

## CONCRETE TECHNOLOGY

<b>VI Semester: CE</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACEB26	Professional Elective	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
<b>Contact Classes: 45</b>		<b>Tutorial Classes: 15</b>			<b>Practical Classes: Nil</b>		<b>Total Classes: 60</b>	
<p><b>OBJECTIVES:</b>  <b>Students will try to learn:</b></p> <ul style="list-style-type: none"> <li>I The fundamental properties of construction materials such as cement, aggregates and admixtures based on laboratory and field tests.</li> <li>II The factors influencing workability and methods involved in measuring workability of fresh concrete.</li> <li>III The importance of water/cement ratio and its influence on compressive, tensile and flexural strengths of hardened concrete</li> <li>IV The concept of quality control and design concrete mix to ensure the quality of concrete</li> <li>V The application of special and new generation concrete by replacing traditional concrete to improve structural performance in real time.</li> </ul> <p><b>COURSE OUTCOMES:</b>            After successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> <li>CO 1: <b>Recall</b> the basic physical and chemical properties of construction materials for determining quality of concrete.</li> <li>CO 2: <b>Identify</b> the soundness of aggregate based on their characteristics for deciding their suitability in construction practice</li> <li>CO 3: <b>Explain</b> workability and factors influencing workability of fresh concrete for identifying the condition of fresh concrete</li> <li>CO 4: <b>Explain</b> the steps involved in the manufacturing of concrete for obtaining economical and durable concrete</li> <li>CO 5: <b>Inspect</b> the impact of water/cement ratio on strength and durability of concrete by measuring its hardened strength</li> <li>CO 6: <b>Organize</b> destructive and Non-destructive tests on hardened concrete for calculating compressive, tensile and flexural strengths</li> <li>CO 7: <b>Compare</b> the quality control methods used for estimating quality of concrete mix</li> <li>CO 8: <b>Develop</b> the most economical and eco-friendly concrete mix based on standard methods for producing quality of concrete with estimated strength and durability.</li> <li>CO 9: <b>Examine</b> special and new generation concrete for satisfying the future needs of industry in real time.</li> </ul>								
<b>MODULE-I</b>	<b>CEMENT ADMIXTURES AND AGGREGATES</b>						<b>Classes: 09</b>	
<p>Portland cement :chemical composition , hydration, setting of cement , structure of hydrate cement , test on physical properties , different grades of cement Admixtures: Mineral and chemical admixtures, properties, dosage, effects usage.</p> <p>Aggregates: Classification of aggregate, particle shape &amp; texture bond, strength &amp; other mechanical properties of aggregate, specific gravity, bulk density, porosity, adsorption &amp; moisture content of</p>								

aggregate, bulking of sand, deleterious substance in aggregate, soundness of aggregate , alkali aggregate reaction, thermal properties, sieve analysis, fineness modulus, grading curves, grading of fine & coarse aggregates, gap graded aggregate, maximum aggregate size.		
<b>MODULE -II</b>	<b>FRESH CONCRETE</b>	<b>Classes: 07</b>
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, steps in manufacture of concrete, quality of mixing water.		
<b>MODULE-III</b>	<b>HARDENED CONCRETE AND ITS TESTING</b>	<b>Classes: 09</b>
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 tests, tension tests, factors affecting strength, flexure tests, splitting tests,		
Non-destructive testing methods, codal provisions for NDT. 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..		
<b>MODULE-IV</b>	<b>MIX DESIGN</b>	<b>Classes: 08</b>
Factors in the choice of mix proportions, Durability of concrete, Quality Control of concrete, Statistical methods, Acceptance criteria, Proportioning of concrete mixes by various methods,BIS method of mix design		
<b>MODULE-V</b>	<b>SPECIAL CONCRETE</b>	<b>Classes: 12</b>
Light weight aggregates, light weight aggregate concrete, cellular concrete , no fines concrete, high density concrete, fiber reinforced concrete, different types of fibers , factors affecting properties of F.R.C, applications, polymer concrete, types of polymer concrete, properties of polymer concrete applications, high performance concrete, self-consolidating concrete, SIFCON		
<b>Text Books:</b>		
1. Shetty, M.S., “Concrete Technology, Theory & Practice”, S. Chand and Co,2004 2. Gambhir, M.L., “Concrete Technology”, Tata McGraw Hill,2004.		
<b>Reference Books:</b>		
1. V.N.Vazirani&S.P.Chandola, Ed. by Vineet Kumar,” Concrete technology”, 6 <sup>th</sup> edition reprint. 2. Santakumar A.R., “Concrete Technology”, Oxford University Press, New Delhi,2007		
<b>Web References:</b>		
1. <a href="http://www.nptel.ac.in/courses/105102088/home.htm">www.nptel.ac.in/courses/105102088/home.htm</a>		
<b>E-Text Books:</b>		
1. <a href="https://www.jntubook.com/concrete-textbook-free-download">https://www.jntubook.com/concrete-textbook-free-download</a> . 2. <a href="http://www.freeengineeringbooks.com/Civil/concrete-Books.php">http://www.freeengineeringbooks.com/Civil/concrete-Books.php</a> 3. <a href="https://www2.unb.ca/gge/Study/Undergraduate/Handbook.pdf">https://www2.unb.ca/gge/Study/Undergraduate/Handbook.pdf</a>		