

Process Heat Transfer Solution Manual Kern Homeedore

Presents comprehensive coverage of both classical and new topics on the subject. Classical aspects discussed include shell and tube heat exchangers and condensers. New topics covered include process intergration, heat exchanger selection and ohmic heating.

This text provides a teachable and readable approach to transport phenomena by providing numerous examples and applications. The text leads the reader through the development and solution of relevant differential equations by applying familiar principles of conservation to numerous situations and by including many worked examples in each chapter. The book is organized similarly to other texts in transport phenomena. Section I deals with the properties and mechanics of fluid motion; Section II with thermal properties and heat transfer; and Section III with diffusion and mass transfer. The authors depart from tradition by building on a presumed understanding of the relationships between the structure and properties of matter, particularly in the chapters devoted to the transport properties. Generous portions of the text, numerous examples, and many problems apply transport phenomena to materials processing.

Every chapter of Radiative Heat Transfer offers uncluttered nomenclature, numerous worked examples, and a large number of problems - many based on "real world" situations, making it ideal for classroom use as well as for self-study. The book's 22 chapters cover the

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four major areas in the field: surface properties; surface transport; properties of participating media; and transfer through participating media. Within each chapter, all analytical methods are developed in substantial detail, and a number of examples show how the developed relations may be applied to practical problems. ·

Extensive solution manual for adopting instructors · Most complete text in the field of radiative heat transfer · Many worked examples and end-of-chapter problems · Large number of computer codes (in Fortran and C++), ranging from basic problem solving aids to sophisticated research tools · Covers experimental methods

This book insures the legacy of the original 1950 classic, *Process Heat Transfer*, by Donald Q. Kern. This second edition book is divided into three parts: Fundamental Principles; Heat Exchangers; and Other Heat Transfer Equipment/ Considerations. · Part I provides a series of chapters concerned with introductory topics that are required when solving heat transfer problems. This part of the book deals with topics such as steady-state heat conduction, unsteady-state conduction, forced convection, free convection, and radiation. · Part II is considered by the authors to be the “meat” of the book – addressing heat transfer equipment design procedures and applications. In addition to providing a more meaningful treatment of the various types of heat exchangers, this part also examines the impact of entropy calculations on exchanger design. · Part III of the book examines other related topics of interest, including boiling and condensation, refrigeration and cryogenics, boilers, cooling towers and quenchers, batch and

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unsteady-state processes, health & safety and the accompanying topic of risk. An Appendix is also included. What is new in the 2nd edition Changes that are addressed in the 2nd edition so that Kern's original work continues to remain relevant in 21st century process engineering include: - Updated Heat Exchanger Design - Increased Number of Illustrative Examples - Energy Conservation/ Entropy Considerations - Environmental Considerations - Health & Safety - Risk Assessment - Refrigeration and Cryogenics - Inclusion of SI Units

This broad-based book covers the three major areas of Chemical Engineering. Most of the books in the market involve one of the individual areas, namely, Fluid Mechanics, Heat Transfer or Mass Transfer, rather than all the three. This book presents this material in a single source. This avoids the user having to refer to a number of books to obtain information. Most published books covering all the three areas in a single source emphasize theory rather than practical issues. This book is written with emphasis on practice with brief theoretical concepts in the form of questions and answers, not adopting stereo-typed question-answer approach practiced in certain books in the market, bridging the two areas of theory and practice with respect to the core areas of chemical engineering. Most parts of the book are easily understandable by those who are not experts in the field. Fluid Mechanics chapters include basics on non-Newtonian systems which, for instance find importance in polymer and food processing, flow through piping, flow measurement, pumps, mixing technology and fluidization

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and two phase flow. For example it covers types of pumps and valves, membranes and areas of their use, different equipment commonly used in chemical industry and their merits and drawbacks. Heat Transfer chapters cover the basics involved in conduction, convection and radiation, with emphasis on insulation, heat exchangers, evaporators, condensers, reboilers and fired heaters. Design methods, performance, operational issues and maintenance problems are highlighted. Topics such as heat pipes, heat pumps, heat tracing, steam traps, refrigeration, cooling of electronic devices, NO_x control find place in the book. Mass transfer chapters cover basics such as diffusion, theories, analogies, mass transfer coefficients and mass transfer with chemical reaction, equipment such as tray and packed columns, column internals including structural packings, design, operational and installation issues, drums and separators are discussed in good detail. Absorption, distillation, extraction and leaching with applications and design methods, including emerging practices involving Divided Wall and Petluk column arrangements, multicomponent separations, supercritical solvent extraction find place in the book.

CD-ROM contains: the limited academic version of Engineering equation solver(EES) with homework problems.

This classic text is an exploration of the practical aspects of thermodynamics and heat transfer. It was designed for daily use and reference for system design and for troubleshooting common engineering problems-an indispensable resource for practicing process engineers.

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A brand new book, **FUNDAMENTALS OF CHEMICAL ENGINEERING THERMODYNAMICS** makes the abstract subject of chemical engineering thermodynamics more accessible to undergraduate students. The subject is presented through a problem-solving inductive (from specific to general) learning approach, written in a conversational and approachable manner. Suitable for either a one-semester course or two-semester sequence in the subject, this book covers thermodynamics in a complete and mathematically rigorous manner, with an emphasis on solving practical engineering problems. The approach taken stresses problem-solving, and draws from best practice engineering teaching strategies. **FUNDAMENTALS OF CHEMICAL ENGINEERING THERMODYNAMICS** uses examples to frame the importance of the material. Each topic begins with a motivational example that is investigated in context to that topic. This framing of the material is helpful to all readers, particularly to global learners who require big picture insights, and hands-on learners who struggle with abstractions. Each worked example is fully annotated with sketches and comments on the thought process behind the solved problems. Common errors are presented and explained. Extensive margin notes add to the book accessibility as well as presenting opportunities for investigation. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

In this textbook, the authors show that a few fundamental principles can provide students of mechanical and

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aeronautical engineering with a deep understanding of all modes of aircraft and spacecraft propulsion.

Process Heat Transfer Echo Point Books & Media

Have you ever Fallen in love at first sight? Gone to your first date with an empty wallet? Been caught kissing your girl by her father? Risked missing your IIT exam to meet her for the last time? Aarav has. Aarav is a rich brat who sleeps with every girl he is even mildly attracted to. He transforms from a shy teenager to an inconsiderate adult until an important realization hits him. Discover the pangs of his roller-coaster life as he reveals his deepest secrets. Now a national bestseller, A Half-baked Love Story is the story of two very different individuals as they come to terms with the pangs and pleasures of first love while battling the situations that life has placed them in. Let the characters guide you through this beautiful tale of love, loss and longing.

This book is designed to: Provide students with the tools to model, analyze and solve a wide range of engineering applications involving conduction heat transfer. Introduce students to three topics not commonly covered in conduction heat transfer textbooks: perturbation methods, heat transfer in living tissue, and microscale conduction. Take advantage of the mathematical simplicity of 0- dimensional conduction to present and explore a variety of physical situations that are of practical interest. Present textbook material in an efficient and concise manner to be covered in its entirety in a one semester graduate course. Drill students in a systematic problem solving methodology with emphasis on thought process, logic, reasoning and verification. To

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accomplish these objectives requires judgment and balance in the selection of topics and the level of details. Mathematical techniques are presented in simplified fashion to be used as tools in obtaining solutions. Examples are carefully selected to illustrate the application of principles and the construction of solutions. Solutions follow an orderly approach which is used in all examples. To provide consistency in solutions logic, I have prepared solutions to all problems included in the first ten chapters myself. Instructors are urged to make them available electronically rather than posting them or presenting them in class in an abridged form. Packed with laws, formulas, calculations solutions, enhancement techniques and rules of thumb, this practical manual offers fast, accurate solutions to the heat transfer problems mechanical engineers face everyday. Audience includes Power, Chemical, and HVAC Engineers Step-by-step procedures for solving specific problems such as heat exchanger design and air-conditioning systems heat load Tabular information for thermal properties of fluids, gaseous, and solids This text provides a teachable and readable approach to transport phenomena (momentum, heat, and mass transport) by providing numerous examples and applications, which are particularly important to metallurgical, ceramic, and materials engineers. Because the authors feel that it is important for students and practicing engineers to visualize the physical situations, they have attempted to lead the reader through the development and solution of the relevant differential equations by applying the familiar principles

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of conservation to numerous situations and by including many worked examples in each chapter. The book is organized in a manner characteristic of other texts in transport phenomena. Section I deals with the properties and mechanics of fluid motion; Section II with thermal properties and heat transfer; and Section III with diffusion and mass transfer. The authors depart from tradition by building on a presumed understanding of the relationships between the structure and properties of matter, particularly in the chapters devoted to the transport properties (viscosity, thermal conductivity, and the diffusion coefficients). In addition, generous portions of the text, numerous examples, and many problems at the ends of the chapters apply transport phenomena to materials processing.

Cutting-edge heat transfer principles and design applications Apply advanced heat transfer concepts to your chemical, petrochemical, and refining equipment designs using the detailed information contained in this comprehensive volume. Filled with valuable graphs, tables, and charts, Heat Transfer in Process Engineering covers the latest analytical and empirical methods for use with current industry software. Select heat transfer equipment, make better use of design software, calculate heat transfer coefficients, troubleshoot your heat transfer process, and comply with design and construction standards. Heat Transfer in Process Engineering allows you to: Review heat transfer principles with a direct focus on process equipment design Design, rate, and specify shell and tube, plate, and hairpin heat exchangers Design, rate, and specify air coolers with plain or finned

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tubes Design, rate, and specify different types of condensers with tube or shellside condensation for pure fluids or multicomponent mixtures Understand the principles and correlations of boiling heat transfer, with their limits on and applications to different types of reboiler design Apply correlations for fired heater ratings, for radiant and convective zones, and calculate fuel efficiency Obtain a set of useful Excel worksheets for process heat transfer calculations

Although the empirical treatment of fluid flow and heat transfer in porous media is over a century old, only in the last three decades has the transport in these heterogeneous systems been addressed in detail. So far, single-phase flows in porous media have been treated or at least formulated satisfactorily, while the subject of two-phase flow and the related heat-transfer in porous media is still in its infancy. This book identifies the principles of transport in porous media and compares the available predictions based on theoretical treatments of various transport mechanisms with the existing experimental results. The theoretical treatment is based on the volume-averaging of the momentum and energy equations with the closure conditions necessary for obtaining solutions. While emphasizing a basic understanding of heat transfer in porous media, this book does not ignore the need for predictive tools; whenever a rigorous theoretical treatment of a phenomena is not available, semi-empirical and empirical treatments are given.

"Includes removable just in time reference cards, great for FE exam study"--Cover.

Completely updated, the seventh edition provides engineers

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with an in-depth look at the key concepts in the field. It incorporates new discussions on emerging areas of heat transfer, discussing technologies that are related to nanotechnology, biomedical engineering and alternative energy. The example problems are also updated to better show how to apply the material. And as engineers follow the rigorous and systematic problem-solving methodology, they'll gain an appreciation for the richness and beauty of the discipline.

This is the eBook of the printed book and may not include any media, website access codes, or print supplements that may come packaged with the bound book. The Concise, Easy-to-Use Guide to Designing Chemical Process Equipment and Evaluating Its Performance Trends such as shale-gas resource development call for a deeper understanding of chemical engineering equipment and design. Chemical Process Equipment Design complements leading texts by providing concise, focused coverage of these topics, filling a major gap in undergraduate chemical engineering education. Richard Turton and Joseph A. Shaeiwitz present relevant design equations, show how to analyze operation of existing equipment, and offer a practical methodology for designing new equipment and for solving common problems.

Theoretical derivations are avoided in favor of working equations, practical computational strategies, and approximately eighty realistic worked examples. The authors identify which equation applies to each situation, and show exactly how to use it to design equipment. By the time undergraduates have worked through this material, they will be able to create preliminary designs for most process equipment found in a typical chemical plant that processes gases and/or liquids. They will also learn how to evaluate the performance of that equipment, even when operating conditions differ from the design case. Coverage includes

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Process fluid mechanics: designing and evaluating pumps, compressors, valves, and other piping systems
Process heat transfer: designing and evaluating heat exchange equipment
Separation equipment: understanding fundamental relationships underlying separation devices, designing them, and assessing their performance
Reactors: basic equations and specific issues relating to chemical reactor equipment design and performance
Other equipment: preliminary analysis and design for pressure vessels, simple phase-separators (knock-out drums), and steam ejectors
This guide draws on fifty years of innovative chemical engineering instruction at West Virginia University and elsewhere. It complements popular undergraduate textbooks for practical courses in fluid mechanics, heat transfer, reactors, or separations; supports senior design courses; and can serve as a core title in courses on equipment design.

The de facto standard text for heat transfer - noted for its readability, comprehensiveness and relevancy. Now revised to include clarified learning objectives, chapter summaries and many new problems. The fourth edition, like previous editions, continues to support four student learning objectives, desired attributes of any first course in heat transfer:

- * Learn the meaning of the terminology and physical principles of heat transfer delineate pertinent transport phenomena for any process or system involving heat transfer.
- * Use requisite inputs for computing heat transfer rates and/or material temperatures.
- * Develop representative models of real processes and systems and draw conclusions concerning process/systems design or performance from the attendant analysis.

Frank Kreith and Mark Bohn's PRINCIPLES OF HEAT TRANSFER is known and respected as a classic in the field! The sixth edition has new homework problems, and the authors have added new Mathcad problems that show

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readers how to use computational software to solve heat transfer problems. This new edition features own web site that features real heat transfer problems from industry, as well as actual case studies.

Although the basic theories of thermodynamics are adequately covered by a number of existing texts, there is little literature that addresses more advanced topics. In this comprehensive work the author redresses this balance, drawing on his twenty-five years of experience of teaching thermodynamics at undergraduate and postgraduate level, to produce a definitive text to cover thoroughly, advanced syllabuses. The book introduces the basic concepts which apply over the whole range of new technologies, considering: a new approach to cycles, enabling their irreversibility to be taken into account; a detailed study of combustion to show how the chemical energy in a fuel is converted into thermal energy and emissions; an analysis of fuel cells to give an understanding of the direct conversion of chemical energy to electrical power; a detailed study of property relationships to enable more sophisticated analyses to be made of both high and low temperature plant and irreversible thermodynamics, whose principles might hold a key to new ways of efficiently covering energy to power (e.g. solar energy, fuel cells).

Worked examples are included in most of the chapters, followed by exercises with solutions. By developing thermodynamics from an explicitly equilibrium perspective, showing how all systems attempt to reach a state of equilibrium, and the effects of these systems when they cannot, the result is an unparalleled insight into the more advanced considerations when converting any form of energy into power, that will prove invaluable to students and professional engineers of all disciplines.

THE FOURTH EDITION IN SI UNITS of Fundamentals of Thermal-Fluid Sciences presents a balanced coverage of

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thermodynamics, fluid mechanics, and heat transfer packaged in a manner suitable for use in introductory thermal sciences courses. By emphasizing the physics and underlying physical phenomena involved, the text gives students practical examples that allow development of an understanding of the theoretical underpinnings of thermal sciences. All the popular features of the previous edition are retained in this edition while new ones are added. **THIS EDITION FEATURES:** A New Chapter on Power and Refrigeration Cycles The new Chapter 9 exposes students to the foundations of power generation and refrigeration in a well-ordered and compact manner. An Early Introduction to the First Law of Thermodynamics (Chapter 3) This chapter establishes a general understanding of energy, mechanisms of energy transfer, and the concept of energy balance, thermo-economics, and conversion efficiency. Learning Objectives Each chapter begins with an overview of the material to be covered and chapter-specific learning objectives to introduce the material and to set goals. Developing Physical Intuition A special effort is made to help students develop an intuitive feel for underlying physical mechanisms of natural phenomena and to gain a mastery of solving practical problems that an engineer is likely to face in the real world. New Problems A large number of problems in the text are modified and many problems are replaced by new ones. Some of the solved examples are also replaced by new ones. Upgraded Artwork Much of the line artwork in the text is upgraded to figures that appear more three-dimensional and realistic. **MEDIA RESOURCES:** Limited Academic Version of EES with selected text solutions packaged with the text on the Student DVD. The Online Learning Center (www.mheducation.asia/olc/cengelTFS4e) offers online resources for instructors including PowerPoint® lecture slides, and complete solutions to homework problems.

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McGraw-Hill's Complete Online Solutions Manual Organization System (<http://cosmos.mhhe.com/>) allows instructors to streamline the creation of assignments, quizzes, and tests by using problems and solutions from the textbook, as well as their own custom material.

The First Law of Thermodynamics states that energy can neither be created nor destroyed. Heat exchangers are devices built for efficient heat transfer from one fluid to another. They are widely used in engineering processes and include examples such as intercoolers, preheaters, boilers and condensers in power plants. Heat exchangers are becoming more and more important to manufacturers striving to control energy costs. Process Heat Transfer Rules of Thumb investigates the design and implementation of industrial heat exchangers. It provides the background needed to understand and master the commercial software packages used by professional engineers for design and analysis of heat exchangers. This book focuses on the types of heat exchangers most widely used by industry, namely shell-and-tube exchangers (including condensers, reboilers and vaporizers), air-cooled heat exchangers and double-pipe (hairpin) exchangers. It provides a substantial introduction to the design of heat exchanger networks using pinch technology, the most efficient strategy used to achieve optimal recovery of heat in industrial processes. Utilizes leading commercial software important to professional engineers designing heat exchangers Illustrates design procedures using complete step-by-step worked examples Provides details on how to develop an initial configuration for a heat exchanger and how to systematically modify it to obtain a final design Abundant example problems solved manually and with the integration of computer software This text provides balanced coverage of the basic

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concepts of thermodynamics and heat transfer. Together with the illustrations, student-friendly writing style, and accessible math, this is an ideal text for an introductory thermal science course for non-mechanical engineering majors.

Advanced Heat Transfer, Second Edition provides a comprehensive presentation of intermediate and advanced heat transfer, and a unified treatment including both single and multiphase systems. It provides a fresh perspective, with coverage of new emerging fields within heat transfer, such as solar energy and cooling of microelectronics. Conductive, radiative and convective modes of heat transfer are presented, as are phase change modes. Using the latest solutions methods, the text is ideal for the range of engineering majors taking a second-level heat transfer course/module, which enables them to succeed in later coursework in energy systems, combustion, and chemical reaction engineering.

Written for chemical, mechanical, and aerospace engineering students taking courses on heat and mass transfer, this textbook presents the basics and proceeds to the required theory and its application aspects. Major topics covered include conduction, convection, radiation, boiling, heat exchangers, and mass transfer and are explained in a detailed, to-the-point manner. Along with coverage of the topics, the author provides appropriate numerical examples to clarify theory and concepts. Exercise problems are presented at the end of each chapter to test the understanding gained within each subject. A solutions manual and PowerPoint slides accompany the text, upon qualification.

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Experimental Methods in Heat Transfer and Fluid Mechanics focuses on how to analyze and solve the classic heat transfer and fluid mechanics measurement problems in one book. This work serves the need of graduate students and researchers looking for advanced measurement techniques for thermal, flow, and heat transfer engineering applications. The text focuses on analyzing and solving classic heat transfer and fluid mechanics measurement problems, emphasizing fundamental principles, measurement techniques, data presentation, and uncertainty analysis. Overall, the text builds a strong and practical background for solving complex engineering heat transfer and fluid flow problems. Features Provides students with an understandable introduction to thermal-fluid measurement Covers heat transfer and fluid mechanics measurements from basic to advanced methods Explains and compares various thermal-fluid experimental and measurement techniques Uses a step-by-step approach to explaining key measurement principles Gives measurement procedures that readers can easily follow and apply in the lab

Chemical Reaction and Reactor Design begins with a discussion of chemical reactions, emphasizing chemical equilibrium and rate of reaction and proceeds to the theory and practice of heat and mass transfer, and important considerations in the design of chemical reactors. The final section of the book provides detailed case studies from the chemical industry covering the six chemical processes: naphtha cracking, steam reforming, epoxy resin production, hydro-treating, fluid catalytic

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cracking and flue gas desulfurization. The comprehensive coverage of theories of chemical reaction and their application to reactor design provided here will be of value to chemical engineers, industrial chemists and researchers in these fields.

The most complete guide of its kind, this is the standard handbook for chemical and process engineers. All new material on fluid flow, long pipe, fractionators, separators and accumulators, cooling towers, gas treating, blending, troubleshooting field cases, gas solubility, and density of irregular solids. This substantial addition of material will also include conversion tables and a new appendix, "Shortcut Equipment Design Methods." This convenient volume helps solve field engineering problems with its hundreds of common sense techniques, shortcuts, and calculations. Here, in a compact, easy-to-use format, are practical tips, handy formulas, correlations, curves, charts, tables, and shortcut methods that will save engineers valuable time and effort. Hundreds of common sense techniques and calculations help users quickly and accurately solve day-to-day design, operations, and equipment problems.

This is a modern, example-driven introductory textbook on heat transfer, with modern applications, written by a renowned scholar.

This bestselling book in the field provides a complete introduction to the physical origins of heat and mass transfer. Noted for its crystal clear presentation and easy-to-follow problem solving methodology, Incropera and Dewitt's systematic approach to the first law develops reader confidence in using this essential tool for thermal

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analysis. Readers will learn the meaning of the terminology and physical principles of heat transfer as well as how to use requisite inputs for computing heat transfer rates and/or material temperatures.

A student-oriented approach in which basic ideas and assumptions are stressed and discussed in detail and full developments of all important analyses are provided. The book contains many worked examples that illustrate the methods of analysis discussed. The book also contains a comprehensive set of problems and a Solutions Manual, written by the text authors.

Over the past few decades there has been a prolific increase in research and development in area of heat transfer, heat exchangers and their associated technologies. This book is a collection of current research in the above mentioned areas and discusses experimental, theoretical and calculation approaches and industrial utilizations with modern ideas and methods to study heat transfer for single and multiphase systems. The topics considered include various basic concepts of heat transfer, the fundamental modes of heat transfer (namely conduction, convection and radiation), thermophysical properties, condensation, boiling, freezing, innovative experiments, measurement analysis, theoretical models and simulations, with many real-world problems and important modern applications. The book is divided in four sections :

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"Heat Transfer in Micro Systems", "Boiling, Freezing and Condensation Heat Transfer", "Heat Transfer and its Assessment", "Heat Transfer Calculations", and each section discusses a wide variety of techniques, methods and applications in accordance with the subjects. The combination of theoretical and experimental investigations with many important practical applications of current interest will make this book of interest to researchers, scientists, engineers and graduate students, who make use of experimental and theoretical investigations, assessment and enhancement techniques in this multidisciplinary field as well as to researchers in mathematical modelling, computer simulations and information sciences, who make use of experimental and theoretical investigations as a means of critical assessment of models and results derived from advanced numerical simulations and improvement of the developed models and numerical methods. Heat Transfer Principles and Applications is a welcome change from more encyclopedic volumes exploring heat transfer. This shorter text fully explains the fundamentals of heat transfer, including heat conduction, convection, radiation and heat exchangers. The fundamentals are then applied to a variety of engineering examples, including topics of special and current interest like solar collectors, cooling of electronic equipment, and energy conservation in buildings. The text covers both

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analytical and numerical solutions to heat transfer problems and makes considerable use of Excel and MATLAB(R) in the solutions. Each chapter has several example problems and a large, but not overwhelming, number of end-of-chapter problems. This best-selling book in the field provides a complete introduction to the physical origins of heat and mass transfer. Noted for its crystal clear presentation and easy-to-follow problem solving methodology, Incropera and Dewitt's systematic approach to the first law develop readers confidence in using this essential tool for thermal analysis.

Introduction to Conduction· One-Dimensional, Steady-State Conduction· Two-Dimensional, Steady-State Conduction· Transient Conduction· Introduction to Convection· External Flow· Internal Flow· Free Convection· Boiling and Condensation· Heat Exchangers· Radiation: Processes and Properties· Radiation Exchange Between Surfaces· Diffusion Mass Transfer

This book is designed as a textbook for mechanical engineering seniors or beginning graduate students. The book provides a reasonable theoretical basis for a subject that has traditionally had a very strong experimental base. The core of the book is devoted to boundary layer theory with special emphasis on the laminar and turbulent thermal boundary layer. Two chapters on heat exchanger theory are included since this subject is one of the principle application

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areas of convective heat transfer.

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