

# CONTENTS OF FIFTH EDITION

## PREFACE

### 1 HYDROLOGIC PRINCIPLES

- 1.1 Introduction to Hydrology
- 1.2 Weather Systems
- 1.3 Precipitation
- 1.4 The Hydrologic Cycle
- 1.5 Simple Rainfall-Runoff
- 1.6 Streamflow and the Hydrograph
- 1.7 Hydrograph Analysis
- 1.8 Hydrologic Measurement

Summary

Problems

References

### 2 HYDROLOGIC ANALYSIS

- 2.1 Watershed Concepts
- 2.2 Unit Hydrograph Theory
- 2.3 Synthetic Unit Hydrograph Development
- 2.4 Applications of Unit Hydrographs
- 2.5 Linear and Kinematic Wave Models
- 2.6 Hydrologic Loss-Evaporation and ET
- 2.7 Hydrologic Loss-Infiltration
- 2.8 Green and Ampt Infiltration Method
- 2.9 Snowfall and Snowmelt

Summary

Problems

References

### 3 FREQUENCY ANALYSIS

- 3.1 Introduction
- 3.2 Probability Concepts

3.3	Random Variables and Probability Distributions
3.4	Return Period or Recurrence Interval
3.5	Common Probabilistic Models
3.6	Graphical Presentation of Data
3.7	Regional Analysis
3.8	Related Topics
	Summary
	Problems
	References
<b>4</b>	<b>FLOOD ROUTING</b>
4.1	Hydrologic and Hydraulic Routing
4.2	Hydrologic River Routing
4.3	Hydrologic Reservoir Routing
4.4	Governing Equations for Hydraulic River Routing
4.5	Movement of a Flood Wave
4.6	Kinematic Wave Routing
4.7	Hydraulic River Routing
	Summary
	Problems
	References
<b>5</b>	<b>HYDROLOGIC SIMULATION MODELS</b>
5.1	Introduction to Hydrologic Models
5.2	Steps in Watershed Modeling
5.3	Description of Major Hydrologic Models
5.4	HEC-HMS Flood Hydrograph Models
5.5	Application of HEC-HMS to Watersheds
5.6	HEC-HMS Watershed Analysis: Case Study
	Summary
	Problems
	References
<b>6</b>	<b>URBAN HYDROLOGY</b>

- 6.1 Characteristics of Urban Hydrology
- 6.2 Review of Physical Processes
- 6.3 Rainfall Analysis in Urban Basins
- 6.4 Methods for Quantity Analysis
- 6.5 Sewer System Hydraulics
- 6.6 Control Options
- 6.7 Operational Computer Models
- 6.8 Case Study
- Summary
- Problems
- References

## 7 FLOODPLAIN HYDRAULICS

- 7.1 Uniform Flow
- 7.2 Uniform Flow Computations
- 7.3 Specific Energy and Critical Flow
- 7.4 Occurrence of Critical Depth
- 7.5 Nonuniform Flow or Gradually Varied Flow
- 7.6 Gradually Varied Flow Equations
- 7.7 Classification of Water Surface Profiles
- 7.8 Hydraulic Jump
- 7.9 Introduction to the HEC-RAS Model
- 7.10 Theoretical Basis for HEC-RAS
- 7.11 Basic Data Requirements (Steady State)
- 7.12 Optional HEC-RAS Capabilities
- 7.13 Bridge Modeling in HEC-RAS
- 7.14 HEC-RAS Features
- Summary
- Problems
- References

## 8 GROUND WATER HYDROLOGY

- 8.1 Introduction

- 8.2 Properties of Ground Water
- 8.3 Ground Water Movement
- 8.4 Flow Nets
- 8.5 General Flow Equations
- 8.6 Dupuit Equation
- 8.7 Streamlines and Equipotential Lines
- 8.8 Unsaturated Flow
- 8.9 Steady-State Well Hydraulics
- 8.10 Unsteady Well Hydraulics
- 8.11 Water Wells
- 8.12 Ground Water Modeling Techniques

Summary

Problems

References

## 9 DESIGN APPLICATIONS IN HYDROLOGY

- 9.1 Introduction
- 9.2 Drainage Collection Systems
- 9.3 Design of Culverts
- 9.4 Detention Basins Used to Mitigate Project Impacts
- 9.5 Floodplain Management Design Issues

Summary

Problems

References

## 10 GIS APPLICATIONS IN HYDROLOGY

- 10.1 Introduction to GIS
- 10.2 General GIS Concepts
- 10.3 Digital Representation Hydrologic Parameters
- 10.4 Digital Representation of Topography
- 10.5 GIS-Based Hydrology and Hydraulics
- 10.6 Common GIS Software Programs

Summary

Online Resources

References

## 11 RADAR RAINFALL APPLICATIONS IN HYDROLOGY

11.1 Introduction

11.2 Radar Estimation of Rainfall

11.3 NEXRAD (WSR-88D) Radar System

11.4 Gage Adjustment of Radar

11.5 Hydrologic Applications

Summary

References

## 12 SEVERE STORM IMPACTS AND FLOOD MANAGEMENT

12.1 Introduction

12.2 Flood Management Issues and Basic Terminology

12.3 Structural and Nonstructural Methods of Flood Control

12.4 The Flood Control Paradox

12.5 The 2005 Hurricane Season: Katrina, Rita, and Ike

12.6 Improved Strategies Toward Flood Management

Summary

References

APPENDIX A SYMBOLS AND NOTATION

APPENDIX B CONVERSION FACTORS

APPENDIX C PROPERTIES OF WATER

APPENDIX D NORMAL DISTRIBUTION TABLES

APPENDIX E USEFUL HYDROLOGY-RELATED INTERNET LINKS

GLOSSARY Note: glossary (pages 758-774) will be moved to the website

INDEX

PAGE

PAGE 9