

Course Code	Course Name	L-T-P-Credits	Year of Introduction
CE361	ADVANCED CONCRETE TECHNOLOGY	3-0-0-3	2016

Prerequisite: CE204 Construction Technology,

Course objectives:

- To understand the behaviour of fresh and hardened concrete.
- To make aware the recent developments in concrete technology
- To understand factors affecting the strength, workability and durability of concrete
- To impart the methods of proportioning of concrete mixtures

Syllabus:

Review of Materials for concrete making. chemical and physical processes of hydration , Properties of fresh concrete - Mineral admixtures - Chemical Admixtures - Proportioning of concrete mixtures. Properties of hardened concrete- Durability of concrete, Non-destructive testing of concrete – special concretes

Expected Outcomes:

The students will be able to:

- i. Understand the testing of concrete materials as per IS code
- ii. Know the procedure to determine the properties of fresh and hardened of concrete
- iii. Design the concrete mix using ACI and IS code methods
- iv. Select and Design special concretes depending on their specific applications
- v. Gain ideas on non-destructive testing of concrete

Text books:

1. Neville A.M., "Properties of Concrete", Trans-Atlantic Publications, Inc.; 5e, 2012
2. Job Thomas., "Concrete Technology", Cenage learning,
3. R. Santhakumar ,, Concrete Technology", Oxford Universities Press, 2006
4. Shetty M. S., Concrete Technology", S. Chand & Co., 2006

References:

1. Mehta and Monteiro, ,,Concrete-Micro structure, Properties and Materials", McGraw Hill Professional
2. Neville A. M. and Brooks J. J., Concrete Technology, Pearson Education, 2010
3. Lea, Chemistry of Cement and Concrete", Butterworth-Heinemann Ltd, 5e, 2017
4. Bungey, Millard, Grantham – Testing of Concrete in Structures- Taylor and Francis, 2006

COURSE PLAN

Module	Contents	Hours	Sem. Exam Marks %
I	Aggregates: Review of types; sampling and testing; effects on properties of concrete, production of artificial aggregates. Cements: Review of types of cements, chemical composition; properties and tests, chemical and physical process of hydration,	6	15

	.Blended cements.		
II	Properties of fresh concrete - basics regarding fresh concrete – mixing, workability, placement, consolidation, and curing, segregation and bleeding Chemical Admixtures: types and classification; actions and interactions; usage; effects on properties of concrete.	7	15
FIRST INTERNAL EXAMINATION			
III	Mineral Admixtures: Flyash, ground granulated blast furnace slag, metakaolin, rice-husk ash and silica fume; chemical composition; physical characteristics; effects on properties of concrete; advantages and disadvantages. Proportioning of concrete mixtures: Factors considered in the design of mix . BIS Method, ACI method.	6	15
IV	Properties of hardened concrete: Strength- compressive tensile and flexure - Elastic properties - Modulus of elasticity - Creep- factors affecting creep, effect of creep - shrinkage- factors affecting shrinkage, plastic shrinkage, drying shrinkage, autogeneous shrinkage, carbonation shrinkage	6	15
SECOND INTERNAL EXAMINATION			
V	Durability of concrete: Durability concept; factors affecting, reinforcement corrosion; fire resistance; frost damage; sulfate attack; alkali silica reaction; concrete in sea water, statistical quality control, acceptance criteria as per BIS code. Non-destructive testing of concrete: Surface Hardness, Ultrasonic, Penetration resistance, Pull-out test, chemical testing for chloride and carbonation- core cutting - measuring reinforcement cover.	9	20
VI	Special concretes - Lightweight concrete- description of various types -High strength concrete - Self compacting concrete -Roller compacted concrete – Ready mixed concrete – Fibre reinforced concrete - polymer concrete Special processes and technology for particular types of structure - Sprayed concrete; underwater concrete, mass concrete; slip form construction, Prefabrication technology	8	20
END SEMESTER EXAMINATION			

QUESTION PAPER PATTERN (End semester exam)

Maximum Marks :100

Exam Duration: 3 Hrs

Part A -Module I & II : 2 questions out of 3 questions carrying 15 marks each

Part B - Module III & IV: 2 questions out of 3 questions carrying 15 marks each

Part C - Module V & VI : 2 questions out of 3 questions carrying 20 marks each

Note : 1.Each part should have at least one question from each module

2.Each question can have a maximum of 4 subdivisions (a, b, c, d)