

CONCRETE TECHNOLOGY SYLLABUS

Course Code	23CE3401	Year	II	Semester	II
Course Category	Professional Core	Branch	CIVIL	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Engineering chemistry, Basic Civil and Mechanical Engineering
Continuous Internal Evaluation	30	Semester End Evaluation:	70	Total Marks:	100

Course Objectives:

The objective of this course is to:

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:

Course will enable the student to:

CO	Statement	Blooms level
CO 1	Familiarize the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field.	L2
CO 2	Test the fresh concrete properties and the hardened concrete properties. Understand the basic concepts of concrete. Design the concrete mix by BIS method.	L5
CO 3	Evaluate the ingredients of concrete through lab test results. realise the importance of quality of concrete	L4
CO 4	Understand the behaviour of concrete in various environments.	L3
CO 5	Familiarize the basic concepts of special concrete and their production and applications.	L2

Course Articulation Matrix:

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

Syllabus:

Unit No	Content	Mapped COs
I	<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>	CO1, CO3
II	<p>FRESH CONCRETE: Steps in Manufacture 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</p>	CO2, CO4
III	<p>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 – Factors affecting strength – Flexure test –Splitting test – Non-destructive testing methods – Codal provisions for NDT.</p>	CO2, CO4
IV	<p>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.</p>	CO2, CO4
V	<p>MIX DESIGN AND 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> <p>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</p>	CO2, CO3, CO5

Learning Resource(s)
Text Book(s)
1. Properties of Concrete by A.M. Neville – PEARSON – 4th edition 2. Concrete Technology by M.L. Gambhir. – Tata Mc.Graw Hill Publishers, New Delhi 5 th edition 2013. 3. Concrete Technology by Job Thomas, Cengagae Publications, 1 st edition, 2015
Reference Book(s)
1. Concrete Microstructure, Properties of Materials by P.K. Mehta and Moterio. McGraw Hill 4th edition 2014 2. Concrete Technology, J.J. Brooks and A. M. Neville, Pearson, 2019, 2nd Edition. 3. Concrete Technology by M. S. Shetty. – S. Chand & Co.; 2004 4. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi
e-Resources & other digital material
https://nptel.ac.in/courses/105102012