CONCRETE TECHNOLOGY

IV Semester: CE

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACEC10	Core	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

The course Concrete Technology focuses on concrete making materials including supplementary cementitious materials. Concrete production process also forms a part of the discussion. Going through the course one would develop first-hand knowledge on concrete production process and properties and uses of concrete as a modern material of construction. The courses will enable one to make appropriate decision regarding ingredient selection and use of concrete.

II. COURSEOBJECTIVES

The Students will try to learn:

1. The physical and chemical properties of cement and admixtures
2. The workability of concrete, manufacturing processes of concrete and the behavior of the hardened concrete.
3. Identify, formulate and solve problems in concrete mix design.
4. The practical knowledge on mix design principles, concepts and methods.

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III. COURSESYLLABUS

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.

IV. 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. Nevile, "Properties of Concrete", Longman Publishers, 2004.

V. 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

VI. WEB REFERENCES

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

VII. 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...