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Heating and Cooling of Buildings EOLSS Publications
Exclusive book integrating thermal sciences and computational approaches Covers both philosophical concepts related to systems and design, to numerical methods, to design of specific systems, to computational fluid dynamics strategies Focus on solving complex real-world thermal system design problems instead of just designing a single component or simple systems Introduces usage of statistics and machine learning methods to optimize the system Includes sample PYTHON codes, exercise problems, special projects

Computer Systems CRC Press
Thermal Energy Systems: Design and Analysis, Second Edition presents basic concepts for simulation and optimization, and introduces simulation and optimization techniques for system modeling. This text addresses engineering economy, optimization, hydraulic systems, energy systems, and system simulation. Computer modeling is presented, and a companion website provides specific coverage of EES and Excel in thermal-fluid design. Assuming prior coursework in basic thermodynamics and fluid mechanics, this fully updated and improved text will guide students in Mechanical and Chemical Engineering as they apply their knowledge to systems analysis and design, and to capstone design project work.

Thermal Design and Optimization Springer Science & Business Media
Chemical Engineering Design, Second Edition, deals with the application of chemical engineering principles to the design of chemical processes and equipment. Revised throughout, this edition has been specifically developed for the U.S. market. It provides the latest US codes and standards, including API, ASME and ISA design codes and ANSI standards. It contains new discussions of conceptual plant design, flowsheet development, and revamp design; extended coverage of capital cost estimation, process costing, and economics; and new chapters on equipment selection, reactor design, and solids handling processes. A rigorous pedagogy assists learning, with detailed worked examples, end of chapter exercises, plus supporting data, and Excel spreadsheet calculations, plus over 150 Patent References for downloading from the companion website. Extensive instructor resources, including 1170 lecture slides and a fully worked solutions manual are available to adopting instructors. This text is designed for chemical and biochemical engineering students (senior undergraduate year, plus appropriate for capstone design courses where taken, plus graduates) and lecturers/tutors, and professionals in industry (chemical process, biochemical, pharmaceutical, petrochemical sectors). New to this edition: Revised organization into Part I: Process Design, and Part II: Plant Design. The broad themes of Part I are flowsheet development, economic analysis, safety and environmental impact and optimization. Part II contains chapters on equipment design and selection that can be used as supplements to a lecture course or as essential references for students or practicing engineers working on design projects. New discussion of conceptual plant design, flowsheet development and revamp design Significantly increased coverage of capital cost estimation, process costing and economics New chapters on equipment selection, reactor design and solids handling processes New sections on fermentation, adsorption, membrane separations, ion exchange and chromatography Increased coverage of batch processing, food, pharmaceutical and biological processes All equipment chapters in Part II revised and updated with current information Updated throughout for latest US codes and standards, including API, ASME and ISA design codes and ANSI standards Additional worked examples and homework problems The most complete and up to date coverage of equipment selection 108 realistic commercial design projects from diverse industries A rigorous pedagogy assists learning, with detailed worked examples, end of chapter exercises, plus supporting data and Excel spreadsheet calculations plus over 150 Patent References, for downloading from the companion website Extensive instructor resources: 1170 lecture slides plus fully worked solutions manual available to adopting instructors

Introduction to Thermo-Fluids Systems Design CRC Press
This text has been very successful in previous editions due to its clear explanations of both process-oriented topics of thermal energy engineering and system-oriented practices. The Third Edition is thoroughly updated, reflecting the impact of micro-computers on engineering, and including a greater emphasis on linear programming.

Thermal Energy Systems Academic Press
Advanced Analytic Control Techniques for Thermal Systems with Heat Exchangers presents the latest research on sophisticated analytic and control techniques specific for Heat Exchangers (HXs) and heat Exchanger Networks (HXNs), such as Stability Analysis, Efficiency of HXs, Fouling Effect, Delay Phenomenon,

Robust Control, Algebraic Control, Geometric Control, Optimal Control, Fuzzy Control and Artificial Intelligence techniques. Editor Libor Pekar and his team of global expert contributors combine their knowledge and experience of investigated and applied systems and processes in this thorough review of the most advanced networks, analyzing their dynamics, efficiency, transient features, physical properties, performance, feasibility, flexibility and controllability. The structural and dynamic analyses and control approaches of HXNs, as well as energy efficient manipulation techniques are discussed, in addition to the design of the control systems through the full life cycle. This equips the reader with an understanding of the relevant theory in a variety of settings and scenarios and the confidence to apply that knowledge to solve problems in an academic or professional setting. Graduate students and early-mid career professionals require a robust understanding of how to suitably design thermal systems with HXs and HXNs to achieve required performance levels, which this book offers in one consolidated reference. All examples and solved problems included have been tried and tested, and these combined with the research driven theory provides professionals, researchers and students with the most recent techniques to maximize the energy efficiency and sustainability of existing and new thermal power systems. Analyses several advanced techniques, the theoretical background of these techniques and includes models, examples and results throughout Focuses on advanced analytic and control techniques which have been investigated or applied to thermal systems with HXs and HXNs. Includes practical applications and advanced ideas from leading experts in the field, as well as case studies and tested problems and solutions.

Thermal System Design and Simulation John Wiley & Sons
This book is designed to serve senior-level engineering students taking a capstone design course in fluid and thermal systems design. It is built from the ground up with the needs and interests of practicing engineers in mind; the emphasis is on practical applications. The book begins with a discussion of design methodology, including the process of bidding to obtain a project, and project management techniques. The text continues with an introductory overview of fluid thermal systems (a pump and pumping system, a household air conditioner, a baseboard heater, a water slide, and a vacuum cleaner are among the examples given), and a review of the properties of fluids and the equations of fluid mechanics. The text then offers an in-depth discussion of piping systems, including the economics of pipe size selection. Janna examines pumps (including net positive suction head considerations) and piping systems. He provides the reader with the ability to design an entire system for moving fluids that is efficient and cost-effective. Next, the book provides a review of basic heat transfer principles, and the analysis of heat exchangers, including double pipe, shell and tube, plate and frame cross flow heat exchangers. Design considerations for these exchangers are also discussed. The text concludes with a chapter of term projects that may be undertaken by teams of students. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Handbook of Air Conditioning and Refrigeration John Wiley & Sons
Publisher Description

Design and Optimization of Thermal Systems CRC Press
The art and the science of building systems design evolve continuously as designers, practitioners, and researchers all endeavor to improve the performance of buildings and the comfort and productivity of their occupants. Retaining coverage from the original second edition while updating the information in electronic form, Heating and Cooling of Buildings: Design for Efficiency, Revised Second Edition presents the technical basis for designing the lighting and mechanical systems of buildings. Along with numerous homework problems, the revised second edition offers a full chapter on economic analysis and optimization, new heating and cooling load procedures and databases, and simplified procedures for ground coupled heat transfer calculations. The accompanying CD-ROM contains an updated version of the Heating and Cooling of Buildings (HCB) software program as well as electronic appendices that include over 1,000 tables in HTML format that can be searched by major categories, a table list, or an index of topics. Ancillary information is available on the book's website www.hcbcentral.com From materials to computers, this edition explores the latest technologies exerting a profound effect on the design and operation of buildings. Emphasizing design optimization and critical thinking, the book continues to be the ultimate resource for understanding energy use in buildings.

Thermal Design John Wiley & Sons
Reference for engineers in a wide variety of industries (including power plants and chemical plants) on design of thermal systems.

Design and Optimization of Thermal Systems, Third Edition Engineering Handbook
This book is designed to serve senior-level engineering students taking a capstone design course in fluid and thermal systems design. It is built from the ground up with the needs and interests of practicing engineers in mind; the

emphasis is on practical applications. The book begins with a discussion of design methodology, including the process of bidding to obtain a project, and project management techniques. The text continues with an introductory overview of fluid thermal systems (a pump and pumping system, a household air conditioner, a baseboard heater, a water slide, and a vacuum cleaner are among the examples given), and a review of the properties of fluids and the equations of fluid mechanics. The text then offers an in-depth discussion of piping systems, including the economics of pipe size selection. Janna examines pumps (including net positive suction head considerations) and piping systems. He provides the reader with the ability to design an entire system for moving fluids that is efficient and cost-effective. Next, the book provides a review of basic heat transfer principles, and the analysis of heat exchangers, including double pipe, shell and tube, plate and frame cross flow heat exchangers. Design considerations for these exchangers are also discussed. The text concludes with a chapter (10) of term projects that may be undertaken by teams of students.

Thermal System Design and Optimization John Wiley & Sons
This book offers the first comprehensive treatment of every solar-powered thermal system design presently available or being used, with an emphasis on commercial and industrial applications. It discusses the underlying theoretical concepts, the various approaches, and the developmental techniques for each system, and includes an up-to-date list of meteorological data for locations throughout the world. Several examples elucidate the concepts and impart working confidence. Engineers, scientists, and students working in solar energy will all find this book to be a helpful guide in selecting the system most suitable to a specific use or in analyzing a given problem.

Design and Simulation of Thermal Systems Cambridge University Press

Refrigeration plays a prominent role in our everyday lives, and cryogenics plays a major role in medical science, space technology and the cooling of low-temperature electronics. This volume contains chapters on basic refrigeration systems, non-compression refrigeration and cooling, and topics related to global environmental issues, alternative refrigerants, optimum refrigerant selection, cost-quality optimization of refrigerants, advanced thermodynamics of reverse-cycle machines, applications in medicine, cryogenics, heat pipes, gas-solid absorption refrigeration, multisalt resorption heat pumps, cryocoolers, thermoacoustic refrigeration, cryogenic heat transfer and enhancement and other topics covering theory, design, and applications, such as pulse tube refrigeration, which is the most efficient of all cryocoolers and can be used in space missions.

The Design and Sizing of Active Solar Thermal Systems CL Engineering
The definitive text/reference for students, researchers and practicing engineers
This book provides comprehensive coverage on refrigeration systems and applications, ranging from the fundamental principles of thermodynamics to food cooling applications for a wide range of sectoral utilizations. Energy and exergy analyses as well as performance assessments through energy and exergy efficiencies and energetic and exergetic coefficients of performance are explored, and numerous analysis techniques, models, correlations and procedures are introduced with examples and case studies. There are specific sections allocated to environmental impact assessment and sustainable development studies. Also featured are discussions of important recent developments in the field, including those stemming from the author's pioneering research. Refrigeration is a uniquely positioned multi-disciplinary field encompassing mechanical, chemical, industrial and food engineering, as well as chemistry. Its wide-ranging applications mean that the industry plays a key role in national and international economies. And it continues to be an area of active research, much of it focusing on making the technology as environmentally friendly and sustainable as possible without compromising cost efficiency and effectiveness. This substantially updated and revised edition of the classic text/reference now features two new chapters devoted to renewable-energy-based integrated refrigeration systems and environmental impact/sustainability assessment. All examples and chapter-end problems have been updated as have conversion factors and the thermophysical properties of an array of materials. Provides a solid foundation in the fundamental principles and the practical applications of refrigeration technologies Examines fundamental aspects of thermodynamics, refrigerants, as well as energy and exergy analyses and energy and exergy based performance assessment criteria and approaches Introduces environmental impact assessment methods and sustainability evaluation of refrigeration systems and applications Covers basic and advanced (and hence integrated) refrigeration cycles and systems, as well as a range of novel applications Discusses crucial industrial, technical and operational problems, as well as new performance improvement techniques and tools for better design and analysis Features clear explanations, numerous chapter-end problems and worked-out examples Refrigeration Systems and Applications, Third Edition is an indispensable working resource for researchers and practitioners in the areas of Refrigeration and Air Conditioning. It is also an ideal textbook for graduate and senior undergraduate students in mechanical, chemical, biochemical, industrial and food engineering disciplines.

Industrial Refrigeration Hb (Pb) McGraw-Hill Science, Engineering & Mathematics

This highly informative and carefully presented textbook introduces the general principles involved in system design and optimization as applicable to thermal systems, followed by the methods to accomplish them. It introduces contemporary techniques like Genetic Algorithms, Simulated Annealing, and Bayesian Inference in the context of optimization of thermal systems. There is a separate chapter devoted to

inverse problems in thermal systems. It also contains sections on Integer Programming and Multi-Objective optimization. The linear programming chapter is fortified by a detailed presentation of the Simplex method. A major highlight of the textbook is the inclusion of workable MATLAB codes for examples of key algorithms discussed in the book. Examples in each chapter clarify the concepts and methods presented and end-of-chapter problems supplement the material presented and enhance the learning process.

Analysis and Design of Energy Systems McGraw-Hill Publishing Company

Providing unlimited opportunities for the use of computer graphics.

Design of Fluid Thermal Systems - SI Version CRC Press

A practical and accessible introductory textbook that enables engineering students to design and optimize typical thermofluid systems. Engineering Design and Optimization of Thermofluid Systems is designed to help students and professionals alike understand the design and optimization techniques used to create complex engineering systems that incorporate heat transfer, thermodynamics, fluid dynamics, and mass transfer. Designed for thermal systems design courses, this comprehensive textbook covers thermofluid theory, practical applications, and established techniques for improved performance, efficiency, and economy of thermofluid systems. Students gain a solid understanding of best practices for the design of pumps, compressors, heat exchangers, HVAC systems, power generation systems, and more. Covering the material using a pragmatic, student-friendly approach, the text begins by introducing design, optimization, and engineering economics—with emphasis on the importance of engineering optimization in maximizing efficiency and minimizing cost. Subsequent chapters review representative thermofluid systems and devices and discuss basic mathematical models for describing thermofluid systems. Moving on to system simulation, students work with the classical calculus method, the Lagrange multiplier, canonical search methods, and geometric programming. Throughout the text, examples and practice problems integrate emerging industry technologies to show students how key concepts are applied in the real world. This well-balanced textbook: Integrates underlying thermofluid principles, the fundamentals of engineering design, and a variety of optimization methods. Covers optimization techniques alongside thermofluid system theory. Provides readers best practices to follow on-the-job when designing thermofluid systems. Contains numerous tables, figures, examples, and problem sets. Emphasizing optimization techniques more than any other thermofluid system textbook available, Engineering Design and Optimization of Thermofluid Systems is the ideal textbook for upper-level undergraduate and graduate students and instructors in thermal systems design courses, and a valuable reference for professional mechanical engineers and researchers in the field.

Design and Analysis of Thermal Systems McGraw-Hill Companies

Design of Thermal Energy Systems Pradip Majumdar, Northern Illinois University, USA A comprehensive introduction to the design and analysis of thermal energy systems. Design of Thermal Energy Systems covers the fundamentals and applications in thermal energy systems and components, including conventional power generation and cooling systems, renewable energy systems, heat recovery systems, heat sinks and thermal management. Practical examples are used throughout and are drawn from solar energy systems, fuel cell and battery thermal management, electrical and electronics cooling, engine exhaust heat and emissions, and manufacturing processes. Recent research topics such as steady and unsteady state simulation and optimization methods are also included. Key features: Provides a comprehensive introduction to the design and analysis of thermal energy systems, covering fundamentals and applications. Includes a wide range of industrial application problems and worked out example problems. Applies thermal analysis techniques to generate design specification and ratings. Demonstrates how to design thermal systems and components to meet engineering specifications. Considers alternative options and allows for the estimation of cost and feasibility of thermal systems. Accompanied by a website including software for design and analysis, a solutions manual, and presentation files with PowerPoint slides. The book is essential reading for: practicing engineers in energy and power industries; consulting engineers in mechanical, electrical and chemical engineering; and senior undergraduate and graduate engineering students.

Refrigeration and Air Conditioning Academic Press

This text is intended for mechanical engineering majors taking a thermal design course. It combines practical coverage of thermal/fluid components and systems, with review coverage of prerequisite thermodynamics, fluid mechanics and heat transfer. Extensive case studies and practical examples show students how the thermal design is done, and the techniques used to simulate and optimize such designs.

This title takes a modern approach, giving students exposure to the general design process, use of software tools for design analysis & simulation, and experimental methods. Report writing, economic factors, and ethical considerations are also discussed in the context of engineering practice.

Design of Thermal Systems McGraw-Hill Companies

Here is the first book to introduce, at the senior-undergraduate and graduate levels, key aspects of the analysis of thermal systems appropriate for computer-aided design. Extensive examples and problems emphasize modelling and computer applications while synthesizing material on thermodynamics, heat transfer, and fluid mechanics. Features thorough coverage of second law analytical techniques, extensive material on numerical simulation and optimization, and an excellent description of cost analysis for thermal system design. Topics covered include the curvefitting of physical data, applications of the second law of thermodynamics, the concept and process of steady-state flowsheeting, the solving of n algebraic equations in n unknowns in both linear and nonlinear systems, the art of

preliminary cost estimation, and techniques of optimization. Appendixes give dozens of project ideas and cover most of the introductory ideas found in an engineering economics text.

Low Temperature and Cryogenic Refrigeration Wiley

The proposed is written as a senior undergraduate or the first-year graduate textbook, covering modern thermal devices such as heat sinks, thermoelectric generators and coolers, heat pipes, and heat exchangers as design components in larger systems. These devices are becoming increasingly important and fundamental in thermal design across such diverse areas as microelectronic cooling, green or thermal energy conversion, and thermal control and management in space, etc. However, there is no textbook available covering this range of topics. The proposed book may be used as a capstone design course after the fundamental courses such as thermodynamics, fluid mechanics, and heat transfer. The underlying concepts in this book cover the, 1) understanding of the physical mechanisms of the thermal devices with the essential formulas and detailed derivations, and 2) designing the thermal devices in conjunction with mathematical modeling, graphical optimization, and occasionally computational-fluid-dynamic (CFD) simulation. Important design examples are developed using the commercial software, MathCAD, which allows the students to easily reach the graphical solutions even with highly detailed processes. In other words, the design concept is embodied through the example problems. The graphical presentation generally provides designers or students with the rich and flexible solutions toward achieving the optimal design. A solutions manual will be provided.