

Heat And Mass Transfer Ds Kumar

This much-needed book presents a clear and very practice-oriented overview of thermal separation processes. An extensive introduction elucidates the physical and physicochemical fundamentals of different unit operations used to separate homogenous mixtures. This is followed by a concise text with numerous explanatory figures and tables referring to process and design, flowsheets, basic engineering and examples of separation process applications. Very helpful guidance in the form of process descriptions, calculation models and operation data is presented in an easy-to-understand manner thereby assisting the practicing engineer in the choosing and evaluation of separation processes and facilitating the modeling and design of innovative equipment. A comprehensive reference list provides further opportunity for the following up of special separation problems. Chemical and mechanical engineers, chemists, physicists and biotechnologists in research and development, plant design and environmental protection, as well as students in chemical engineering and natural sciences will find this all-embracing reference guide of tremendous value and practical use.

"Fundamentals of Momentum, Heat and Mass Transfer, 6th Edition provides

***a unified treatment of momentum transfer (fluid mechanics), heat transfer and mass transfer. The new edition has been updated to include more modern examples, problems, and illustrations with real world applications. The treatment of the three areas of transport phenomena is done sequentially. The subjects of momentum, heat, and mass transfer are introduced, in that order, and appropriate analysis tools are developed"--
Apresenta tendências, novas idéias e descobertas recentes no campo da Transferência Computacional de Calor e Massa***

This text is meant to fill a long felt need for a comprehensive and authoritative book on heat and mass transfer for students of Mechanical/Chemical/Aeronautical/Production/ Metallurgical engineering. The dual objective of understanding the physical phenomena involved and the ability to formulate and solve typical problems by an average student has been kept in mind while writing this book. In this text, an effort has been made to identify the similarities in both qualitative and quantitative approach, between heat transfer and mass transfer. This gives a better understanding of the phenomena of mass transfer. The subject matter has been developed to a sufficiently advanced stage in a logical and coherent manner with neat illustrations along with an adequate number of solved examples. A large number of problems (with answers) at the end of each

chapter assist in the pedagogy. The book has been appended with a set of selected MCQs. The role of experimentation in the teaching of Heat and Mass Transfer is well established. Properly designed experiments reinforce the teaching of basic principles more thoroughly. Keeping this in mind one full chapter comprising 12 typical experiments forms another special feature of this text. Contents: Basic Concepts Fundamental Equations of Conduction One-Dimensional Steady State Heat Conduction Multi-Dimensional Steady State Conduction Transient Heat Conduction Fundamentals of Convective Heat Transfer Forced Convection Systems Natural Convection Thermal Radiation - Basic Relations Radiative Heat Exchange Between Surfaces Boiling and Condensation Heat Exchangers Diffusion Mass Transfer Convective Mass Transfer Experiments in Engineering Heat and Mass Transfer.

This textbook is targetted to undergraduate students in chemical engineering, chemical technology, and biochemical engineering for courses in mass transfer, separation processes, transport processes, and unit operations. The principles of mass transfer, both diffusional and convective have been comprehensively discussed. The application of these principles to separation processes is explained. The more common separation processes used in the chemical industries are individually described in

separate chapters. The book also provides a good understanding of the construction, the operating principles, and the selection criteria of separation equipment. Recent developments in equipment have been included as far as possible. The procedure of equipment design and sizing has been illustrated by simple examples. An overview of different applications and aspects of membrane separation has also been provided. 'Humidification and water cooling', necessary in every process industry, is also described. Finally, elementary principles of 'unsteady state diffusion' and mass transfer accompanied by a chemical reaction are covered.

SALIENT FEATURES :

- A balanced coverage of theoretical principles and applications.***
- Important recent developments in mass transfer equipment and practice are included.***
- A large number of solved problems of varying levels of complexities showing the applications of the theory are included.***
- Many end-chapter exercises.***
- Chapter-wise multiple choice questions.***
- An Instructors manual for the teachers.***

Heat and Mass Transfer in Capillary-Porous Bodies describes the modern theory of heat and mass transfer on the basis of the thermodynamics of irreversible processes. This book provides a systematic account of the phenomena of heat and mass transfer in capillary-porous bodies. Organized into 10 chapters, this book begins with an overview of the processes of the

transfer of heat and mass of a substance. This text then examines the application of the theory to the investigation of heat and mass exchange in walls and in technological processes for the manufacture of building materials. Other chapters consider the thermal properties of building materials by using the methods of the thermodynamics of mass transfer. The final chapter deals with the method of finite differences, which is applicable to the solution of problems of non-steady heat conduction. This book is a valuable resource for scientists, post-graduate students, engineers, and students in higher educational establishments for architectural engineering.

[Advanced Heat and Mass Transfer](#)

[Convective Heat and Mass Transfer in Porous Media](#)

[Fundamentals of Engineering Heat and Mass Transfer](#)

[Momentum, Heat, and Mass Transfer Fundamentals](#)

[Fundamentals of the Finite Element Method for Heat and Mass Transfer](#)

[Engineering Thermodynamics](#)

[Heat and Mass Transfer \(SI Units\)](#)

[Thermal Separation Processes](#)

[Convective Heat and Mass Transfer](#)

Fundamentals of the Finite Element Method for Heat and Mass Transfer, Second Edition is a

comprehensively updated new edition and is a unique book on the application of the finite element method to heat and mass transfer. • Addresses fundamentals, applications and computer implementation • Educational computer codes are freely available to download, modify and use • Includes a large number of worked examples and exercises • Fills the gap between learning and research

Progress in Heat and Mass Transfer, Volume 5: Heat and Mass Transfer in Rheologically Complex Fluids compiles selected papers presented at the International Seminar held in Herceg Novi, Yugoslavia on September 8-12, 1970. This book discusses the continuum foundation of rheology; transport phenomena in turbulent flow of rheologically complex fluids; and heat-transfer effects in flowing polymers. The thixotropic effects in viscoelastic media; non-equilibrium thermodynamics and rheology of viscoelastic fluids; and flow instability due to convective time changes of consistency are also elaborated. This publication also covers the prediction method for turbulent momentum and heat transfer in viscous non-Newtonian liquids; methods for determining thermal properties of anisotropic systems; and convection in ferromagnetic fluid due to magneto caloric effect. This volume is beneficial to students and researchers interested in the heat and mass transfer in rheologically complex fluids.

This textbook presents the classical treatment of the problems of heat transfer in an exhaustive manner with due emphasis on understanding of the physics of the problems. This emphasis will be especially visible in the chapters on convective heat transfer. Emphasis is also laid on the solution of steady and unsteady two-dimensional heat conduction problems. Another special feature of the book is a chapter on introduction to design of heat exchangers and their illustrative design problems. A simple and understandable treatment of gaseous radiation has been presented. A special chapter on flat plate solar

air heater has been incorporated that covers mathematical modeling of the air heater. The chapter on mass transfer has been written looking specifically at the needs of the students of mechanical engineering. The book includes a large number and variety of solved problems with supporting line diagrams. A number of application-based examples have been incorporated where applicable. The end-of-chapter exercise problems are supplemented with stepwise answers. Though the book has been primarily designed to serve as a complete textbook for undergraduate and graduate students of mechanical engineering, it will also be useful for students of chemical, aerospace, automobile, production, and industrial engineering streams. The book fully covers the topics of heat transfer coursework and can also be used as an excellent reference for students preparing for competitive graduate examinations.

Revised extensively and updated with several new topics, this book discusses the principles and applications of "Heat and Mass Transfer". It is written with extensive pedagogy, clear explanations and examples throughout to elucidate the concepts and facilitate problem solving.

The field's essential standard for more than three decades, Fundamentals of Momentum, Heat and Mass Transfer offers a systematic introduction to transport phenomena and rate processes. Thorough coverage of central principles helps students build a foundational knowledge base while developing vital analysis and problem solving skills. Momentum, heat, and mass transfer are introduced sequentially for clarity of concept and logical organization of processes, while examples of modern applications illustrate real-world practices and strengthen student comprehension. Designed to keep the focus on concept over content, this text uses accessible language and efficient pedagogy to streamline student mastery and facilitate further exploration. Abundant examples, practice problems, and illustrations reinforce basic principles, while extensive tables simplify comparisons of the various

states of matter. Detailed coverage of topics including dimensional analysis, viscous flow, conduction, convection, and molecular diffusion provide broadly-relevant guidance for undergraduates at the sophomore or junior level, with special significance to students of chemical, mechanical, environmental, and biochemical engineering.

The rapid growth of literature on convective heat and mass transfer through porous media has brought both engineering and fundamental knowledge to a new state of completeness and depth. Additionally, several new questions of fundamental merit have arisen in several areas which bear direct relation to further advancement of basic knowledge and applications in this field. For example, the growth of fundamental heat transfer data and correlations for engineering use for saturated media has now reached the point where the relations for heat transfer coefficients and flow parameters are known well enough for design purposes. Multiple flow field regimes in natural convection have been identified in several important enclosure geometries. New questions have arisen on the nature of equations being used in theoretical studies, i. e. , the Validity of Darcy assumption is being brought into question; Wall effects in high and low velocity flow fields have been found to play a role in predicting transport coefficients; The formulation of transport problems in fractured media are being investigated as both an extension of those in a homogeneous medium and for application in engineering systems in geologic media and problems on saturated media are being addressed to determine their proper formulation and solution. The long standing problem of how to adequately formulate and solve problems of multi-phase heat and mass transfer in heterogeneous media is important in the technologies of chemical reactor engineering and enhanced oil recovery.

[Models of Laminar Free Convection with Phase Change for Heat and Mass Transfer Analysis Progress in Heat and Mass Transfer](#)

[Analytical Heat Transfer](#)

[Heat Transfer in Fluidized Beds](#)

[A HEAT TRANSFER TEXTBOOK](#)

[Heat and Mass Transfer in MHD Flows](#)

[Fundamentals of Momentum, Heat, and Mass Transfer](#)

[SI Units](#)

[Fundamentals of Momentum, Heat and Mass Transfer, 6th Edition](#)

"Presents the fundamentals of momentum, heat, and mass transfer from both a microscopic and a macroscopic perspective. Features a large number of idealized and real-world examples that we worked out in detail."

This book introduces two of the most exciting heat pumping technologies, the coabsorbent and the thermal recovery (mechanical vapor) compression, characterized by a high potential in primary energy savings and environmental protection. New cycles with potential applications of nontruncated, truncated, hybrid truncated, and multi-effect coabsorbent types are introduced in this work. Thermal-to-work recovery compression (TWRC) is the first of two particular methods explored here, including how superheat is converted into work, which diminishes the compressor work input. In the second method, thermal-to-thermal recovery compression (TTRC), the superheat is converted into useful cooling and/or heating, and added to the cycle output effect via the coabsorbent

technology. These and other methods of discharge gas superheat recovery are analyzed for single-, two-, three-, and multi-stage compression cooling and heating, ammonia and ammonia-water cycles, and the effectiveness results are given. The author presents absorption-related topics, including the divided-device method for mass and heat transfer analysis, and truncation as a unique method for a better source-task match. Along with advanced gas recovery, the first and second principles of COP and exergy calculation, the ideal point approaching (i.p.a.) effect and the two-point theory of mass and heat transfer, the book also addresses the new wording of the Laplace equation, the Marangoni effect true explanation, and the new mass and heat exchangers based on this effect. The work goes on to explore coabsorbent separate and combined cooling, heating, and power (CHP) production and advanced water-lithium bromide cycle air-conditioning, as well as analyzing high-efficiency ammonia-water heat-driven heating and industrial low-temperature cooling, in detail. Readers will learn how coabsorbent technology is based on classic absorption, but is more general. It is capable of offering effective solutions for all cooling and heating applications (industry, agriculture, district, household, etc.), provided that two supplying heat-sink sources with temperatures outdistanced by a minimum of 12-15°C are available. This book has clear and concise presentation and illustrates the theory

and applications with diagrams, tables, and flowcharts.

This book presents recent developments in our systematic studies of hydrodynamics and heat and mass transfer in laminar free convection, accelerating film boiling and condensation of Newtonian fluids, as well as accelerating film flow of non-Newtonian power-law fluids (FFNF). These new developments provided in this book are (i) novel system of analysis models based on the developed New Similarity Analysis Method; (ii) a system of advanced methods for treatment of gas temperature- dependent physical properties, and liquid temperature- dependent physical properties; (iii) the organically combined models of the governing mathematical models with those on treatment model of variable physical properties; (iv) rigorous approach of overcoming a challenge on accurate solution of three-point boundary value problem related to two-phase film boiling and condensation; and (v) A pseudo-similarity method of dealing with thermal boundary layer of FFNF for greatly simplifies the heat-transfer analysis and numerical calculation. A system of practical application equations on heat and mass transfer are provided in each chapter, which are formulated based on the rigorous numerical solutions with consideration of variable physical properties. In addition, in the second edition, other new research developments are further included on resolving an even big

challenge associated with investigations of laminar free film condensation of vapour-gas mixture. They involve the novel methods for treatment of concentration- and temperature- dependent physical properties of vapour-gas mixture, and for rigorous solution of interfacial vapour saturation temperature, which have lead to rigorous analysis and calculation results on two-phase film flow velocity, temperature, and concentration fields, as well as condensate heat and mass transfer.

This book discusses conventional as well as unconventional wood drying technologies. It covers fundamental thermophysical and energetic aspects and integrates two complex thermodynamic systems, conventional kilns and heat pumps, aimed at improving the energy performance of dryers and the final quality of dried lumber. It discusses advanced components, kiln energy requirements, modeling, and software and emphasizes dryer/heat pump optimum coupling, control, and energy efficiency. Problems are included in most chapters as practical, numerical examples for process and system/components calculation and design. The book presents promising advancements and R&D challenges and future requirements.

The purpose of ' Numerical Analysis of Heat and Mass Transfer in Porous Media ' is to provide a collection of recent contributions in the field of computational heat

and mass transfer in porous media. The main benefit of the book is that it discusses the majority of the topics related to numerical transport phenomenon in engineering (including state-of-the-art and applications) and presents some of the most important theoretical and computational developments in porous media and transport phenomenon domain, providing a self-contained major reference that is appealing to both the scientists, researchers and the engineers. At the same time, these topics encounter of a variety of scientific and engineering disciplines, such as chemical, civil, agricultural, mechanical engineering, etc. The book is divided in several chapters that intend to be a resume of the current state of knowledge for benefit of professional colleagues.

Convective Heat and Mass Transfer, Second Edition, is ideal for the graduate level study of convection heat and mass transfer, with coverage of well-established theory and practice as well as trending topics, such as nanoscale heat transfer and CFD. It is appropriate for both Mechanical and Chemical Engineering courses/modules.

[Free Convection Film Flows and Heat Transfer](#)

[Heat & Mass Transfer](#)

[Principles and Design](#)

[Computational heat and mass transfer - CHMT 2001- Vol.II](#)

[Presented at 1994 International Mechanical Engineering Congress and Exposition, Chicago, Illinois, November 6-11, 1994](#)
[Computational Methods for Heat and Mass Transfer](#)
[Experimental Heat Transfer, Fluid Mechanics and Thermodynamics 1993](#)
[Advances in Heat and Mass Transfer in Biological Systems](#)
[Heat & Mass Transfer 2E](#)

Filling the gap between basic undergraduate courses and advanced graduate courses, this text explains how to analyze and solve conduction, convection, and radiation heat transfer problems analytically. It describes many well-known analytical methods and their solutions, such as Bessel functions, separation of variables, similarity method, integral method, and matrix inversion method. Developed from the author's 30 years of teaching, the text also presents step-by-step mathematical formula derivations, analytical solution procedures, and numerous demonstration examples of heat transfer applications.

The book provides an exhaustive coverage of two- and three-dimensional heat conduction, forced and free convection, boiling and radiation heat transfer, heat exchangers, computer methods in heat transfer, and mass transfer. The main emphasis is on the understanding of fundamental concepts and their application to complex problems.

Amidst tightening requirements for eliminating CFC's, HCFC's, halons, and HFC's from

use in air conditioning and heat pumps, the search began for replacements that are environmentally benign, non-flammable, and similar to the banned refrigerants in system-level behavior. Refrigerant mixtures are increasingly used as working fluids because they demo

This book provides a much needed and thorough treatment of the heat transfer in agitated disperse systems. It gives predictive equations for the heat transfer in moving beds, bubbling and circulating fluidized beds, pneumatic transport in vertical tubes and particulate fluidized beds. Owing to the many different modes of activation of heat transfer, the basic approach of the book is to provide experimental evidence of the relevance of particle motion to the proximity of solid surfaces for the heat transfer observed. This has been achieved by the evaluation of experiments obtained with a newly developed pulsed light method using luminous particles. Heat Transfer in Fluidized Beds will be of great use to students and researchers involved in heat transfer and thermodynamics.

The papers contained in this volume reflect the ingenuity and originality of experimental work in the areas of fluid mechanics, heat transfer and thermodynamics. The contributors are drawn from 27 countries which indicates how well the worldwide scientific community is networked. The papers cover a broad spectrum from the experimental investigation of complex fundamental physical phenomena to the study of practical devices and applications. A uniform outline and

method of presentation has been used for each paper.

This Special Issue of Processes operates on the basis of a rigorous peer-review with a single-blind assessment and at least two independent reviewers, thereby ensuring a high quality final product. I would like to thank our reviewers, for providing the authors with constructive comments, and Editorial Board, for their professional advice that led to the final decision. I am sure that, in coming years, readers of this Special Issue will find the scientific manuscripts interesting and beneficial to their research.

[Heat Transfer](#)

[Heat and Mass Transfer in Capillary-Porous Bodies](#)

[Analysis Of Heat And Mass Transfer](#)

[Fundamentals of Heat and Mass Transfer](#)

[Heat and Mass Transfer](#)

[Optimization of Heat and Mass Exchange](#)

[Selected Papers of the 1970 International Seminar](#)

[Basic Of Heat & Mass Transfer\(Up\)](#)

[Coabsorbent and Thermal Recovery Compression Heat Pumping Technologies](#)

This complete reference book covers topics in heat and mass transfer, containing extensive information in the form of interesting and realistic examples, problems, charts, tables, illustrations, and more. Heat and Mass Transfer emphasizes

practical processes and provides the resources necessary for performing accurate and efficient calculations. This excellent reference comes with a complete set of fully integrated software available for download at crcpress.com, consisting of 21 computer programs that facilitate calculations, using procedures developed in the text. Easy-to-follow instructions for software implementation make this a valuable tool for effective problem-solving.

The advent of high-speed computers has encouraged a growing demand for newly graduated engineers to possess the basic skills of computational methods for heat and mass transfer and fluid dynamics. Computational fluid dynamics and heat transfer, as well as finite element codes, are standard tools in the computer-aided design and analysis of processes and products involving coupled transport and multi-physic phenomena. This textbook introduces the fundamentals of two important computational techniques for solving heat and mass transfer and fluid flow problems: finite difference and finite element methods. The objective of the book is to help the students thoroughly understand the basic concepts and procedures of fluid dynamics, heat and mass transfer and implement computational methodology into a computer code and solve more complex problems on their own. Theory and practice are combined in a simple and straightforward manner. Classic problems in heat transfer, mass transfer, and fluid flows are solved and illustrated through step-by-step derivations and numerous figures. End-of-chapter problems are provided at the end of every chapter for extra practice and homework assignments. The book is divided into three parts: Part One

contains a review of basic equations of heat transfer, mass transfer and fluid dynamics; concepts of numerical approximations and errors; numerical solution techniques for systems of linear algebraic equations; and numerical integrations and quadrature formulas. (The last two topics are included primarily for students who have had no prior course on numerical analysis). Part Two introduces the finite difference/control volume method. Part Three presents the finite element method. As an introductory text, this book is appropriate for senior undergraduate and first-year graduate level courses. Students taking independent study can use the text as a comprehensive reference guide. Others who will find it a useful resource include practicing engineers and scientists developing their own codes and using commercial codes for the analysis and design of processes and products involving heat and mass transfer and fluid dynamics.

Control of heat and mass transfer processes by means of external force effects is one of the most important problems in modern applied physics. This book is devoted to the study of the magnetic field effect as it bears on transfer phenomena: heat and mass transfer. In conducting media, this influence is mainly due to the induced electric current and the interaction of the current with the magnetic field, whereas in magnetizable fluids, molecular or colloidal solution, transfer phenomena are directly affected by the field. When analysing heat and mass transfer in multiphase magnetizing media, only those phenomena which could be described in terms of conventional quasi-stationary approximation are considered. The effects associated with the non-equilibrium magnetization of the

system and particle interaction receive special attention here. The problem studied here have been considered with a view to possible applications, particularly in biology and medicine. Contents:Thermodynamic Analysis of Transfer Phenomena in Electric and Magnetic FieldsHeat Transfer in a Laminar MHD-FlowFree MHD ConvectionConvective Mass Transfer in Magnetic FieldHeat and Mass Transfer in Magnetizable FluidsTurbulent Heat and Mass Transfer in Magnetic FieldMain Trends in ApplicationsProblems of Methodology for Experimental Studies on Heat and Mass Transfer Readership: Physicists, applied mathematicians and research engineers. Keywords:Magnetohydrodynamics;Heat Transfer;Mass Transfer;Boundary Layer;Thermomagnetic Convection;Magnetic Fluids;Magnetophoresis;Magnetodiffusion Convection;Thermomagnetophoresis;Blood Cell SeparationReview:“Appearance of books like the one discussed here is highly desirable and valuable for researchers, practical engineers and students who already work in MHD. It will also doubtless attract to this fascinating area many individuals for whom this book will be the first inspiring encounter with MHD.”Herman Branover for Int. J Heat Mass Transfer, (GB) “... an excellent collection and discussion of referenced works which should be of interest to researchers in this subject area ... the authors have provided a genuine service by making their discussion of the Russian literature available in English.”Richard A Gardner Appl Mech Rev This book provides a solid foundation in the principles of heat and mass transfer and shows how to solve problems by applying modern methods. The basic theory

is developed systematically, exploring in detail the solution methods to all important problems. The revised second edition incorporates state-of-the-art findings on heat and mass transfer correlations. The book will be useful not only to upper- and graduate-level students, but also to practicing scientists and engineers. Many worked-out examples and numerous exercises with their solutions will facilitate learning and understanding, and an appendix includes data on key properties of important substances.

[Previews of Heat and Mass Transfer](#)

[Industrial Heat Pump-Assisted Wood Drying](#)

[Vapor Compression Heat Pumps with Refrigerant Mixtures](#)

[PRINCIPLES OF MASS TRANSFER AND SEPERATION PROCESSES](#)

[Numerical Analysis of Heat and Mass Transfer in Porous Media](#)

[Heat & Mass Transfer in Textiles](#)