Water Resources Engineering

GIS in Water Resources EngineeringWater Quality & Treatment: A Handbook on Drinking WaterModern Water Resources EngineeringA Dictionary of Civil, Water Resources & Environmental EngineeringWater-Resources EngineeringWater Resources and Environmental Engineering IStatistical Analysis in Water Resources EngineeringWater Resources Engineering Educational Series: Channel hydraulicsHydrology and Water Resources EngineeringHydrology and Water Resource Systems AnalysisWater-resources EngineeringHydrology and Water Resources EngineeringWater Resources Systems AnalysisWater-Resources EngineeringPractical HydraulicsWater Resources EngineeringPractical Hydraulics and Water Resources EngineeringProceedings of the Annual Sanitary and Water Resources Engineering ConferenceWater Resources EngineeringGIS and Geocomputation for Water Resource Science and EngineeringIrrigation and Water Resources EngineeringElements of Water Resources EngineeringUrban Water Engineering and ManagementCopulas and Their Applications in Water Resources EngineeringGeographic Information Systems in Water Resources EngineeringAdvances in Water Resources Engineering and ManagementWater Resources EngineeringMonographs and Surveys in Water Resources EngineeringIntroduction to Water ResourcesWater Resources EngineeringWater-resources EngineeringAdvances in Water Resources EngineeringWater Resources EngineeringClimate Variations, Climate Change, and Water Resources EngineeringWater-Resources Engineering [rental Edition]Water Resources EngineeringWater 4.0Water Resources Engineering in KarstEngineering Reliability and Risk in Water ResourcesSoft Computing in Water Resources Engineering

GIS in Water Resources Engineering

This book, Advances in Water Resources Engineering, Volume 14, covers the topics on watershed sediment dynamics and modeling, integrated simulation of interactive surface water and groundwater systems, river channel stabilization with submerged vanes, non-equilibrium sediment transport, reservoir sedimentation, and fluvial processes, minimum energy dissipation rate theory and applications, hydraulic modeling development and application, geophysical methods for assessment of earthen dams, soil erosion on upland areas by rainfall and overland flow, geofluvial modeling methodologies and applications, and environmental water engineering glossary.

Water Quality & Treatment: A Handbook on Drinking Water

Water Resource Engineering presents practical methods to solve problems commonly encountered by practicing water resources engineers in day-to-day work in the fields of hydrology, hydraulics, groundwater, hydraulic designs, hydropower, environmental impact evaluation, and remedial investigations. Numerous illustrative examples are provided based on the author's extensive experience in academia and consulting practice throughout the world. Prakash transforms well-known theoretical equations into easy-to-use solutions without complex theoretical explanations. The concise manner in which this handbook is presented makes it useful for any consulting water resources engineer. Product

ReviewsØ "The book serves as a good reference for any consulting engineers involved in water resources design and analysis." ?Basant Maheshwari, University of Western Sydney, Richmond, Journal of Irrigation and Drainage EngineeringØ

Modern Water Resources Engineering

The study of water resources crosses disciplinary boundaries, from geography and natural resources, to Earth sciences, environmental studies, and engineering. Since not all students come to the water-resources course with the same mathematical background, Clausen's effective, practical presentation integrates topics related to water quantity and water quality. He emphasizes fundamental concepts throughout: the qualitative foundations of hydrology needed to understand the hydrologic cycle and water availability, as well as the physical, chemical, and biological principles underlying water quality. Important social-science issues, including water law and regulations, the economic principles of water supply and demand, and sustainable water management, contextualize the material. Abundant illustrations and purposeful examples reinforce chapter content. End-of-chapter problems provide opportunities for readers to practice the calculations needed for real-world applications.

A Dictionary of Civil, Water Resources & Environmental Engineering

This book comprises select papers presented at the International Conference on Trends and Recent Advances in Civil Engineering (TRACE 2018). The book covers inter-disciplinary research and applications in integrated water resource management, river ecology, irrigation system, water pollution and treatment, hydraulic structure and hydro-informatics. The topics on water resource management include technological intervention and solution for climate change impacts on water resources, water security, clean water to all, sustainable water reuse, flood risk assessment, interlinking of rivers and hydro policy. The contents of this book will be useful to researchers and professionals working in the field of water resource management and related policy making.

Water-Resources Engineering

A definitive guide, this book focuses on the design and construction of water infrastructure projects within karst formations and provides engineering approaches for preventing and mitigating their environmental problems. It features 200 figures, investigative techniques, practical design solutions, case studies with failure analysis, criteria prop

Water Resources and Environmental Engineering I

The Book Irrigation And Water Resources Engineering Deals With The Fundamental And General Aspects Of Irrigation And Water Resources Engineering And Includes Recent Developments In Hydraulic Engineering Related To Irrigation And Water Resources Engineering. Significant Inclusions In The Book Are A Chapter On Management (Including Operation, Maintenance, And Evaluation) Of Canal

Irrigation In India, Detailed Environmental Aspects For Water Resource Projects, A Note On Interlinking Of Rivers In India, And Design Problems Of Hydraulic Structures Such As Guide Bunds, Settling Basins Etc.The First Chapter Of The Book Introduces Irrigation And Deals With The Need, Development And Environmental Aspects Of Irrigation In India. The Second Chapter On Hydrology Deals With Different Aspects Of Surface Water Resource. Soil-Water Relationships Have Been Dealt With In Chapter 3. Aspects Related To Ground Water Resource Have Been Discussed In Chapter 4. Canal Irrigation And Its Management Aspects Form The Subject Matter Of Chapters 5 And 6. Behaviour Of Alluvial Channels And Design Of Stable Channels Have Been Included In Chapters 7 And 8, Respectively. Concepts Of Surface And Subsurface Flows, As Applicable To Hydraulic Structures, Have Been Introduced In Chapter 9. Different Types Of Canal Structures Have Been Discussed In Chapters 10, 11, And 13. Chapter 12 Has Been Devoted To Rivers And River Training Methods. After Introducing Planning Aspects Of Water Resource Projects In Chapter 14, Embankment Dams, Gravity Dams And Spillways Have Been Dealt With, Respectively, In Chapters 15, 16 And 17.The Students Would Find Solved Examples (Including Design Problems) In The Text, And Unsolved Exercises And The List Of References Given At The End Of Each Chapter Useful.

Statistical Analysis in Water Resources Engineering

Hydraulics has a reputation for being a complex, even intimidating, discipline. Put simply, hydraulics is the study of how water and similar fluids behave and can be harnessed for practical use. It is one of the fundamental scientific and engineering subjects and many professions demand a working knowledge of its basic concepts, yet most hydraulics textbooks are aimed at readers with a strong engineering or mathematical background. Practical Hydraulics approaches the subject from basic principles and demonstrates how these are applied in practice. It is clearly written and includes many illustrations and examples. It will appeal to a wide range of professionals and students needing an introduction to the subject, from farmers irrigating crops to fire crews putting out fires with high-pressure water hoses. However hydraulics is not just about water. Many other fluids behave in the same way and so affect a wide range of people from doctors, needing to know how blood flows in veins, to car designers, wanting to save fuel by reducing drag.

Water Resources Engineering Educational Series: Channel hydraulics

Engineers have attempted to solve water resources engineering problems with the help of empirical, regression-based and numerical models. Empirical models are not universal, nor are regression-based models. The numerical models are, on the other hand, physics-based but require substantial data measurement and parameter estimation. Hence, there is a need to employ models that are robust, user-friendly, and practical and that do not have the shortcomings of the existing methods. Artificial intelligence methods meet this need. Soft Computing in Water Resources Engineering introduces the basics of artificial neural networks (ANN), fuzzy logic (FL) and genetic algorithms (GA). It gives details on the feed forward back propagation algorithm and also introduces neuro-fuzzy modelling to readers. Artificial intelligence method applications covered in the book include predicting

and forecasting floods, predicting suspended sediment, predicting event-based flow hydrographs and sedimentographs, locating seepage path in an earth-fill dam body, and the predicting dispersion coefficient in natural channels. The author also provides an analysis comparing the artificial intelligence models and contemporary non-artificial intelligence methods (empirical, numerical, regression, etc.). The ANN, FL, and GA are fairly new methods in water resources engineering. The first publications appeared in the early 1990s and quite a few studies followed in the early 2000s. Although these methods are currently widely known in journal publications, they are still very new for many scientific readers and they are totally new for students, especially undergraduates. Numerical methods were first taught at the graduate level but are now taught at the undergraduate level. There are already a few graduate courses developed on AI methods in engineering and included in the graduate curriculum of some universities. It is expected that these courses, too, will soon be taught at the undergraduate levels.

Hydrology and Water Resources Engineering

This report provides a broad overview of the interaction between climate variations and water resources engineering.

Hydrology and Water Resource Systems Analysis

Water-resources Engineering

Water is now at the centre of world attention as never before and more professionals from all walks of life are engaging in careers linked to water – in public water supply and waste treatment, agriculture, irrigation, energy, environment, amenity management, and sustainable development. This book offers an appropriate depth of understanding of basic hydraulics and water resources engineering for those who work with civil engineers and others in the complex world of water resources development, management, and water security. It is simple, practical, and avoids (most of) the maths in traditional textbooks. Lots of excellent ‘stories’ help readers to quickly grasp important water principles and practices. This third edition is broader in scope and includes new chapters on water resources engineering and water security. Civil engineers may also find it a useful introduction to complement the more rigorous hydraulics textbooks.

Hydrology and Water Resources Engineering

Discusses the mechanical advantages of Jeeps, Land Rovers, and other rigs and describes optional equipment, driving techniques, and on-the-road repair procedures

Water Resources Systems Analysis

The definitive water quality and treatment resource--fully revised and updated Comprehensive, current, and written by leading experts, Water Quality & Treatment: A Handbook on Drinking Water, Sixth Edition covers state-of-the-art

technologies and methods for water treatment and quality control. Significant revisions and new material in this edition reflect the latest advances and critical topics in water supply and treatment. Presented by the American Water Works Association, this is the leading source of authoritative information on drinking water quality and treatment. NEW CHAPTERS ON: Chemical principles, source water composition, and watershed protection Natural treatment systems Water reuse for drinking water augmentation Ultraviolet light processes Formation and control of disinfection by-products DETAILED COVERAGE OF: Drinking water standards, regulations, goals, and health effects Hydraulic characteristics of water treatment reactors Gas-liquid processes and chemical oxidation Coagulation, flocculation, sedimentation, and flotation Granular media and membrane filtration Ion exchange and adsorption of inorganic contaminants Precipitation, coprecipitation, and precipitative softening Adsorption of organic compounds by activated carbon Chemical disinfection Internal corrosion and deposition control Microbiological quality control in distribution systems Water treatment plant residuals management

Water-Resources Engineering

Designed to provide an up-to-date broad coverage of pertinent topics concerning water resource engineering. This book focuses on modern computer-based modeling and analysis methods, illustrating recent advances in computer technology and computational methods that have greatly increased capabilities for solving water resources engineering problems. Focuses on fundamental topics of hydraulics, hydrology, and water management. Water resources engineering concepts and methods are addressed from the perspective of practical applications in water management and associated environmental and infrastructure management. The focus is on mathematical modeling and analysis using state-of-the-art computational techniques and computer software. Appropriate as a reference in water resources engineering for practicing engineers.

Practical Hydraulics

This print textbook is available for students to rent for their classes. The Pearson print rental program provides students with affordable access to learning materials, so they come to class ready to succeed. Rigorous, in-depth coverage of the fundamentals of water-resources engineering. Water-Resources Engineering sequentially covers the theory and design applications in each of the key areas of water-resources engineering, including hydraulics, hydrology, and water-resources planning and management. It provides students with a firm understanding of the depth and breadth of the technical areas that are fundamental to their discipline, thus encouraging them to be more innovative, view water-resource systems holistically, and be technically prepared for a lifetime of learning. Presented from first principles, the text is rigorous and reinforced by detailed presentations of design applications. The 4th Edition reflects the state-of-the-art of water-resources engineering, with updated and new material throughout. This title is also available digitally as a standalone Pearson eText. Contact your Pearson rep for more information.

Water Resources Engineering

Hydraulic, hydrologic and water resources engineers have been concerned for a long time about failure phenomena. One of the major concerns is the definition of a failure event E, of its probability of occurrence PtE), and of the complementary notion of reliability. However, as the stochastic aspects of hydraulics and water resources engineering were developed, words such as "failure," "reliability," and "risk" took on different meanings for different specialists. For example, "risk" is defined in a Bayesian framework as the expected loss resulting from a precisely defined failure event, while according to the practice of stochastic hydraulics it is the probability of occurrence of a failure event. The need to standardize the various concepts and operational definitions generated numerous exciting discussions between the co-editors of this book during 1983-84 when L. Duckstein, under sponsorship of the Alexander von Humboldt Foundation (FRG), was working with E. Plate at the Institute of Hydrology and Water Resources of the University of Karlsruhe. After consulting with the Scientific Affairs Division of NATO, an organizing committee was formed. This comittee - J. Bernier (France), M. Benedini (Italy), S. Sorooshian (U. S. A.), and co-directors L. Duckstein (U. S. A.) and E. J. Plate (F. R. G.) -- brought into being this NATO Advanced Study Institute (ASI). Precisely stated, the purpose of this ASI was to present a tutorial overview of existing work in the broad area of reliability while also pointing out topics for further development.

Practical Hydraulics and Water Resources Engineering

"Hydrology and Water Resources Engineering illustrates all the terms of the hydrologic cycle and discusses the possible ways of their estimation. Application of the methods to the field problems are discussed extensively. The book focuses primarily on surface water hydrology and all the aspects of hydrologic processes, analysis, and design. All the hydrologic processes and storages such as precipitation, infiltration, evaporation, stream flow-runoff estimation, evapo-transpiration, hydrograph, flood estimation, flood routing, reservoir and sedimentation are covered with a number of alternative approaches to solve the problems, followed by examples, taken from field data to make the readers understand the techniques conceptually."--BOOK JACKET.

Proceedings of the Annual Sanitary and Water Resources Engineering Conference

Water-Resources Engineering provides comprehensive coverage of hydraulics, hydrology, and water-resources planning and management. Presented from first principles, the material is rigorous, relevant to the practice of water resources engineering, and reinforced by detailed presentations of design applications. Prior knowledge of fluid mechanics and calculus (up to differential equations) is assumed.

Water Resources Engineering

This Book Presents A Comprehensive Treatment Of The Various Dimensions Of

Water Resources Engineering. The Fundamental Principles And Design Concepts Relating To Various Structures Are Clearly Highlighted. The Practical Application Of Design Concepts Is Emphasised Throughout The Book.The Text Is Profusely Illustrated By A Large Number Of Detailed Drawings Andphotographs. Several Worked Out Examples Are Also Included For A Better Understanding Of The Concepts.Practice Problems And Questions From Various Examinations Are Given For Exercise And Self-Test.This Revised Edition Includes * A New Chapter On River Diversion Head Works Statistical Analysis Of Rainfall And Run-Off Data * Infiltration Indices And Storage Capacity Of Reservoirs * Design Of Sarda Type Canal Drop * Additional Photographs, Diagrams And Examples.The Book Would Serve As An Ideal Text For B.E. Civil Engineering Students And Amie Candidates. Practising Engineers And Candidates Appearing In Various Competitive Examinations Including Gate, Upsc And Ies Would Also Find This Book Very Useful.

GIS and Geocomputation for Water Resource Science and Engineering

Hydrology and water resources analysis can be looked at together, but this is the only book which presents the relevant material and which bridges the gap between scientific processes and applications in one text. New methods and programs for solving hydrological problems are outlined in a concise and readily accessible form. Hydrology and Water Resource Systems Analysis includes a number of illustrations and tables, with fully solved example problems integrated within the text. It describes a systematic treatment of various surface water estimation techniques; and provides detailed treatment of theory and applications of groundwater flow for both steady-state and unsteady-state conditions; time series analysis and hydrological simulation; floodplain management; reservoir and stream flow routing; sedimentation and erosion hydraulics; urban hydrology; the hydrological design of basic hydraulic structures; storage spillways and energy dissipation for flood control, optimization techniques for water management projects; and methods for uncertainty analysis. It is written for advanced undergraduate and graduate students and for practitioners. Hydrologists and water-related professionals will be helped with an unfamiliar term or a new subject area, or be given a formula, the procedure for solving a problem, or guidance on the computer packages which are available, or shown how to obtain values from a table of data. For them it is a compendium of hydrological practice rather than science, but sufficient scientific background is provided to enable them to understand the hydrological processes in a given problem, and to appreciate the limitations of the methods presented for solving it.

Irrigation and Water Resources Engineering

Discusses the mechanical advantages of Jeeps, Land Rovers, and other rigs and describes optional equipment, driving techniques, and on-the-road repair procedures

Elements of Water Resources Engineering

Urban Water Engineering and Management

GIS and Geocomputation for Water Resource Science and Engineering not only provides a comprehensive introduction to the fundamentals of geographic information systems but also demonstrates how GIS and mathematical models can be integrated to develop spatial decision support systems to support water resources planning, management and engineering. The book uses a hands-on active learning approach to introduce fundamental concepts and numerous case-studies are provided to reinforce learning and demonstrate practical aspects. The benefits and challenges of using GIS in environmental and water resources fields are clearly tackled in this book, demonstrating how these technologies can be used to harness increasingly available digital data to develop spatially-oriented sustainable solutions. In addition to providing a strong grounding on fundamentals, the book also demonstrates how GIS can be combined with traditional physics-based and statistical models as well as information-theoretic tools like neural networks and fuzzy set theory.

Copulas and Their Applications in Water Resources Engineering

In past decades, urban water management practices focused on optimizing the design and operation of water distribution networks, wastewater collection systems, and water and wastewater treatment plants. However, municipalities are now faced with aging urban water infrastructures whose operation must be improved and expanded to maintain current high

Geographic Information Systems in Water Resources Engineering

Focusing on conflict resolution, Water Resources Systems Analysis discusses systematic approaches to the mathematical modeling of various water resources issues, which helps decision-makers allocate water effectively and efficiently. Readers will gain an understanding of simulation, optimization, multi-criterion-decision-making, as well as engineer

Advances in Water Resources Engineering and Management

The Book Conforms To The Modern Concept Of Treating The Diversified Problems Of Water Resources Engineering Through A Multi-Disciplinary And Integrated Approach And Incorporating It In The Educational Curriculum For Effective And Comprehensive Teaching. It Specifically Deals With The Principal Segments Of Water Resources Engineering Which Include Hydrology, Ground Water, Water Management For Irrigation And Power, Flood Control, Engineering Economy In Water Resources Projects For Flood Control, Project Planning In Water Resources, Concrete And Earth Dams.Because Of The Multi-Disciplinary Nature Of Water Resources Engineering Problems, It Is Seldom Possible To Do Full Justice To The Subjects Unless The Teaching Imparts Background Knowledge Of The Allied Disciplines, Viz., Probability And Statistics, Engineering Economics And Systems Engineering. The Book Represents An Attempt To Fulfill This Primal Need.The Book Would Primarily Benefit Students Doing Graduation In Civil Engineering And Those

Appearing In Section-B Examination Of The Institution Of Engineers (India). Besides, Some Of The Topics Covered In The Book Would Also Be Of Much Use By Post-Graduate Students In Water Resources Engineering.

Water Resources Engineering

A dictionary written for the Civil Professional Engineering (PE) exam.

Monographs and Surveys in Water Resources Engineering

"This book will serve the needs of the undergraduate and postgraduate students of civil engineering. Field engineers working in the areas of water resources engineering and agriculture engineering will also find it useful."--Jacket.

Introduction to Water Resources

Water Resources Engineering

Illustration of copula theory with detailed real-world case study examples in the fields of hydrology and water resources engineering.

Water-resources Engineering

Turn on the faucet, and water pours out. Pull out the drain plug, and the dirty water disappears. Most of us give little thought to the hidden systems that bring us water and take it away when we’re done with it. But these underappreciated marvels of engineering face an array of challenges that cannot be solved without a fundamental change to our relationship with water, David Sedlak explains in this enlightening book. To make informed decisions about the future, we need to understand the three revolutions in urban water systems that have occurred over the past 2,500 years and the technologies that will remake the system.div /DIVdivThe author starts by describing Water 1.0, the early Roman aqueducts, fountains, and sewers that made dense urban living feasible. He then details the development of drinking water and sewage treatment systems—the second and third revolutions in urban water. He offers an insider’s look at current systems that rely on reservoirs, underground pipe networks, treatment plants, and storm sewers to provide water that is safe to drink, before addressing how these water systems will have to be reinvented. For everyone who cares about reliable, clean, abundant water, this book is essential reading./DIV

Advances in Water Resources Engineering

Water Resources Engineering

Climate Variations, Climate Change, and Water Resources

Engineering

State-of-the-art GIS spatial data management and analysis tools are revolutionizing the field of water resource engineering. Familiarity with these technologies is now a prerequisite for success in engineers' and planners' efforts to create a reliable infrastructure.GIS in Water Resource Engineering presents a review of the concepts and application

Water-Resources Engineering [rental Edition]

Water Resources Engineering

Modern water conveyance and storage techniques are the product of thousands of years of human innovation; today we rely on that same innovation to devise solutions to problems surrounding the rational use and conservation of water resources, with the same overarching goal: to supply humankind with adequate, clean, freshwater. Water Resources Engineering presents an in-depth introduction to hydrological and hydraulic processes, with rigorous coverage of both core principles and practical applications. The discussion focuses on the engineering aspects of water supply and water excess management, relating water use and the hydrological cycle to fundamental concepts of fluid mechanics, energy, and other physical concepts, while emphasizing the use of up-to-date analytical tools and methods. Now in its Third Edition, this straightforward text includes new links to additional resources that help students develop a deeper, more intuitive grasp of the material, while the depth and breadth of coverage retains a level of rigor suitable for use as a reference among practicing engineers.

Water 4.0

This book presents a thorough concepts and applications of GIS in the various sub-fields of water resources engineering. The book develops a general understanding of the nature of GIS and how it is used to create and analyse geographic data. The book addresses concepts and application in: surface water hydrology, groundwater hydrology, water supply and irrigation systems, flood pain management, water quality, water resource monitoring and forecasting, river basin planning and management. The book introduces primary field data collection methods and describes procedures for interpretation and analysis. Also it focuses on the linkage of GIS data with water resource analysis and management models. Applications are presented with descriptions of GIS in water resources engineering arms engineers and planners with an arsenal of tools to assist in the creation of reliable, environmentally sensitive, infrastructure. The book examines various ways that innovative water resource managers are using spatial analysis and electronic mapping to provide increased functionality and reliability to the complex systems they oversee. The book also discusses GIS important tool for unity, as countries who are seeking acceptance to the economic union must use the technology to bring their water infrastructures into conformance with EU standards.

Water Resources Engineering in Karst

The book is a compilation of the papers presented in the International Conference on Emerging Trends in Water Resources and Environmental Engineering (ETWREE 2017). The high quality papers are written by research scholars and academicians of prestigious institutes across India. The book discusses the challenges of water management due to misuse or abuse of water resources and the ever mounting challenges on use, reuse and conservation of water. It also discusses issues of water resources such as water quantity, quality, management and planning for the benefits of water resource scientists, faculties, policy makers, stake holders working in the water resources planning and management. The research content discussed in the book will be helpful for engineers to solve practical day to day problems related to water and environmental engineering.

Engineering Reliability and Risk in Water Resources

The Handbook of Environmental Engineering series is an incredible collection of methodologies that study the effects of pollution and waste in their three basic forms: gas, solid, and liquid. This exciting new addition to the series, Volume 15: Modern Water Resources Engineering , has been designed to serve as a water resources engineering reference book as well as a supplemental textbook. We hope and expect it will prove of equal high value to advanced undergraduate and graduate students, to designers of water resources systems, and to scientists and researchers. A critical volume in the Handbook of Environmental Engineering series, chapters employ methods of practical design and calculation illustrated by numerical examples, include pertinent cost data whenever possible, and explore in great detail the fundamental principles of the field. Volume 15: Modern Water Resources Engineering, provides information on some of the most innovative and ground-breaking advances in the field today from a panel of esteemed experts.

Soft Computing in Water Resources Engineering

Modern water conveyance and storage techniques are the product of thousands of years of human innovation; today we rely on that same innovation to devise solutions to problems surrounding the rational use and conservation of water resources, with the same overarching goal: to supply humankind with adequate, clean, freshwater. Water Resources Engineering presents an in-depth introduction to hydrological and hydraulic processes, with rigorous coverage of both core principles and practical applications. The discussion focuses on the engineering aspects of water supply and water excess management, relating water use and the hydrological cycle to fundamental concepts of fluid mechanics, energy, and other physical concepts, while emphasizing the use of up-to-date analytical tools and methods. Now in its Third Edition, this straightforward text includes new links to additional resources that help students develop a deeper, more intuitive grasp of the material, while the depth and breadth of coverage retains a level of rigor suitable for use as a reference among practicing engineers.