

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - CIVIL ENGINEERING

Semester: IV

Subject Name: **Concrete Technology**

Sr. No.	Course content
1.	General: Historical background, composition of concrete, general note on strength mechanism, current practice and future trends.
2.	Ingredients of Concrete A. Cement- Chemical composition, hydration, heat of hydration, hydrated structure, various types of cement, testing of cement as per Indian standard. B. Aggregates-Function in concrete, classification, effect of geometry & texture, strength, mechanical properties, moisture content, water absorption, bulking of sand, deleterious substances, sieve analysis, various grading and grading requirements, sampling & testing as per Indian Standards. C. Water- General Requirements & limiting values of impurities. D. Admixtures- Additives and admixtures, types, need and benefits Mineral admixture - Fly ash, silica fume, blast furnace slag, and other pozzolanic materials. Chemical admixtures - Accelerator, retarder, water reducing elements, plasticizer and super-plasticizer, their functions and dosage.
3.	Fresh concrete: Methods of mixing, transporting and placing of concrete. Workability – Definition and need, factors affecting workability, various tests as per IS and ASTM. Segregation and bleeding, stiffening, re-tempering. Curing: necessity and various methods, microcracking.
4.	Hardened concrete: Compressive and tensile strength and their relationship, various tests as per IS and ASTM Factors affecting strength – water cement ratio, gel space ratio, aggregate cement ratio, properties of ingredients, effect of age, maturity, aggregate cement-paste interface, various finishes of concrete. Introduction to aspects of elasticity, shrinkage and creep. Tests for strength of concrete: Destructive, semi destructive and non- destructive tests with their limitations, test methods as per IS and ASTM.
5.	Durability and permeability of concrete: Definitions, causes, carbonation, cracking.

6.	Concrete in aggressive environment: Alkali – aggregate reaction, sulphate attack, chloride attack, acid attack, effect of sea water, special coating for water proofing, sulphate chloride and acid attack, concrete for hot liquids.
7.	Special Concrete: Review of behavior and characteristics of high strength concrete, high performance concrete, fiber reinforced concrete, mass concrete, light weight and heavy weight concrete, Precast concrete.
8.	Special concreting techniques: Pumped concrete, shotcrete, underwater concrete, pre-placed concrete, vacuum dewatered concrete, hot and cold weather concreting, Ready mixed concrete.
9.	Concrete mix design: Principles of mix proportioning, probabilistic parameters, factors governing selection of mix. Road note - 4, DOE, ACI and IS method of concrete mix design, Variability of test results, acceptance criteria, various IS code provisions.
10.	Repair and rehabilitation: Distress in structure – causes and precautions, damage assessment of structural elements, repairing techniques and repairing materials.

Term Work:

1. Term work shall consist of tests on cement and aggregate, fresh concrete and hardened concrete. It includes destructive, partial destructive and non- destructive tests.
2. Term work shall include report on topic assigned by respective lab in-charge.
3. Term work shall include field visit and students will have to submit a report on it.
4. Oral/Practical marks include viva-voce on practical performed and submitted reports.

Reference Books:

1. A.M.Neville ; *Properties of Concrete*
2. D.F.Orchard; *Concrete Technology*
3. P Kumar Mehta, Monteiro; *Concrete Technology*
4. 4 A R Santhakumar; *Concrete Technology*
5. M S Shetty; *Concrete Technology*
6. M L Gambhir; *Concrete Technology*