

CONCRETE TECHNOLOGY

IV Semester: CE

Course Code	Category	Hours/Week			Credits	Maximum Marks		
ACEC10	Core	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
Contact Classes:45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes:45			

Prerequisite: No prerequisites required

I. COURSEOVERVIEW

Concrete is the most versatile construction material used all around the world. The study of concrete has become indispensable to the Civil engineering graduates to learn fundamental properties of fresh concrete, hardened concrete, strength and durability. Concrete technology provides a comprehensive coverage of the theoretical and practical aspects of the subject and includes the latest developments in the field of concrete construction. It incorporates the latest Indian standard specifications and codes of practices for regulating concrete construction. The properties of concrete and its constituent materials, the role of various admixtures in modifying these properties to suit specific requirements and situations are also be studied. The course also provides the knowledge on mix design for producing most economical and durable concrete, it also enable the students to acquire knowledge on special and new generation concrete with their applications.

II. COURSEOBJECTIVES

The Students will try to learn:

- I The fundamental properties of construction materials such as cement, aggregates and admixtures based on laboratory and field tests for identifying material quality
- II The factors influencing workability and methods involved in measuring workability of fresh concrete.
- III The importance of water/cement ratio and its influence on compressive tensile and flexural strengths of hardened concrete.
- IV The concept of quality control and design of concrete mix for ensuring quality of concrete.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

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| CO 1 | Choose the basic physical and chemical properties of construction materials for determining quality of concrete. | Remember |
| CO 2 | Explain the workability and manufacturing process of concrete for obtaining economical and durable concrete. | Understand |
| CO 3 | Inspect the impact of water/cement ratio on strength and durability of concrete by measuring its hardened strength | Analyze |
| CO 4 | Apply destructive and Non-destructive tests of hardened concrete for calculating compressive, tensile and flexural strengths | Apply |
| CO 5 | Develop the most economical and eco-friendly concrete mix based on standard methods for producing quality of concrete. | Understand |
| CO 6 | Examine special concretes and new generation concrete for satisfying the future needs of industry in real time. | Analyze |

IV. SYLLABUS:

MODULE – I: CEMENT, ADMIXTURES AND AGGREGATES (09)

Portland cement: Manufacturing of cement, chemical composition, hydration, setting of cement, structure of hydrated cement, test on physical properties, different grades of cement. Admixtures: Mineral and chemical admixtures, properties, dosage, effects, usage. 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 substances in aggregate, soundness of aggregate, alkali aggregate reaction, thermal properties, sieve analysis, fineness modulus, grading curves, grading of fine & coarse aggregates, gap graded aggregate.

MODULE – II: FRESH CONCRETE (09)

Workability: Factors affecting workability, measurement of workability by different tests, setting times of concrete, the effect of time and temperature on workability, segregation & bleeding, mixing and vibration of concrete, steps in manufacture of concrete, quality of mixing water.

MODULE – III: HARDENED CONCRETE AND TESTING (09)

Water / Cement ratio: Abram's Law, Gel space ratio, Nature of strength of concrete, maturity concept, strength in tension and compression, factors affecting strength, relation between compression and tensile strength, curing.

Testing of hardened concrete: compression tests, tension tests, flexure tests, split tests, Non-Destructive Testing methods, codal provisions for NDT; Elasticity: modulus of elasticity, dynamic modulus of elasticity, Poisson's ratio, Creep - factors influencing creep, relation between creep and time, nature of creep, effects of creep. Shrinkage - types of shrinkage.

MODULE – IV: MIX DESIGN (09)

Factors in the choice of mix proportions, durability of concrete, quality control of concrete, statistical methods, acceptance criteria, BIS method of mix design.

MODULE – V: SPECIAL CONCRETES (09)

Light weight aggregate concrete - cellular concrete, No-fines concrete; Fiber Reinforced Concrete: different types of fibers, factors affecting properties of F.R.C, applications. Polymer concrete - types of polymer concrete, properties of polymer concrete, applications, high-Performance concrete, high strength concrete, high-density concrete, Self-Consolidating Concrete, SIFCON.

V. TEXT BOOKS

1. Shetty, M.S., "Concrete Technology, Theory & Practice", S.Chand and Co, 2004.
2. Gambhir, M.L., "Concrete Technology", Tata McGraw Hill, 2004.
3. Neville, "Properties of Concrete", Longman Publishers, 2004.

VI. REFERENCE BOOKS

1. V.N.Vazirani & S.P.Chandola, Ed. by Vineet Kumar," Concrete Technology", 6th Edition reprint.
2. Santakumar A.R., "Concrete Technology", Oxford University Press, New Delhi, 2007

VII. WEB REFERENCES

1. <http://nptel.ac.in/courses/105102012/>
2. <http://nptel.ac.in/courses/105104030/>

VIII. E-TEXTBOOKS

1. <http://www.freeengineeringbooks.com/civilbooksdownload/ConcreteTechnology.php>
2. <http://www.faadooengineers.com/threads/10428Concretetechnologyebookfreedownload>
3. https://books.google.com.au/books/about/Concrete_Technology.html?id...