



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

CIVIL ENGINEERING

COURSE DESCRIPTOR

Course Title	CONCRETE TECHNOLOGY LABORATORY				
Course Code	ACE108				
Programme	B.Tech				
Semester	V	CIVIL			
Course Type	Core				
Regulation	IARE - R16				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	-	-	-	3	2
Chief Coordinator	Ms. B. Bhavani, Assistant Professor				
Course Faculty	Mr. G. Rama Krishna, Associate Professor Ms. B. Bhavani, Assistant Professor				

I. COURSE OVERVIEW:

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 regulating concrete construction. The properties of concrete and its constituent materials and the role of various admixtures in modifying these properties to suit specific requirements, such as ready mix concrete, reinforcement detailing, disaster-resistant construction, and concrete machinery have been treated exhaustively and also special concrete in addition to the durability maintenance and quality control of concrete structure.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Level
-	-	-	-	-

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Concrete Technology Laboratory	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✗	Chalk & Talk	✗	Quiz	✗	Assignments	✗	MOOCs
✓	LCD / PPT	✗	Seminars	✓	Mini Project	✗	Videos
✓	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

Continuous Internal Assessment (CIA):

CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	Laboratory		Total Marks
	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

Continuous Internal Examination (CIE):

One CIE exams shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	Performance	Calculations and Graph	Results and Error Analysis	Viva	Total
2	2	2	2	2	10

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	2	Presentation on real-world problems
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	2	Exercise, Discussion and Seminars
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	2	Project Work / Tutorial
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	2	Project Work

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO1	Engineering Knowledge: Graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication.	2	Presentation on real-world problems
PSO2	Broadness and Diversity: Graduates will have a broad understanding of economical, environmental, societal, health and safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage.	-	-
PSO3	Self-Learning and Service: Graduates will be motivated for continuous self-learning in engineering practice and/or pursue research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.	-	-

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Understand the basic physical and chemical properties of cement, admixtures and aggregates
II	Describe the properties and factors influencing the workability of fresh concrete
III	Determine the affect of water/cement ratio on the strength of hardened concrete and also the strength of concrete by using NDT testing methods
IV	Analyse the mix design of concrete

IX. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
ACE108.01	CLO 1	Understand the properties of various ingredients of concrete like cement, aggregate	PO1, PO3	2
ACE108.02	CLO 2	Understand the fineness of cement	PO1, PO3, PO5	3
ACE108.03	CLO 3	To determine the percentage of water at the standard consistency	PO3, PO5, PO9	1
ACE108.04	CLO 4	To determine the setting time of cement	PO1, PO3, PO5	3
ACE108.05	CLO 5	To determine the specific gravity of cement in terms of water and kerosene	PO1, PO3	2
ACE108.06	CLO 6	To determine the compressive strength of the cement	PO1, PO3, PO5, PO9	2
ACE108.07	CLO 7	To determine the quality of cement by identifying the presence of magnesium and calcium	PO1, PO3	2
ACE108.08	CLO 8	To determine the size of fine aggregate	PO1, PO3	2
ACE108.09	CLO 9	To understand the nature of the sand in wet and dry conditions	PO1, PO5	2
ACE108.10	CLO10	Understand the concept of workability of concrete	PO1, PO3, PO5, PO9	1
ACE108.11	CLO11	Explain the different tests involved in testing of hardened concrete.	PO1, PO3	1

3 = High; 2 = Medium; 1 = Low

X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	2		2										1		
CLO 2	2		1		2								2		
CLO 3			1		1				2				2		
CLO 4	2		2		1								1		
CLO 5	2		2										2		
CLO 6	2		1		2				1				2		

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 7	2		2										2		
CLO 8	2		2										1		
CLO 9	2				1								2		
CLO 10	2		1		1				1				2		
CLO 11	1		1										2		

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PSO1	SEE Exams	PO 1, PSO1	Assignments	-	Seminars	-
Laboratory Practices	PO 1, PO 3	Student Viva	PO 1	Mini Project	PO 1	Certification	-

XII. ASSESSMENT METHODOLOGIES - INDIRECT

✓	Early Semester Feedback	✓	End Semester OBE Feedback
✗	Assessment of Mini Projects by Experts		

XIII. SYLLABUS

LIST OF EXPERIMENTS	
Week-1	INTRODUCTION TO CONCRETE LABORATORY -I
Introduction to concrete technology laboratory. Do's and Don'ts in surveying lab.	
Week-2	FINENESS OF CEMENT
Fineness of cement	
Week-3	NORMAL CONSISTENCY OF CEMENT
Normal consistency of cement	
Week-4	INITIAL AND FINAL SETTING TIMES OF CEMENT
Initial and final setting times of cement	
Week-5	SPECIFIC GRAVITY OF CEMENT
Specific gravity of cement	
Week-6	COMPRESSIVE STRENGTH OF CEMENT
Compressive strength of cement	
Week-7	SOUNDNESS OF CEMENT
Soundness of cement	

Week-8	FINENESS MODULUS OF FINE AND COARSE AGGREGATE
Fineness modulus of fine and coarse aggregate	
Week-9	BULKING OF SAND
Bulking of sand	
Week-10	WORKABILITY TESTS ON FRESH CONCRETE
Workability tests on fresh concrete	
Week-11	TEST FOR COMPRESSIVE STRENGTH OF CEMENT CONCRETE
Test for compressive strength of cement concrete	
Week-12	REVISION
Revision	
Week-13	REVISION
Revision	
Week-14	REVISION
Revision	
Reference Books:	
1. Hemanth sood and LN Mittal, —Laboratory Manual on concrete technologyl, CBS Publishers Pvt. Ltd., New Delhi, 2 nd Edition, 2013.	
2. Khanna S.K & Justo C.E.G. —Pavement materials and testingl, Tata McGraw Hill Education, 2012	
Web References:	
https://nptel.ac.in	

XIV. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Week	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	Introduction to concrete technology laboratory	CLO1	R1, R2
2	Fineness of cement	CLO 2	R1, R2
3	Normal consistency of cement	CLO 3	R1, R2
4	Initial and final setting times of cement	CLO 4	R1, R2
5	Specific gravity of cement	CLO 5	R1, R2
6	Compressive strength of cement	CLO 6	R1, R2
7	Soundness of cement	CLO 7	R1, R2
8	Fineness modulus of fine and coarse aggregate	CLO 8	R1, R2
9	Bulking of sand	CLO 9	R1, R2
10	Workability tests on fresh concrete	CLO 10	R1, R2
11	Test for compressive strength of cement concrete	CLO 11	R1, R2

XV. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S NO	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	Design a concrete mix for lower grade concrete using BIS	NPTEL/ Videos	PO 1	PSO 1
2	Design a concrete mix for higher grade concrete using BIS	Open Ended problems	PO 1	PSO 1

Prepared by:

Mrs. B. Bhavani, Assistant Professor

HOD, CE