



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

CONCRETE MATERIALS LABORATORY								
IV Semester: CE								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
ACED11	Core	0	0	2	1	40	60	100
		Contact Classes: Nil		Tutorial Classes: Nil		Practical Classes: 45		Total Classes: 45
Prerequisite: Nil								

I. COURSE OVERVIEW:

Concrete material laboratory course emphasizes the practical aspects of the latest developments in the field of concrete construction. It focuses the latest Indian standard specifications and codes, which regulates the concrete construction. The laboratory course covers the properties of concrete and its constituent materials, the role of various admixtures in modifying these properties to suit specific requirements, such as ready mix concrete, reinforcement detailing, disaster-resistant construction, concrete machinery and it also enable the students to acquire knowledge on special and new generation concrete with their applications.

II. COURSE OBJECTIVES:

The students will try to learn:

- I. Fundamental properties of construction materials like 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. Importance of water/cement ratio and its influence on compressive strengths of hardened concrete.
- IV. Concept of quality control and design of concrete mix for ensuring quality of concrete.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO 1 Demonstrate the basic properties of cement and aggregates for determining their suitability through various laboratory tests.
- CO 2 Determine physical and chemical properties of cement in laboratory for deciding its suitability in construction practice.
- CO 3 Determine the specific gravity of cement for estimating quantity in mix design.
- CO 4 Examine the fineness modulus of aggregates and bulking of sand for producing good quality concrete.
- CO 5 Measure the workability of fresh concrete for identifying the condition of plastic concrete.
- CO 6 Determine Compressive strength of cement concrete for accepting in construction practice.

IV. COURSE CONTENT:

Week-1: INTRODUCTION TO CONCRETE TECHNOLOGY

Introduction to concrete technology laboratory.

Week-2: FINENESS OF CEMENT AND NORMAL CONSISTENCY OF CEMENT

Fineness and normal consistency of cement.

Week-3: INITIAL AND FINAL SETTING TIME OF CEMENT AND SPECIFIC GRAVITY OF CEMENT

Setting time of cement and specific gravity of cement.

Week-4: COMPRESSIVE STRENGTH OF CEMENT AND SOUNDNESS OF CEMENT

Compressive Strength and Soundness of cement.

Week-5: FINENESS MODULUS OF FINE AND COARSE AGGREGATE AND BULKING OF SAND

Fineness modulus of fine and coarse aggregate and bulking of sand.

Week-6: WORKABILITY TESTS ON FRESH CONCRETE

Workability test on fresh concrete.

Week-7: TEST FOR COMPRESSIVE STRENGTH OF CEMENT CONCRETE

Compressive strength of cement concrete.

Week-8: AIR ENTRAINMENT TEST ON FRESH CONCRETE

Measurement of air entrainment test on fresh concrete.

Week-9: PERMEABILITY OF CONCRETE

Performing permeability of concrete test on fresh concrete.

Week-10: NON DESTRUCTIVE TESTING OF CONCRETE

Performing non destructive testing of concrete.

Week-11: ACCELERATED CURING OF CONCRETE

Performing accelerated curing test on Concrete.

Week-12: INFLUENCE OF W/C RATIO ON STRENGTH AND AGGREGATE / CEMENT RATIO ON WORKABILITY AND STRENGTH

Influence of W/C ratio on strength of concrete.

Week-13: MARSH CONE TEST

Performing Marsh cone Test on fresh concrete.

Week-14: WORKABILITY TESTS ON FRESH SELF-COMPACTING CONCRETE

Measurement of Workability Tests on Fresh self-compacting concrete.

V. TEXT BOOKS:

1. Hemanth Sood and LN Mittal, “*Laboratory Manual on Concrete Technology*”, CBS Publishers Pvt. Ltd., New Delhi, 2nd Edition, 2013.
2. Khanna S.K and Justo C.E.G., “*Pavement Materials and Testing*” Tata McGraw Hill Education, 2012.

VI. REFERENCE BOOKS:

1. Malik R.S., Meo, G.S., “*Laboratory Manual on Concrete Technology*”, Computech Publication Ltd New Asian, 2009.
2. Sikka, V.B., “*Laboratory Manual on Concrete Technology*”, S. K. Kataria & Sons, 2013.

VII. ELECTRONICS RESOURCES:

1. <https://www.globalgilson.com/concrete-testing-equipment>
2. <https://itram.ac.in/labdetail/4>
3. <https://www.ce.washington.edu/research/facilities/construction-materials>
4. <https://www.ncbindia.com/testing-services.php>
5. <https://nptel.ac.in/courses/105102012/>

VIII. MATERIAL ONLINE:

1. Course template
2. Lab manual