CONCRETE TECHNOLOGY

Course Code: 15CE1112

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Prerequisites : Chemistry

Course Outcomes:

At the end of the course the student will be able to:

CO 1 Identify the characteristics of basic ingredients and properties of concrete

CO 2 Distinguish the properties of fresh and hardened concrete

CO 3 Assess the quality of hardened concrete

CO 4 Select various admixtures of concrete

CO 5 Justify the significance of special concretes

UNIT-I (10 Lectures)

CONSTITUENTS OF CONCRETE:

CEMENT:

Chemical Composition, Chemical and Physical processes of Hydration, Structure of Hydrated Cement, Blended Cements, Properties of cement and their effect on properties of Concrete. (Test procedures not required)

AGGREGATES:

Classification, Mechanical, Physical and Thermal properties of Fine and Coarse aggregates that affect the properties of concrete. (Test procedures not required), Manufacturing Sand, Quality of mixing water.

MANUFACTURING OF CONCRETE AND SPECIAL PROCESSES OF CONCRETING:

Manufacture of Concrete: Mixing – Transporting – Placing – Compacting – Curing (Curing compounds, Steam curing, Micro-film curing), Safe Stripping Time.

SPECIAL PROCESSES OF CONCRETING:

Hot and cold weather concreting –Underwater Concrete –Grouted concrete – Mass concrete – Pumped concrete – Concrete for Liquid Retaining Structures – Slip form construction – Concrete surface treatments.

UNIT-II (10 Lectures)

FRESH CONCRETE:

WORKABILITY:

Definition, Factors affecting workability, significance, Tests available for measurement (test procedures not required)

SEGREGATION AND BLEEDING :

Definitions – causes and effects, measurement – Laittance, Factors effecting performance of Hardened concrete, Water/ Cement Ratio, Abram's law, Powers law, Gel space ratio, Maturity concept.

HARDENED CONCRETE:

Properties of Hardened concrete: Deformation characteristics: Creep – Shrinkage – Soundness &Thermal properties, Durability.

UNIT-III (10 Lectures)

TESTING OF HARDENED CONCRETE QUALITY CONTROL:

Destructive, partially destructive and Non- Destructive testing of concrete, Codal provisions, relationship between tensile strength and compressive strength, cube strength and cylinder strength. Variability of Concrete Strength, Concept of Quality, Stages and means of Control, Statistical methods of measuring Variability, Acceptance Criteria, applications. Mix design as per IS code.

UNIT-IV (10 Lectures)

ADMIXTURES:

Mineral Admixtures : Fly ash, GGBS, Silica Fume – origin and manufacture, Chemical Composition, Chemical and Physical processes of hydration, effects on properties of concrete.

Chemical Admixtures : Classification, origin and manufacture, chemical composition, actions and interactions, applications.

UNIT-V (10 Lectures)

SPECIAL CONCRETE:

Plain concrete – Reinforced Concrete – Pre-stressed Concrete – Lightweight concrete – Cellular concrete - Smart Concrete – Fiber reinforced concrete– Polymer concrete – Fly ash concrete – Self compacting concrete Recycled concrete – Roller compacted concrete- Ready Mix Concrete.

High performance concrete – Very high strength concrete – High density concrete – Lime concrete – Sulphur impregnated concrete –Refractory concrete – Radiation shielding concrete

TEXT BOOKS:

1. A.M.Neville, J.J.Brookes, *"Concrete Technology"*, 5th Edition, Pearson Education, 2009.
2. M.S.Shetty, *"Concrete Technology"*, 6th Edition, Chand Publication, 2010.

REFERENCES:

1. A.M. Neville, *"Properties of Concrete"*, 2nd Edition, Pearson Education, 2000.
2. A.R. Shanta Kumar, *"Concrete Technology"*, 1st Edition, Oxford University Press, New Delhi, 2010.
3. N. Krishna Raju, *"Design of Concrete Mixes"*, 2nd Edition, CBS Publishers and distributors, 2007.
4. M.L. Gambhir, *"Concrete Technology"*, 3rd Edition, Tata Mc-Graw hill Publishers, New Delhi, 2008.
5. IS 456:2000, *"Code of practice of plain and reinforced concrete"*4th Revision, August 2000.