

CONCRETE TECHNOLOGY

Lectures : 4 Periods/Week
Semester End Exam. : 3 Hours

Sessional marks : 40
Semester End Exam. marks : 60
Credits : 4

Course objectives:

- To know about the composition, manufacturing process, types and testing of cement
- to know the properties of materials used for making concrete i.e cement, Fine aggregate, coarse aggregate and water etc
- To study the properties and behaviour of concrete during fresh state and hardened state by various theories, concepts and tests
- To understand the composition and effects of admixtures and construction chemicals used to improve the properties of concrete
- To know about special concretes and concreting methods
- To know about the advantage of ready mix concrete
- Studying the design mix procedure using different codes
- To Know future trends in concrete technology

Course outcomes:

- the materials used for the concrete and manufacturing procedure
- The chemistry involved and behaviour of the concrete during fresh and hardened state
- using the concrete effectively in the field
- handling the ready mix concrete in field
- Designing the concrete mix as per IS 10262 code
- special concretes and concreting methods
- Using different admixtures and construction chemicals in the concrete.
- Durability aspects like corrosion of reinforcement in concrete, sulphate attack etc

UNIT-I

Cement

General, Manufacture of Portland cement by dry process, Approximate oxide composition limits of OPC, Bogue's compounds, Hydration of cement, heat of hydration, structure of hydrated cement.

Types Of Cements and testing of cement

Ordinary Portland cement, low alkali cement, Rapid hardening cement, Sulphate resisting cement, Portland blast furnace slag cement, Portland pozzolana cement, air entraining cement, white cement, hydro phobic cement, oil well cement, low heat Portland cement.

Soundness test, Setting times test, Compressive strength test and Fineness test by air permeability apparatus.

Aggregates and Testing Of Aggregates

Classification of aggregates according to size and shape. Characteristics of aggregates-shape and texture, cleanliness, toughness, hardness.

Tests for bulking of fine aggregate, Fineness modulus and Zoning of fine aggregate, Fineness modulus of coarse aggregate.

UNIT-II

Water

Tolerable concentrations of impurities in mixing water, Use of sea water for mixing concrete.

Fresh Concrete

Workability, factors affecting workability, Segregation and Bleeding in concrete, measurement of workability using slump cone test, Kelly ball test, Vee-Bee test, compaction factor test.

Hardened Concrete

Factors affecting compressive strength of concrete, Cube compression test, split tensile strength test, flexural strength of concrete. Durability of concrete, factors affecting durability of concrete. Non-destructive testing : Rebound hammer test, Ultrasonic pulse velocity test

UNIT-III

Production of Concrete

Batching of materials, mixing, transportation, placing, compaction and finishing of concrete. Curing of concrete and methods of curing.

Concrete Mix Design

Basic considerations for concrete mix design, factors influencing the choice of mix proportions, Indian standard method of concrete mix design.

Ready Mixed Concrete (RMC)

Advantages of RMC, components of RMC plant, distribution and transportation, handling and placing, specifications for ready mix concrete as per IS:4926-2003.

UNIT-IV

Chemical and Mineral Admixtures

Functions of admixtures, accelerators, retarders, air entraining admixtures, plasticizers and super plasticizers, water proofers, fly ash, silica fume, ground granulated blast furnace slag.

Special Materials in Construction And Concreting Techniques

Ferro-cement, self-compacting concrete, fibre reinforced concrete, high strength concrete

High performance concrete

Future Trends in Concrete Technology

Sustainability of concrete industry - Recycled aggregate concrete, Green buildings, Use of supplementary materials

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS:

1. Concrete technology by A.R.Santha kumar, 1st Edition, Oxford University Press, 2006.
2. Concrete technology by M.S.Shetty, S.Chand & Company Pvt. Ltd., New Delhi, 2005

REFERENCE BOOKS :

1. Properties of concrete by A.M.Neville, Pearson Education, 2007.
2. Concrete technology by M.L.Gambhir, Tata McGraw-Hill, 2009.

WEB REFERENCES:

- <http://nptel.iitm.ac.in/video.php?subjectId=105102088>
- <http://www.engineeringcivil.com/theory/concrete-engineering/>