INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

CIVIL ENGINEERING

COURSE DESCRIPTOR

Course Title	**BUILDING MATERIALS, CONSTRUCTION AND PLANNING**				
Course Code	ACE007				
Programme	B.Tech				
Semester	IV	CE			
Course Type	Foundation				
Regulation	IARE - R16				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	1	4	-	-
Chief Coordinator	Mr. KAnand Goud, Assistant Professor				
Course Faculty	Mr. KAnand Goud, Assistant Professor Mr. P Vinay Kumar, Assistant Professor				

I. COURSE OVERVIEW:

A construction materials course introduces students to materials used in different construction projects from building materials to ground and foundation make-up. Specific materials studied include soil, metals, concrete and wood. This course also covers finishes and materials for the exterior and interior of buildings. Skills are developed to assess the effect materials have on a building projects related to structure, fire safety, building codes as well as market demand. A large part of construction management has to do with overseeing entire building projects or multiple construction projects. This course helps to develop students' skills in managing projects and people. This course may be taken at different times in a construction management program with an emphasis on residential or commercial construction. Specific topics may include record keeping, job-site management, use of subcontractors and scheduling. Specific computer software may be used for construction project scheduling. Students typically work on sample projects in order to gain real-world experience in planning and scheduling construction projects.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites
UG	ACE003	III	Engineering Geology

III. MARKSDISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Building Materials Construction And Planning	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:

The course will be evaluated for a total of 100 marks, with 30 marks for Continuous Internal Assessment (CIA) and 70 marks for Semester End Examination (SEE). Out of 30 marks allotted for CIA during the semester, marks are awarded by taking average of two CIA examinations or the marks scored in the make-up examination.

Semester End Examination (SEE): The SEE is conducted for 70 marks of 3 hours duration. The syllabus for the theory courses is divided into five units and each unit carries equal weightage in terms of marks distribution. The question paper pattern is as follows. Two full questions with "either" or "choice" will be drawn from each unit. Each question carries 14 marks. There could be a maximum of two sub divisions in a question.

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

50 %	To test the objectiveness of the concept.
50 %	To test the analytical skill of the concept OR to test the application skill of the concept.

Continuous Internal Assessment (CIA):
CIA is conducted for a total of 30 marks (Table 1), with 25 marks for Continuous Internal Examination (CIE), 05 marks for Quiz/ Alternative Assessment Tool (AAT).

Table 1: Assessment pattern for CIA

Component	Theory		Total Marks
Type of Assessment	CIE Exam	Quiz / AAT	
CIA Marks	25	05	30

Continuous Internal Examination (CIE):
Two CIE exams shall be conducted at the end of the 8th and 16th week of the semester respectively. The CIE exam is conducted for 25 marks of 2 hours duration consisting of two parts. Part–A shall have five compulsory questions of one mark each. In part–B, four out of five questions have to be answered where, each question carries 5 marks. Marks are awarded by taking average of marks scored in two CIE exams.

Quiz / Alternative Assessment Tool (AAT):
Two Quiz exams shall be online examination consisting of 25 multiple choice questions and are be answered by choosing the correct answer from a given set of choices (commonly four). Marks shall be awarded considering the average of two quizzes for every course. The AAT may include seminars, assignments, term paper, open ended experiments, five minutes video and MOOCs.

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.	3	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.	3	Assignments
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	2	Open ended experiments

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	**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	3	Guest Lectures
PSO 2	**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.	2	Guest Lectures
PSO 3	**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	Develop knowledge of material science and behaviour of various building materials used in construction.
II	Identify the construction materials required for the assigned work.
III	Provide procedural knowledge of the simple testing methods of cement, lime and concrete etc.

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
CACE007.01	CLO 1	Predict the properties of building stones and its classifications.	PO 1	3
CACE007.02	CLO 2	Understand the concept of various methods of manufacture of bricks.	PO 1	3
CACE007.03	CLO 3	Identify rock using basic geological classification systems	PO 1	3
CACE007.04	CLO 4	Differentiate the fine aggregates and coarse aggregates under various views.	PO 3	2
CACE007.05	CLO 5	Explain various types of cements and their applications in construction. Various field and laboratory tests on cement.	PO 3	2
CACE007.06	CLO 6	Analyze the importance of mineral and chemical admixtures, requirements of the concrete in construction.	PO 4	2
CACE007.07	CLO 7	Explain different types of lintel, arches and the materials which are commonly used for construction.	PO 4	2
CACE007.08	CLO 8	Explain the suitability of floors in buildings like mosaic flooring, terrazzo flooring, rubber flooring, asphalt flooring.	PO 4	2
CACE007.09	CLO 9	Understand the different types of trusses, RCC roofs, madras terrace/shell roofs.	PO 1	2
CACE007.10	CLO 10	Explain the foundations and uses of different types of foundations.	PO 4	2
CACE007.11	CLO 11	Develop the building walls and foundations how they will help for buildings and details to precise the type of Footings.	PO 1	3
CACE007.12	CLO 12	Explain the classification of various types of woods. State the properties, seasoning of Timber.	PO 4	3
CACE007.13	CLO 13	Understand the Types of properties of wood, aluminium and manufacture of glass.	PO 4	2
CACE007.14	CLO 14	Differentiate the uses of Galvanized iron, fiber-reinforcement plastics, steel and aluminium in construction.	PO 4	3
CACE007.15	CLO 15	Understand masonry, english and flemish bonds. finishing plastering painting and know about building services.	PO 3	2
CACE007.16	CLO 16	Explain Geometrical design of RCC doglegged and open-well stairs. Classification of staircase and technical terms and types of stairs.	PO 3	3
CACE007.17	CLO 17	Principle of building planning and by laws and standards of building material Components and orientation of the building.	PO 1, PO 4	2
CACE007.18	CLO 18	Possess the knowledge and skills for employability and to succeed in national and international level competitive examinations.	PO 1, PO 3	2
CACE007.19	CLO 19	Understand the requirements of good stairs.	PO 1	3
CACE007.20	CLO 20	Design RCC doglegged and open-well stairs.	PO 3	3

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	3												3		
CLO 2	3												1		
CLO 3	3													2	
CLO 4			2										1		
CLO 5			2											2	
CLO 6				2										2	
CLO 7				2									2		
CLO 8				3									1		
CLO 9	2												1		
CLO 10				2								2	3		
CLO 11	3												3		
CLO 12				3									2		
CLO 13				2								2		3	
CLO 14				3									1		
CLO 15			2										3		
CLO 16			3										3		
CLO 17	2			2										3	
CLO 18	2		2										3		
CLO 19	3													3	
CLO 20			3										3		

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES–DIRECT

CIE Exams	PO 1; PO 3; PO 4	SEE Exams	PO 1; PO 3; PO 4	Assignments	PO 3	Seminars	PO 4
Laboratory Practices	-	Student Viva	-	Mini Project	-	Certification	-
Term Paper	-						

XII. ASSESSMENT METHODOLOGIES-INDIRECT

✔	Early Semester Feedback	✔	End Semester OBE Feedback
✘	Assessment of Mini Projects by Experts		

XIII. SYLLABUS

Unit-I	**STONES, BRICKS AND AGGREGATES:**
Properties of building stones, relation to their structural requirements. Classification of stones, stone quarrying, precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacture of bricks, Comparison between clamp burning and kiln burning; Fine aggregate: Natural and manufactured: Sieve analysis, zoning, specify gravity, bulking, moisture content, deleterious materials; Coarse aggregate: Natural and manufactured: Importance of size, shape and texture.	
Unit-II	**CEMENT AND ADMIXTURES**
Various types of cement and their properties; Various field and laboratory tests for cement; Various ingredients of cement concrete and their importance, various tests for concrete; Field and tests admixtures, mineral and chemical admixture.	
Unit-III	**BUILDING COMPONENTS AND FOUNDATIONS**
Lintels, arches, different types of floors-concrete, mosaic, terrazzo floors, pitched, flat and curved roofs, lean-to-roof, coupled roofs, trussed roofs, king and queen post trusses; RCC roofs, madras terrace/shell roofs; Foundations: Shallow foundations, spread, combined, strap and mat footings..	
Unit-IV	**WOOD, ALUMINUM AND GLASS**
Structure, properties, seasoning of timber; Classification of various types of woods used in buildings, defects in timber; Alternative materials for wood, galvanized iron, fibre-reinforced plastics, steel, aluminium; Types of masonry, English and Flemish bonds, rubble and ashlars masonry, cavity and partition walls.	
Unit-V	**STAIRS AND BUILDING PLANNING**
Stairs: Definitions, technical terms and types of stairs, requirements of good stairs; Geometrical design of RCC doglegged and open-well stairs; Principles of building planning, classification building and planning and building by laws.	
Text Books:	
1. S. K. Duggal, "Building Materials", New Age International Publishers. 2. Sushil Kumar "Building Materials and construction", Standard Publishers, 20th edition, reprint, 2015. 3. Dr.B. C. Punmia, Ashok kumar Jain, Arun Kumar Jain, "Building Construction", Laxmi Publications (P) ltd., New Delhi. 4. Rangawala S. C. "Engineering Materials‖", Charter Publishing House, Anand, India	
Reference Books:	
1. PC Verghese, "Building Construction", PHI. 2. R. Chuddy, "Construction Technology",Vol 1&2, Longman UK. 3. Subhash Chander, "Basic Civil Engineering", Jain Brothers.	

XIV. COURSE PLAN:

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

Lecture No	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1-2	Understand stones, bricks and aggregates.	CLO 1	T1:3.1, 2.4,6.1
3-4	Understand Properties of building stones.	CLO 1	T1:3.9
5	Explain Classification of stones	CLO 1	T1:3.3
6	Explain stone quarrying.	CLO 1	T1:3.4
7	Study about precautions in blasting	CLO 1	T1:3.4
8-9	Study of dressing of stone.	CLO 1	T1:3.7
10	Understand the composition of good brick earth.	CLO 2	T1:2.7
11-12	Understand various methods of manufacture of bricks.	CLO 2	T1:2.9
13	Explain Comparison between clamp burning and kiln burning.	CLO 2	T1:2.9
14-15	Explain Fine aggregate: Natural and manufactured Sieve analysis, zoning	CLO 4	T1:6.2, 6.12
16	Explain specify gravity, bulking, moisture content,	CLO 1	T1:6.8
17	Identify deleterious materials	CLO 2	T1:6.4
18-19	Explain Coarse aggregate: Natural and manufactured: Importance of size, shape and texture.	CLO 4	T1:6.9
20	Explain the various types of cement	CLO 5	T1:5.1,5.2
21	Explain properties of cement	CLO 5	T1:5.1,5.2
22-23	Explain the various field and laboratory tests for cement;	CLO 5	T1:5.9
24	Explain various ingredients of cement.	CLO 5	T1:5.3,5.4
25-26	Explain various tests for concrete: Field and lab tests.	CLO 6	T1:10
27-28	Explain admixtures: mineral and chemical admixture.	CLO 6	T1:10.17
29	Explain Building Components Lintels, arches.	CLO 7	T2:9.1
30	Explain different types of floors-concrete, mosaic, terrazzo floors.	CLO 8	T2:12
31-32	Explain the pitched, flat and curved roofs, lean-to-roof, coupled roofs, trussed roofs.	CLO 9	T2:13
33	Explain the king and queen post. Trusses.	CLO 9	T2:13.1
34	Explain RCC roofs, madras terrace/shell roofs.	CLO 9	T2:13
35-36	Introduction to the Foundations: Shallow foundations, spread, combined, strap and mat footings.	CLO 10	T2:9.2
37	Explain classification of various types of woods used in buildings.	CLO12	T1:4.4
38	Explain defects in timber.	CLO 12	T1:4.8
39	Understand Alternative materials for wood, galvanized iron, fibre-reinforced plastics, steel, aluminium.	CLO 14	T1:4.14, 4.17
40	Explain Types of masonry, English and Flemish bonds, rubble and ashlars masonry, cavity and partition walls.	CLO 14	T2:11
41	Explain stairs and building planning; Stairs Definitions, technical terms and types of stairs	CLO 16	T2:8
42-43	Explain the Geometrical design of RCC doglegged and open-well stairs	CLO 14	T2:8
44	Explain Principles of building planning,	CLO 17	T2:9
45	Explain the building by laws.	CLO 17	T2:14

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

S no	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	Knowledge of construction materials, various cement properties and their tests.	Seminars/Guest Lectures/NPTEL	PO 1	PSO 1
2	Analyze the sequence of construction work. Building components and foundation	Seminars/Guest Lectures/NPTEL	PO 3	PSO 1
3	Knowledge of building planning and building By-Laws	Seminars/ Assignments	PO 4	PSO 1

Prepared by:
Mr. K. Anand Goud, Assistant Professor

HOD, CIVIL ENGINEERING