# GUJARAT TECHNOLOGICAL UNIVERSITY

## B.E Semester: 3

## Civil Engineering

Subject Code 130605
Subject Name Concrete Technology

| Sr.No | Course contents |
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| 1 | General:<br>Historical background, composition of concrete, general note on strength mechanism, current practice and future trends. |
| 2 | Ingredients of Concrete<br>1. Cement- Chemical composition, hydration, heat of hydration, hydrated structure, various types of cement, testing of cement as per Indian standard.<br>2. 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.<br>3. Water- General Requirements & limiting values of impurities.<br>4. Admixtures- Additives and admixtures, types, need and benefits<br>Mineral admixture - Fly ash, silica fume, blast furnace slag, and other pozzolanic materials.<br>Chemical admixtures - Accelerator, retarder, water reducing elements, plasticizer and super-plasticizer, their functions and dosage. |
| 3 | Fresh concrete :<br>Methods of mixing, transporting and placing of concrete. Workability – Definition and need, factors affecting workability, various tests as per IS ad ASTM. Segregation and bleeding, stiffening, re-tempering. Curing: necessity and various methods, microcracking. |
| 4 | Hardened concrete:<br>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:<br>Definitions, causes, carbonation, cracking |

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| 6 | Concrete in aggressive environment:<br>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:<br>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:<br>Pumped concrete, shotcrete, underwater concrete, pre-placed concrete, vacuum dewatered concrete, hot and cold weather concreting, Ready mixed concrete. |
| 9 | Concrete mix design:<br>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:<br>Distress in structure – causes and precautions, damage assessment of structural elements, repairing techniques and repairing materials. |

Term Work:

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

## Reference Books:


1. A.M.Neville ; Properties of Concrete , Pearson Education
2. P Kumar Mehta, Monteiro; Concrete Technology, Indian Concrete Institute
3. A R Santhakumar; Concrete Technology , Oxford University Press
4. M S Shetty; Concrete Technology , S.Chand Publication New Delhi
5. M L Gambhir; Concrete Technology , Tata McGraw Hill