III B.Tech I Semester

15ACE19-CONCRETE TECHNOLOGY

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Course Objective:

- *Lot of advances is taking place in the concrete technology as par with development taking place in the engineering.*
- *The present day industry needs the knowledge of concrete technology thoroughly.*
- *The subject is designed to give the basic knowledge as well as latest developments in concrete technology.*

UNIT - I

Cement, Concrete & Its Components: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Test`s on physical properties – Different grades of cement – Admixtures – Mineral additives: slags, flyashes, rice husk ash, metakaolin, calcinedclays,silica fume, limestone powder.and chemical admixtures- aggregates: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – II

Tests on Concrete : Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.- Water / Cement ratio – Abram's Law – Gel space ratio – Nature of strength of concrete – Maturity concept – Curing- Compression tests – Tension tests – – Strength in tension & compression – Factors affecting strength– Relation between compressive & tensile strength– Flexure tests – Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT – III

Elasticity, Creep & Shrinkage : Modulus of elasticity – Dynamic modulus of elasticity – Posisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT – IV

Mix Design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – ACI method & IS 10262 method.

UNIT – V

Special Concretes: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON – Bacterial concrete(self healing concrete).

Course outcomes:

- *Identify the functional role of ingredients of concrete and apply this knowledge to mix design philosophy.*
- *Acquire and apply fundamental knowledge in the fresh and hardened properties of concrete.*
- *Evaluate the effect of the environment on service life performance, properties and failure modes of structural concrete and demonstrate techniques of measuring the Non Destructive Testing of concrete structure.*
- *Develop an awareness of the utilization of waste materials as novel innovative materials for use in concrete.*
- *Design a concrete mix which fulfills the required properties for fresh and hardened concrete.*

TEXT BOOKS:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete Technology by M.S.Shetty. – S.Chand& Co.; 2004

REFERENCES:

1. Properties of Concrete by A.M.Neville – Pearson publication – 4th edition
2. Concrete Technology by A.R. Santha Kumar, Oxford university Press, New Delhi
3. Non-Destructive Test and Evaluation of materials by J.Prasad& C.G.K. Nair , Tata Mcgraw hill Publishers, New Delhi.
4. P.K.Mehta and P.J.M. Monteiro," concrete micro structure, properties and materials', Third edition Tata McGraw Hill 2006