

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

Pre-requisites: Building Materials and Construction, engineering chemistry

Learning objectives:

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

Course outcomes:

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

1. Comprehend the properties of cement and admixtures in concrete and understand the properties of aggregates in concrete
2. Study the properties of fresh concrete and evaluate the properties of hardened concrete including strength and durability
3. Carry out the test procedures for the laboratory properties of hardened concrete and analyze the elasticity, creep and shrinkage properties of concrete
4. Design concrete mixes by using Indian Standard method
5. Study the properties of special concretes

UNIT- I

CEMENTS & ADMIXTURES:

Manufacture of cement - 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.

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

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 - Ready Mix Concrete (RMC)

HARDENED CONCRETE:

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

UNIT – III

TESTING OF HARDENED CONCRETE:

Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Non-destructive testing (NDT) methods – code provisions.

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 – 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 – BIS method of mix design.

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 compacting concrete – Slurry infiltrated fibrous concrete.

NON DESTRUCTIVE TESTS:

Rebound Hammer Test- RH Test, Ultrasonic Pulse Velocity- UPV Test

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.

e-learning resources:

<http://nptel.ac.in/courses.php>

<http://jntuk-coeerd.in/>