



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

ADVANCED CONCRETE TECHNOLOGY								
I Semester: ST								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIA	SEE	Total
BSTD04	Elective	3	0	0	3	40	60	100
Contact Classes: 48	Total Tutorials: Nil	Total Practical Classes: Nil			Total Classes: 48			
Prerequisite: Concrete Technology								

I. COURSE OVERVIEW:

Concrete is the most versatile construction material used all around the world. The study of concrete has become indispensable to the Civil engineering graduates to learn fundamental properties of fresh concrete, hardened concrete, strength and durability. Concrete technology provides a comprehensive coverage of the theoretical and practical aspects of the subject and includes the latest developments in the field of concrete construction. It incorporates the latest Indian standard specifications and codes of practices for regulating concrete construction. The properties of concrete and its constituent materials, the role of various admixtures in modifying these properties to suit specific requirements and situations are also be studied. The course also provides the knowledge on mix design for producing most economical and durable concrete, it also enables the students to acquire knowledge on special and new generation concrete with their applications.

II. COURSE OBJECTIVES:

The student will try to learn:

- I. The fundamental properties of construction materials such as cement, aggregates and admixtures based on laboratory and field tests for identifying material quality.
- II. The factors influencing workability and methods involved in measuring workability of fresh concrete.
- III. The application of special and new generation concrete by replacing traditional concrete for improving structural performance in real time.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

- CO 1 Explain the basic physical and chemical properties of construction materials for determining quality of concrete.
- CO 2 Outline the workability and manufacturing process of concrete for obtaining economical and durable concrete.
- CO 3 Inspect the impact of water/cement ratio on strength and durability of concrete by measuring its hardened strength.
- CO 4 Identify the materials and technics of repair for rehabilitation and retrofitting of structures.
- CO 5 Develop the most economical and eco-friendly concrete mix based on standard methods for producing quality of concrete.
- CO 6 Examine special concretes and new generation concrete for satisfying the future needs of industry in real time.

IV. COURSE CONTENT:

MODULE - I: MATERIALS FORMING CONCRETE (10)

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 (10)

High strength concrete, micro structure, manufacturing and properties, design of HSC using erintroyshaklok 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 (10)

Self-compacting concrete, polymer concrete, Fiber reinforced concrete- Requirements and Guidelines- advantages and applications, Light weight concrete, bacteria concrete, geo polymer concrete, self-curing concrete, recycled aggregate concrete.

V. TEXT BOOKS:

1. A. M. Neville, "Properties of Concrete", ELBS publications, 2012.
2. A. K. Santha kumar, "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. Krishna Raju, "Design of Concrete Mixes", CBS Publications, 1996.
3. P. K. Mehta, "Concrete: Micro Structure", ICI, Chennai, 2007

VII. ELECTRONICS RESOURCES:

1. <http://nptel.ac.in/courses/112104160/3>
2. <http://nptel.ac.in/downloads/112104160/>
1. <https://books.google.co.in/books?id=DXOsGoqtiggC&printsec=frontcover#v=onepage&q&f=false>.
3. https://www.researchgate.net/publication/273059503_Introduction_to_Structural_Health_Monitoring

VIII. MATERIALS ONLINE:

1. Course Template
2. Tutorial Question Bank
3. Assignments
4. Model Question Paper – I
5. Model Question Paper - II
6. Lecture Notes
7. Power point presentation