

CONCRETE TECHNOLOGY

V Semester: CE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACE010	Core	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
Contact Classes:45	Tutorial Classes: 15	Practical Classes: Nil			Total Classes: 60			

COURSE OBJECTIVES:

The course should enable the students to:

- I. Discuss the physical and chemical properties of cement and admixtures.
- II. Understand the workability of concrete, manufacturing processes of concrete and the behavior of the hardened concrete.
- III. Identify, formulate and solve problems in concrete mix design.
- IV. Enrich the practical knowledge on mix design principles, concepts and methods.

COURSE OUTCOMES (COs):

- CO 1: Understand the basic physical and chemical properties of cement, admixtures and aggregates.
- CO 2: Describe the properties and factors influencing the workability of fresh concrete.
- CO 3: Determine the effect of water/cement ratio on the strength of hardened concrete and also the strength of concrete by using NDT testing methods.
- CO 4: Analyze the mix design of concrete.
- CO 5: Understand the basic concepts and applications of special concretes at various situations

COURSE LEARNING OUTCOMES (CLOs):

1. Explain the different types of cement, grades of cement and hydration process.
2. Classify different types of admixture and their usage.
3. Understand aggregates and classification of aggregate depending upon shape, size, texture etc.
4. Understand the Alkali Aggregate Reaction.
5. Understand Sieve Analysis and grading of aggregate.
6. Understand the concept of workability of concrete and factors affecting workability.
7. Explain the measurement of workability by different test.
8. Understand the concept of segregation and bleeding in concrete.
9. Explain the various steps involved in the manufacturing process of concrete.
10. Understand the importance of quality of mixing water.
11. Understand hardened concrete and its properties.
12. Explain the importance of water cement ratio, maturity concept in hardened concrete.
13. Understand the various methods of curing of concrete.
14. Explain the different tests involved in testing of hardened concrete.
15. Understand the concept of creep and how it affects hardened concrete.
16. Explain shrinkage and its effect on concrete.
17. Understand the importance of Mix proportions.
18. Understand durability and quality control of concrete.
19. Explain Acceptance criteria involved in concrete mix proportioning.
20. Explain proportioning of concrete method by different methods.
21. Design the concrete mix by BIS method.
22. Explain the different types of special concrete.
23. Explain the effect of fiber in the concrete.

24. Understand the performance of fibers on concrete. 25. Explain the tests involved in self-compacting concrete.		
UNIT- I	CEMENTS ADMIXTURES& AGGREGATES	Classes: 09
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, 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 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	Classes: 09
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 - III	HARDENED CONCRETE AND ITS TESTING	Classes: 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, factors affecting strength, flexure tests, splitting tests, nondestructive testing methods, codal provisions for NDT; 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	Classes: 09
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	Classes: 09
Light weight aggregates, light weight aggregate concrete, cellular concrete , No fines concrete, high density 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, self-consolidating concrete, SIFCON.		
Text Books:		
1. Shetty, M.S., -Concrete Technology, Theory & Practical, S.Chand and Co, 2004. 2. Gambhir, M.L., -Concrete Technology, Tata McGraw Hill, 2004. 3. Neville, -Properties of Concrete, Longman Publishers, 2004.		
Reference Books:		
1. Santakumar A.R., -Concrete Technology, Oxford University Press, New Delhi, 2007.		

Web References:
1. http://nptel.ac.in/courses/105102012/ 2. http://nptel.ac.in/courses/105104030/
E-Text Books:
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...