

## ADVANCED CONCRETE TECHNOLOGY

<b>I Semester: ST</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
<b>BSTC08</b>	<b>Elective</b>	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
<b>Contact Classes: 45</b>		<b>Total Tutorials: Nil</b>		<b>Total Practical Classes: Nil</b>		<b>Total Classes: 45</b>		
<p><b>I. COURSE OVERVIEW:</b>                      This course introduces the principles of elasticity, components of stresses and strains, differential equations of equilibrium, boundary conditions, compatibility conditions and stress function. This course also covers the two dimensional problems in rectangular coordinates and polar coordinates, Fourier series for two dimensional problems stress distribution symmetrical about an axis, pure bending of curved bars, strain components in polar coordinates, displacements for symmetrical stress distributions, simple symmetric and asymmetric problems, analysis of stress strain in three dimensions, torsion of prismatical bars and plasticity. This course is reached to student by power point presentations, lecture notes, and assignment questions, seminars, previous model question papers, and question bank of long and short answers.</p>								
<p><b>II. COURSE OBJECTIVES:</b>  <b>The student will try to learn:</b></p> <ol 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 for identifying material quality.</li> <li>II. The factors influencing workability and methods involved in measuring workability of fresh concrete.</li> <li>III. The application of special and new generation concrete by replacing traditional concrete for improving structural performance in real time.</li> </ol>								
<p><b>COURSE OUTCOMES:</b></p>								
<p><b>After successful completion of the course, students should be able to:</b></p>								
CO 1	Explain the basic physical and chemical properties of construction materials for determining quality of concrete.						Understand	
CO 2	Outline the workability and manufacturing process of concrete for obtaining economical and durable concrete.						Understand	
CO 3	Inspect the impact of water/cement ratio on strength and durability of concrete by measuring its hardened strength.						Analyze	
CO 4	Identify the materials and technics of repair for rehabilitation and retrofitting of structures.						Understand	
CO 5	Develop the most economical and eco-friendly concrete mix based on standard methods for producing quality of concrete.						Understand	
CO 6	Examine special concretes and new generation concrete for satisfying the future needs of industry in real time.						Analyze	

#### **IV. SYLLABUS:**

##### **MODULE-I: MATERIALS FORMING CONCRETE (09)**

Concrete making materials: cement, bogue compounds, hydration Process, types of cement, aggregates, gradation charts, combined aggregate, alkali silica reaction, admixtures, chemical and mineral admixtures.

##### **MODULE-II: TESTS ON FRESH AND HARDENED CONCRETE (09)**

Fresh and hardened Concrete: Fresh Concrete workability tests on concrete setting times of fresh concrete, segregation and bleeding. Hardened concrete: Abram's law, gel space ratios, maturity concept, stress behaviour, creep and shrinkage, durability tests on concrete, nondestructive testing of concrete.

##### **MODULE-III: HIGH STRENGTH AND HIGH PERFORMANCE CONCRETES (09)**

High strength concrete, micro structure, manufacturing and properties, design of HSC using entrained air method, ultra high strength concrete.

High performance concrete, requirements and properties of high performance concrete, design considerations.

##### **MODULE-IV: QUALITY CONTROL OF CONCRETE (09)**

Concrete mix design: Quality control, quality assurance, quality audit, mix design method - BIS method

##### **MODULE-V: SPECIAL CONCRETES (09)**

Self-compacting concrete, polymer concrete, fiber reinforced concrete, reactive powder concrete requirements and guidelines, advantages and applications. Light weight concrete, bacteria concrete, geopolymer concrete, self curing concrete, recycled aggregate concrete.

#### **V. TEXT BOOKS:**

1. A.M.Neville, "Properties of Concrete", ELBS publications, 2012.
2. A.K. Santhakumar, "Concrete Technology", Oxford Press, 2006.
3. M.S.Shetty, "Concrete Technology", S.Chand & Co, 2006.

#### **VI. REFERENCE BOOKS:**

1. Rajat Siddique, "Special Structural Concreted", Galgotia Publications, 2004.
2. N.KrishnaRaju, "Design of Concrete Mixes", CBS Publications, 1996.
3. P.K.Mehta, "Concrete: Micro Structure", ICI, Chennai, 2007.

#### **VII. WEB REFERENCES:**

1. <http://nptel.ac.in/courses/112104160/3>
2. <http://nptel.ac.in/downloads/112104160/>

#### **VIII. E-TEXT BOOKS:**

1. <https://books.google.co.in/books?id=DXOsGoqtiggC&printsec=frontcover#v=onepage&q&f=false>.
2. [https://www.researchgate.net/publication/273059503\\_Introduction\\_to\\_Structural\\_Health\\_Monitoring](https://www.researchgate.net/publication/273059503_Introduction_to_Structural_Health_Monitoring)