

Subject Code : 1ET1060403	Subject Title : CONCRETE TECHNOLOGY
Pre-requisite Subject	Basic Knowledge of Material Science

Course Objective:

1. To understand the properties of ingredients of concrete
2. To study the behavior of concrete at its fresh and hardened state
3. To study about the concrete design mix
4. To know about the procedures in concreting
5. To understand special concrete and their use

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total (T+P)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
01	Introduction: Introduction of concrete, Historic development, Composition of concrete, Advantages of concrete over other materials, Advances and future trends in concrete, Overview of Sustainability and Concrete development.	03	7
02	Concrete Making Materials: 2.1 Cement: Chemical composition, Hydration of cement, structure of hydrated cement, Tests on cement (special cements, water chemical admixtures. 2.2 Aggregates: Classification, IS specifications, Properties, Grading, Methods of combining aggregates, specified gradings, Testing of aggregates. 2.3 Water – General requirements & limiting values of impurities	08	19
03	Fresh Concrete: Properties of fresh concrete, Definition and Measurement methods of workability as per IS and ASTM standards, factors affecting workability, Segregation & Bleeding, Slump loss, Re-tempering, Site preparations for concreting, Mixing, Conveying, Placing, Compaction, Finishing of concrete. Curing & various methods of curing.	07	17
04	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 behaviour of concrete, Overview of Modulus of elasticity, Dimensional stability – Creep & Shrinkage	05	12
05	Durability & Permeability of concrete: Causes of deterioration in concrete and durability problems, Factors affecting durability, Transport mechanism of gases & fluids in concrete, Cracking & causes of cracking, Carbonation induced & corrosion induced cracking, Alkali-aggregate reaction, Degradation by freeze & thaw, Sulphate attack, Durability under sea-water (marine environment).	07	17
06	Mix design of Concrete: Principles of concrete mix design, Parameters and factors influencing mix design, Indian Standard methods of mix design, Acceptability criteria, variability of results, Various provisions of IS code for sound concrete.	05	12

07	Special concrete and Concreting methods: Advanced cement based composites, Fibre reinforced concrete, Polymer modified concrete, Self-compacting concrete, Light weight concrete, High strength concrete, Light-weight & heavy weight concrete, High volume fly ash concrete. Special concreting methods: Pumped concrete, Ready mix concrete, Under-water concreting, Hot & cold weather concreting, Precast concrete.	04	9
08	Miscellaneous Topics: Non-Destructive testing of concrete – Introduction to Destructive, semi-destructive & Non-destructive testing methodology, Problems faced during Non-destructive evaluation, Test methods like Rebound Hammer test, Ultra-sonic pulse velocity, Penetration tests, Pull out tests. Overview of Fracture Mechanics – Origin of fracture mechanics, Understanding the quasi-brittle nature of concrete, Failure of concrete under low stress, Micro – cracking, crack propagation, stress concentration at openings.	03	7

Course Outcome:

On completion of the course, the students will be able to:

1. test all the concrete materials as per IS code
2. design the concrete mix using ACI and IS code methods
3. determine the properties of fresh and hardened of concrete
4. design special concretes and their specific applications
5. ensure quality control while testing/ sampling and acceptance criteria

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. Advanced Concrete Technology –ZONGJIN Li
5. Concrete Technology- Gambhir M. L.
6. Concrete Technology by A.R. Santhakumar, IIT Madras

List of Practical:

Tests on cement, aggregates, Design & making of concrete, Tests on fresh concrete, Hard concrete (destructive & non-destructive test methods)

Field Visit: Visit of any construction Site or RMC or Cement Plant

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide.