

2/4 B.Tech. FOURTH SEMESTER

CE4T1

CONCRETE TECHNOLOGY

Credits: 3

Lecture: 3 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

Objectives:

- To learn the fundamental concepts and understanding of the behavioral aspects of various materials in concrete making and special concretes.

Learning outcomes:

At the end of course the student will be able to

- Identify, describe and carry out tests relevant to the use of concrete on site
- Describe the materials used to make concrete; including their sources, production and properties
- Design normal concrete mixes
- Explain how good concrete is produced

UNIT- I

CEMENTS & ADMIXTURES:

Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

UNIT – II

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 – III

FRESH 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.

UNIT – IV

HARDENED CONCRETE:

Water / Cement ratio – Abram's Law – Gelspaoe ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing.

UNIT – V

TESTING OF HARDENED CONCRETE:

Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT – VI

ELASTICITY, CREEP & SHRINKAGE:

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

UNIT – VII

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 – BIS method of mix design.

UNIT – VIII

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 compacting concrete – Slurry infiltrated fibrous concrete.

Learning resources

Text books:

1. Concrete Technology by Shetty, M.S., S. Chand & Co., 2004.
2. Concrete Technology by Santha Kumar, A.R., Oxford University Press, New Delhi, 2009.

Reference books:

1. Concrete Technology, (4th edition) by Gambhir, M.L., Tata McGraw-Hill, New Delhi, 2009.
2. Properties of Concrete, (4th edition) by Neville, A.M., Low Priced Edition, 1995.