

Reinforced Concrete Mechanics Design 4th Edition

This textbook describes the basic mechanical features of concrete and explains the main resistant mechanisms activated in the reinforced concrete structures and foundations when subjected to centred and eccentric axial force, bending moment, shear, torsion and prestressing. It presents a complete set of limit-state design criteria of the modern theory of RC incorporating principles and rules of the final version of the official Eurocode 2. This textbook examines methodological more than notional aspects of the presented topics, focusing on the verifications of assumptions, the rigorousness of the analysis and the consequent degree of reliability of results. Each chapter develops an organic topic, which is eventually illustrated by examples in each final paragraph containing the relative numerical applications. These practical end-of-chapter appendices and intuitive flow-charts ensure a smooth learning experience. The book stands as an ideal learning resource for students of structural design and analysis courses in civil engineering, building construction and architecture, as well as a valuable reference for concrete structural design professionals in practice.

Based on the 1995 edition of the American Concrete Institute Building Code, this text explains the theory and practice of reinforced concrete design in a systematic and clear fashion, with an abundance of step-by-step worked examples, illustrations, and photographs. The focus is on preparing students to make the many judgment decisions required in reinforced concrete design, and reflects the author's experience as both a teacher of reinforced concrete design and as a member of various code committees. This edition provides new, revised and expanded coverage of the following topics: core testing and durability; shrinkage and creep; bases the maximum steel ratio and the value of the factor on Appendix B of ACI318-95; composite concrete beams; strut-and-tie models; dapped ends and T-beam flanges. It also expands the discussion of STMs and adds new examples in SI units.

This book is prepared according to the ACI Code 2019 for buildings and AASHTO LRFD Specifications for Bridges 2007. The units used throughout the presentation are the SI units, however, the expressions and examples are also given in US Customary units in the starting chapters to keep continuity with the traditional system of units. It is tried that the three main phases of structural design, namely load determination, design calculations and detailing are introduced to the beginner. This book is useful with the 2nd part of the same book. The comments on the previous editions of the book sent by colleagues, fellow engineers and students are incorporated in this edition. All persons who contributed in this regard are greatly acknowledged. Suggestions for further improvement of the presentation will be appreciated and will be incorporated in the future editions. Structural Cross Sections: Analysis and Design provides valuable information on this key subject covering almost all aspects including theoretical formulation, practical analysis and design computations, various considerations and issues related to cross-sectional behavior, and computer applications for determination of cross-sectional response. The presented approach can handle all complex shapes, material behaviors and configurations. The book starts with a clear and rigorous overview of role of cross-sections and their behavior in overall structural design process. Basic aspects of structural mechanics are reviewed and procedures to determine basic cross-sectional properties, stress and strain distributions, stress resultants and other response parameters, are provided. A brief discussion about the role of material behavior in cross-sectional response is also included. The unified and integrated approach to determine axial-flexural capacity of cross-sections is utilized in development of P-M and M-M interaction diagrams of cross-sections of various shapes. The behavior and design of cross-sections subjected to shear and torsion is also included with emphasis on reinforced concrete sections. Several detailed flow charts are included to demonstrate the procedures used in ACI, BS and Euro codes for design of cross-section subjected to shear and torsion, followed by solved examples. The book also presents the discussion about various factors that can lead to ductile response of cross-sections, especially those made of reinforced concrete. The definition and development of action-deformation curves especially moment-curvature (-) curve is discussed extensively. Various factors such as confinement, rebar distribution and axial load effect on the ductility are shown through examples. The use of moment-curvature curve to compute various section response parameters is also explained though equations and examples. Several typical techniques and materials for retrofitting of cross-sections of reinforced concrete beams, columns and slabs etc. are reviewed. A brief discussion of various informative references related to the evaluation and retrofitting of structures is included for practical applications. Towards the end, the book provides an overview of various software applications available for cross-section design and analysis. A framework for the development of a general-purpose cross-section analysis software, is presented and various features of few commercially available software packages are compared using some example cross-sections. Presents a generalized procedure to compute axial-flexural capacity of cross-sections of any number and configuration of materials Heavily illustrated with schematics, diagrams, and line drawings Includes the convenient approach to develop P-M interaction, M-M Interaction and Moment-Curvature relationships for reinforced concrete cross-sections Provides detailed flowcharts for code-based (ACI, BS and Eurocode) design of reinforced concrete cross-sections subjected to axial-flexural actions as well as shear-torsion. Presents formulae and expressions to compute various commonly used cross-sectional properties of common section shapes Discusses various parameters affecting the ductility of cross-sections and the role of confinement in the behavior reinforced concrete cross-sections Reviews various practical retrofitting techniques to rehabilitate the damaged cross-sections Covers the concepts discussed in main text using various solved and unsolved numerical examples Presents an overview of various computer applications and packages available for analysis of cross-sections Supported by author-developed computer-based apps to be used in conjunction with the practical applications presented in the book

Solutions Manual

4th Edition

Discussions and Problem Solving

*The International Handbook of FRP Composites in Civil Engineering**Reinforced Concrete Fundamentals**9th EAI International Conference, ICAST 2021, Hybrid Event, Bahir Dar, Ethiopia, August 27-29, 2021,**Proceedings, Part II*

Corrosion-resistant, electromagnetic transparent and lightweight fiber-reinforced polymers (FRPs) are accepted as valid alternatives to steel in concrete reinforcement. Reinforced Concrete with FRP Bars: Mechanics and Design, a technical guide based on the authors' more than 30 years of collective experience, provides principles, algorithms, and practical examples. Well-illustrated with case studies on flexural and column-type members, the book covers internal, non-prestressed FRP reinforcement. It assumes some familiarity with reinforced concrete, and excludes prestressing and near-surface mounted reinforcement applications. The text discusses FRP materials properties, and addresses testing and quality control, durability, and serviceability. It provides a historical overview, and emphasizes the ACI technical literature along with other research worldwide. Includes an explanation of the key physical mechanical properties of FRP bars and their production methods Provides algorithms that govern design and detailing, including a new formulation for the use of FRP bars in columns Offers a justification for the development of strength reduction factors based on reliability considerations Uses a two-story building solved in Mathcad® that can become a template for real projects This book is mainly intended for practitioners and focuses on the fundamentals of performance and design of concrete members with FRP reinforcement and reinforcement detailing. Graduate students and researchers can use it as a valuable resource. Antonio Nanni is a professor at the University of Miami and the University of Naples Federico II. Antonio De Luca and Hany Zadeh are consultant design engineers.

There are many regions worldwide which are susceptible to extreme loads such as earthquakes. These can cause loss of life and adverse impacts on civil infrastructures, the environment, and communities. A series of methods and measures have been used to mitigate the effects of these extreme loads. The adopted approaches and methods must enable civil structures to be resilient and sustainable. Therefore, to reduce damage and downtime in addition to protecting life and promoting safety, new resilient structure technologies must be proposed and developed. This special issue book focuses on methods of enhancing the sustainability and resilience of civil infrastructures in the event of extreme loads (e.g., earthquakes). This book contributes proposals of and theoretical, numerical, and experimental research on new and resilient civil structures and their structural performance under extreme loading events. These works will certainly play a significant role in promoting the application of new recoverable structures. Moreover, this book also introduces some case studies discussing the implementation of low-damage structural systems in buildings as well as articles on the development of design philosophies and performance criteria for resilient buildings and new sustainable communities. Shallow Foundations: Discussions and Problem Solving is written for civil engineers and all civil engineering students taking courses in soil mechanics and geotechnical engineering. It covers the analysis, design and application of shallow foundations, with a primary focus on the interface between the structural elements and underlying soil. Topics such as site investigation, foundation contact pressure and settlement, vertical stresses in soils due to foundation loads, settlements, and bearing capacity are all fully covered, and a chapter is devoted to the structural design of different types of shallow foundations. It provides essential data for the design of shallow foundations under normal circumstances, considering both the American (ACI) and the European (EN) Standard Building Code Requirements, with each chapter being a concise discussion of critical and practical aspects. Applications are highlighted through solving a relatively large number of realistic problems. A total of 180 problems, all with full solutions, consolidate understanding of the fundamental principles and illustrate the design and application of shallow foundations.

The 14th edition of the classic text, Design of Concrete Structures, is completely revised using the newly released 2008 ACI (American Concrete Institute) Code. This new edition has the same dual objectives as the previous editions; first to establish a firm understanding of the behavior of structural concrete, then to develop proficiency in the methods used in current design practice. Design of Concrete Structures covers the behavior and design aspects of concrete and provides updated examples and homework problems. New material on slender columns, seismic design, anchorage using headed deformed bars, and reinforcing slabs for shear using headed studs has been added. The notation has been thoroughly updated to match changes in the ACI Code. The text also presents the basic mechanics of structural concrete and methods for the design of individual members for bending, shear, torsion, and axial force, and provides detail in the various types of structural systems applications, including an extensive presentation of slabs, footings, foundations, and retaining walls.

*Structural Analysis Fundamentals**Structural Investigation for Reinforcing Congestion Alleviation in Concrete Members and Connections**Experiment-Based Structural Mechanics**Analysis and Design**Modern Protective Structures*

Reinforced Concrete with FRP Bars

Civil Engineer's Reference Book, Fourth Edition provides civil engineers with reports on design and construction practices in the UK and overseas. It gives a concise presentation of theory and practice in the many branches of a civil engineer's profession and it enables them to study a subject in greater depth. The book discusses some improvements in earlier practices, for example in surveying, geotechnics, water management, project management, underwater working, and the control and use of materials. Other changes covered are from the evolving needs of clients for almost all forms of construction, maintenance and repair. Another major change is the introduction of new national and Euro-codes based on limit state design, covering most aspects of structural engineering. The fourth edition incorporates these advances and, at the same time, gives greater prominence to the special problems relating to work overseas, with differing client requirements and climatic conditions. Chapters 1 to 10 provide engineers, at all levels of development, with 'lecture notes' on the basic theories of civil engineering. Chapters 11 to 44 cover the practice of design and construction in many of the fields of civil engineering. Civil engineers, architects, lawyers, mechanical engineers, insurers, clients, and students of civil engineering will find benefit in the use of this text.

Fiber-reinforced polymer (FRP) composites have become an integral part of the construction industry because of their versatility, enhanced durability and resistance to fatigue and corrosion, high strength-to-weight ratio, accelerated construction, and lower maintenance and life-cycle costs. Advanced FRP composite materials are also emerging for a wide range of civil infrastructure applications. These include everything from bridge decks, bridge strengthening and repairs, and seismic retrofit to marine waterfront structures and sustainable, energy-efficient housing. The International Handbook of FRP Composites in Civil Engineering brings together a wealth of information on advances in materials, techniques, practices, nondestructive testing, and structural health monitoring of FRP composites, specifically for civil infrastructure. With a focus on professional applications, the handbook supplies design guidelines and standards of practice from around the world. It also includes helpful design formulas, tables, and charts to provide immediate answers to common questions. Organized into seven parts, the handbook covers: FRP fundamentals, including history, codes and standards, manufacturing, materials, mechanics, and life-cycle costs Bridge deck applications and the critical topic of connection design for FRP structural members External reinforcement for rehabilitation, including the strengthening of reinforced concrete, masonry, wood, and metallic structures FRP composites for the reinforcement of concrete structures, including material characteristics, design procedures, and quality assurance-quality control (QA/QC) issues Hybrid FRP composite systems, with an emphasis on design, construction, QA/QC, and repair Quality control, quality assurance, and evaluation using nondestructive testing, and in-service monitoring using structural health monitoring of FRP composites, including smart composites that can actively sense and respond to the environment and internal states FRP-related books, journals, conference proceedings, organizations, and research sources Comprehensive yet concise, this is an invaluable reference for practicing engineers and construction professionals, as well as researchers and students. It offers ready-to-use information on how FRP composites can be more effectively utilized in new construction, repair and reconstruction, and architectural engineering.

This book is prepared according to the 2019 ACI Code for buildings and 2007 AASHTO LRFD Specifications for bridges. The units used throughout the presentation are the SI units according to the official system of units in Pakistan. As in Part-I of the same series of books, it is tried that the three main phases of structural design, namely load determination, design calculations and detailing are together introduced to the beginner. In this set of two books, besides the usual reinforced concrete design, retaining walls, yield line and strip method of slab design, slabs-on-grade, moment-curvature relationships, water retaining structures, prestressed concrete, dome design, special types of stairs, machine foundations, pipe design for D-load, bridge super-structure design, bridge sub-structure design, ordinary RC wall subjected to in-plane and out-of-plane bending, special RC wall, coupling beam, basics of formwork design, plain concrete properties and repair / rehabilitation of concrete structures are also presented. This book is useful with the 1st part of the same book.

Covering the broad spectrum of modern structural engineering topics, the Handbook of Structural Engineering is a complete, single-volume reference. It includes the theoretical, practical, and computing aspects of the field, providing practicing engineers, consultants, students, and other interested individuals with a reliable, easy-to-use source of information. Divided into three sections, the handbook covers:

LRFD Approaches to Design and Analysis
 Mechanics and Design, Global Edition
 Design of Reinforced Concrete
 Handbook of Structural Engineering
 Reinforced Concrete Beams, Columns and Frames
 Structural Cross Sections

This introduction to the principles of concrete mechanics and design focuses on the fundamentals - from very basic, elementary to the very complicated concepts and features an easy-to-follow yet thorough step-by-step design methodology. *emphasizes basic principles of the mechanics aspects of concrete design and avoids explanations of the detail requirements which can be found in the ACI Code and Commentary. *surveys modern design philosophies and features an amply illustrated tour of the world of concrete. *carefully lays out the various design procedures step-by-step - for flexural design, shear design, column design, etc, prepares and encourages students to program procedures for computer solution. Instructors, at their own discretion, can suggest follow-up coding assignment. *goes beyond the traditional description of materials to provide substantive coverage of concrete, current concrete technology, and the durability of materials - especially since many engineers will find themselves repairing, rehabilitating, and strengthening existing structures, rather than designing new ones. *explores the interrelationship between design and analysis - a typical problem area for students, especially in relation to statically indeterminate structures, reviews some structural analysis methods for continuous beams and frames, especially those methods that designers will find useful for checking purposes - e.g., moment distribution, explains how the behavior of structures can be controlled through design decisions. *includes sections on basic plate theory

and yield line theory as supplements to the common design procedures of the ACI Code. *contains important optional topics that students can master through self-study after understanding the basics such as torsion, slab design, footings, and retaining walls. *includes many easy-to-follow examples worked out in great detail. *contains a large number of illustrations. *features very carefully designed problem sets that require students to think and appreciate various physical aspects of what they are doing. *contains a comprehensive glossary of terms common in concrete engineering and the construction industry. Definitions are based largely on The Cement and Concrete Terminology Report of ACI Committee 116.

An exploration of the world of concrete as it applies to the construction of buildings, Reinforced Concrete Design of Tall Buildings provides a practical perspective on all aspects of reinforced concrete used in the design of structures, with particular focus on tall and ultra-tall buildings. Written by Dr. Bungale S. Taranath, this work explains the fundamental principles and state-of-the-art technologies required to build vertical structures as sound as they are eloquent. Dozens of cases studies of tall buildings throughout the world, many designed by Dr. Taranath, provide in-depth insight on why and how specific structural system choices are made. The book bridges the gap between two approaches: one based on intuitive skills and experience and the other based on computer skills and analytical techniques. Examining the results when experiential intuition marries unfathomable precision, this book discusses: The latest building codes, including ASCE/SEI 7-05, IBC-06/09, ACI 318-05/08, and ASCE/SEI 41-06 Recent developments in studies of seismic vulnerability and retrofit design Earthquake hazard mitigation technology, including seismic base isolation, passive energy dissipation, and damping systems Lateral bracing concepts and gravity-resisting systems Performance based design trends Dynamic response spectrum and equivalent lateral load procedures Using realistic examples throughout, Dr. Taranath shows how to create sound, cost-efficient high rise structures. His lucid and thorough explanations provide the tools required to derive systems that gracefully resist the battering forces of nature while addressing the specific needs of building owners, developers, and architects. The book is packed with broad-ranging material from fundamental principles to the state-of-the-art technologies and includes techniques thoroughly developed to be highly adaptable. Offering complete guidance, instructive examples, and color illustrations, the author develops several approaches for designing tall buildings. He demonstrates the benefits of blending imaginative problem solving and rational analysis for creating better structural systems.

High strength fibre composites (FRPs) have been used with civil structures since the 1980s, mostly in the repair, strengthening and retrofitting of concrete structures. This has attracted considerable research, and the industry has expanded exponentially in the last decade. Design guidelines have been developed by professional organizations in a number of countries including USA, Japan, Europe and China, but until now designers have had no publication which provides practical guidance or accessible coverage of the fundamentals. This book fills this void. It deals with the fundamentals of composites, and basic design principles, and provides step-by-step guidelines for design. Its main theme is the repair and retrofit of un-reinforced, reinforced and prestressed concrete structures using carbon, glass and other high strength fibre composites. In the case of beams, the focus is on their strengthening for flexure and shear or their stiffening. The main interest with columns is the improvement of their ductility; and both strengthening and ductility improvement of un-reinforced structures are covered. Methods for evaluating the strengthened structures are presented. Step by step procedures are set out, including flow charts, for the various structural components, and design examples and practice problems are used to illustrate. As infrastructure ages worldwide, and its demolition and replacement becomes less of an option, the need for repair and retrofit of existing facilities will increase. Besides its audience of design professionals, this book suits graduate and advanced undergraduate students.

In today's world, reasonably predictable military operations have been replaced by low intensity conflicts-less predictable terrorist activities carried out by determined individuals or small groups that possess a wide range of backgrounds and capabilities. Because of the threats posed by this evolving type of warfare, civil engineers and emergency personnel face new challenges in designing facilities to protect lives and property and in conducting effective rescue operations and forensic investigations. Addressing these needs, Modern Protective Structures develops realistic guidelines for the analysis, design, assessment, retrofit, and research of protected facilities. After introducing a comprehensive risk management approach, the author provides a general background on explosive devices and their capabilities as well as explosive effects and the processes that generate them. He then discusses the effects of conventional and nuclear explosions. The book subsequently considers the significant design differences between conventional and nuclear loads and between existing design procedures and state-of-the-art information from recent research. It also summarizes existing blast-resistant design approaches and describes the dynamic responses of structural systems to blasts, shocks, and impacts. Additional coverage includes the behavior of specific structural connections, the traditional concept of P-I diagrams, and progressive collapse. The book concludes with a systematic and balanced protective design approach. Tackling the analytical, design, assessment, and hazard mitigation issues associated with short-duration dynamic loads, this book examines how impulsive loads affect various types of buildings and facilities. It provides the necessary material to help ensure the safety of persons, assets, and projects.

Principles of Reinforced Concrete Design

Design of Concrete Structures with Stress Fields

An Overview

Design of Concrete Structures

Highway Bridge Superstructure Engineering

Advances of Science and Technology

17 2 STRESS FIELDS FOR SIMPLE STRUCTURES 2. 1 INTRODUCTION In this chapter the behavior and strength of simple structures made of reinforced or prestressed concrete is investigated with the aid of stress fields. In particular, the webs and flanges of beams, simple walls, brackets, bracing beams and joints of frames are investigated. By this means, the majority of design

cases are already covered. In reality, all structural components are three-dimensional. Here, however, components are considered either directly as two-dimensional plate elements (i. e. the plane stress condition with no variation of stress over the thickness of the element) or they are subdivided into several plates. Since two-dimensional structural elements are statically redundant, it is possible for a particular loading to be in equilibrium with many (theoretically an infinite number of) stress states. If the lower bound method of the theory of plasticity is employed, then an admissible stress field or any combination of such stress fields may be selected. In chapter 4 it is shown that this method is suitable for the design of reinforced concrete structures, and the consequence of the choice of the final structural system on the structural behavior is dealt with in detail. The first cases of the use of this method date back to Ritter [6] and Morsch [4], who already at the beginning of the century investigated the resultants of the internal stresses by means of truss models.

The purpose of this text is to provide a straightforward introduction to the principles and methods of design for concrete structures. The theory and practice described are of fundamental nature and will be of use internationally.

This book describes the application of nonlinear static and dynamic analysis for the design, maintenance and seismic strengthening of reinforced concrete structures. The latest structural and RC constitutive modelling techniques are described in detail, with particular attention given to multi-dimensional cracking and damage assessment, and their practical applications for performance-based design. Other subjects covered include 2D/3D analysis techniques, bond and tension stiffness, shear transfer, compression and confinement. It can be used in conjunction with WCOMD and COM3 software. *Nonlinear Mechanics of Reinforced Concrete* presents a practical methodology for structural engineers, graduate students and researchers concerned with the design and maintenance of concrete structures.

Manual of numerical methods in concrete aims to present a unified approach for the available mathematical models of concrete, linking them to finite element analysis and to computer programs in which special provisions are made for concrete plasticity, cracking and crushing with and without concrete aggregate interlocking. Creep, temperature, and shrinkage formulations are included and geared to various concrete constitutive models.

Concrete Structures, Part-I

Reinforced Concrete Structures: Analysis and Design

Design of Prestressed Concrete

Resilience and Sustainability of Civil Infrastructures under Extreme Loads

Reinforced Concrete

FRP Composites for Reinforced and Prestressed Concrete Structures

Structural Analysis Fundamentals presents fundamental procedures of structural analysis necessary for teaching undergraduate and graduate and structural design practice. It applies linear analysis of structures of all types, including beams, plane and space trusses, plane and space plane and eccentric grids, plates and shells, and assemblage of finite elements. It also treats plastic and time-dependent responses of structures under loading, as well as dynamic analysis of structures and their responses to earthquakes. Geometric nonlinearity in analysis of cable nets and arches are examined. This is an ideal text for basic and advanced material for use in undergraduate and higher courses. A companion set of computer programs assist in a thorough understanding and application of analysis procedures. The authors provide a special program for each structure and procedure. Unlike commercial software, the user can apply any program of the set without a manual or training period. Students, lecturers and engineers internationally employ the procedures presented in this text and its companion website. Ramez Gayed is a civil engineering professor and adjunct professor at the University of Calgary. He is an expert in the analysis and design of concrete and steel structures. Amin Ghali is an emeritus professor at the University of Calgary, a consultant on major international structures, and the inventor of several reinforcing systems for concrete. He has authored over 300 papers, fifteen books and editions on structural analysis and design, and eight patents.

This book is focused on the theoretical and practical design of reinforced concrete beams, columns and frame structures. It is based on the design approach of designing normal reinforced concrete structural elements that are compatible with most international design rules, including the European design rules – Eurocode 2 – for reinforced concrete structures. The book tries to distinguish between what belongs to the design philosophy of such structural elements (related to strength of materials arguments) and what belongs to the design rule aspect (related to specific characteristic data (for the material or loading parameters)). A previous book, entitled *Reinforced Concrete Beams, Columns and Slabs: Mechanics and Design*, deals with the fundamental aspects of the mechanics and design of reinforced concrete in general, both related to the Serviceability Limit State (SLS) and the Ultimate Limit State (ULS), whereas the current book deals with more advanced ULS aspects, such as instability and second-order analysis aspects. Some recent research results including the use of non-local mechanics are also presented. This book is aimed at Masters-level students, engineers, researchers and teachers in the field of reinforced concrete design. Most of the books in this series are practical or code-oriented, whereas this book is more theoretically based, using rigorous mathematics and mechanics tools. Contents: 1. Design at Ultimate Limit State (ULS). 2. Slender Compression Members – Mechanics and Design. 3. Approximate Analysis Methods. Appendix 1. Cardano's Method. Appendix 2. Steel Reinforcement Table. About the Authors Jostein Hellesland has been Professor of Structural Mechanics at the University of Oslo, Norway since January 1988. His contribution to the field of stability has been recognized and magnified by many high quality papers in famous international journals such as *Engineering Structures*, *Thin-Walled Structures*, *Journal of Constructional Steel Research*, *Journal of Structural Engineering*. Noël Challamel is Professor in Civil Engineering at UBS, University of South Brittany in France and chairman of the EMI-ASCE Stability committee. His contributions mainly concern the dynamics, stability and inelastic behavior of structural components with special emphasis on Continuum Damage Mechanics (more than 70 publications in International peer-reviewed journals). Charles Casandjari is formerly Associate Professor at INSA (French National Institute of Applied Sciences), Rennes, France and the chairman of the course on reinforced concrete design. He has published work on the mechanics of concrete and is also involved in creating a web experience for teaching reinforced concrete design – BA-CORTEX. Christophe Lanos is Professor in Civil Engineering at the University of Rennes 1 in France. He has mainly published work on the mechanics of concrete, as well as other related subjects. He is also involved in creating a web experience for teaching reinforced concrete design – BA-CORTEX.

Design of Reinforced Concrete, 10th Edition by Jack McCormac and Russell Brown, introduces the fundamentals of reinforced concrete design in a clear and comprehensive manner and grounded in the basic principles of mechanics of solids. Students build on their understanding of basic

mechanics to learn new concepts such as compressive stress and strain in concrete, while applying current ACI Code.

For courses in architecture and civil engineering. Reinforced Concrete: Mechanics and Design uses the theory of reinforced concrete to teach students the basic scientific and artistic principles of civil engineering. The text takes a topic often introduced at the advanced level and makes it accessible to all audiences by building a foundation with core engineering concepts. The Seventh Edition is up-to-date with the latest Eurocode 2 Structural Concrete, giving students access to accurate information that can be applied outside of the classroom. Students are able to apply engineering concepts to real world scenarios with in-text examples and practice problems in each chapter. With explanatory features throughout, the Seventh Edition makes the reinforced concrete design a theory all engineers can learn from.

To Eurocode 2

Reinforced Concrete Design to Eurocodes

Design Theory and Examples, Fourth Edition

Non-Linear Mechanics of Reinforced Concrete

Structural Analysis

Reinforced Concrete Design of Tall Buildings

Concrete is an integral part of twenty-first century structural engineering, and an understanding of how to analyze and design concrete structures is a vital part of training as a structural engineer. With Eurocode legislation increasingly replacing British Standards, it's also important to know how this affects the way you can work with concrete. Newly revised to Eurocode 2, this second edition retains the original's emphasis on qualitative understanding of the overall behaviour of concrete structures. Now expanded, with a new chapter dedicated to case studies, worked examples, and exercise examples, it is an even more comprehensive guide to conceptual design, analysis, and detailed design of concrete structures. The book provides civil and structural engineering students with complete coverage of the analysis and design of reinforced and prestressed concrete structures. Great emphasis is placed on developing a qualitative understanding of the overall behaviour of structures.

In this book, three potential solutions to the issue of steel congestion in reinforced concrete (RC) structures are researched. The first method examines RC mixed with steel fibers. The use of steel fibers instead of stirrups results in the reduction of reinforcing congestion in a manner which is both effective in reducing the effects of congestion and practical to implement. In the second method, reinforcing congestion in RC or prestressed concrete (PC) structures is effectively reduced by t ...

This textbook demonstrates theoretical principles and actual cases of structural mechanics. This book explains basic definitions of beam, frame, and truss which are widely used in the field of structure mechanics and also shows important engineering tests such as moment distribution, characteristics of member section, analysis of a truss, analysis of a statically indeterminate structure, and principle of bending resistance of concrete section. These contents can help many students to figure out the resistance principle of a structure through simple model tests, dynamics, reinforced concrete structure, steel frame structure and understand how dynamic computational equation is mathematically used in structure mechanics.

A How-To Guide for Bridge Engineers and Designers Highway Bridge Superstructure Engineering: LRFD Approaches to Design and Analysis provides a detailed discussion of traditional structural design perspectives, and serves as a state-of-the-art resource on the latest design and analysis of highway bridge superstructures. This book is applicable to highway bridges of all construction and material types, and is based on the load and resistance factor design (LRFD) philosophy. It discusses the theory of probability (with an explanation leading to the calibration process and reliability), and includes fully solved design examples of steel, reinforced and prestressed concrete bridge superstructures. It also contains step-by-step calculations for determining the distribution factors for several different types of bridge superstructures (which form the basis of load and resistance design specifications) and can be found in the AASHTO LRFD Bridge Design Specifications. Fully Realize the Basis and Significance of LRFD Specifications Divided into six chapters, this instructive text: Introduces bridge engineering as a discipline of structural design Describes numerous types of highway bridge superstructures systems Presents a detailed discussion of various types of loads that act on bridge superstructures and substructures Discusses the methods of analyses of highway bridge superstructures Includes a detailed discussion of reinforced and prestressed concrete bridges, and slab-steel girder bridges Highway Bridge Superstructure Engineering: LRFD Approaches to Design and Analysis can be used for teaching highway bridge design courses to undergraduate- and graduate-level classes, and as an excellent resource for practicing engineers.

Reinforced Concrete Design to Eurocode 2

The Complete Process, Second Edition

Sustainable Architectural Design

A Unified Classical and Matrix Approach, Seventh Edition

PRO 30: 4th International RILEM Workshop on High Performance Fiber Reinforced Cement Composites (HPFRCC 4)

Modelling and Applications Validated by Experimental and Site-monitoring Data

This comprehensive textbook combines classical and matrix-based methods of structural analysis and develops them concurrently. It is widely used by civil and structural engineering lecturers and students because of its clear and thorough style and content. The text is used for undergraduate and graduate courses and serves as reference in structural engineering practice. With its six translations, the book is used internationally, independent of codes of practice and regardless of the adopted system of units. Now in its seventh edition: the introductory background material has been reworked and enhanced throughout, and particularly in early chapters, explanatory notes, new examples and problems are inserted for more clarity., along with 160 examples and 430 problems with solutions. dynamic analysis of structures, and applications to vibration and earthquake problems, are presented in new sections and in two new chapters the companion website provides an enlarged set of 16 computer programs to assist in teaching and learning linear and nonlinear structural analysis. The source code, an executable file, input example(s) and a brief manual are provided for each program.

This Fifth Edition maintains the basic Ferguson approach in which design procedures stem from and provide the basis for a clear understanding of the behavior of reinforced concrete. Behavior of reinforced concrete members and assemblages at every load stage is illustrated with illustrations and photos, and calculation models that relate to the physical behaviors are provided to help students and practitioners recognize and assess various design situations. To avoid confusion, many of the examples now use customary or English units, rather than SI units as in the Fourth Edition. This edition conforms to the technical changes in the '83 and '86 revisions to the ACI Building Code. In this edition, service load analysis of stresses, computations of deflection and distribution of reinforcement to control crack widths have been incorporated with the sections that treat analysis and design of flexural members. Material relating to seismic design has been revised and expanded, and more emphasis has been placed on developing conceptual models for design.

This book is a guide to a sustainable design process that moves from theory, to site and energy use, to building systems, and finally to evaluation and case studies, so you can integrate design and technology for effective sustainable building. Kuppaswamy Iyengar shows you how to get it right the first time, use free energy systems, and utilise technologies that minimize fossil fuel use. Each chapter has a sustainable design overview, technical details and strategies marked by clear sections, a summary, and further resources. Heavily illustrated with charts, tables, drawings, photographs, and case studies, the book shows technologies and concepts integrated into cohesive project types, from small and large office spaces to single and multiuse residences, hospitals, schools, restaurants, and warehouses to demonstrate implementing your designs to meet clients' needs now and for the future. Includes an overview of alternate assessment and evaluation systems such as BREEAM, CASBEE, GBTool, Green Globes alongside LEED, ECOTECT, energy 10, HEED and eQuest simulation programs. The guide reveals the importance of the building envelope—walls, superstructure, insulation, windows, floors, roofs, and building materials—on the environmental impact of a building, and has a section on site systems examining site selection, landscape design, thermal impact, and building placement.

This established and popular textbook has now been extensively rewritten and expanded in line with the current Eurocodes. It presents the principles of the design of concrete elements and also the design of complete structures, and provides practical illustrations of the theory. It explains the background to the Eurocode rules and goes beyond the c

A Guide to Fundamentals and Design for Repair and Retrofit
Concrete Structures Part-II 4th Ed.

Civil Engineer's Reference Book

Reinforced Concrete Design

Mechanics and Design

Reinforced and Prestressed Concrete Design to EC2

Reinforced concrete design encompasses both the art and science of engineering. This book presents the theory of reinforced concrete as a direct application of the laws of statics and mechanics of materials. In addition, it emphasizes that a successful design not only satisfies design rules, but also is capable of being built in a timely fashion and for a reasonable cost. A multi-tiered approach makes Reinforced Concrete: Mechanics and Design an outstanding textbook for a variety of university courses on reinforced concrete design. Topics are normally introduced at a fundamental level, and then move to higher levels where prior educational experience and the development of engineering judgment will be required.

A PRACTICAL GUIDE TO REINFORCED CONCRETE STRUCTURE ANALYSIS AND DESIGN Reinforced Concrete Structures explains the underlying principles of reinforced concrete design and covers the analysis, design, and detailing requirements in the 2008 American Concrete Institute (ACI) Building Code Requirements for Structural Concrete and Commentary and the 2009 International Code Council (ICC) International Building Code (IBC). This authoritative resource discusses reinforced concrete members and provides techniques for sizing the cross section, calculating the required amount of reinforcement, and detailing the reinforcement. Design procedures and flowcharts guide you through code requirements, and worked-out examples demonstrate the proper application of the design provisions. COVERAGE INCLUDES: Mechanics of reinforced concrete Material properties of concrete and reinforcing steel Considerations for analysis and design of reinforced concrete structures Requirements for strength and serviceability Principles of the strength design method Design and detailing requirements for beams, one-way slabs, two-way slabs, columns, walls, and foundations

Encouraging creative uses of reinforced concrete, Principles of Reinforced Concrete Design draws a clear distinction between fundamentals and professional consensus. This text presents a mixture of fundamentals along with practical methods. It provides the fundamental concepts required for designing reinforced concrete (RC) structures, emphasizing principles based on mechanics, experience, and experimentation, while encouraging practitioners to consult their local building codes. The book presents design choices that fall in line with the boundaries defined by professional consensus (building codes), and provides reference material outlining the design criteria contained in building codes. It includes applications for both building and bridge structural design, and it is applicable worldwide, as it is not dependent upon any particular codes. Contains concise coverage that can be taught in one semester Underscores the fundamental principles of behavior Provides students with an understanding of the principles upon which codes are based Assists in navigating the labyrinth of ever-changing codes Fosters an inherent understanding of design The text also provides a brief history of reinforced concrete. While the initial attraction for using reinforced concrete in building construction has been attributed to its fire resistance, its increase in popularity was also due to the creativity of engineers who kept extending its limits of application. Along with height achievement, reinforced concrete gained momentum by providing convenience, plasticity, and low-cost economic appeal. Principles of Reinforced Concrete Design provides undergraduate students with the fundamentals of mechanics and direct observation, as well as the concepts required to design reinforced concrete (RC) structures, and applies to both building and bridge structural design.

Publisher Description

Shallow Foundations

Section and Slender Member Analysis

Manual of Numerical Methods in Concrete