JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech. II Year II Semester
CE402PC: CONCRETE TECHNOLOGY
L: 3 T: 0 P: 0 C: 3

Course Objectives:

- Know different types of cement as per their properties for different field applications.
- Understand Design economic concrete mix proportion for different exposure conditions and intended purposes.
- Know field and laboratory tests on concrete in plastic and hardened stage.

Course Outcomes:

- Determine the properties of concrete ingredients i.e., cement, sand, coarse aggregate by conducting different tests. Recognize the effects of the rheology and early age properties of concrete on its long-term behavior.
- Apply the use of various chemical admixtures and mineral additives to design cement-based materials with tailor-made properties.
- Use advanced laboratory techniques to characterize cement-based materials.
- Perform mix design and engineering properties of special concretes such as high-performance concrete, self-compacting concrete, and fiber reinforced concrete.

UNIT – I

- Aggregate: Deleterious substance in aggregate.
- Soundness of aggregate.
- Alkali aggregate reaction.
- Thermal properties.
- Sieve analysis, Fineness modulus, Grading curves.
- Grading of fine, Manufactured sand and coarse Aggregates.
- Gap graded aggregate, Maximum aggregate size.
- Properties of Recycled aggregate.

UNIT – II

- Fresh Concrete: Workability and factors affecting it.
- Measurement of workability by different tests.
- Setting times of concrete.
- Effect of time and temperature on workability.
- Segregation and bleeding.
- Mixing, vibration and revibration of concrete.
- Steps in manufacture of concrete.

- Quality of mixing water.

UNIT – III

- Hardened Concrete: Water/Cement ratio, Abram's Law.
- Gel/space ratio, Gain of strength, Maturity concept.
- Strength in tension and compression, Factors affecting strength.
- Relation between compression and tensile strength, Curing.
- Testing of Hardened Concrete: Compression, Tension, Flexure, Splitting, Pull-out tests.
- Non-destructive testing methods and codal provisions for NDT.

UNIT – IV

- Elasticity, Creep & Shrinkage: Modulus of elasticity, Dynamic modulus, Poisson's ratio.
- Creep: Factors influencing, Relation between creep & time, Nature and Effects.
- Shrinkage: Types and effects.

UNIT – V

- Admixtures: Types, mineral and chemical admixtures.
- Mix Design: Factors, Durability, Quality Control, Statistical methods, Acceptance criteria.
- Proportioning by various methods – BIS method of mix design.
- Special Concretes: Lightweight, Cellular, No-fines, High density, Fibre reinforced, Polymer concrete, High performance, Self compacting, Nano silica and Nano Alumina concrete.

Textbooks:

- Concrete Technology by M.S. Shetty – S. Chand & Co., 2004.
- Concrete Technology by A.R. Santhakumar, 2nd Edition, Oxford University Press, New Delhi.
- Concrete Technology by M.L. Gambhir – Tata McGraw Hill Publishers, 5th Edition, New Delhi.

Reference Books:

- Properties of Concrete by A.M. Neville – Low priced Edition – 4th edition.
- Concrete: Microstructure, Properties and Materials – P.K. Mehta and J.M. Monteiro, McGraw Hill Publishers.

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