

## 20ES 1301- CONSTRUCTION MATERIALS & CONCRETE TECHNOLOGY

<b>Offering Branches</b>	CE		
<b>Course Category:</b>	Engineering Sciences	<b>Credits:</b>	3
<b>Course Type:</b>	Theory	<b>Lecture-Tutorial-Practical:</b>	3-0-0
<b>Prerequisites:</b>	20BS1101- Calculus and Linear Algebra 20BS1206 – Chemistry of materials	<b>Continuous Evaluation:</b>	30
		<b>Semester End Evaluation:</b>	70
		<b>Total Marks:</b>	100

### Course Outcomes

Upon successful completion of the course, the student will be able to:

<b>CO1</b>	<b>Describe</b> the basic Engineering Properties of the construction materials & Concrete ingredients	K2
<b>CO2</b>	<b>Describe</b> the various functional components of a building	K2
<b>CO3</b>	<b>Understand</b> and conduct the different qualitative and quantitative tests on materials of concrete & concrete itself.	K2
<b>CO4</b>	<b>Ascertain</b> the efficiency of different mixing, transporting, placing, compaction and curing techniques of concrete	K2
<b>CO5</b>	<b>Apply</b> basic requirements of the IS design specifications Can carry out the concrete mix design using IS guidelines.	K3

### Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	3				2	2					2	3	2
<b>CO2</b>	2	2				2	2					2	2	2
<b>CO3</b>	3	3				2	2					2	3	2
<b>CO4</b>	2	2				2	2					2	2	2
<b>CO5</b>	1	1	1			2	2					2	1	2
<b>Avg.</b>	<b>2</b>	<b>2</b>	<b>1</b>			<b>2</b>	<b>2</b>					<b>2</b>	<b>2</b>	<b>2</b>

1- Low

2-Medium

3-High

### Course Content

<b>UNIT-1</b>	<p><b>Construction Materials:</b> Stones and Bricks - Properties of building stones, classification of stones, stone quarrying, Manufacturing of bricks various types of bricks and blocks used for construction, tests on bricks and blocks; Wood: Classification of various types of woods used in buildings; Timber – seasoning of timber, Defects in Timber Market forms – Industrial timber– Plywood – Veneer –panels of laminates; Bamboo-suitability as a building material</p>	<b>CO1, CO3</b>
<b>UNIT-2</b>	<p><b>Construction Practices:</b> Types of Structural systems -load bearing structure- framed structure- load transfer mechanism; Foundations – Deep foundation and its types, Shallow foundations and its types; Masonry -Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry; Mortar: Importance, properties and types of mortar; Finishing- Damp Proofing, water proofing materials and their uses, Plastering, Paints, Ingredients, types, white washing and distempering.</p>	<b>CO2</b>
<b>UNIT-3</b>	<p><b>Concrete Ingredients:</b> Cement: Portland cement – chemical composition – Manufacturing - Hydration, Setting of cement – Structure of hydrated cement – Field and Laboratory testing – Types of cement. Aggregates: Classification of aggregate Particle size, shape &amp; texture, strength &amp; other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption &amp; moisture content of aggregate – Bulking of sand –</p>	<b>CO1, CO3</b>

	Soundness of aggregate – Sieve analysis – Fineness modulus – Grading of fine & coarse Aggregates – Alternatives to river sand	
<b>UNIT-4</b>	<b>Admixtures and Fresh Concrete:</b> Admixtures: Benefits of admixtures, Classification of admixtures, Fly ash , GGBS, Silica fume, accelerators, retarders , water- reducing admixtures, super plasticizer Fresh Concrete: Properties of fresh concrete, workability, factors affecting workability, measurement of workability, Segregation and Bleeding, Process of manufacture of concrete, quality of mixing water.	<b>CO1, CO3, CO4</b>
<b>UNIT-5</b>	<b>Hardened Properties and Mix Proportioning:</b> Strength & Durability of Concrete: Water/cement ratio, factor affecting strength of concrete, Tests on hardened concrete, Durability, Factors affecting durability; Sulfate attack, alkali aggregate reaction, Carbonation of concrete Mix proportioning:- Factors affecting the mix proportioning of Concrete, Proportioning of concrete mixes by– IS 10262- 2019 and IS 456.	<b>CO3, CO5</b>
<b>Learning Resources</b>		
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. S.C. Rangwala, Engineering Materials, 4/e, Charotar Publishing House, 2014.</li> <li>2. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Building Construction, Laxmi Publications, 2005</li> <li>3. M.S. Shetty, Concrete Technology, 7/e, S.Chand and Company Ltd, 2015.</li> </ol>	
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. P.C. Varghese, A Text Book Building Materials, 1/e, Prentice-Hall, Publication, 2005.</li> <li>2. A.M. Neville and J.J. Brooks, Concrete Technology, 2/e, Prentice Hall, 2010.</li> <li>3. P.K.Mehta, Concrete: Microstructure, Properties and Materials, 4/e, McGraw-Hill Education, 2014.</li> <li>4. A.R.Santha Kumar, Concrete Technology, 2/e, Oxford University Press India, 2018</li> </ol>	
<b>e-Resources &amp; other digital material</b>	<ol style="list-style-type: none"> <li>1. <a href="http://textofvideo.nptel.ac.in/105102012/lec41.pdf">http://textofvideo.nptel.ac.in/105102012/lec41.pdf</a></li> <li>2. <a href="https://nptel.ac.in/courses/105102088/">https://nptel.ac.in/courses/105102088/</a></li> </ol>	