

OBJECTIVE

To enable the students to have a complete knowledge on the manufacture, quality control and types of cement, and preparation, properties and different types of concrete.

OUTCOME

On completion of the course the students are expected to

- Have studied the raw materials, manufacturing process and mechanism of hydration of cement.
- Have learnt the tests done on cement and the quality control procedures.
- Have studied the different types of cements and their characteristics.
- Have learnt the types of aggregates and admixtures used for concrete making and the preparation of a concrete mixture.
- Have understood the different properties of concrete and the testing methods of the same.

UNIT I CEMENT

Raw materials, manufacturing process. Composition of cement phases – effect of composition on burnability of clinker, influence of minor components. Hydration of cement.

UNIT II TESTING AND QUALITY CONTROL OF CEMENT

Tests on properties of cement – consistency of standard paste, setting time, soundness, strength of cement. Quality control – litre-weight test, microscopic and X-ray investigation of clinker materials.

UNIT III TYPES OF CEMENT

Types of Portland cement, blast furnace slag cement, trifer cement, high alumina cement, white and coloured cement, oil well cement, hydrophobic cement, water proof cement, super sulphate cement, sulphate resisting cement.

UNIT IV CONCRETES

Aggregates – types, characteristics. Admixtures – types, characteristics. Proportioning of concrete mixtures – consideration, procedure. Recent advances in concretes – types, significance, characteristics.

UNIT V PROPERTIES OF CONCRETE

Strength, permeability, creep, thermal expansion, shrinkage, moisture movement, penetration of X-ray, abrasion resistance, fire resistance, freeze-thaw resistance, electrical properties.

TEXT BOOKS

1. P. Kumar Mehta and Paulo J.M. Monteiro, Concrete – Microstructure, Properties and Materials, 3rd Edn., Tata McGraw Hill, 2006.
2. A.M.Neville, Properties of Concrete, 4th Edn., Pearson Education, 1995.

REFERENCES

1. A.M.Neville and J.J.Brooks, Concrete Technology, Pearson Education, 1987.
2. Peter C.Hewlett (Editor), Lea's Chemistry of Cement and Concrete, 4th Edn., Elsevier, 1998.
3. Deborah DL. Chung, Multifunctional Cement Based Materials, Marcel Dekker Inc., 2003.
4. J. Bensted and P.Barnes (Editors), Structure and Performance of Cements, 2nd Edn., Spon Press, 2002.