and Instruments provides thorough coverage of sensors, materials and nanoscience, instruments and measurements, and biomedical systems and devices, including all of the basic information required to thoroughly understand each area. It explores the emerging fields of sensors, nanotechnologies, and biological effects. Broadcasting and Optical Communication Technology explores communications, information theory, and devices, covering all of the basic information needed for a thorough understanding of these areas. It also examines the emerging areas of adaptive estimation and optical communication. Computers, Software Engineering, and Digital Devices examines digital and logical devices, displays, testing, software, and computers, presenting the fundamental concepts needed to ensure a thorough understanding of each field. It treats the emerging fields of programmable logic, hardware description languages, and parallel computing in detail. Systems, Controls, Embedded Systems, Energy, and Machines explores in detail the fields of energy devices, machines, and systems as well as control systems. It provides all of the fundamental concepts needed for thorough, in-depth understanding of each area and devotes special attention to the emerging area of embedded systems. Encompassing the work of the world's foremost experts in their respective specialties, The Electrical Engineering Handbook, Third Edition remains the most convenient, reliable source of information available. This edition features the latest developments, the broadest scope of coverage, and new material on nanotechnologies, fuel cells, embedded systems, and biometrics. The engineering community has relied on the Handbook for more than twelve years, and it will continue to be a platform to launch the next wave of advancements. The Handbook's latest incarnation features a protective slipcase, which helps you stay organized without overwhelming your bookshelf. It is an attractive addition to any collection, and will help keep each volume of the Handbook as fresh as your latest research.

Leonard L. Grigsby 2018-12-14 The Electric Power Engineering Handbook, Third Edition updates coverage of recent developments and rapid technological growth in crucial aspects of power systems, including protection, dynamics and stability, operation, and control. With contributions from worldwide field leaders—edited by L.L. Grigsby, one of the world's most respected, accomplished authorities in power engineering—this reference includes chapters on: Nonconventional Power Generation Conventional Power Generation Transmission Systems Distribution Systems Electric Power Utilization Power Quality Power System Analysis and Simulation Power System Transients Power System Planning (Reliability) Power Electronics Power System Protection Power System Dynamics and Stability Power System Operation and Control Content includes a simplified overview of advances in international standards, practices, and technologies, such as small-signal stability and power system oscillations, power system stability controls, and dynamic modeling of power systems. Each book in this popular series supplies a high level of detail and, more importantly, a tutorial style of writing and use of photographs and graphics to help the reader understand the material. This resource will help readers achieve safe, economical, high-quality power delivery in a dynamic and demanding environment. Volumes in the set: K12642 Electric Power Generation, Transmission, and Distribution, Third Edition (ISBN: 9781439856284) K12648 Power Systems, Third Edition (ISBN: 9781439856338) K13917 Power System Stability and Control, Third Edition (9781439883204) K12650 Electric Power Substations Engineering, Third Edition (9781439856383) K12643 Electric Power Transformer Engineering, Third Edition (9781439856291)

Jeremy Lin 2017-10-09 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.

Electric Power Systems Alexandra von Meier 2006-06-30 A clear explanation of the technology for producing and delivering electricity Electric Power Systems explains and illustrates how the electric grid works in a clear, straightforward style that makes highly technical material accessible. It begins with a thorough discussion of the underlying physical concepts of electricity, circuits, and complex power that serves as a foundation for more advanced material. Readers are then introduced to the main components of electric power systems, including generators, motors and other appliances, and transmission and distribution equipment such as power lines, transformers, and circuit breakers. The author explains how a whole power system is managed and coordinated, analyzed mathematically, and kept stable and reliable. Recognizing the economic and environmental implications of electric energy production and public concern over disruptions of service, this book exposes the challenges of producing and delivering electricity to help inform public policy decisions. Its discussions of complex concepts such as reactive power balance, load flow, and stability analysis, for example, offer deep insight into the complexity of electric grid operation and demonstrate how and why physics constrains economics and politics. Although this survival guide includes mathematical equations and formulas, it discusses their meaning in plain English and does not assume any prior familiarity with particular notations or technical jargon. Additional features include: * A glossary of symbols, units, abbreviations, and acronyms * Illustrations that help readers visualize processes and better understand complex concepts * Detailed analysis of a case study, including a Web reference to the case, enabling readers to test the consequences of manipulating various parameters With its clear discussion of how electric grids work, Electric Power Systems is appropriate for a broad readership of professionals, undergraduate and graduate students, government agency managers, environmental advocates, and consumers.