CONCRETE TECHNOLOGY

By
Dr. R. P. Rethaliya

Edition : 2nd Edition : 2018
ISBN : 9789385039317
Binding : Paperback
Pages : 504 + 16 = 520
Size (mm) : 235 x 21 x 170
Weight : 640 g

ABOUT THE BOOK
This book provide the basic principles and sufficient information on the state of art relating to all facets of manufacturing and production processes in the making of structural concrete. To cater to the needs of the undergraduate level courses, more emphasis is laid on the fundamentals and practice.

Entire book has been revised as per the revisions in various B.I.S. codes related to Cement, Sand, Aggregate, Concrete Mix Design, etc. The chapter on Concrete Mix Design is entirely rewritten. A large number of Multiple Choice Questions have been added in each chapter.

In addition to the traditional concrete technology topics dealing with the principles of concrete and concrete – making materials, the current state of the art of self compacting concrete, special concretes, concreting techniques, non-destructive testing (NDT), repairs and strengthening of concrete structures, fly ash concrete, etc. has been included.

The book incorporates relevant information on numerous Indian standard specifications and code of practices relating to cement and concrete including the latest revision of IS: 456–2000.

The entire subject matter is canvassed in the chapters like Cement; Types of Cement; Testing of Cement; Aggregates; Water for Construction; Admixtures; Fresh Concrete; Production of Concrete; Strength of Concrete; Elasticity, Creep and Shrinkage; Durability of Concrete; Testing of Hardened Concrete; Quality Control of Concrete; Concrete Mix Design; Special Concretes and Concreting Techniques; Repair and Rehabilitation of Concrete Structures; Fly Ash Concrete. The book now Contains:

194 Self explanatory neat diagrams
140 Useful tables
18 Worked Examples
212 Short Questions with Answers
287 Objective Questions
229 Exercise Questions.

The book should prove to be extremely useful to the Civil and Structural Engineering students preparing for the Degree Examinations of all the Indian Universities, Diploma Examinations conducted by various Boards of Technical Education, Certificate Courses as well as for the A.M.I.E., U.P.S.C., G.A.T.E., I.E.S., R.R.B. and other similar competitive and professional examinations. It should also prove of interest to the practising professionals.
Chapter 1 CEMENT
1-1. Introduction
1-2. History of Modern Cement
1-3. Manufacture of Portland cement
1-3-1. Wet process in manufacture of cement
1-3-2. Dry process in manufacture of cement
1-3-3. Semi-dry process
1-4. Hydration of cement
1-5. Heat of Hydration
1-6. Hydration products
1-7. Setting and Hardening
1-8. False set
1-9. Structure of hydrated cement
1-10. Water requirements for hydration

Chapter 2 TYPES OF CEMENT
2-1. Introduction
2-2. Types of cement
2-3. Use of cement type for different situations

Chapter 3 TESTING OF CEMENT
3-1. Introduction
3-2. Field testing of cement
3-3. Storage of cement
3-4. Physical properties of Portland cement
3-4-1. Fineness test
3-4-2. Standard consistency test
3-4-3. Initial and final setting time
3-4-4. Compressive strength test
3-4-5. Soundness test
3-5. Physical properties of various types of cement

Chapter 4 AGGREGATES
4-1. Introduction
4-2. Classification of aggregates based on unit weight
4-3. Classification of aggregates based on source or parent rock
4-4. Classification of aggregates based on size
4-5. Classification based on shape
4-6. Classification based on texture
4-7. Strength of aggregate
4-8. Aggregate crushing value test ([IS:2386-1963) Part IV]
4-9. 'Ten per cent fines value’ Test ([IS:2386-1963 Part IV]
4-10. Aggregate Impact value test (IS:383-2016)
4-11. Aggregate abrasion value test ([IS:2386-1963) Part IV]
4-12. Specific gravity
4-13. Bulk density
4-14. Absorption and moisture content
4-15. Bulking of fine aggregates
4-16. Deleterious substances in aggregate
4-17. Soundness of aggregate
4-18. Alkali Aggregate reaction
4-19. Grading of aggregate
4-20. Combining aggregates to obtain specified grading
4-21. Fineness modulus (FM)

Chapter 5 WATER FOR CONSTRUCTION
5-1. Introduction
5-2. Quality of water
5-3. Effect of impurities in water
5-4. Sea water

Chapter 6 ADMIXTURES
6-1. Introduction
6-2. Purposes of using Admixtures
6-3. Classification of Admixtures
6-4. Accelerating Admixtures (Accelerators)
6-5. Retarding Admixtures (Retarders)
6-6. Plasticizers (Water reducing admixtures)
6-7. Super-plasticizers
6-8. Air-entraining admixtures
6-9. Pozzolanic admixtures
6-10. Grouting admixtures
6-11. Water proofing admixtures
6-12. Air-detraining admixtures
6-13. Bonding admixtures
6-14. Corrosion inhibiting admixtures
6-15. Gas-forming Admixtures
6-16. Colouring Admixtures (Pigments)
6-17. Alkali-aggregate expansion inhibiting admixtures
6-18. Fungicidal, Germicidal and insecticidal admixtures
6-19. Adverse effect of excess use of admixtures

Chapter 7 FRESH CONCRETE
7-1. Introduction
7-2. Workability
7-3. Factors affecting workability
7-4. Measurement of workability
7-4-1. Slump test
7-4-2. Compacting factor test
7-4-3. Flow test
7-4-4. Flow test (As per Is:9103-1999)
7-4-5. Vee bee consistometer test
7-4-6. Kelly Ball Test
7-5. Segregation
7-6. Bleeding
7-7. Setting time of concrete

Chapter 8 PRODUCTION OF CONCRETE
8-1. Introduction
8-2. Batching or Measurement of materials
8-2-1. Batching of aggregate
CONCRETE TECHNOLOGY
DETAILED CONTENTS

8-2. Batching of cement
8-2.3. Measurement of water
8-3. Mixing of concrete
8-3.1. Hand mixing
8-3.2. Machine mixing
8-4. Transporting concrete
8-5. Placing of concrete
8-5.1. Precautions to be taken while placing concrete
8-5.2. Slip-form technique
8-6. Compaction of concrete
8-7. Methods of compaction
8-7.1. Hand compaction
8-7.2. Compaction by vibration
8-7.3. Compaction by pressure and jolting
8-7.4. Compaction by spinning
8-8. Prolonged vibration and Revibration
8-9. General points on using vibrators
8-10. Curing of concrete
8-10.1. Curing conditions
8-10.2. Maturity of concrete
8-10.3. Period of curing
8-10.4. Methods of curing concrete
8-10.5. Application of heat
8-11. Form work
  Short questions with Answers 8
  Multiple Choice Questions (MCQ) 8
  Answers to Multiple Choice questions 8
  Exercise 8
  References

Chapter 9 STRENGTH OF CONCRETE
9-1. Introduction
9-2. Water/cement ratio
9-3. Gel/space ratio
9-4. Effect of Age on strength of concrete
9-5. Effect of maximum size of aggregate on strength of concrete
9-6. Bond strength
9-7. Fatigue strength of concrete
9-8. Impact strength of concrete
9-9. Relation between compressive strength and tensile strength
  Short questions with Answers 9
  Multiple Choice questions (MCQ) 9
  Answers to Multiple Choice questions (MCQ) 9
  Exercise 9
  References

Chapter 10 ELASTICITY, CREEP AND SHRINKAGE
10-1. Introduction
10-2. Stress strain relation
10-3. Modulus of elasticity
10-4. Factors affecting modulus of elasticity
10-5. Poisson’s ratio
10-6. Shrinkage
10-7. Factors affecting shrinkage
10-8. Creep
10-9. Factors affecting creep
10-10. Measurement of creep
10-11. Effects of creep
  Short questions with Answers 10
  Multiple Choice questions (MCQ) 10
  Answers to Multiple Choice questions (MCQ) 10
  Exercise 10
  References

Chapter 11 DURABILITY OF CONCRETE
11-1. Introduction
11-2. Durability
11-3. Factors affecting durability
11-4. Requirement for durability
11-4.1. General environment
11-4.2. Effect of weathering – freezing and thawing
11-4.3. Exposure to Sulphate Attack
11-4.4. Acid Attack
11-4.5. Sea water Attack
11-4.6. Abrasion, Erosion and Cavitation
11-4.7. Carbonation
11-4.8. Shape and size of member
11-4.9. Requirement of concrete cover
11-4.10. Type and quality of constituent materials
11-5. Effects of De-icing salts
11-6. Efflorescence
11-7. Permeability of concrete
11-7.1. Importance of permeability
11-7.2. Factors affecting permeability
11-7.3. Measurement of water permeability
11-8. Resistance of concrete to fire
11-9. Thermal properties of concrete
11-10. Joints in concrete
  Short questions with Answers 11
  Multiple choice questions (MCQ) 11
  Answers to Multiple choice questions (MCQ) 11
  Exercise 11
  References

Chapter 12 TESTING OF HARDENED CONCRETE
12-1. General
12-2. Compression tests
12-3. Tensile strength of concrete
12-4. Ring tension Test
12-5. Factors Influencing strength results
12-6. Test cores
12-7. Accelerated curing test
12-8. In-situ strength assessment
12-8-1. Surface hardness test
12-8-2. Rebound-Hammer test
12-8-3. Ultrasonic pulse velocity test
12-8-4. Pull-out testing
12-8-5. Pull-off test
12-8-6. Penetration Resistance test (Windsor probe test)
12-8-7. Radioactive methods
12-8-8. Nuclear methods
12-8-9. Magnetic methods
12-8-10. Electrical methods
  Short questions with Answers 12
  Multiple choice questions (MCQ) 12
  Answers to Multiple choice questions (MCQ) 12
  Exercise 12
  References

Chapter 13 QUALITY CONTROL OF CONCRETE
13-1. General
13-2. Quality control
13-3. Quality control, Personnel and Equipment
13-4. Advantages of Quality control
13-5. Sampling and strength test of concrete
13-6. Statistical quality control of concrete
13-7. Standard Deviation
13-8. Acceptance Criteria
  Short questions with Answers 13
  Multiple choice questions (MCQ) 13
  Answers to Multiple choice questions (MCQ) 13
  Exercise 13
  References
Chapter 14 CONCRETE MIX DESIGN

14-1. General
14-2. Objectives of Mix Design
14-3. Basic considerations
14-4. Proportioning of ingredients
14-5. Factors influencing the choice of mix proportions
14-6. Methods of concrete mix design
14-7. I.S. method of mix design [IS: 10262-2009]
14-7-1. Trial mixes
14-8. The ACI method of mix Design
14-9. The DOE (British) mix design method
14-10. Mix design for pumped concrete
    - Basic considerations for pumped concrete
    - Short questions with Answers 14
    - Multiple choice questions (MCQ) 14
    - Answers to Multiple choice questions (MCQ) 14

Chapter 15 SPECIAL CONCRETES AND CONCRETING TECHNIQUES

15-1. General
15-2. Light weight concrete
15-3. High Density Concrete
15-4. Mass concrete
15-5. Read Mixed Concrete (RMC)
15-6. Vaccum concrete
15-7. Recycled Aggregate Concrete (RAC)
15-8. Silica fume concrete
15-9. Fibre reinforced concrete (FRC)
15-10. Polymer concrete
15-11. Cold-weather concreting
15-12. Recommended practices and precautions
15-13. Hot-weather concreting
15-14. Recommended practices and precautions
15-15. Pre-packed concrete
15-16. Shotcrete or guniting
15-17. Ferro cement
15-18. Roller compacted concrete (RCC)
15-19. Self compacting concrete (SCC)
15-19-1. Materials for SCC
15-19-2. Workability test Methods of SCC
15-20. High strength concrete
    - Short questions with Answers 15
    - Multiple choice questions (MCQ) 15
    - Answers to Multiple choice questions (MCQ) 15

Chapter 16 REPAIR AND REHABILITATION OF CONCRETE STRUCTURES

16-1. Evaluation procedures for repair and strengthening of concrete structures
16-2. Tools for evaluation of concrete structures
16-3. Cracks in concrete
16-4. Classification of cracks
16-5. Causes of cracks in concrete
16-6. Corrosion of reinforcement in concrete-causes and remedies
16-6-1. Corrosion process and mechanism
16-6-2. Anodic reactions
16-6-3. Causes of corrosion
16-7. Repair of concrete structures
16-8. Crack repair by epoxy injection grouting
16-9. Cracks repair by routing and sealing
16-10. Crack repair by stitching
16-11. Providing additional reinforcement
16-12. Drilling and plugging
16-13. Crack repair by prestressing steel
16-14. Crack repair by grouting
16-15. Column jacketing
16-16. Beam jacketing
    - Short questions with answers 16
    - Multiple choice questions (MCQ) 16
    - Answers to Multiple choice questions (MCQ) 16

Chapter 17 FLY ASH CONCRETE

17-1. General
17-2. Fly ash types and characteristics
17-3. Fly ash production and utilisation of india
17-4. Utilisation of fly ash
17-4-1. Fly ash Bricks
17-4-2. FaL-G technology
17-4-3. Fly ash based aggregate
17-4-4. Fly ash blended cement
17-4-5. Fly ash concret
    - Short questions with answers 17
    - Multiple choice questions (MCQ) 17
    - Answers to Multiple choice questions (MCQ) 17

INDEX