- Preface p. xi
- Preface to the second edition p. xiii
- Preface to the first edition p. xv
- Acknowledgements p. xvii
- List of tables p. xviii
- List of main symbols p. xx
- Part 1 Dam engineering p. 1
- 1 Elements of dam engineering p. 3
- 1.1 General p. 3
- 1.2 Introductory perspectives p. 4
- 1.3 Embankment dam types and characteristics p. 11
- 1.4 Concrete dam types and characteristics p. 14
- 1.5 Spillways, outlets and ancillary works p. 19
- 1.6 Site assessment and selection of type of dam p. 21
- 1.7 Loads on dams p. 34
- References p. 38
- 2 Embankment dam engineering p. 40
- 2.1 Introduction p. 40
- 2.2 Nature and classification of engineering soils p. 40
- 2.3 Engineering characteristics of soils p. 45
- 2.4 Principles of embankment dam design p. 56
- 2.5 Materials and construction p. 67
- 2.6 Seepage analysis p. 72
- 2.7 Stability and stress p. 76
- 2.8 Settlement and deformation p. 91
- 2.9 Rockfill embankments and rockfill p. 94
- 2.10 Small embankments and flood banks p. 97
- 2.11 Geosynthetics in embankment dams p. 99
- Worked examples p. 101
- References p. 106
- 3 Concrete dam engineering p. 111
- 3.1 Loading: concepts and criteria p. 111
- 3.2 Gravity dam analysis p. 122
- 3.3 Buttress dam analysis p. 144
- 3.4 Arch dam analysis p. 146
- 3.5 Design features and construction p. 153
- 3.6 Concrete for dams p. 159
- 3.7 The roller-compacted concrete gravity dam p. 163
- Worked examples p. 168
- References p. 174
- 4 Dam outlet works p. 176
- 4.1 Introduction p. 176
- 4.2 The design flood p. 177
- 4.3 Flood routing p. 180

- 4.4 Freeboard p. 182
- 4.5 Sedimentation in reservoirs p. 185
- 4.6 Cavitation p. 188
- 4.7 Spillways p. 191
- 4.8 Bottom outlets p. 216
- Worked examples p. 218
- References p. 222
- 5 Energy dissipation p. 227
- 5.1 General p. 227
- 5.2 Energy dissipation on spillways p. 228
- 5.3 Stilling basins p. 232
- 5.4 Plunge pools p. 241
- 5.5 Energy dissipation at bottom outlets p. 243
- Worked examples p. 244
- References p. 246
- 6 Gates and valves p. 249
- 6.1 General p. 249
- 6.2 Crest gates p. 250
- 6.3 High-head gates and valves p. 256
- 6.4 Tidal barrage and surge protection gates p. 259
- 6.5 Hydrodynamic forces acting on gates p. 260
- Worked example p. 264
- References p. 266
- 7 Dam safety: instrumentation and surveillance p. 268
- 7.1 Introduction p. 268
- 7.2 Instrumentation p. 270
- 7.3 Surveillance p. 282
- 7.4 Dam safety legislation p. 283
- 7.5 Reservoir hazard and risk assessment p. 286
- References p. 288
- Part 2 Other hydraulic structures p. 291
- 8 River engineering p. 293
- 8.1 Introduction p. 293
- 8.2 Some basic principles of open-channel flow p. 294
- 8.3 River morphology and regime p. 299
- 8.4 River surveys p. 303
- 8.5 Flow-measuring structures p. 310
- 8.6 River flood routing p. 313
- 8.7 River improvement p. 315
- Worked examples p. 325
- References p. 333
- 9 Diversion works p. 336
- 9.1 Weirs and barrages; worked examples p. 336
- 9.2 Intakes; worked examples p. 364

- 9.3 Fish passes p. 382
- References p. 387
- 10 Cross-drainage and drop structures p. 390
- 10.1 Aqueducts and canal inlets and outlets; worked examples p. 390
- 10.2 Culverts, bridges and dips; worked examples p. 400
- 10.3 Drop structures; worked example p. 420
- References p. 431
- 11 Inland waterways p. 433
- 11.1 Introduction p. 433
- 11.2 Definitions, classification and some UK and other waterways p. 434
- 11.3 Multipurpose utilization of waterways p. 438
- 11.4 Transport on inland waterways p. 441
- 11.5 Canalization and navigation canals p. 443
- 11.6 Resistance of ships p. 445
- 11.7 Wave action on banks p. 447
- 11.8 Locks p. 449
- 11.9 Thrift locks p. 458
- 11.10 Lifts and inclined planes p. 460
- 11.11 Lock approaches p. 461
- 11.12 Inland ports p. 463
- Worked examples p. 465
- References p. 466
- 12 Hydroelectric power development p. 468
- 12.1 Introduction p. 468
- 12.2 Worldwide hydroelectric power development in perspective p. 468
- 12.3 Power supply and demand p. 469
- 12.4 Some fundamental definitions p. 470
- 12.5 Types of water power development p. 471
- 12.6 Head classification of hydropower plants p. 474
- 12.7 Streamflow data essential for the assessment of water-power potential p. 475
- 12.8 Hydraulic turbines and their selection p. 477
- 12.9 Other components of hydropower plants p. 490
- 12.10 Surge tanks p. 498
- 12.11 Minihydroelectric power plant development p. 502
- 12.12 Renewable energy sources p. 503
- Worked examples p. 507
- References p. 520
- 13 Pumping stations p. 522
- 13.1 Introduction p. 522
- 13.2 Pumps and their classification p. 522
- 13.3 Design of pumping mains p. 528
- 13.4 Classification of pumping stations and intakes p. 531
- 13.5 Sump design p. 533
- 13.6 Screening devices p. 536

- 13.7 Benching p. 536
- 13.8 Surges p. 536
- 13.9 General design considerations of pumping stations and mains p. 540
- Worked examples p. 542
- References p. 548
- 14 Waves and offshore engineering p. 549
- 14.1 Introduction p. 549
- 14.2 Wave motion p. 550
- 14.3 Range of validity of linear theory p. 558
- 14.4 Waves approaching a shore p. 560
- 14.5 Wave breaking p. 562
- 14.6 Wave reflection p. 565
- 14.7 Basin oscillations p. 566
- 14.8 Wave diffraction p. 567
- 14.9 Wave prediction p. 568
- 14.10 Wave statistics p. 573
- 14.11 Forces on cylindrical structures p. 575
- 14.12 Vortex-induced oscillations p. 585
- 14.13 Oscillations of cylinders in waves p. 590
- Worked examples p. 591
- References p. 597
- 15 Coastal engineering p. 600
- 15.1 Introduction p. 600
- 15.2 Coastal defence p. 601
- 15.3 Wave forces on coastal structures p. 607
- 15.4 Wave run-up p. 611
- 15.5 Wave overtopping p. 614
- 15.6 Rubble-mound breakwaters p. 616
- 15.7 Sea outfalls p. 622
- 15.8 Coastal management p. 631
- Worked examples p. 632
- References p. 639
- 16 Models in hydraulic engineering p. 642
- 16.1 Hydraulic models p. 642
- 16.2 Structural models p. 651
- Worked example p. 654
- References p. 655
- Author index p. 658
- Subject index p. 662