

COURSE DESCRIPTION			
Program	Architecture, Interior Design		
Course Title	Building Materials & Technology		
Course Code	2182	Semester	II
Type of Course	Theory	Contact Hours	45
Teaching Scheme (L: T:P:R)	2:1:0:0	Credits	3
CIE Marks	40	ESE Marks	60

Introduction

This course provides fundamental knowledge on conventional, modern, and sustainable materials used in building construction, along with basic construction technologies. It introduces students to the properties, selection criteria, manufacturing processes, and applications of building materials such as stone, timber, bamboo, bricks, concrete, metals, composites, and finishing materials. The course also covers essential construction practices related to masonry, foundations, roofing systems, and formwork. Emphasis is given to material performance, sustainability, and suitability for different building components, enabling students to make informed decisions in planning and execution of building works.

Course Objectives

1	To understand the fundamental classification, properties, and sustainable aspects of commonly used building materials.
2	To gain knowledge of concrete materials, mix proportions, construction processes, and building finishes used in practice.
3	To comprehend basic building components, structural elements, and foundation systems used in buildings.
4	To familiarize with masonry techniques, roofing systems, formwork, scaffolding, and modern construction technologies.

Course Pre-requisite

Topic	Course code	Course Title	Semester
Mechanical and chemical properties of materials			Secondary Education

Course Outcome

CO	Course Outcome	Blooms Taxonomy Level
CO1	Classify building materials and explain the properties, defects, and sustainability aspects of stone, timber, bamboo, and eco-friendly masonry blocks.	Understand
CO2	Explain the types and properties of cement, ingredients of concrete, mix proportions, grades, concreting processes, curing methods, common defects and the characteristics and uses of flooring and finishing materials in buildings.	Understand
CO3	Identify building components and distinguish between load-bearing and non-load-bearing elements, including foundations and structural systems.	Understand
CO4	Apply the knowledge of masonry types, brick properties and bonds, formwork, scaffolding, roofing systems, and vertical circulation components in basic building construction situations.	Apply

CO-PO mapping

COURSE ARTICULATION MATRIX											
Course Outcomes	PROGRAM OUTCOMES										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	-	-	-	1	-	-	1	-	1
CO2	2	3	2	-	2	3	1	-	1	-	1
CO3	3	3	2	2	2	1	-	-	1	-	1
CO4	2	2	3	2	1	1	1	2	2	1	1
Total	10	10	7	4	5	6	2	2	5	1	4
Correlation Level	2.5	2.5	2.3	2	2	1.5	1	2	1.3	1	1

Legends: 1 - Low; 2 - Medium; 3 - High; No Correlation - "-"

Teaching and Assessment Scheme

Teaching Scheme/Week				Self-learning (SS)/Week	Total Hours/Semester	Credits C	Examination Scheme						
							Theory			Practical			Total
L	T	P	S				CIE	ESE	Total	CIE	ESE	Total	
3	0	0	0	4	45	3	40	60	100	0	0	0	100

L: Lecture (One unit is of one-hour duration with one credit), T: Tutorial (One unit is of one-hour duration with one credit), P: Practical (One unit is of one-hour duration with 0.5 credit), S: Project (One unit is of one-hour duration with 0.5 credit) SS: Self-Learning, CIE: Continuous Internal Evaluation, ESE: End Semester Examination

Syllabus - Major Topics

Module	Title	Major Topics	Instructional Hours	
			L	T
Module I	Fundamentals of Building Materials	Classification of building materials: natural, artificial, engineered and green materials - Stone, timber and bamboo: comparative properties, defects and seasoning. - Eco-friendly masonry blocks: clay bricks, fly ash bricks, AAC blocks and CSEB	7	4
Module II	Concrete Materials and Building Finishes	Cement types and properties: OPC, rapid hardening, quick setting, white cement - Ingredients of concrete: cement, water, fine and coarse aggregates - PCC and RCC - Mix proportions and water-cement ratio - Concrete grades: M15, M20, M25 and applications - Concreting process: mixing, placing, compaction - Curing methods, precautions and concrete defects - Flooring materials: stone, tile, cement, terrazzo - Finishing materials: plaster, putty, surface finishes - Composite materials: plywood, MDF, particle board - Metals in construction: steel, aluminium - Insulation materials, coatings and paints: thermal and acoustic	7	4
Module III	Building Components & Foundation Systems	Basic building components and foundations - Load-bearing and non-load-bearing components - Walls and columns, beams and slabs, doors and windows, staircases, roofs and finishes (flooring, plaster, paint) - Types of foundations: shallow (strip, isolated, combined footing, raft) and deep (pile and pier)	8	4
Module IV	Masonry, Roofing & Construction Technology	Masonry types: stone, brick and block masonry - Bricks: standard sizes, properties and characteristics - Brick bonds: English, Flemish, rat-trap, header and stretcher - Formwork and scaffolding: framework materials, uses, merits and demerits - Scaffolding: purpose and types - Vertical circulation systems: lifts, stairs and escalators - Roofing classification (based on shape, materials and structural system) - Roof forms: flat, pitched, curved, trussed roofs	7	4

Detailed Syllabus

Subtopic	Student Learning Outcome	Mode of delivery (L/T)	Mapped CO	Taxonomy Level	Instructional Hours
Module I					
Classification of building materials (natural, artificial, engineered, green)	Classify building materials based on origin, manufacturing process and sustainability	L	CO1	Understand	3
Stone: types, properties, defects and uses	Explain properties, defects and applications of stone in buildings	L	CO1	Understand	2
Timber: properties, defects, seasoning and uses	Describe characteristics, defects and seasoning methods of timber	L	CO1	Understand	2
Bamboo as a sustainable building material	Discuss bamboo as a renewable and sustainable construction material	T	CO1	Understand	2
Eco-friendly masonry blocks (clay bricks, fly ash bricks, AAC blocks, CSEB)	Compare eco-friendly masonry units based on properties and applications	T	CO1	Understand	2
Module II					
Types of cement (OPC, rapid hardening, quick setting, white cement)	Differentiate types of cement based on properties and applications	L	CO2	Understand	2
Ingredients of concrete	Explain the role of cement, water, fine and coarse aggregates in concrete	L	CO2	Understand	2
PCC and RCC - concept and applications	Discuss the difference between PCC and RCC with applications	L	CO2	Understand	1
Concrete grades, water-cement ratio and mix proportions	Explain nominal mix proportions for simple building works	L	CO2	Understand	2

Concreting process: mixing, placing and compaction	Explain the stages involved in the concreting process	T	CO2	Understand	2
Curing methods and concrete defects	Classify curing methods and common defects in concrete	T	CO2	Understand	1
Flooring and finishing materials	Select suitable flooring and finishing materials for different building spaces	T	CO2	Remember	1
Module III					
Basic building components	Identify substructure and superstructure components of a building	L	CO3	Remember	2
Load-bearing and non-load-bearing structures	Differentiate load-bearing and framed structural systems	L	CO3	Understand	2
Structural elements: walls, columns, beams and slabs	Explain the functions of major structural components	L	CO3	Apply	3
Building elements: doors, windows, staircases, roofs and finishes	Describe functional requirements of common building elements	L	CO3	Understand	2
Types of foundations: shallow foundations	Classify shallow foundations based on load and soil conditions	T	CO3	Understand	2
Deep foundations: pile and pier foundations	Explain situations requiring deep foundations	T	CO3	Understand	1
Module IV					
Types of masonry: stone, brick and block masonry	Differentiate masonry types based on materials and construction technique	L	CO4	Understand	1
Bricks: standard sizes, properties and characteristics	State standard brick sizes and properties	L	CO4	Remember	1
Brick bonds: English, Flemish, rat-trap, header and stretcher	Identify brick bonds and their applications	L	CO4	Remember	2
Formwork: materials, uses, merits and demerits	Explain the purpose and types of formwork	L	CO4	Understand	2
Scaffolding: purpose and types	Describe types of scaffolding used in construction	T	CO4	Understand	1
Roofing systems and roof forms	Apply knowledge of roofing systems to select suitable types based on form, material, and functional requirements.	T	CO4	Apply	2

Suggested Student Activities for Self-Learning

Week	Self-Learning description	Hours
Module I		
1	Prepare a classification chart of building materials (natural, artificial, engineered and green) with examples and uses	4
2	Case study on stone, timber and bamboo highlighting properties, defects and seasoning methods	4
3	Comparative write-up on eco-friendly masonry blocks: clay bricks, fly ash bricks, AAC blocks and CSEB	4
Module II		
4	Prepare a comparison chart of cement types and their properties (OPC, rapid hardening, quick setting, white cement)	4
5	Flowchart explaining ingredients of concrete, mix proportions and water-cement ratio	4
6	Study note on concrete grades (M15, M20, M25), PCC and RCC with applications	4
7	Documentation of concreting process, curing methods, concrete defects and precautions	4
8	Identification and comparison of flooring, finishing, composite, metal, insulation and coating materials used in buildings	4
Module III		
9	Draw labeled diagrams of basic building components including substructure and superstructure	4
10	Comparative note on load-bearing and non-load-bearing building components	4
11	Identification and sketching of walls, columns, beams, slabs, doors, windows, staircases and finishes	4
12	Case study identifying shallow or deep foundation type used in a building and justification of selection	4
Module IV		
13	Documentation of masonry types and brick properties with sketches or photographs	4
14	Illustration and identification of brick bonds, formwork and scaffolding types with uses	4

15	Chart showing roofing classification, roof forms and vertical circulation systems used in buildings	4
Total Self-Learning hours		60

Learning Resources

TEXT BOOK			
Sl. No.	Title	Author	Publication
1	Construction Materials	D.N. Ghose	Tata McGraw Hill
2	Building Construction	S.C. Rangwala	Charotar Publishing
3	Building Construction	Sushil Kumar	Standard Publishers

REFERENCE			
Sl. No.	Title	Author	Publication
1	Engineering Materials	S.C. Rangwala	Charotar Publishing, Ahmedabad
2	Laboratory Manual on Testing of Engineering Materials	H. Sood	New Age Publishers, New Delhi
3	Civil Engineering Materials	N. Subramanian	Oxford University Press

WEB RESOURCES		
Sl. No.	URL	Modules Covered
1	https://www.aboutcivil.org/engineering-materials.html	I & II
2	https://www.civilseek.com	II
3	https://theconstructor.org	III
4	https://constructionknowledge.net	IV
5	https://bis.gov.in	All

Assessment Methodology - Theory

Mode	Attendance	CA1	CA2	CA3	CA4	CA5	CA6	ESE
		Self-learning activities (Module 1)	Self-learning activities (Module 2)	Self-learning activities (Module 3)	Self-learning activities (Module 4)	Series Exam (2 modules)	Series Exam (2 modules)	Written Exam (theory)
Duration						2 hours	2 hours	2.5 hours
Exam mark		15	15	15	15	50	50	60
Converted to						20	20	
Marks	5	15				20		60
Total	40							60
Tentative schedule	End of semester	By 4th week	By 7th week	By 11th week	By 14th week	8th week	15th week	End of semester

Series Examination Pattern- Theory

Time	Module	Part A	Marks	Part B	Marks	Part C (With choice)	Marks	Total
2 hours	Any one module	2	1	3	3	2	7	25
	Any one module	2	1	3	3	2	7	25
	Number	4		6		4		50

End Semester Examination Pattern of Question Paper - Theory

Duration	Module	TYPE OF QUESTIONS						
		Part A (2 Questions from each module)		Part B 2 out of 3 questions from each module)		Part C (1 set questions with choice from each module)		Total Marks
		No. of Questions	Marks (1 mark each)	No. of Questions	Marks (3 marks each)	No. of Questions	Marks (7 marks each)	
2.5 hours	1	2	2	3	6	1 set	7	15
	2	2	2	3	6	1 set	7	15
	3	2	2	3	6	1 set	7	15
	4	2	2	3	6	1 set	7	15
		8	8	12	24	4 sets	28	60

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