

## Irrigation And Water Power Engineering

**River stage or flow rates are required for the design and evaluation of hydraulic structures. Most river reaches are ungauged and a methodology is needed to estimate the stages, or rates of flow, at specific locations in streams where no measurements are available. Flood routing techniques are utilised to estimate the stages, or rates of flow, in order to predict flood wave propagation along river reaches. Models can be developed for gauged catchments and their parameters related to physical characteristics such as slope, reach width, reach length so that the approach can be applied to ungauged catchments in the region. The objective of this study is to assess Muskingum-based methods for flow routing in ungauged river reaches, both with and without lateral inflows. Using observed data, the model parameters were calibrated to assess performance of the Muskingum flood routing procedures and the Muskingum-Cunge method was then assessed using catchment derived parameters for use in ungauged river reaches. The Muskingum parameters were derived from empirically estimated variables and variables estimated from assumed river cross-sections within the selected river reaches used. Three sub-catchments in the Thukela catchment in KwaZulu-Natal, South**

**Africa were selected for analyses, with river lengths of 4, 21 and 54 km. The slopes of the river reaches and reach lengths were derived from a digital elevation model. Manning roughness coefficients were estimated from field observations. Flow variables such as velocity, hydraulic radius, wetted perimeters, flow depth and top flow width were determined from empirical equations and cross-sections of the selected rivers. Lateral inflows to long river reaches were estimated from the Saint-Venant equation. Observed events were extracted for each sub-catchment to assess the Muskingum-Cunge parameter estimation method and Three-parameter Muskingum method. The extracted events were further analysed using empirically estimated flow variables. The performances of the methods were evaluated by comparing both graphically and statistically the simulated and observed hydrographs. Sensitivity analyses were undertaken using three selected events and a 50% variation in selected input variables was used to identify sensitive variables. The performance of the calibrated Muskingum-Cunge flood routing method using observed hydrographs displayed acceptable results. Therefore, the Muskingum-Cunge flood routing method was applied in ungauged catchments, with variables estimated empirically. The results obtained shows that the computed outflow hydrographs generated using the Muskingum-Cunge method, with the empirically estimated variables and**

**variables estimated from cross-sections of the selected rivers resulted in reasonably accurate computed outflow hydrographs with respect to peak discharge, timing of peak flow and volume. From this study, it is concluded that the Muskingum-Cunge method can be applied to route floods in ungauged catchments in the Thukela catchment and it is postulated that the method can be used to route floods in other ungauged rivers in South Africa.**

**The subject “Irrigation Engineering” has assumed importance since last 30 to 40 years. Continued increase in population, particular in developing countries, at a very fast rate has caused scarcity of food. The real answer to food problem, is increased production of food articles; which is possible only by artificial irrigation of fields. India has a very large potential for irrigation, because area and water resources both are abundantly available. Abundance of area for irrigation and availability of lot of water resources are probably the reasons that most of the early irrigation practices and theories were developed in India. There is lot of variations in rainfall in different regions of India. Some of the areas have very little rainfall insufficient to grow any crop. Other areas have sufficient rainfall but its distribution is not as required by the crops. Scanty rainfall and erratic distribution both necessitate artificial irrigation. The purpose of this book is to present the subject in most concise form. Simplicity of language is the main**

**feature of the book. The book is completely in MKS units and covers the syllabus of all the Indian Universities, State Technical Boards, and A.M.I.E. (India) examinations. The book should be equally useful to practicing Engineers as reference book. Examples of almost all the important irrigation works have been solved and then illustrated in neat drawing charts. Khosla's Charts, Lacey's and Garret diagrams all are in MKS units. Rajsons Publications Pvt. Ltd. Every effort was made to eliminate printing errors. I would appreciate if printing errors are brought to my notice and Suggestions to bring about improvements in the book are most welcome. I am thankful to all my friends who have rendered great help by their valuable suggestions. In last I am thankful to Shri R.K. Jain, Prop. Standard Book House, without whose efforts this venture would not have reached the readers. The book provides a comprehensive account of an important sector of engineering—the hydro-power—that is renewable and potentially sustainable. It covers the entire scope of the subject in a lucid manner starting from the fundamentals of hydrology, to various hydraulic and civil structures to electrical and mechanical equipment as required for hydro-power projects. Many new issues and challenges voiced in the energy sector in general and water power in particular during the last decade have been addressed in the book. Recent innovations and developments in some areas like wave power, and new**

**technologies in hydraulic structures, like the P-K weirs, fuse gates, stepped spillways, CFRD, RCC, etc., find place suitably in the book. The book is meant for undergraduate and postgraduate students of civil and electrical engineering and for the professionals interested in the subject. NEW IN THE SECOND EDITION ♦ Thoroughly rewritten text; takes account of the new and growing technology, including • New types of dams, sedimentation of reservoirs, rehabilitation of dams • Spillway design floods, new types of spillways • Mathematical models for rainfall-runoff analysis, including contribution of snowfall • Structural components of tidal plants, and new types of turbines • Wave power exploitation ♦ Detailed study on Sardar Sarovar and Tehri projects ♦ Fully updated with the latest data, up to 2013 ♦ Two new chapters on 'small-scale hydro, and 'environmental impact of hydro and multi-purpose projects'**

## **IRRIGATION AND WATER POWER ENGINEERING**

**Irrigation, Water Power and Water Resources  
Engineering (in SI Units)**

**Modelling and Management of Irrigation System**

**Irrigation and Drainage Engineering**

**Water Supply Engineering**

*This book presents the results of the Interdisciplinary Research Group "Society – Water – Technology" of the Berlin-Brandenburg Academy of Sciences and Humanities. It describes interdisciplinary evaluation criteria for major water*

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*engineering projects (MWEPs) and portrays an application to the Lower Jordan Valley (Middle East) and the Fergana Valley (Central Asia). Both areas are characterised by transboundary conflicts, by challenges due to demographic and climate change and by political and societal pressures. Based on the findings, the book provides recommendations for science and political decisions makers as well as for international financing institutions. In addition, it outlines research gaps from an interdisciplinary perspective. In the past, MWEPs have been used as an instrument to cope with the demands of growing populations and to enhance development progress. Experiences with MWEPs have shown that a purely technical approach has not always brought about the desired results. In many cases, MWEPs have even resulted in negative implications for society and environment. Therefore, improved management strategies and enhanced technologies for a sustainable water resource management system are a prerequisite to meet present and future challenges. And, moreover, the continuous evaluation and optimisation of these measures is, likewise, a must. The book, now in its second edition, fulfills the need for an up-to-date comprehensive text on irrigation water management for students of agriculture both at the undergraduate and postgraduate levels. The scope of the book makes it a useful reference for courses in agricultural engineering, agronomy, soil science, agricultural physics and environmental sciences. It can also serve as a valuable guidebook to persons working with farming communities. The coverage in sixteen chapters brings out different aspects of irrigation including irrigation situation in the world, rainfall, evaporation, water wealth and progressive development of irrigation in India, measurement of soil water and irrigation water, methods of irrigation, irrigation with saline water, formulating cropping pattern in irrigated area and management of high*

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*water table. In the second edition, a new chapter on 'On-farm Irrigation System' has been included and a few chapters have been updated to include latest development. The book has useful research data and a large number of diagrams for easy comprehension of the topics. The end-of-chapter problems and numerous worked-out examples serve to aid further understanding of the subject. The book also contains an extensive glossary.*

*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*

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*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.*

*Irrigation Engineering (Including Hydrology)*

*A New Era for Coordination*

*Society - Water - Technology*

*How a Couple of Regular Guys Grew The Home Depot from Nothing to \$30 Billion*

*Fundamentals of Irrigation and On-farm Water Management: Volume 1*

*William Whipple addresses current challenges of the water resources industry, stressing the need for coordination between current environmental regulations and water resources planning.*

*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*

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*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.*

*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.*

*Flood Routing in Ungauged Catchments Using Muskingum Methods*

*Irrigation and Water Resources Engineering Built from Scratch*

*Irrigation Engineering*

*Irrigation Water Resources and Water Power Engineering*

Designed primarily as a textbook for the undergraduate students of civil and agricultural engineering, this comprehensive and well-written text covers irrigation system and hydroelectric power development in lucid language. The text is organized in two parts. Part I (Irrigation Engineering) deals with the methods of water distribution to crops, water requirement of crops, soil-water relationship, well irrigation and hydraulics of well, canal irrigation and different theories of irrigation canal design. Part II (Water Power Engineering) offers the

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procedures of harnessing the hydropotential of river valleys to produce electricity. It also discusses different types of dams, surge tanks, turbines, draft tubes, power houses and their components. The text emphasizes on the solutions of unsteady equations of surge tank and pipe carrying water to power house under water hammer situation. It also includes computer programs for the numerical solutions of hyperbolic partial differential equations. KEY FEATURES : Provides worked out examples and problems (in SI units). Presents all possible methods of design including Ranga-Raju-Misri's new approach of canal design. Gives numerous illustrations to reinforce the understanding of the subject. Besides undergraduate students, this book will also be of immense use to the postgraduate students of water resources engineering.

Exponential growth of the worldwide population requires increasing amounts of water, food, and energy. However, as the quantity of available fresh water and energy sources directly affecting cost of food production and transportation diminishes, technological solutions are necessary to secure sustainable supplies. In direct response to this reality, this book focuses on the water-energy-food nexus and describes in depth the challenges and processes involved in efficient water and energy production and management, wastewater treatment, and impact upon food and essential commodities. The book is organized into 4 sections on water, food, energy, and the future of sustainability, highlighting the interplay among these topics. The first section emphasizes water desalination, water management, and wastewater

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treatment. The second section discusses cereal processing, sustainable food security, bioenergy in food production, water and energy consumption in food processing, and mathematical modeling for food undergoing phase changes. The third section discusses fossil fuels, biofuels, synthetic fuels, renewable energy, and carbon capture. Finally, the book concludes with a discussion of the future of sustainability, including coverage of the role of molecular thermodynamics in developing processes and products, green engineering in process systems, petrochemical water splitting, petrochemical approaches to solar hydrogen generation, design and operation strategy of energy-efficient processes, and the sustainability of process, supply chain, and enterprise.

Now includes Worked Examples for lecturers in a companion pdf! The fourth edition of this volume presents design principles and practical guidance for key hydraulic structures. Fully revised and updated, this new edition contains enhanced texts and sections on: environmental issues and the World Commission on Dams partially saturated soils, small amenity dams, tailing dams, upstream dam face protection and the rehabilitation of embankment dams RCC dams and the upgrading of masonry and concrete dams flow over stepped spillways and scour in plunge pools cavitation, aeration and vibration of gates risk analysis and contingency planning in dam safety small hydroelectric power development and tidal and wave power wave statistics, pipeline stability, wave–structure interaction and coastal modelling computational models in hydraulic engineering. The

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book's key topics are explored in two parts - dam engineering and other hydraulic structures – and the text concludes with a chapter on models in hydraulic engineering. Worked numerical examples supplement the main text and extensive lists of references conclude each chapter. Hydraulic Structures provides advanced students with a solid foundation in the subject and is a useful reference source for researchers, designers and other professionals.

For Water and Power in the Ancient World  
Practical Analysis from South Asia  
hydrology

Processes, Technologies, and Challenges  
Hydraulic Engineering of Dams

**Market\_Desc:** *For the undergraduate students of civil engineering at major Indian universities and engineering colleges. The text is also useful to the experts and professionals in the field of irrigation and agriculture. Special Features:*

- *Presents neatly-drawn drawings of dams, spillways, canals and cross-drainage works, not provided with any other book.*
- *Explains all aspects of soil moisture, irrigation systems, tanks, dams and canal river systems, water rights and environmental aspects.*
- *Discusses live case studies of major dams (the Tehri Dam, the Almatti Dam) for easy understanding of some important concepts.*
- *Explains all topics with solved examples and neatly-drawn sketches.*
- *Uses the SI units throughout the book.*
- *Supplies chapter-end problems and*

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*objective questions for self assessments. About The Book: Irrigation Engineering is designed for the undergraduate students of civil engineering at major Indian universities and engineering colleges. The text is also useful to the experts and professionals in the field of irrigation and agriculture. The content is divided into two parts: Part A and Part B. Part A contain 21 chapters. In this part, the author has discussed various irrigation systems usually adopted in different agro-climatic regions in India. With neatly-drawn sketches, the design of irrigation structures for storage, diversion, distribution and control are illustrated with exam-oriented worked-out examples. Part B of the book comprises 27 irrigation/hydraulic structures (called plates), presenting sketches with usual three-views to scale of dams, spillways, canals and cross-drainage works. These sketches are furnished with all details and dimensions (workable drawings) with lucid and complete designs.*

*Including Dams Engineering, Hydrology and Fluid Power Engineering. For the student of B.E./B.Tech. Civil Engg., Institution of Engineers (India) U.P.S.C. Exam & Practising Engineers.*

*Water is now at the centre of world attention as never before and more professionals from all walks of life are engaging in careers linked to water - in public water supply and waste treatment, agriculture, irrigation,*

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*energy, environment, amenity management, and sustainable development. This book offers an appropriate depth of understanding of basic hydraulics and water resources engineering for those who work with civil engineers and others in the complex world of water resources development, management, and water security. It is simple, practical, and avoids (most of) the maths in traditional textbooks. Lots of excellent 'stories' help readers to quickly grasp important water principles and practices. This third edition is broader in scope and includes new chapters on water resources engineering and water security. Civil engineers may also find it a useful introduction to complement the more rigorous hydraulics textbooks.*

*Hydraulic Structures*

*IRRIGATION WATER MANAGEMENT*

*Managing Canal Irrigation*

*Thirst*

*Irrigation and Water Power Engineering*

The First Edition of this treatise on Irrigation Engineering duly subsidised by national Book trust, Government of India, published in 1984. was highly acclaimed by the engineering teachers and taughts and its revised edition appeared in 1990. The dynamism inherent in the subject necessitated drastic changes in the text, prompted by the overwhelming response of irrigation and agriculture engineering students and practising engineers in the country and abroad duly patronised by the publications, Shri Ravindra Kumar Gupta, Managing Director, S. Chand & Company

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Ltd.,New Delhi

Freshwater shortages will affect 75% of the world's population by 2050. Mithen puts this crisis into context by exploring 10,000 years of water management. Thirst tells of civilizations defeated by the water challenge, and of technological ingenuity that sustained communities in hostile environments. Work with nature, not against it, he advises.

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 Engineering and Hydraulic Structures  
IRRIGATION ENGINEERING

Water Resources

Waste Water Engineering

Irrigation Water Resources And Water Power Engineering, 7/e

***One of the greatest entrepreneurial success stories of the past twenty years When a friend told Bernie Marcus and Arthur Blank that "you've just been hit in the ass by a golden horseshoe," they thought he was crazy. After all, both had just been fired. What the friend, Ken Langone, meant was that they now had the***

***opportunity to create the kind of wide-open warehouse store that would help spark a consumer revolution through low prices, excellent customer service, and wide availability of products. Built from Scratch is the story of how two incredibly determined and creative people—and their associates—built a business from nothing to 761 stores and \$30 billion in sales in a mere twenty years. Built from Scratch tells many colorful stories associated with The Home Depot's founding and meteoric rise; shows that a company can be a tough, growth-oriented competitor and still maintain a high sense of responsibility to the community; and provides great lessons useful to people in any business, from start-ups to the Fortune 500. A challenge to re-examine beliefs, biases and actions is presented through the exposure of misleading research and faulty diagnosis in the current policies and practices of canal irrigation.***

***Irrigation and Water Power Engineering Firewall Media Irrigation and Water Power Engineering Laxmi Publications, Ltd. IRRIGATION AND WATER POWER ENGINEERING PHI Learning Pvt. Ltd. Irrigation Engineering, Including Water Power Engineering Irrigation Engineering And Hydraulic Structures Evaporation, Evapotranspiration, and Irrigation Water Requirements The Water-Food-Energy Nexus A Critical Appraisal of Major Water Engineering Projects***

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With the increased use of alternative irrigation water sources on turfgrass and landscape sites, their management is becoming more complex and whole ecosystems-oriented. Yet few turfgrass managers have received formal training in the intricacies of irrigation water. *Turfgrass and Landscape Irrigation Water Quality: Assessment and Management* provides a comprehensive, science-based review of irrigation water quality. The book examines field problems in a logical manner, provides clear scientific explanations, and offers detailed practical information for resolving each specific problem in an environmentally sustainable manner. Divided into four parts, the book begins with an overview of the assessment of irrigation water. It discusses factors that affect the quality of water, assists readers in understanding irrigation water quality tests, and examines field monitoring. The second part focuses on explaining scientific irrigation water quality situations or challenges associated with various water sources, including saline, seawater, and reclaimed

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irrigation water, as well as stormwater reuse. The next section explores management options for site-specific problems. The authors discuss irrigation system design when confronted with poor quality water, salt leaching, water acidification, and turfgrass nutritional considerations, and discusses lake, pond, and stream management and other water issues. Lastly, the text addresses potential environmental concerns related to irrigation water sources on the watershed/landscape level. The book contains several case studies which further clarify the material and provides a comprehensive appendix list of landscape plants and their relative salinity tolerances. The diversity and nature of various water quality related challenges are quite daunting, even for the most seasoned professional. This volume provides a foundation for understanding the complexities of water quality that is certain to lead to science-based management decisions that are environmentally friendly and sustainable for years to come. Hydraulic engineering of dams and their

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appurtenant structures counts among the essential tasks to successfully design safe water-retaining reservoirs for hydroelectric power generation, flood retention, and irrigation and water supply demands. In view of climate change, especially dams and reservoirs, among other water infrastructure, will and have to play an even more important role than in the past as part of necessary mitigation and adaptation measures to satisfy vital needs in water supply, renewable energy and food worldwide as expressed in the Sustainable Development Goals of the United Nations. This book deals with the major hydraulic aspects of dam engineering considering recent developments in research and construction, namely overflow, conveyance and dissipations structures of spillways, river diversion facilities during construction, bottom and low-level outlets as well as intake structures. Furthermore, the book covers reservoir sedimentation, impulse waves and dambreak waves, which are relevant topics in view of sustainable and safe operation of reservoirs. The

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book is richly illustrated with photographs, highlighting the various appurtenant structures of dams addressed in the book chapters, as well as figures and diagrams showing important relations among the governing parameters of a certain phenomenon. An extensive literature review along with an updated bibliography complete this book.

Agriculture is one of the few industries that has been creating resources continuously from nature. Sustainability of this industry is a crucial issue at now-a-days.

Agricultural technologies are important to feed the growing world population. Agricultural engineering has been applying scientific principles for the optimal use of natural resources in agricultural production for the benefit of humankind. The role of agricultural engineering is increasing in the coming days at the forthcoming challenges of producing more food with less water coupled with climate uncertainty. I am happy to know that a book entitled "Fundamentals of Irrigation and On-farm Water Management", written by Engr. Dr.

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M. H. Ali, is going to be published by Springer. The book is designed to cover the major fields of agricultural and environmental engineering such as weather, plant, soil, water, and basics of on-farm water management. The book will be quite useful for the students of agricultural engineering. Students of other related branches of engineering sciences, and engineers working in the field and at research institutes will also be benefited. The book may serve as a text book for the students and as a practical hand-book for the practitioners and researchers in the field of irrigation and on-farm water management. Utilization of the recent literature in the area and citation of relevant journals / reports have added a special value to this book. Considering the topics covered, engineers, scientists, practitioners, and educators will find this book as a valuable resource.

Turfgrass and Landscape Irrigation  
Water Quality

Practical Hydraulics and Water  
Resources Engineering

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Water Power Engineering, 2nd Edition  
Basic Civil Engineering

**Irrigation is becoming an activity of precision, where combining information collected from various sources is necessary to optimally manage resources. New management strategies, such as big data techniques, sensors, artificial intelligence, unmanned aerial vehicles (UAV), and new technologies in general, are becoming more relevant every day. As such, modeling techniques, both at the water distribution network and the farm levels, will be essential to gather information from various sources and offer useful recommendations for decision-making processes. In this book, 10 high quality papers were selected that cover a wide range of issues that are relevant to the different aspects related to irrigation management: water source and distribution network, plot irrigation systems, and crop water management.**

**Irrigation, Water Power and Water Resources Engineering**

**A Textbook Of Water Power Engineering**

**Water Power Engineering, 1E**

**National Engineering Handbook**

**Assessment and Management**