

Subject Code:	Subject Title: Essentials of Disciplinary Research Subject-1 Subject Sub-Title: Concrete Technology
Pre-requisite Subject	Building Materials, Material Science

Objectives of course: To learn about materials of Concrete and their properties

Learning outcomes: After learning the course, the students should be able to understand the basic concept of Concrete ingredients & their properties, Mechanical property testing, fresh & Hard Concrete Properties, Mix Design

Teaching Scheme (Credit Distribution)				Assessment Scheme (Weightage)	
Lecture	Tutorial	Practical	Credit	Hall Exam	Continuous Evaluation
4	--	--	4	60%	40%

Continuous evaluation is based on assignments/quiz/presentation/small projects as per the supervisor instructions.

Subject Content					
Unit	Topic	No. of Lecture	Weightage %		
1	Concrete Making Materials : Cement: Chemical composition, Hydration of cement, structure of hydrated cement, Tests on cement, water chemical admixtures. Aggregates: Classification IS specifications, Properties, Grading, Methods of combining aggregates, specified grading, Testing of aggregates. Water – General requirements & limiting values of impurities	4	25		
2	Fresh Concrete: Properties of fresh concrete, Definition and Measurement methods of workability as per IS, factors affecting workability, Segregation & Bleeding, Slump loss, Re-tempering, Site preparations for concreting, Mixing, Stages of concreting. Curing & various methods of curing.	3	25		
3	Hardened Concrete: Strengths of hardened concrete (Tensile & Compressive strength, Flexural & Bond strength), standard test methods as per IS and ASTM, Failure mechanism under compression & tension, Stress-strain behavior of concrete, Overview of Modulus of elasticity, Dimensional stability –Creep & Shrinkage	4	25		
4	Mix design of Concrete: Principles of concrete mix design, Parameters and factors influencing mix design, Indian Standard methods of mix design	4	25		

List of References:

1. Properties of Concrete - Neville A. M.
2. Concrete Microstructure, Properties and Materials –P.Kumar Mehta / Paulo J.M.Monteiro
3. Concrete Technology- Shetty M. S.
4. IS: 10262 – 2019, Concrete Mix Proportioning — Guidelines
5. Concrete Technology- Gambhir M. L.

Subject Code:	Subject Title: Essentials of Disciplinary Research Subject-2 Subject Sub-Title: Advanced Concrete Technology
Pre-requisite Subject	Concrete Technology

Objectives of course: To acquaint and equip students with the basics of special concretes and their mix design process, advanced techniques to evaluate properties of special concretes.

Learning outcomes: Student will be able to understand the basics characteristics of special concrete their properties and Advances testing of concrete

Teaching Scheme (Credit Distribution)				Assessment Scheme (Weightage)	
Lecture	Tutorial	Practical	Credit	Hall Exam	Continuous Evaluation
2	--	--	2	60%	40%

Continuous evaluation is based on assignments/quiz/presentation/small projects as per the supervisor instructions.

Subject Contents			
Unit	Topic	No. of Lecture	Weightage %
1	Special concretes - Lightweight concrete- description of various types -High strength concrete - Self compacting concrete -Roller compacted concrete – Ready mixed concrete – Fiber reinforced concrete - polymer concrete	3	20
2	Durability of Concrete: Durability, Transport mechanism of fluids and gases in concrete, cracking in concrete – corrosion and carbonation induced cracking, Alkali Aggregate Reaction, degradation by freeze and thaw, chloride attack, sulphate and sea water attack (marine conditions).	4	25
3	Workability Tests: V-Funnel test, U-Tube test, L-Box Test, J-Ring Test, Vee-bee test Accelerated testing methods. Analysis of hardened concrete. Core drilling and testing. Partially destructive testing. Non-destructive testing of concrete: Surface Hardness, Ultrasonic, Penetration resistance, Pull-out test, chemical testing for chloride and carbonation- core cutting - measuring reinforcement cover.	5	35
4	Mix design of Special Concrete: Principles of special concrete mix design, Indian Standard methods of mix design for Self Compacting Concrete, High Strength Concrete	3	20

List of References:

1. Advanced Concrete Technology – ZONGJIN Li
2. Concrete Technology Theory and Practice: Shetty M.S., S. Chand.
3. Concrete- Microstructures, Properties and Materials: P. Kumar Mehta and Paulo J. M. Monteiro, Indian Edition, Indian Concrete Institute, Chennai, 1999.
4. Concrete Mixture Proportioning- A Scientific Approach: De Larrard F., E&FN Spon, London, 1999.
5. IS: 10262 – 2019, Concrete Mix Proportioning — Guidelines