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)