

23CE22T2 CONCRETE TECHNOLOGY

Course Category	Professional Core	Credits	3
Course Type	Theory	Lecture – Tutorial –Practical	3-0-0
Prerequisite	-	Sessional Evaluation	30
		Semester End Exam. Evaluation	70
		Total Marks	100

Course Objectives	<ol style="list-style-type: none"> 1. Learn materials and their properties used in the production of concrete 2. Learn the behavior of concrete at fresh stage 3. Learn the behavior of concrete at hardened stage 4. Learn the influence of elasticity, creep and shrinkage on concrete 5. Learn the mix design methodology and special concretes 		
Course Outcomes	COs	Statements	Blooms Level
	CO1	Familiarize the basic ingredients of concrete and their role in the production of concrete and its behavior in the field.	L3
	CO2	Identify the properties of concrete in the fresh state and Methods of curing.	L2
	CO3	Evaluate the mechanical properties of hardened concrete and perform non-destructive tests on concrete.	L5
	CO4	Understand the durability properties of concrete.	L2
	CO5	Design the concrete mix using ACI and BIS codes and understand the significance of special concretes in construction industry.	L2
Course Content	<p align="center">UNIT I</p> <p>Cements: Portland cement – Chemical composition; Hydration; Setting of cement; Fineness of cement; Structure of hydrate cement; Test for physical properties; Different grades of cements; Admixtures: Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume.</p> <p>Aggregates: Classification of aggregate - Particle shape & texture; Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate; Bulking of sand; Deleterious substances; Soundness; Alkali aggregate reaction; Thermal properties; Sieve analysis – Fineness modulus – Grading curves; Grading of fine & coarse Aggregates; Maximum aggregate size; Quality of mixing water</p>		

UNIT II

Fresh Concrete: Steps in preparation of Concrete - proportion, mixing, placing, compaction, finishing, curing (including various types in each stage); Properties of fresh concrete – Workability, Factors affecting workability, Measurement of workability by different tests; Setting times of concrete; Effect of time and temperature on workability; Segregation & bleeding; Mixing and vibration of concrete; Ready mixed concrete; Shotcrete.

UNIT III

Hardened Concrete: Water / Cement ratio – Abram’s Law – Gel/space ratio; Nature of strength of concrete; Maturity concept; Strength in tension & compression; Factors affecting strength; Relation between compression & tensile strength; Curing; Testing of Hardened Concrete - Compression test, Tension test, Flexure test, Splitting test; Non-destructive testing methods; Codal provisions for NDT.

UNIT IV

Elasticity, Creep & Shrinkage: Modulus of elasticity, Dynamic modulus of elasticity, Poisson’s ratio; Creep of concrete – Factors influencing creep, Relation between creep & time, Nature of creep, Effects of creep; Shrinkage – types of shrinkage.

UNIT V

Mix Design: Factors in the choice of mix proportions; Quality control of concrete; Statistical methods: Acceptance Criteria - Concepts; Proportioning of concrete mixes by ACI method and IS Code method.

Special Concretes: Ready mixed concrete; Fibre reinforced concrete – Different types of fibres – Factors affecting properties of FRC; High performance concrete; Self consolidating concrete; Self-healing concrete.

<p>Textbooks and Reference books</p>	<p>Textbooks:</p> <ol style="list-style-type: none"> 1. M.S. Shetty, “<i>Concrete Technology Theory and Practice</i>”, S. Chand & Company Ltd., 8th revised edition, 2019. 2. Dr.R.P.Rethaliya, “<i>Concrete Technology</i>”, Charotar Publishing House, 2nd edition, 2018. 3. V.N.Vazirani and S.P.Ratwani, “<i>Concrete Technology</i>”, Khanna Publishers, 6th edition, 2016. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. A.M. Neville, J.J. Brooks, “<i>Concrete Technology</i>”, Pearson 2nd edition, Concrete Manual by U.S. Bureau of Reclamation, 2019. 2. P. Kumar Mehta, Paulo J.M. Monteiro, “<i>Concrete: Microstructure, Properties, and Materials</i>”, McGraw Hill Education, 4th edition, 2017. 3. M.L.Gambhir, “<i>Concrete Technology Theory and Practice</i>”, McGraw Hill Education, 5th edition, 2017.
<p>E- resources</p>	<ol style="list-style-type: none"> 1. https://archive.nptel.ac.in/courses/105/102/105102012/ 2. https://gate.nptel.ac.in/video.php?branchID=5&cid=1 3. https://www.slideshare.net/slideshow/aggregates-of-concrete/72746033 4. https://www.slideshare.net/slideshow/aggregates-used-in-concrete/123082323?from_search=1 5. https://www.slideshare.net/slideshow/fresh-concrete-72766607/72766607?from_search=0 6. https://www.slideshare.net/slideshow/hardened-concrete-94251797/94251797?from_search=0 7. https://www.slideshare.net/slideshow/concrete-durability-65111811/65111811?from_search=1 8. https://www.slideshare.net/gauravhtandon1/concrete-mix-design-46415349?from_search=1

CO-PO Mapping: 3-High mapping, 2-Moderate mapping, 1-Low mapping, - Not mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	-	1	-	-	1	-	-	1	1	-	2	1
CO2	1	1	1	-	-	-	-	-	-	-	-	1	-	1	1
CO3	2	1	1	2	-	-	-	-	-	-	-	2	-	1	2
CO4	1	1	-	-	-	-	1	-	-	-	-	1	-	2	-
CO5	3	3	-	1	-	-	-	-	-	-	1	2	1	3	3