

# Drainage Engineering Lecture Notes

This is likewise one of the factors by obtaining the soft documents of this Drainage Engineering Lecture Notes by online. You might not require more period to spend to go to the ebook start as skillfully as search for them. In some cases, you likewise realize not discover the publication Drainage Engineering Lecture Notes that you are looking for. It will certainly squander the time.

However below, subsequently you visit this web page, it will be thus totally easy to get as without difficulty as download lead Drainage Engineering Lecture Notes

It will not agree to many period as we tell before. You can accomplish it even if sham something else at home and even in your workplace. thus easy! So, are you question? Just exercise just what we have enough money under as with ease as review Drainage Engineering Lecture Notes what you following to read!

Hydroinformatics Tools for Planning, Design, Operation and Rehabilitation of Sewer Systems J. Marsalek 2013-04-17 Hydroinformatics systems are systems that combine computational hydraulic modelling with information systems (including knowledge-based systems). They are gaining rapid acceptance in the areas of environmental planning, design and management. The present book focuses exclusively on sewage systems, starting with their planning and then going on to discuss their design, operation and rehabilitation. The very experienced authors discuss business and information needs in the management of urban drainage, tools for collecting and archiving such data, and their use in modelling catchment hydrology, sewer systems hydraulics, wastewater quality, wastewater treatment plant operation, and receiving waters. The control and operation of sewer systems in real time is described, followed by a discussion of their maintenance and rehabilitation. Intelligent decision support systems for managing the urban drainage business process are presented. Audience: Researchers into sewer design, municipal engineers, planners and managers interested in an innovative approach to all aspects of the planning, design and operation of sewer systems.

Lecture-notes on the Theory of Electrical Measurements William Arnold Anthony 1908

Irrigation and Drainage Engineering Peter Waller 2015-11-18 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.

Recent Trends in Civil Engineering Bibhuti Bhusan Das 2020-11-23 This book comprises select peer-reviewed proceedings of the International Conference Trending Moments and Steer Forces – Civil Engineering Today (TMSF 2019). It presents latest research in different domains of civil engineering like structural and concrete engineering, geotechnical engineering, transportation engineering, environmental engineering, and construction technology and management. The contents also include miscellaneous applications of civil engineering in a wide range of technical and societal problems making use of engineering principles and relational data structures involving measurement sciences. Given the range of topics covered, this book can be useful for students, researchers as well as practitioners working in the field of civil engineering.

Recent Advances in Mechanical Engineering Mohammad Muzammil 2020-12-28 This book presents selected peer-reviewed papers presented at the International Conference on Innovative Technologies in Mechanical Engineering (ITME) 2019. The book discusses a wide range of topics in mechanical engineering such as

mechanical systems, materials engineering, micro-machining, renewable energy, systems engineering, thermal engineering, additive manufacturing, automotive technologies, rapid prototyping, computer aided design and manufacturing. This book, in addition to assisting students and researchers working in various areas of mechanical engineering, can also be useful to researchers and professionals working in various allied and interdisciplinary fields.

Land Drainage: Principles, Methods and Applications A.K. Bhattacharya & A.M. Michael 2006 Land Drainage – Principles, Methods and Applications presents the latest information, concepts and technology for ensuring sustainable agricultural production and environmental management by adopting land drainage measures. It focuses on a subject, central to the sustainability of irrigated agriculture. The authors' considerable field work experience and strong grip on the subject are pivotal in conceptualizing this book. This book provides an explicit description of the subject for students as well as the practicing engineers in this area. A logical sequence is followed in the presentation of chapters, beginning with the occurrence of drainage problems, their causes, remedies, design and execution of drainage systems and the benefits of drainage. The book can claim to be the only comprehensive title on the subject in India. SALIENT FEATURES 1. Follows an application-centric approach based on mathematical and statistical concepts 2. Provides a global scenario of drainage by studying different drainage models 3. Discusses drainage in the Indian context 4. Text is supported by statistical inputs and well illustrated examples 5. Includes self-assessment questions with answers and a number of solved and unsolved problems 6. Includes case studies of Drainage and Salt Management

Proceedings of AICCE'19 Fadzli Mohamed Nazri 2019-11-28 This book gathers the latest research, innovations, and applications in the field of civil engineering, as presented by leading national and international academics, researchers, engineers, and postgraduate students at the AWAM International Conference on Civil Engineering 2019 (AICCE'19), held in Penang, Malaysia on August 21-22, 2019. The book covers highly diverse topics in the main fields of civil engineering, including structural and earthquake engineering, environmental engineering, geotechnical engineering, highway and transportation engineering, water resources engineering, and geomatic and construction management. In line with the conference theme, "Transforming the Nation for a Sustainable Tomorrow", which relates to the United Nations' 17 Global Goals for Sustainable Development, it highlights important elements in the planning and development stages to establish design standards beneficial to the environment and its surroundings. The contributions introduce numerous exciting ideas that spur novel research directions and foster multidisciplinary collaborations between various specialists in the field of civil engineering.

Current Trends in Civil Engineering Job Thomas 2020-11-20 This book comprises the select proceedings of the International Conference on Recent Advances in Civil Engineering (ICRACE) 2020, held at the Cochin University of Science and Technology, Cochin, Kerala, India. The book focuses on latest research in different areas of civil engineering and lays special emphasis on sustainable construction practices. It is divided into seven major themes: (i) Modern materials and sustainable construction, (ii) Environmental engineering and management, (iii) Geotechnical engineering, (iv) Health, safety and environment, (v) Irrigation, water resources and management, (vi) Structural Engineering, and (vii) Transportation engineering and traffic planning. Given the range of the topics covered, this book can be useful for students, scholars and professionals interested in the different sub-disciplines of civil engineering.

Water Systems Management Workshop, 1972 United States. Bureau of Reclamation 1972

Applications of Geomatics in Civil Engineering Jayanta Kumar Ghosh 2019-06-19 This book comprises select proceedings of the First International Conference on Geomatics in Civil Engineering (ICGCE 2018). This book presents latest research on applications of geomatics engineering in different domains of civil engineering, like structural engineering, geotechnical engineering, hydraulic and water resources engineering, environmental engineering and transportation engineering. It also covers miscellaneous applications of geomatics in a wide range of technical and societal problems making use of geospatial information, engineering principles, and relational data structures involving measurement sciences. The book proves to be very useful for the scientific and engineering community working in the field of geomatics and geospatial technology.

Role of Sediment Transport in Operation and Maintenance of Supply and Demand Based Irrigation Canals: Application to Machai Maira Branch Canals Sarfraz Munir 2011-01-27 This work describes the role of sediment transport in the operation and maintenance of demand-based downstream controlled irrigation canals. Sediment deposition in these irrigation canals severely affects the operation of the automatic flow control system. The book also discusses sediment transport modelling in irrigation canals. A simplified 1-D mathematical model SETRIC (SEdiment TRansport in Irrigation Canals) has been improved with the inclusion of downstream control component for the downstream controlled irrigation canals. Based on field measurements and sediment transport modelling, a number of approaches have been proposed for sediment management in such irrigation canals by improvement in their design and operation. This book will be of interest to Irrigation Engineers and Managers, Hydraulic Engineers, Water Resources Engineers and Managers, Civil Engineers, and Agricultural Engineers.

Shallow Water Hydraulics Oscar Castro-Orgaz 2019-11-08 This book presents the theory and computation of open channel flows, using detailed analytical, numerical

and experimental results. The fundamental equations of open channel flows are derived by means of a rigorous vertical integration of the RANS equations for turbulent flow. In turn, the hydrostatic pressure hypothesis, which forms the core of many shallow water hydraulic models, is scrutinized by analyzing its underlying assumptions. The book's main focus is on one-dimensional models, including detailed treatments of unsteady and steady flows. The use of modern shock capturing finite difference and finite volume methods is described in detail, and the quality of solutions is carefully assessed on the basis of analytical and experimental results. The book's unique features include:

- Rigorous derivation of the hydrostatic-based shallow water hydraulic models
- Detailed treatment of steady open channel flows, including the computation of transcritical flow profiles
- General analysis of gate maneuvers as the solution of a Riemann problem
- Presents modern shock capturing finite volume methods for the computation of unsteady free surface flows
- Introduces readers to movable bed and sediment transport in shallow water models
- Includes numerical solutions of shallow water hydraulic models for non-hydrostatic steady and unsteady free surface flows

This book is suitable for both undergraduate and graduate level students, given that the theory and numerical methods are progressively introduced starting with the basics. As supporting material, a collection of source codes written in Visual Basic and inserted as macros in Microsoft Excel® is available. The theory is implemented step-by-step in the codes, and the resulting programs are used throughout the book to produce the respective solutions.

Introduction to Hydrogeology J.C. Nonner 2002-01-01 Providing an introduction to the crucially important topic of groundwater, this text covers all major fields of hydrogeology and includes outlines of the occurrence of groundwater in various rock types, the movement and storage of groundwater, the formulation of groundwater balances, the development of groundwater chemistry, as well as the practical application of hydrogeology for groundwater development. Following a unique systems approach to describe and connect its various elements, the text also explores a large selection of examples of groundwater cases from various parts of the world. In addition, theoretical sections and examples are illustrated with a number of drawings, photos and computer printouts. Suitable for education in hydrogeology at postgraduate and graduate level, the text is also a useful reference tool for professionals and decision-makers involved in water or water-related activities. In the revised paperback edition of *Introduction to Hydrogeology* (February 2006), suggestions of reviewers, students and colleagues have been taken into account. This means that more attention is paid to the processes in the unsaturated zone, especially those relating to groundwater recharge. Also, in the revised edition, the investigation methods are highlighted in the sections where the related theory is dealt with, and they are not presented in the last chapter on groundwater management. Chapter titles are re-named and some definitions are adjusted. The References and Bibliography section is also extended, some figures are improved, and the inevitable 'typing errors' are corrected as well.

Sediment Transport in Irrigation Canals Herman Depeweg 2014-10-06 Sediment transport in irrigation canals influences to a great extent the sustainability of an irrigation system. Unwanted erosion or deposition will not only increase maintenance costs, but may also lead to unfair, unreliable and unequitable distribution of irrigation water to the end users. Proper knowledge of the characteristics, including behaviour and transport of sediment will help to design irrigation systems, plan efficient and reliable water delivery schedules, to have a controlled deposition of sediments, to estimate and arrange maintenance activities, etc. The main aim of these lecture notes is to present a detailed analysis and physical and mathematical descriptions of sediment transport in irrigation canals and to describe the mathematical model SETRIC that predicts the sediment transport, deposition and entrainment rate as function of time and place for various flow conditions and sediment inputs. The model is typically suited for the simulation of sediment transport under the particular conditions of non-wide irrigation canals where the flow and sediment transport are strongly determined by the operation of the flow control structures. The lecture notes will contribute to an improved understanding of the behaviour of sediments in irrigation canals. They will also help to decide on the appropriate design of the system, the water delivery plans, to evaluate design alternatives and to achieve an adequate and reliable water supply to the farmers.

General Catalog Issue Pennsylvania State College 1888

Hydroinformatics, Proceedings Of The 6th International Conference (In 2 Volumes, With Cd-rom) Liong Shie-yui 2004-06-18 Hydroinformatics addresses cross-disciplinary issues ranging from technological and sociological to more general environmental concerns, including an ethical perspective. It covers the application of information technology in the widest sense to problems of the aquatic environment. This two-volume publication contains about 250 high quality papers contributed by authors from over 50 countries. The proceedings present many exciting new findings in the emerging subjects, as well as their applications, such as: data mining, data assimilation, artificial neural networks, fuzzy logic, genetic algorithms and genetic programming, chaos theory and support vector machines, geographic information systems and virtual imaging, decision support and management systems, Internet-based technologies. This book provides an excellent reference to researchers, graduate students, practitioners, and all those interested in the field of hydroinformatics.

Modern Land Drainage Willem F. Vlotman 2020-05-07 Modern Land Drainage 2nd edition is a fully revised and updated edition of the 2004 edition. Modern Land

Drainage describes traditional drainage formulas (Hooghoudt, Kirkham, Donnan, Ernst, Glover-Dumm) for rainfed agriculture in the humid temperature zone. Significant parts are devoted to drainage for salinity control of irrigated land in (semi-) arid zones, and to drainage of rice land in the humid tropics. Institutional, management and maintenance aspects are extensively covered, as well as the mitigation of adverse impacts of drainage interventions on the environment. The latest computer applications for drainage design in the context of integrated water management are described (DRAINMOD, HEC, SWAP, etc.). Field surveys are executed by governments, with the aid of consultants, but rarely are the end stakeholders (i.e., farmers and general public) involved from inception to planning to execution of a drainage system. Yet, during the Operation, Management and Maintenance (OMM) phase of a water management system, they are expected to takeover, run, bear and be responsible for the costs of OMM. The book describes successful methodologies and processes to be followed for engagement of stakeholders at all levels, from government to farm, from minister to farmer, and, from beginning to end. The book covers all aspects needed for sustainable drainage. The latest survey methodologies with satellites and drones are suggested to assess cause and effect. Waterlogging and salinity are the effect of something caused most likely upstream of the drainage problem location. Hence treating the cause may be more cost-effective. Triple Bottom Line (social, environmental and financial considerations) and the water-food-energy nexus are an integral part of the drainage design process. Controlled drainage, i.e. the balance of removal and conservation of drainage water and minimising solute transport as low as reasonably achievable (ALARA principle) is extensively described. This work is intended for use both as a university level textbook and as a professional handbook; it is of particular value to professionals engaged in drainage development in the context of integrated water resources and river basin management, civil and agricultural engineers, government officials, university students and libraries.

Advances in Civil Engineering Rao Martand Singh 2020-09-21 This volume comprises select peer reviewed papers presented at the international conference - Advanced Research and Innovations in Civil Engineering (ARICE 2019). It brings together a wide variety of innovative topics and current developments in various branches of civil engineering. Some of the major topics covered include structural engineering, water resources engineering, transportation engineering, geotechnical engineering, environmental engineering, and remote sensing. The book also looks at emerging topics such as green building technologies, zero-energy buildings, smart materials, and intelligent transportation systems. Given its contents, the book will prove useful to students, researchers, and professionals working in the field of civil engineering.

Sustainable Civil Engineering Practices Varinder S. Kanwar 2020-04-30 This book comprises select proceedings of the International Conference on Sustainable Civil Engineering Practices (ICSCEP 2019). It covers several important aspects of sustainable civil engineering practices dealing with effective waste and material management, natural resources, industrial products, energy, food, transportation and shelter, while conserving and protecting the environmental quality and the natural resource base essential for future development. The book also discusses engineering solutions to sustainable development and green design issues. Special emphasis is given on qualitative guidelines for generation, treatment, handling, transport, disposal and recycling of wastes. The book is intended as a practice-oriented reference guide for researchers and practitioners, and will be useful for all working in sustainable civil engineering related fields.

Advances in Transportation Geotechnics IV Erol Tutumluer 2021-08-30 This volume presents selected papers presented during the 4th International Conference on Transportation Geotechnics (ICTG). The papers address the geotechnical challenges in design, construction, maintenance, monitoring, and upgrading of roads, railways, airfields, and harbor facilities and other ground transportation infrastructure with the goal of providing safe, economic, environmental, reliable and sustainable infrastructures. This volume will be of interest to postgraduate students, academics, researchers, and consultants working in the field of civil and transport infrastructure.

Proceedings of the 3rd International Conference on Sustainability in Civil Engineering Thanh Bui-Tien 2021-04-27 This book contains the proceedings of the 3rd International Conference on Sustainability in Civil Engineering, ICSCE 2020, held on 26–27 November 2020, in Hanoi, Vietnam. It presents the expertise of scientists and engineers in academia and industry in the field of bridge and highway engineering, construction materials, environmental engineering, engineering in industry 4.0, geotechnical engineering, structural damage detection and health monitoring, structural engineering, geographic information system engineering, traffic, transportation and logistics engineering, water resources, estuary and coastal engineering.

Flood Control and Drainage Engineering S.N. Ghosh 1997-01-01 A survey of the problems encountered in flood control and drainage engineering. Among the topics studied are: estimation of design flood; flood routing through reservoirs and channels; design of spillways; and flood mitigation through planning of reservoir capacities and operation of reservoirs.

Lecture Notes on Some of the Business Features of Engineering Practice Alexander Crombie Humphreys 1912

Advances in Water Resources and Transportation Engineering Yusuf A. Mehta 2021-06-21 This book comprises select proceedings of the International Conference on Trends and Recent Advances in Civil Engineering (TRACE 2020). The volume focuses on latest research works carried out in the area of water resources and

transportation engineering. The topics include technological intervention and solution for water security, sustainability in water resources and transportation infrastructure, crop protection, resilience to disaster like flood, hurricane and drought, traffic congestion, transport planning etc. It aims to address broad spectrum of audience by covering inter-disciplinary innovative research and applications in these areas. It will be useful to graduate students, researchers, scientists, and practitioners working in water resources and transportation engineering domain.

Agricultural Library Notes 1928

Ground Improvement and Reinforced Soil Structures C. N. V. Satyanarayana Reddy 2021-07-27 This volume comprises the select proceedings of the Indian Geotechnical Conference (IGC) 2020. The contents focus on recent developments in geotechnical engineering for sustainable tomorrow. The volume covers the topics related advances in ground improvement of weak foundation soils for various civil engineering projects and design/construction of reinforced soil structures with different fill materials using synthetic and natural reinforcements in different forms.

Sustainable Engineering Arvind Kumar Agnihotri 2019-04-04 This volume contains selected papers presented during the International Conference on Environmental Geotechnology, Recycled Waste Material and Sustainable Engineering (EGRWSE-2018). The multidisciplinary articles in this volume discuss environment-friendly technologies and the application of 'smart' solutions and initiatives to improve infrastructure and services, with a strong emphasis on sustainability and conservation of resources. This volume will be of interest to engineers, professionals, and researchers working on improving urban infrastructure and strengthen civic amenities in a sustainable manner.

Modelling, Simulation and Control of Urban Wastewater Systems Manfred Schütze 2011-06-27 by Professor Poul Harremoes Environmental engineering has been a discipline dominated by empirical approaches to engineering. Historically speaking, the development of urban drainage structures was very successful on the basis of pure empiricism. Just think of the impressive structures built by the Romans long before the discipline of hydraulics came into being. The fact is that the Romans did not know much about the theories of hydraulics, which were discovered as late as the mid-1800s. However, with the Renaissance came a new era. Astronomy (Galileos) and basic physics (Newton) started the scientific revolution and in the mid-1800s Navier and Stokes developed the application of Newtons laws to hydrodynamics, and later, St. Venant the first basic physics description of the motion of water in open channels. The combination of basic physical understanding of the phenomena involved in the flow of water in pipes and the experience gained by "trial and error", the engineering approach to urban drainage improved the design and performance of the engineering drainage infrastructure. However, due to the mathematical complications of the basic equations, solutions were available only to quite simple cases of practical significance until the introduction of new principles of calculation made possible by computers and their ability to crunch numbers. Now even intricate hydraulic phenomena can be simulated with a reasonable degree of confidence that the simulations are in agreement with performance in practice, if the models are adequately calibrated with sample performance data.

The Alumni Quarterly and Fortnightly Notes 1919

Man-Machine-Environment System Engineering Shengzhao Long 2017-08-21 These proceedings showcase the best papers selected from more than 500 submissions, introducing readers to the top research topics and the latest developmental trends in the theory and application of Man-Machine-Environment System Engineering (MMESE). This research topic was first established in China by Professor Shengzhao Long in 1981, with direct support from one of the greatest modern Chinese scientists, Xuesen Qian. In a letter to Shengzhao Long from October 22nd, 1993, Xuesen Qian wrote: "You have created a very important modern science and technology in China!" MMESE primarily focuses on the relationship between Man, Machine and Environment, studying the optimum combination of related Man-Machine-Environment systems. In this paradigm, "Man" refers to working people as the subject at the workplace (e.g. operators, decision-makers); "Machine" is the general name for any object controlled by Man (including tools, machinery, computers, systems and technologies), and "Environment" describes the specific working conditions under which Man and Machine interact (e.g. temperature, noise, vibration, hazardous gases etc.). In turn, the three goals of optimization are to ensure safety, efficiency and economy in this context. These proceedings present interdisciplinary studies on the concepts and methods of physiology, psychology, system engineering, computer science, environmental science, management, education, and other related disciplines. They offer a valuable resource for all researchers and professionals whose work involves interdisciplinary areas touching on MMESE subjects.

The Publishers Weekly 1889

Recent Advancements in Civil Engineering Boeing Laishram

Catalog Pennsylvania State University 1888

Reliability and Optimization of Structural Systems '91 Rüdiger Rackwitz 2012-12-06 This proceedings volume contains 38 papers presented at the 4th Working

Conference on "Reliability and Optimization of Structural Systems", held at the Technical University of Munich, Germany, September 11- 13, 1991. The Working Conference was organised by the IFIP (International Federation for Information Processing) Working Group 7.5 of Technical Committee 7 and was the fourth in a series, following similar conferences held at the University of Aalborg, Denmark, May 1987, at the Imperial College, London, UK, September 1988 and at the University of California, Berkeley, California, USA, March 1990. The Working Conference was attended by 54 participants from 16 countries. The objectives of Working Group 7.5 are: • to promote modern structural systems optimization and reliability theory, • to advance international cooperation in the field of structural system optimization and reliability theory, • to stimulate research, development and application of structural system optimization and reliability theory, • to further the dissemination and exchange of information on reliability and optimization of structural systems • to encourage education in structural system optimization and reliability theory. At present the members of the Working Group are: A. H.-S. Ang, U.S.A. M. Grimmelt, FRG G. A ugwti, Italy N. C. Lind, Canada M. J. Baker, UK H. O. Mad&en, Denmark P. Bjerager, Norway R. E. Melcher~, Australia C. A. Cornell, U.S.A. F. Mo~e~, U.S.A.

Model Predictive Control on Open Water Systems Peter-Jules van Overloop 2006 "In the research Model Predictive Control on Open Water Systems, the relatively new control methodology Model Predictive Control is configured for application of water quantity control on open water systems, especially on irrigation canals and large drainage systems. The methodology applies an internal model of the open water system, by which optimal control actions are calculated over a prediction horizon. As internal model, two simplified models are used, the Integrator Delay model and the Saint Venant model. Kalman filtering is applied to initialize the internal models. The optimization uses an objective function in which conflicting objectives can be weighed. In most of the cases, these conflicting objectives are keeping the water levels at different locations in the water system within a range around setpoint and executing this by using as little control effort or energy as possible. To tune the weight factors in the objective function, an estimate of the maximum allowed value of each variable in the objective function is used. The optimization takes the constraints of the control structures into account. Every control time step, the optimal control actions are calculated, while only the first set of control actions is actually executed. This results in a controlled water system that is constantly maintaining the objective in an optimal way, while taking predictions, such as expected irrigation demands or extreme storm events and the constraints of the water system into account."

Reservoir Engineering Sylvester Okotie 2018-11-22 This book provides a clear and basic understanding of the concept of reservoir engineering to professionals and students in the oil and gas industry. The content contains detailed explanations of key theoretic and mathematical concepts and provides readers with the logical ability to approach the various challenges encountered in daily reservoir/field operations for effective reservoir management. Chapters are fully illustrated and contain numerous calculations involving the estimation of hydrocarbon volume in-place, current and abandonment reserves, aquifer models and properties for a particular reservoir/field, the type of energy in the system and evaluation of the strength of the aquifer if present. The book is written in oil field units with detailed solved examples and exercises to enhance practical application. It is useful as a professional reference and for students who are taking applied and advanced reservoir engineering courses in reservoir simulation, enhanced oil recovery and well test analysis.

Materials for Subsurface Land Drainage Systems L. C. P. M. Stuyt 2005 Reliable subsurface drainage systems for groundwater table and salinity control are needed to maintain or enhance the productivity of irrigated lands and to contribute to the rural development of lowlands in the humid tropic. This publication presents guidelines to assess the need for envelopes and for the selection of appropriate materials (i.e. pipes and envelopes) for the proper and lasting performance of subsurface drainage systems. In addition, it also contains guidelines for adequate installation and maintenance of drainage materials as well as the required specifications and standards of such materials, which may be used in tender documents for implementation of subsurface drainage works. Practical guidelines for the implementation of laboratory and field investigations to evaluate the performance of drainage materials have also been included.--Publisher's description.

Water Resources in Arid Lands: Management and Sustainability Ali Al-Maktoumi 2021-07-26 This book presents the most recent innovative studies in the field of water resources for arid areas to move towards more sustainable management of the resources. It gathers outstanding contributions presented at the 2nd International Water Conference on Water Resources in Arid Areas (IWC), which was held online (Muscat, Oman) in November 2020. Papers discuss challenges and solutions to alleviate water resource scarcity in arid areas, including water resources management, the introduction of modern irrigation systems, natural groundwater recharge, construction of dams for artificial recharge, use of treated wastewater, and desalination technologies. As such, the book provides a platform for the exchange of recent advances in water resources research, which are essential to improving the critical water situation and to move towards more sustainable management of water resources.

The Use of Delft3D to Simulate the Deposition of Cohesive and Non-Cohesive Sediments in Irrigation Systems Shaimaa Abd Al-Ameear Theol 2020-03-13 Sediment deposition threatens the performance of many irrigation systems. Because of the high impact on irrigation performance and crop production, many studies have been done on how to deal with sediment deposition. In this research, the Delft3D model, originally developed for hydro-morphologic modeling of rivers and estuaries, was

adapted for the use in irrigation systems simulations and applied to different case studies. This research addresses two shortcomings of previous studies of sediments in irrigation systems. Firstly, while previous studies primarily used 1D models, this research uses a 2D/3D model. The use of 2D/3D models in irrigation systems is significant because the non-uniform flow around structures such as offtakes, weirs and gates, leads to asymmetric sedimentation patterns that are missed by 1D simulations. Secondly, whereas previous studies mostly considered non-cohesive sediments, this research simulates cohesive, non-cohesive and a mix of both sediment types. This is important for irrigation systems that draw water from natural rivers that carry a mix of cohesive and non-cohesive sediments. The findings of this research are important for irrigation system maintenance and gate operation. It is also essential for the development of canal operating plans that meet crop water requirements and at the same time minimizes sediment deposition by alternating gates.