

Irrigation And Drainage Engineering

Sustainability of Irrigated Agriculture
Microirrigation for Crop Production
Sustainable Irrigation and Drainage
IV Canal Automation
Management, Operation, and Maintenance of Irrigation and Drainage Systems
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A Guide to Golf Course Irrigation System Design and Drainage
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Irrigation and Drainage
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Automatic Control, Mechatronics and Industrial Engineering
Pipelines for Water Conveyance and Drainage
Irrigation And Drainage
Trickle Irrigation for Crop Production
Drainage Engineering: Principles and Practices
Planning and Evaluation of Irrigation Projects
Engineering Practices for Management of Soil Salinity

Sustainability of Irrigated Agriculture

Planning and Evaluation of Irrigation Projects: Methods and Implementation presents the considerations, options and factors necessary for effective implementation of irrigation strategies, going further to provide methods for evaluating the efficiency of systems-in-place for remedial correction as needed. As the first book to take this lifecycle approach to agricultural irrigation, it includes real-world examples not only on natural resource availability concerns, but also on financial impacts and measurements. With 21 chapters divided into two sections, this book is a valuable resource for agricultural and hydrology engineers, conservation scientists and anyone seeking to implement and maintain irrigation systems. Uses real-world examples to present practical insights
Incorporates both planning and evaluation for full-scope understanding and application
Illustrates both potential benefits and limitations of irrigation solutions
Provides potential means to increase crop productivity that can result in improved farm income

Microirrigation for Crop Production

A Guide to Golf Course Irrigation System Design and Drainage details every phase of an irrigation program - from the system design to construction, from scheduling to operation, and much more. It also covers the fundamentals of drainage design and installation. Turfgrass managers and golf course superintendents will refer to this handy book often to plan and implement effective irrigation systems, ensure appropriate capacity, easy installation, and practical operation and maintenance.

Sustainable Irrigation and Drainage IV

Irrigated agriculture and the use of water resources in agriculture face the challenges of sustainable development. Research has advanced our knowledge of water use by crops, soil-water-solutes interactions, and the engineering and managerial tools needed to mobilize, convey, distribute, control and apply water for agricultural production. However, the achievements booked in user practice have revealed the need for new developments in the areas of resource conservation, control of environmental and health impacts, modernisation of technologies and management, economic viability and the social acceptance of changes. The contributions to Sustainability of Irrigated Agriculture cover most of the relevant disciplines. Besides its multidisciplinary, the different origins, experience, backgrounds and practices of the authors provide a wide, in-depth analysis of the various aspects of water resource utilization in agriculture. The papers review scientific, technical and managerial aspects, highlighting the main problems, issues and future developments. The book covers the different aspects of sustainability, including environmental, technical, economic, institutional and social ones. Advances in irrigation science and engineering are dealt with, both on- and off-farm. Special attention is paid to the different components of water quality management, to the transfer of technology, and to capacity building.

Canal Automation

This monograph provides an overview of the principles required for a service orientation in the management of irrigation and drainage systems. The material covered is designed to emphasize an area largely neglected in the irrigation and drainage management literature. The dominating philosophy underlying this book is that irrigation and drainage systems must be managed as a service business responsive to the needs and changing requirements of its customers. It is postulated that this service approach to the management of irrigation and drainage systems constitutes a key element of the strategy that is needed to improve the current level of performance of many irrigation and drainage systems worldwide. Enhanced performance of irrigation is a prerequisite if we are to face the enormous challenge of producing greater quantities of food to meet the demand of a growing population. This is particularly the case in an environment with increasing competition for water from industry and urban water users, set against mounting concerns about environmental sustainability.

Management, Operation, and Maintenance of Irrigation and Drainage Systems

This paper provides the basis for the preparation of manuals necessary for managers and staffs to perform needed activities at the proper time. The guide provides a comprehensive list of issues that should be addressed in operation and maintenance manuals for irrigation and drainage systems, and a listing of published materials and working papers which will assist in the formulation of plans for operation and maintenance. The paper serves as a valuable tool to help improve the performance of irrigation and drainage systems and to assist managers in developing and improving effective organizations to serve water consumers better.

A Handbook On Irrigation And Drainage

This textbook focuses specifically on the combined topics of irrigation and drainage engineering. It emphasizes both basic concepts and practical applications of the latest technologies available. The design of irrigation, pumping, and drainage systems using Excel and Visual Basic for Applications programs are explained for both graduate and undergraduate students and practicing engineers. The book emphasizes environmental protection, economics, and engineering design processes. It includes detailed chapters on irrigation economics, soils, reference evapotranspiration, crop evapotranspiration, pipe flow, pumps, open-channel flow, groundwater, center pivots, turf and landscape, drip, orchards, wheel lines, hand lines, surfaces, greenhouse hydroponics, soil water movement, drainage systems design, drainage and wetlands contaminant fate and transport. It contains summaries, homework problems, and color photos. The book draws from the fields of fluid mechanics, soil physics, hydrology, soil chemistry, economics, and plant sciences to present a broad interdisciplinary view of the fundamental concepts in irrigation and drainage systems design.

Land Drainage and Irrigation

The sustainability of irrigation and drainage in the face of many variants and constraints like availability of water as a resource, ecological balance, socio-cultural impacts, and climate change effects lies in the strategies adopted and systems emplaced. It has always remained a challenge for the users of irrigation waters to maintain sustainability in quality and quantity. This book aims to explore frontiers of knowledge in coining sustainable strategies and systems direly needed in managing the quality and quantity of water required for crop irrigation, surface and root zone drainage and flood management using available tools of research and development?. Eminent authors and their colleagues possessing varied professional backgrounds and expertise have dealt with these issues concerning the strategies and systems of irrigation and drainage. This book will prove to be beneficial for crop growers, agricultural engineers, water resource managers, academicians and graduate students alike.

Irrigation Management

Primarily written as course material on flood control and drainage engineering for advanced students of civil engineering, this third edition is thoroughly revised. It accommodates recent developments in remote sensing, information technology and GIS technology. New additional material deals with problems of flood forecasting, flood plain prioritization and flood hazard zoning, and engineering measures for flood control. Drainage improvement is tackled, with particular regard to salinity and coastal aquifer management from the ingress of sea water. The book includes design problem-solving and case studies, making it practical and applications-oriented. The subject matter will be of considerable interest to civil engineers, agricultural engineers, architects and town planners, as well as other government and non-government organizations

Sustainable Irrigation and Drainage V

This book Irrigation & Agricultural Drainage Engineering is intended as a source book in the area of irrigation and drainage for the students of agricultural engineering in particular and agricultural science in general. However, this book also may be useful for agricultural extension workers and the professional working in this area. The contents of the book will enable one to acquire some basic requirements which an irrigation and drainage manager must have. The contents include basics along with some information toward research achievements, importance and usefulness so that the students get interested to the subject and at the same time help them to attend the institutional and competitive examinations. The book contains good numbers of numerical as example and task to get the students familiar to the requirements, complications, and possible remedies in actual working condition.

Irrigation Engineering And Hydraulic Structures

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.

Perspectives in Civil Engineering

"Irrigation and drainage has made a major contribution to facilitate increasing food production in order to meet the needs of an ever-growing world population. Irrigation, as the biggest water user in most regions of the world, is facing significant challenges in balancing social, economic and environmental needs for water. The water is basic source for all living in the world and it covers two third of the earth, it is the lifeblood of plants and its permanent or temporary shortage can cause serious damage to plants yield and quality. Irrigation has an important place in terms of water usage, its environmental impact and reuse of urban waste water. Irrigation; firstly begin with people becoming sedentary and agricultural practices, it has been made to improve the quality and quantity of crop production. In most countries agriculture represents by far the largest use of water and worldwide, it represents about 70% of total withdrawal and 90% of water consumption. Especially since the 1950s, people living in the cities started to be the owner of a garden, studies conducted in the urban landscape water is needed in these areas with different types of grass and ornamental crops, in order to ensure the sustainability of irrigation, which resulted in entering of irrigation into urban life. The sustainability of irrigation and drainage in the face of many variants and constraints like availability of water as a resource, ecological balance, socio-cultural impacts, and climate change effects lies in the strategies adopted and systems emplaced. Thus, sustainable irrigation and drainage management will be a frontier field in the future. This raises a number of questions; how can we increase the efficiency and productivity of water use under the circumstance of increasing uncertainties of flooding and drought? How can we reduce the nutrients output from agro-field by using irrigation and drainage technique, to reduce the pollution to groundwater and surface water? This volume Irrigation and Drainage Engineering aims to explore frontiers of knowledge in coining sustainable strategies and systems direly needed in managing the quality and quantity of water required for crop irrigation, surface and root zone drainage and flood management using available tools of research and development. The contribute chapters are written by well-known authors possessing various professional backgrounds and proficiency have dealt with these issues concerning the strategies and systems of irrigation and drainage. This book will be of invaluable for crop growers, agricultural engineers, water resource managers, academicians and graduate students alike."

Irrigation and Drainage Engineering

The agri-food chain consumes about one third of the world's energy production with about 12% of it for crop production and nearly 80% for processing, distribution, retail, preparation and cooking. The agri-food chain also accounts for 80-90% of total global freshwater use where 70% alone is for irrigation. Additionally, on a global scale, freshwater production consumes nearly 15% of the entire energy production. It can therefore be argued that making agriculture and the agri-food supply chain independent from fossil fuel use has a huge potential to contribute to global food security and climate protection not only for the next decades but also for the coming century. Provision of secure, accessible and environmentally sustainable supplies of water, energy and food must thus be a priority. One of the major objectives of the world's scientists, farmers, decisions makers and industrialists is to overcome the present dependence on fossil fuels in the agro-food sector. This dependency increases the volatility of food prices and affects economic access to sustenance. This book provides a critical review of recent developments in solar, wind and geothermal energy applications in agriculture and the agro-food sector such as processing, distribution, retail, preparation and cooking.

Selection of Irrigation Methods for Agriculture

A Guide to Golf Course Irrigation System Design and Drainage

In many countries irrigated agriculture consumes a large proportion of the available water resources, often over 70% of the total. There is considerable pressure to release water for other uses and, as a sector, irrigated agriculture will have to increase the efficiency and productivity of its water use. This is particularly true for manually operated irrigation systems managed by government agencies, which provide water for a large number of users on small landholdings and represent 60% of the total irrigated area worldwide. Drawing on the author's 30 years of experience in some 28 countries, this book offers knowledge of the management of irrigation and drainage systems, including traditional technical areas of systems operation and maintenance, and expanding managerial, institutional and organizational aspects. Chapters provide guidelines to improve management, operation and maintenance processes, which move management thinking out of traditional public-sector mindsets to a more customer-focused, performance-oriented service delivery. As a practical guide to improve efficiency and productivity in irrigated agriculture, this book will be essential reading for irrigation managers and technicians as well as students and policy makers in water management, agriculture and sustainable development.

Handbook of Irrigation System Selection for Semi-Arid Regions

An entirely new agricultural technology, trickle or drip irrigation, began its development in the early 1960's. Initial progress was sporadic even though the advantages in water management with trickle systems were recognized. Operators were

reluctant to use the system because of its high initial cost and questions regarding its reliability. Once the main problems were isolated and solutions developed to make the system reliable, rapid acceptance by the growers resulted. Today, trickle irrigation is being used on crops that were earlier considered to be uneconomical. This multi-purpose handbook brings together current knowledge from various engineering and scientific disciplines (crop, hydraulic, irrigation and soil sciences) needed for understanding the trickle irrigation system for crop production. The two dozen contributors are experts on the various subjects, which range from the basic to the more practical aspects of trickle irrigation. Major topics include design, operation and management - with individual chapters covering historical development, emitter construction and clogging, system design, water and salt distribution, automation, water treatment, irrigation scheduling, maintenance, fertilization and salinity. The book greatly expands the scope of research papers, reviews, extension bulletins, and updates earlier text with new information on trickle systems. A multi-disciplinary approach has been taken on a multi-faceted subject. The material contained in the book is the most comprehensive yet developed on the topic. Illustrative sample problems and solutions provide field operators and extension personnel with information needed to install and maintain trickle systems. As it is up-to-date, it is useful as a teaching and reference source for students, manufacturers and irrigation system operators as well as irrigation and crop specialists, and consultants.

Geothermal, Wind and Solar Energy Applications in Agriculture and Aquaculture

This report contains 27 papers that serve as a testament to the state-of-the-art of civil engineering at the outset of the 21st century, as well as to commemorate the ASCE's Sesquicentennial. Written by the leading practitioners, educators, and researchers of civil engineering, each of these peer-reviewed papers explores a particular aspect of civil engineering knowledge and practice. Each paper explores the development of a particular civil engineering specialty, including milestones and future barriers, constraints, and opportunities. The papers celebrate the history, heritage, and accomplishments of the profession in all facets of practice, including construction facilities, special structures, engineering mechanics, surveying and mapping, irrigation and water quality, forensics, computing, materials, geotechnical engineering, hydraulic engineering, and transportation engineering. While each paper is unique, collectively they provide a snapshot of the profession while offering thoughtful predictions of likely developments in the years to come. Together the papers illuminate the mounting complexity facing civil engineering stemming from rapid growth in scientific knowledge, technological development, and human populations, especially in the last 50 years. An overarching theme is the need for systems-level approaches and consideration from undergraduate education through advanced engineering materials, processes, technologies, and design methods and tools. These papers speak to the need for civil engineers of all specialties to recognize and embrace the growing interconnectedness of the global infrastructure, economy, society, and the need to work for more sustainable, life-cycle-oriented solutions. While embracing the past and the present, the papers collected here clearly have an eye on the future needs of ASCE and the civil engineering profession.

Basic Civil Engineering

Irrigation and Drainage Engineering

IRRIGATION FUNDAMENTALS is a comprehensive text on the basic principles and practices of applied agricultural irrigation. Written over a period of more than 10 years, it is based on the authors' extensive experience in farming, consulting, research, teaching, and other related agricultural activities. The book is for use by teachers of introductory courses in irrigation, farmers who have some basic technical knowledge, and for administrators who need a general understanding of irrigation as an aid for policy decisions in water resource development and planning. Various factors that influence crop yield and production including climate, fertility, water, drainage, and agronomic practices are addressed. The various irrigation methods such as border, basin, contour, furrow, sub, sprinkle, and drip or trickle are described; and conditions are given for selection of the appropriate method to use. Recent developments and new technology are included herein when they have obvious practical applications, but for the most part the material presented in this book is based on well established principles and practices. Much of the content is very practical and much is essentially nontechnical. Nevertheless, some of the material covered in this book goes beyond the basic concepts in an attempt to better describe the relationships and techniques employed by irrigation scientists and irrigation engineers. From the Preface: The future of the world depends very much on how we manage natural resources. Since the year 1900 there has been a ninefold increase in global carbon emissions from burning fossil fuels, and the world population has increased about 3.7 times in this century. Vast areas of forests have been destroyed, and irrigated lands now produce 40% of the food supply. Due to depletion of groundwater reserves and an increase in population, irrigated area per capita is declining. Consequently, the irrigation of additional alluvial lands is a strategic necessity for all of humankind. Much of the alluvial lands cannot be made productive without prior development of water resources through flood control, drainage, and irrigation. The production of electricity through hydropower and the production of alcohol fuel from irrigated crops, as has been practiced for many years in Brazil, can slow the increase in carbon emissions. Such diverse developments are typically not separable; rather, they must be considered as integral parts of a comprehensive development plan. The conservation of natural resources and increasing productivity of irrigated lands are also strategic necessities. Much of the current technology is highly transferable and crop yields can be significantly increased on lands already under irrigation. The authors have worked in many countries in connection with resource inventories, teaching, and the planning, development and use of irrigation as a tool for increasing production and providing employment. They have written extensively and have been honored for their achievements. They have considerable experience with everything from primitive low-technology irrigation developments to highly developed irrigation in the USA and in dozens of countries around the world. Both of the authors have dedicated their careers to teaching, research, and consulting in agricultural irrigation and water resources development and planning.

It is their hope and expectation that this book will provide incentives for investigating and documenting land and water resources, improving development, increasing crop yields, conserving resources, and improving the environment. From the Table of Contents: Chapt. 1 - INTRODUCTION: Irrigation Fundamentals: - - A Definition of Irrigation - - Statistical Perspectives of Agricultural Irrigation Chapt. 2 - FACTORS INFLUENCING CROP PRODUCTION: - - Introduction - - Temperature, Radiation, and Evaporative Potential - - Climate Change - - Soil Fertility and Fertilizers - - Water Availability and Distribution - - Soil Aeration and Drainage - - Plant Density, Spacing and Leaf Area Index - - Crop Variety Chapt. 3 - AGRICULTURAL SOILS: - - Introduction - - Soil Texture and Structure - - Soil Classification and Evaluation - - Bureau of Reclamation Land Classification - - Soil Age and Topography - - Soil Chemistry - - Infiltration Rates - - Soil-Water Relationships - - Equations for Soil Water Content - - Soil Water Potential - - Measuring Soil Water Content Chapt. 4 - EVALUATING IRRIGATION RESOURCES: - - Introduction - - Climate - - Hydrology - - Human and Other Factors - - Integrated Development Chapt. 5 - IRRIGATION METHODS: - - Introduction - - Graded Border Irrigation - - Basin Irrigation - - Contour Levees - - Furrow Irrigation - - Sub-Irrigation - - Sprinkle Irrigation - - Drip or Trickle Irrigation - - Selecting an Irrigation Method - - Land Grading and Leveling - - Laser-Leveling Equipment and Practices - - Computing Diagonal Slopes - - Irrigation System Evaluation Chapt. 6 - CROP WATER REQUIREMENTS: - - Introduction - - Direct Methods - - Indirect Methods - - Potential Evaporation - - Reference Evapotranspiration - - Extraterrestrial Solar Radiation - - Irrigation Requirements - - Crop Coefficients Chapt. 7 - IRRIGATION SCHEDULING: - - Introduction - - Allowable Water Depletion - - Monitoring Soil Water - - Scheduling Irrigations - - Rice Irrigation

Management of Irrigation and Drainage Systems

"Wessex Institute of Technology's Sustainable Irrigation 2012 Conference held at University of South Australia in Adelaide"--Preface.

Irrigation Engineering and Hydraulic Structures

Prepared by the Task Committee on Pipelines for Water Conveyance and Drainage of the Irrigation Delivery and Drainage Systems Committee of the Irrigation and Drainage Council of the Environmental and Water Resources Institute of the American Society of Civil Engineers. Pipelines for Water Conveyance and Drainage offers a concise listing and description of 11 types of pipe commonly used for water conveyance and drainage. For each type of pipe, 20 characteristics are described, including such physical attributes as material, available sizes, standard lengths, protective linings and coatings, joints, and fittings. Performance characteristics include allowable internal pressure, external load capabilities, hydraulic resistance factor, wave speed, allowable leakage rates, and water quality tolerances. Installation and maintenance criteria include specifications; tapping methods; repair methods; installation, backfill, and protective requirements; and useful life.

Information about common standards, industry groups, and reference publications is also included. This Manual of Practice (MOP) pertains to the following types of pipe: concrete, welded steel, ductile iron, polyvinyl chloride (PVC), high-density polyethylene (HDPE) pressure, polyethylene profile wall, PVC and polypropylene profile wall, corrugated polyethylene, fiberglass, corrugated metal, and vitrified clay pipe and clay drain tile. Design engineers, utility managers, planners, and educators will find MOP 125 to be an essential reference for designing, installing, and maintaining pipelines that convey water and drainage.

Land Consolidation

Irrigation Engineering

Irrigation, as the biggest water user in most regions of the world is facing significant challenges in balancing social, economic and environmental needs for water. These proceedings of the 5th International Conference on Sustainable Irrigation and Drainage: Management, Technologies and Policies provide examples of how irrigation and drainage can become more sustainable, while acknowledging that the concept of sustainability is a goal that continues to change as our knowledge of the biophysical realities alters. In that sense moving towards sustainability is an ever evolving journey. A focus is made on the implications for improving sustainability, whether this is drainage, irrigation technologies, economic modelling, governance studies for irrigation management, reuse of water or any other aspect. Topics covered include: Irrigation management; Irrigation modelling; Irrigation systems and planning; Economic incentives; Groundwater issues; Water contamination and remediation; Drainage systems; Drainage modelling; International issues; Water reuse; Climate change effects; Water trade; Economics of irrigation; Socio-economic benefits.

Flood Control and Drainage Engineering, 3rd Edition

Engineering technology development and implementation play an important role in making the industry more sustainable in an increasingly competitive world. This book covers significant recent developments in both fundamental and applied research in the engineering field. Domains of application include, but are not limited to, Intelligent Control Systems and Optimization, Signal Processing, Sensors, Systems Modeling and Control, Robotics and Automation, Industrial and Electric Engineering, Production and Management. This book is an excellent reference work to get up to date with the latest research and developments in the fields of Automation, Mechatronics and Industrial Engineering. It aims to provide a platform for researchers and professionals in all relevant fields to gain new ideas and establish great achievements in scientific development.

Modern Land Drainage

Basic knowledge of soil, water and plant, hydrologic and hydraulics to the state-of-the-art of irrigation system design and management.

Agricultural Drainage Engineering: Field and Laboratory Manual

Readers will find that there is no universally "best" irrigation method, and that the proper method selection will depend upon the crop, climate, economics, water quality, support infrastructure, energy availability, and numerous other factors. As such, this report will remain a valuable resource each time a new irrigation need arises."--BOOK JACKET.

Agricultural Salinity Assessment and Management

Irrigation Engineering and Hydraulic Structures comprehensively deals with all aspects of Irrigation in India, soil moisture and different types of irrigation systems including but not limited to Sprinkler, Tubewell, Canal and Micro-Irrigation. The book also focuses on Engineering Hydrology, Dams, Water Power Engineering as well as Irrigation Water Management. Special care has been taken to highlight the principles, practices and design procedures that have been widely recommended as well as suggest improvements in the application of existing methods and adoption of latest techniques used in other parts of the world.

Irrigation Fundamentals

Abiotic stresses are known to adversely impact agricultural productivity on millions of hectares globally, and it is projected that these problems are likely to increase, primarily due to anthropogenic interventions as well as climatic changes. Understanding abiotic stresses—especially salt stress on soil—calls for an interdisciplinary approach because salt-stressed soils need hydro-technical, chemical, and agronomic interventions as well as an understanding of plant response when exposed to these stresses. This volume explores and conveys the latest information on emerging technologies in the management of abiotic salt stress and their field applications. It brings together experts from various fields (academia, technology, and engineering) to provide the latest information and knowledge on this important challenge.

Evaporation, Evapotranspiration, and Irrigation Water Requirements

Agricultural drainage system is planned to remove excess water from the crop land, whether coming through irrigation

system, rainfall or runoff, before it creates waterlogging or high salinity condition. The Field and Laboratory Manual will assist in imparting better practical skills and understanding to Under Graduate (UG) and Post Graduate (PG) Students of Agricultural Engineering and Technology faculty. The manual will be helpful to the students as a reference for preparation of competitive examinations like GATE/ JRF/ SRF/ NET/ ARS, etc.

Irrigation and Drainage

Basic Civil Engineering is designed to enrich the preliminary conceptual knowledge about civil engineering to the students of non-civil branches of engineering. The coverage includes materials for construction, building construction, basic surveying and other major topics like environmental engineering, geo-technical engineering, transport traffic and urban engineering, irrigation & water supply engineering and CAD.

Irrigation and Agricultural Drainage Engineering

The Handbook of Irrigation System Selection for Semi-Arid Regions compares the various types of available irrigation systems for different regions and conditions, and explains how to analyze field data to determine the suitability of the land for surface, sprinkle, or drip irrigation systems. The book focuses on strategies for irrigation development and management and examines deficit irrigation and partial root-zone drying systems. Also, solute leaching modeling under different irrigation systems, soil moisture conditions, and organic fertilizer application in arid areas are discussed. Further, it examines multi-criteria decision making for irrigation management and the appraisal of agricultural lands for irrigation in hot, sub-humid regions. Features: Presents comparative analysis to aid in the selection of the most appropriate types of irrigation systems according to land characteristics. Includes numerous practical case studies. Offers parametric evaluation systems for irrigation purposes. Considers data from semi-arid zones, each with different sub-climates. Focusing on semi-arid land, the book highlights parametric evaluation systems for irrigation purposes, along with the use of analytical hierarchy processes integrated with GIS to determine which systems are best suited. This comprehensive and well-illustrated handbook will be of great interest to students, professionals, and researchers involved with all aspects of irrigation in semi-arid regions.

Irrigation and Agricultural Drainage Engineering

Fully renewed and extended, this edition is a valuable source of information for anyone involved in drainage engineering and management. It provides new theories, technologies, knowledge and experiences in combination with traditional land development practices in the humid temperature zone. Aspects covered include: management and maintenance; drainage

application and design; and adverse impacts on the environment. Intended as both a handbook and a textbook, this work is of particular value to university students as well as professionals within drainage development, engineering and management.

Planning the Management, Operation, and Maintenance of Irrigation and Drainage Systems

Drainage Water Management is a new practice in which water control structures are installed in the main drain lines to hold water back and allow farmers to drain only as needed. Irrigation Engineering is important since it helps determine future Irrigation expectations. Irrigation has been a central feature of agriculture for over 5000 years, and was the basis of the economy and society of numerous societies, ranging from Asia to Arizona. Irrigation can be termed as the artificial process of applying water to the soil to help in growing agricultural crops or maintaining the landscapes when there is shortage of natural water by rain. Additionally, irrigation also has a few other uses in crop production, which include protecting plants against frost, suppressing weed growth in grain fields and preventing soil consolidation. Irrigation is often studied together with drainage, which is the natural or artificial removal of surface and sub-surface water from a given area. water is required for agriculture. sometimes this water requirement is fulfilled by rain, but there are some dry areas where irrigation is the only process by which water is supplied to crops. Irrigation and Agricultural Drainage Engineering informs students in the application of engineering principles to upkeep useful plant life, with minimum degradation of soil and water resources. The primary objective is to understand soil, water and plant relationships and how they can be applied to better manage natural resources in the production of food and fiber. Aspects covered include: management and maintenance; drainage application and design; and adverse impacts on the environment. This work is of particular value to university students as well as professionals within drainage development, engineering and management.

Irrigation and Water Resources Engineering

Microirrigation has become the fastest growing segment of the irrigation industry worldwide and has the potential to increase the quality of food supply through improved water fertilizer efficiency. This book is meant to update the text "Trickle Irrigation, Design, Operation and Management". This text offers the most current understanding of the management criteria needed to obtain maximum water and fertilization efficiency. * Presents a detailed explanation of system design, operation, and management specific to various types of MI systems * Analyzes proper use of irrigation technology and its effect to increase efficiency * Provides an understanding to the basic science needed to comprehend operation and management * Over 150 figures of designs and charts of systems including, surface drip, subsurface drip, spray/microsprinkler, and more

Automatic Control, Mechatronics and Industrial Engineering

Pipelines for Water Conveyance and Drainage

The current book attempts to fill the gap in one of the major subject of land drainage that will have a major impact on production and productivity of irrigated lands. The book Titled `Drainage Engineering: Principles and Practices` deals with the subject of surface and subsurface drainage to reclaim waterlogged salt affected soils. Based on the course curricula as suggested by Deans´ committee constituted by ICAR, the current publication has been divided into 11 Chapters covering all the facets of land drainage as applied to agriculture. Each chapter covers one of the related issues beginning with general introduction to water logging, soil salinity and land drainage in Chapter 1. Surface drainage methods, an essential intervention in monsoon climatic regions and as supplement to the subsurface drainage are included in Chapter 2. Drainage investigations, a precursor to problem diagnosis and to assemble the drainage design parameters are included in Chapter 3. The drainage design procedures such as assessment of drainage depth, spacing and capacity of drains forms the subject matter of Chapter 4. While drainage materials are discussed in Chapter 5, drainage construction procedures and methodologies to monitor and evaluate completed projects are included in Chapter 6. Some of the new drainage techniques such as mole, interceptor, vertical and bio-drainage have been included in Chapter 7 since these can either be applied singly or in integration with horizontal subsurface drainage. Chapters 8-10 deal withreclamation of salt affected soils,acid soils and management of saline water. Eco-friendly reuse and disposal of saline drainage wateralso form the subject matter of discussion of Chapter 10. Cost calculations, socio-economic and environmental issues associated with drainage projects have been included in final chapter 11. Glossary of terms has been added for quick overview of the terms used in the book. Clearly, each and every aspect of surface and subsurface drainage for agricultural lands has been covered in the book. Besides covering the principles of land drainage, field practices have been included making the book a handy tool for specialized training programmes on land drainage. It is believed that the book will find its place in the shelves of students and teachers, field functionaries and libraries of state agricultural universitiesand civil engineering colleges.

Irrigation And Drainage

Trickle Irrigation for Crop Production

MOP 57 presents significant innovations and modifications of procedures that have been implemented throughout the irrigation and drainage industry.

Drainage Engineering: Principles and Practices

Planning and Evaluation of Irrigation Projects

MOP 71 considers worldwide salinity and trace element management in irrigated agriculture and water supplies.

Engineering Practices for Management of Soil Salinity

Brings together collections of important papers on particular topics from scholarly journals, conference papers and other hard-to-access sources.

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