COURSE DESCRIPTION			
Program	**Civil Engineering, Civil Engineering & Planning, Civil & Rural Engineering, Civil & Environmental Engineering, Civil Engineering (Construction Technology)**		
Course Title	**Building Materials & Construction Techniques**		
Course Code	**2011**	**Semester**	**II**
Type of Course	**Theory**	**Contact Hours**	**60**
Teaching Scheme (L: T:P:R)	**4:0:0:0**	**Credits**	**4**
CIE Marks	**40**	**ESE Marks**	**60**

Introduction

This course introduces the fundamental building materials and construction practices used in civil engineering works. It focuses on the classification, properties, manufacture, testing, and suitability of materials, along with methods of construction for substructures and superstructures. The course also covers basic planning, foundation systems, prefabricated structures, and essential building components, providing the technical knowledge required for Understand and executing building construction projects.

Course Objectives

1	To impart knowledge on the classification, properties, manufacturing processes, testing, and suitability of basic building materials such as stone, timber, lime, bricks, blocks, and alternative construction materials.
2	To understand the types, properties, and applications of finishing materials, wood products, glass, metals, special purpose materials, industrial and agro-waste materials, and structural steel sections used in building construction.
3	To familiarize students with construction methods, site layout practices, earthwork operations, and various types of deep foundations.
4	To impart knowledge on the types, components, fittings, and functional aspects of doors, windows, ventilators, roofs, trusses, and vertical communication systems in buildings.

Course Pre-requisite

Topic	Course code	Course Title	Semester
Mechanical and chemical properties of materials	2003A	Chemistry for Engineering Practices	I
Basic components of building and its functions, Types of Foundation	1011	Fundamentals of building construction	I

Course Outcome

CO	Course Outcome	Blooms Taxonomy Level
CO1	Explain the classification, properties, uses, manufacturing processes, testing methods, and suitability of basic building materials used in construction.	Understand
CO2	Identify appropriate finishing materials, wood products, glass, metals, and special materials	Understand
CO3	Describe construction practices related to prefabricated structures, site layout, earthwork operations, and types of foundations.	Understand
CO4	Explain the types, components, and functional requirements of doors, windows, ventilators, roofs, trusses, and vertical communication systems used in buildings.	Understand

CO-PO mapping

COURSE ARTICULATION MATRIX											
Course Outcomes	PROGRAM OUTCOMES										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-
Total	12	6	-	-	-	-	-	-	-	-	-
Correlation Level	3	2	-	-	-	-	-	-	-	-	-
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	
4	0	0	0	6	60	4	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	Basic building materials	Classification of materials Stone, timber, lime, Brick earth, AAC blocks, Fly ash bricks Field test on bricks	18	0
Module II	Flooring, finishing and special materials	Flooring materials, wood products, glass, and metals, waterproofing, and insulating materials, POP Industrial, agro-waste, and special construction materials	15	0
Module III	Building construction practices and foundation	Prefabricated structures, Site layout, earthwork, and substructure construction. Types of foundations	12	0
Module IV	Building components and roofing	Doors, windows, ventilators, and fittings Vertical communication systems Roofs and roof trusses	15	0

Detailed Syllabus

Subtopic	Student Learning Outcome	Mode of delivery (L/T)	Mapped CO	Taxonomy Level	Instructional Hours
Module I					
Classification of materials	Types - Natural, artificial, special, finished and recycled.	L	CO1	Understand	1
Stone	Classification of rocks : Igneous, Sedimentary and Metamorphic	L	CO1	Remember	1
Stone	Requirements of good building stone	L	CO1	Understand	1
Stone	General characteristics of stone, Laterite stones	L	CO1	Understand	1
Stone	Quarrying and dressing of stone	L	CO1	Understand	1
Timber	Structure of timber	L	CO1	Understand	1
Timber	General properties and uses of good timber	L	CO1	Understand	1
Timber	Different methods of seasoning of timber	L	CO1	Understand	2
Timber	Defects in timber	L	CO1	Remember	1
Timber	Use of bamboo in construction	L	CO1	Understand	1
Lime	Lime -types and uses	L	CO1	Understand	2
Brick	Constituents of brick earth	L	CO1	Remember	1
Brick	Conventional or Traditional bricks , Size of brick : Nominal and standard	L	CO1	Remember	1
Brick	Classification of burnt clay bricks and their suitability	L	CO1	Understand	1
Brick	Manufacturing process of burnt clay bricks	L	CO1	Understand	1
Brick	Fly ash bricks, Autoclave Aerated Concrete (AAC) blocks (brief description only)	L	CO1	Understand	1
Module II					
Flooring materials	Types and uses (Natural and Artificial) - Granite, Marble, Clay tiles, Ceramic tiles, Pavement blocks	L	CO2	Understand	2

Wood Products	Plywood, particle board, Veneers, laminated board and their uses	L	CO2	Understand	1
Glass	Types of glass and uses : soda lime glass, lead glass	L	CO1	Remember	1
Glass	Types of glass and uses : Toughened glass and borosilicate glass.	L	CO2	Remember	1
Metals	Ferrous and non-ferrous metals and their uses	L	CO2	Understand	1
Insulating materials	Types and suitability in construction : Waterproofing, Termite proofing;	L	CO2	Understand	1
Insulating materials	Types and suitability in construction: Thermal and sound insulating materials	L	CO2	Understand	1
Plaster of Paris	Constituents and uses of POP, POP finishing boards,	L	CO2	Understand	1
Industrial and agro waste materials	Brief description and uses of Industrial waste materials- Fly ash, Blast furnace slag	L	CO2	Understand	1
Industrial and agro waste materials	Brief description and uses of Agro waste materials - Rice husk, Bagasse, coir fibers	L	CO2	Understand	1
Special processed construction materials	Ferro Crete, Artificial timber (brief description and uses)	L	CO2	Remember	1
Special processed construction materials	MDF, HDF (brief description and uses)	L	CO2	Remember	1
Special processed construction materials	PVC foam board, WPC (brief description and uses)	L	CO2	Remember	1
Special processed construction materials	ACP, Artificial sand (M sand) (brief description and uses)	L	CO2	Remember	1
Module III					
Construction methods for various structures	Brief description of Prefabricated structures	L	CO3	Understand	1
Construction methods for various structures	Construction methods for Structural Steel buildings.	L	CO3	Understand	2
Construction of substructure and site layout	Construction of Substructure - Job Layout - Site Clearance	L	CO3	Understand	1
Construction of substructure and site layout	Layout for Load Bearing Structure by Center Line and Face Line Method	L	CO3	Understand	1
Construction of substructure and site layout	Layout for Framed Structure by Center Line and Face Line Method	L	CO3	Understand	1
Earthwork and filling	Excavation for Foundation, Timbering and Strutting	L	CO3	Understand	2
Earthwork and filling	Materials used for plinth Filling	L	CO3	Remember	1
Foundation	Types of foundation - Shallow Foundation and Deep Foundation	L	CO3	Remember	1
Foundation	Types of Pile Foundation	L	CO3	Remember	1
Foundation	Types of Well foundation	L	CO3	Remember	1
Module IV					
Types of doors	Fully Paneled Doors, Partly Paneled	L	CO4	Remember	1
Types of doors	Flush Doors, Collapsible Doors	L	CO4	Remember	1
Types of doors	Rolling Shutters	L	CO4	Understand	1
Types of doors	Revolving Doors, Glazed Doors	L	CO4	Understand	1
Types of windows	FullyPaneled, Partly Paneled and Glazed	L	CO4	Remember	1
Types of windows	Wooden, Steel, Aluminium windows	L	CO4	Remember	1
Types of windows	Sliding Windows, Louvered Window, Bay window	L	CO4	Understand	1
Types of windows	Corner window, Gable and Dormer window	L	CO4	Understand	1
Types of windows	Skylight , Ventilators	L	CO4	Understand	1

Vertical communication methods	Types of stairs	L	CO4	Understand	2
Vertical communication methods	Terms used in stairs	L	CO4	Remember	1
Vertical communication methods	Lifts and Escalators	L	CO4	Understand	1
Roofs and roof truss	Flat roof, Pitched Roof - terms used in roofs	L	CO4	Understand	2

Suggested Student Activities for Self-Learning

Week	Self-Learning description	Hours
Module I		
1	Study the classification of rocks, Prepare a brief report on 'Sustainable materials used in Construction'	6
2	Case study: Use of bamboo and timber in low-cost or rural construction	6
3	Compare burnt clay bricks, fly ash bricks, and AAC blocks	6
4	Collect samples of natural building materials available and prepare a report	6
Module II		
5	Suggest suitable flooring materials for:Residential building, Hospitals, Educational buildings and Industrial buildings; justify your answer.	6
6	Visit a hardware shop in your locality to identify physically tiles, glass, ACP, PVC boards, plywood, MDF, HDF, particle board, etc	6
7	Measure the quantity of flooring materials used in your home.Get an idea about the cost of flooring	6
8	Watch a video on the use of various types of glass used in buildings.	6
Module III		
9	Prepare a neat sketch showing center line and face line method	6
10	Prepare an estimate of excavation for foundation in your neighborhood	6
11	Watch prefabricated building construction videos and summarize advantages	6
12	Choose suitable foundation type for : Bridge pier, Multi-story building, Black cotton soil	6
Module IV		
13	Arches-Definition, Types and Materials used for construction	6
14	Fixtures and fastenings for doors and windows.	6
15	Sizes of doors and windows recommended by BIS	6
Total Self-Learning hours		90

Learning Resources

TEXT BOOK			
Sl. No.	Title	Author	Publication
1	Building Construction	Rangawala, S. C	Charotar Publication
2	Construction Materials	Ghose, D. N	Tata McGraw Hill
3	Engineering Materials	Rangwala, S.C	Charotar Publication

REFERENCE			
Sl. No.	Title	Author	Publication
1	Laboratory Manual on Testing of Engineering Materials	Sood H	New Age Publishers
2	KBR		
3	BIS		

WEB RESOURCES		
Sl. No.	URL	Modules Covered

1	https://testbook.com/civil-engineering/building-materials-classification	I & II
2	https://civilengineeringnotes.com/types-of-foundations/	III
3	https://theconstructor.org/building/types-of-stairs-uses-building/11304/	IV

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		24	24	24	18	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						Total Marks
		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)		
		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