

GANPAT UNIVERSITY				
FACULTY OF DIPLOMA ENGINEERING				
Programme	Diploma in Civil Engineering			
Semester	III	Version	1.0.0.0	
Effective from Academic Year	2026-27	Effective for the batch Admitted in	JULY 2025	
Course code	1CI3105	Course Name	Building Material & Construction	

I. TEACHING-LEARNING AND ASSESSMENT SCHEME																			
Course Type	Course code	Course Title	Teaching & Learning Scheme									Examination Scheme							
			Credit				Actual Contact Hrs/week			SLH	Total Learning Hrs/Week	TH			PR			SLA	Total
			CL	TL	LL	Total	CL	TL	LL			CE	SEE	Total	CE	SEE	Total		
DSC	1CI3105	Building Material & Construction	3	0	1	4	3	0	2	3	8	40	60	100	30	20	50	20	170

Abbreviation:	CL- Classroom Learning	TL - Tutorial Learning	LL - Laboratory Learning
	SLH - Self Learning Hours	NLH - Notional Learning Hours	SLA - Self Learning Assessment
	FA - Formative Assessment (Term work +Mid Sem Exam +Attendance)		SA - Summative Assessment

II. PRE-REQUISITES				
Basic knowledge of Civil Workshop Practices.				
III. INDUSTRY / EMPLOYER EXPECTED OUTCOMES				
Students will be able to select, test, and apply appropriate building materials and construction techniques while assisting in quality-controlled, economical, and safe building works at construction sites.				
IV. COURSE LEARNING OUTCOMES				
At the end of the course, students will be able to achieve the following course learning outcomes: CO1. Understand and appreciate the important properties of various building materials and the functions of different building components. CO2. Identify, select, and use appropriate locally available bricks or stones along with suitable binding materials and/or concrete as per the requirements of building construction. CO3. Determine and select appropriate types of foundations based on site and soil conditions. CO4. Execute construction activities such as masonry, concreting, formwork, temporary structures, plastering, D.P.C., anti-termite treatment, and plumbing/electrical fittings using suitable construction masonry. CO5. Explain the importance of maintenance work and adopt safety measures in civil engineering activities.				
V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:				
Name of Unit	Theory Learning outcomes (TLO's) aligned to CO's	Learning Content mapped with Theory Learning outcomes (TLO's) & CO's	Marks	Hours
Unit-1 Introduction	TLO 1.1 Explain the important physical, chemical, and engineering properties of building materials used in civil engineering construction. TLO 1.2 Classify buildings based on occupancy and type of construction. TLO 1.3 Understand and explain the concept and functions of various components of buildings.	1.1 Physical, chemical, and engineering properties of building materials. 1.2 Uses and applications of different building materials in construction. 1.3 Alternative and sustainable materials for common building construction items. 1.4 Introduction to various civil engineering structures.	06	04

		1.5 Functions and importance of different components of buildings and other structures.		
Unit-2 Building Materials: Bricks and Stones	TLO 2.1 Classify clay products and different types of bricks used in building construction with respect to their properties and applications. TLO 2.2 Explain the manufacturing process of bricks and relate each stage to the quality and performance of bricks in construction works. TLO 2.3 Identify and interpret standard tests, grading, and BIS requirements of bricks, and classify rocks used in building construction. TLO 2.4 Describe various rock products and explain the characteristics of building stones with respect to strength, durability, water absorption, and other physical properties. TLO 2.5 Select suitable building stones for different civil engineering works based on BIS standards, properties, and site requirements.	2.1 Classification of clay products used in building construction. 2.2 Types of bricks and their uses in civil engineering works. 2.3 Manufacturing process of bricks: preparation of clay, moulding, drying, and burning. 2.4 Tests on bricks, standard requirements and grading of bricks as per BIS specifications, and classification of rocks used in building construction. 2.5 Rock products used in construction. 2.6 Characteristics of building stones: Structure, texture, strength, specific gravity, porosity, water absorption, hardness, durability, and weight. 2.7 Standard requirements of building stones as per BIS specifications and important building stones used in construction along with their suitability for various civil engineering works.	10	07
Unit-3 Binding Materials and Concrete	TLO 3.1 Understand the types, sources, and benefits of lime and pozzolanic materials in improving construction performance. TLO 3.2 Identify cement types, BIS grades, and evaluates their quality through standard tests for appropriate applications. TLO 3.3 Apply proper storage and handling practices to maintain cement quality and prevent wastage on construction sites. TLO 3.4 Understand the types and properties of aggregates and concrete ingredients and their effect on concrete performance.	3.1 Sources, classification, and field applications of lime. 3.2 Types of pozzolanic materials and advantages of their use in construction. 3.3 Types of cement, grades as per BIS, and their applications in civil engineering works. 3.4 Engineering properties of cement and standard field and laboratory tests as per BIS. 3.5 Methods of proper storage and handling of cement at construction sites. 3.6 Types, requirements, and engineering properties of aggregates as per BIS. 3.7 Ingredients of concrete and their role in concrete performance.	10	07

	TLO 3.5 Implement proper batching, mixing, placing, compaction, and curing techniques to ensure durable and quality concrete.	3.8 Production of concrete including batching, mixing, transportation, placing, compaction, and curing.		
Unit-4 Timber and Miscellaneous Materials	TLO 4.1 Identify and classify different types of timber used in construction. TLO 4.2 Recognize the various applications of timber in structural and non-structural works. TLO 4.3 Identify common defects in timber and understand their causes and remedies. TLO 4.4 Understand the seasoning process and its importance for timber durability. TLO 4.5 Explain the types of engineered wood products and their applications. TLO 4.6 Identify plastics and PVC materials and their roles in modern construction. TLO 4.7 Understand the types and purposes of paints and varnishes in building finishes.	4.1 Types, classification, uses, defects, seasoning, and engineered timber products. 4.2 Plastics, PVC materials, paints, and varnishes used in construction. 4.3 Materials and methods used for anti-termite and pest treatment in buildings. 4.4 Types, properties, and applications of glass and fibre materials in construction. 4.5 Structural steel, iron, and their use in building construction. 4.6 Ceramic products, concrete blocks, and refractory materials for construction purposes.	07	05
Unit-5 Foundations	TLO 5.1 Identify and select suitable types of foundations based on soil conditions and structural requirements. TLO 5.2 Explain foundation failures and suggest appropriate preventive and remedial measures.	4.1 Classification and types of foundations. 4.2 Selection of suitable foundations for different structures and site conditions. 4.3 Foundations in problematic soils such as black cotton soil and loose soils. 4.4 Timbering in trenches. 4.5 Causes of foundation failures, precautions, and remedial measures.	07	06
Unit-6 Building Items & Masonry Construction	TLO 6.1 Understand the purpose, types, procedures, and suitability of plastering and pointing in construction. TLO 6.2 Apply damp proofing, waterproofing, and anti-termite treatments to protect structures from moisture and pests.	5.1 Purpose, Importance, Types, procedures, advantages, disadvantages, and suitability of plastering and pointing in construction. 5.2 Damp proof course, waterproofing methods, and anti-termite treatments for building durability.	14	10

	TLO 6.3 Recognize the necessity of construction joints and select appropriate materials for their implementation. TLO 6.4 Understand types of fittings and proper laying procedures for plumbing and electrical systems. TLO 6.5 Select suitable masonry types and follow proper procedures for brick and stone masonry construction. TLO 6.6 Identify scaffolding types, their purposes, and select them based on site and structural requirements. TLO 6.7 Apply correct methods for erecting centering and formwork for beams, slabs, and other structural components.	5.3 Necessity of construction joints and selection of appropriate materials for joint implementation. 5.4 Types of fittings, installation techniques, and laying procedures for plumbing and electrification. 5.5 Brick and Stone masonry, Selection of suitable masonry types, and step-by-step construction procedures. 5.6 Purpose, Types, and Selection criteria for scaffolding in construction projects. 5.7 Selection of scaffolding based on site conditions, structural requirements, and safety considerations. 5.8 Methods and procedures for erecting centering for beams, slabs, and other structural components.		
Unit-7 Building Maintenance & Safety Measures	TLO 7.1 Explain the concept of building maintenance, including its causes, types, and remedial measures. TLO 7.2 Understand and explain important laws, norms, regulations, and acts related to safety in construction activities. TLO 7.3 Describe safety precautions and preventive measures to be adopted during building construction and maintenance works.	6.1 Purpose, need, importance, and methods of building maintenance. 6.2 Causes and types of defects in buildings. 6.3 Preparation of maintenance work reports. 6.4 Remedial measures and their execution. 6.5 Procedure of any one type of building maintenance work. 6.6 Importance of various laws, norms, regulations, and acts related to safety. 6.7 Safety equipment used in building construction and maintenance. 6.8 Safety precautions and preventive measures. 6.9 Post-accident procedures.	06	06

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL

Sr. No.	Practical/Laboratory Learning Outcome (LLO)	Practical Titles	Relevant COs
1	LLO 1.1 systematically tabulate civil engineering materials cost and quality parameters.	Conduct local market survey for common civil engineering materials to tabulate cost and quality	CO2
2	LLO 1.2 Determine Quality of brick according to standard specifications.	Perform tests on given sample of brick such as Water absorption, Compressive strength	CO1&CO2

3	LLO 1.3 Determine Quality of given sample of brick and cement on field.	Perform field test on given sample of brick and cement.	CO1&CO2
4	LLO 1.4 Determine Quality of Cement according to standard specifications.	Perform lab tests on given sample of cement Soundness, Initial and final setting time.	CO1&CO2
5	LLO 1.5 Determine Quality of fine aggregate according to standard specifications.	Perform test on given sample of fine aggregate. Sieve analysis, Silt and clay content.	CO1&CO2
6	LLO 1.6 Determine components of building and /structures in the given model.	Identify components of building and /structures in the given model.	CO4
7	LLO 1.7 Marking layout on the ground for a building from the given line out plan	Draw foundation plan and mark layout on the ground for a building of Two room load bearing structure from the given line out plan.	CO3
8	LLO 1.8 Demonstrating Arrangement of the bricks English and Flemish bond.	Arrange the bricks to make 1 ^{1/2} brick thick wall in English and Flemish bond. (Minimum 3 Course)	CO4&CO5
9	LLO 1.8 Demonstrate various types, Layout plan for Foundations and timbering in trenches	To draw a sketches for Foundations – various types, Layout plan, timbering in trenches	CO3

VII. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

- Arrange field visit at construction site where the Excavation for foundation work are in progress.
- Visit a nearby construction site and collect samples of material being used with justification.
- Visit a construction site where green building technologies are being implemented and prepare report.
- Give seminar on any relevant topic.

Mini projects

- **Green Building Materials:** Prepare a report suggesting at least 10 conventional materials replaced by green materials, with cost and environmental justification.
- **Acoustic Materials:** Prepare a report on applications of acoustic materials with a sample portfolio.
- **Refractory Materials:** Prepare a report on applications of refractory materials with a sample portfolio.
- **Foundation:** Prepare a report on at least two types of foundations used in nearby buildings.
- **Construction Technology:** Collect information on latest building construction technologies and prepare a report.
- **Maintenance:** Prepare a report on remedial measures to repair cracks in nearby buildings.
- **Miscellaneous Materials:** Conduct a market survey of waterproofing materials and prepare a report including application methods.
- **Safety:** Prepare posters or charts to raise awareness of safety in civil engineering construction activities.

VIII. LIST OF INSTRUMENTS / EQUIPMENT / TRAINER BOARD	
1	Bricks, Compressive strength testing machine, Oven, Digital Balance, tray.
2	Vicat apparatus conforming to IS : 5513-1976, Balance, Gauging Trowel, Digital Stop Watch.
3	I.S Sieve set (Sizes- 80 mm, 40 mm, 20 mm, 10 mm, 4.75 mm, 2.36 mm, 1.18 mm, 600 μ , 300 μ , 150 μ) sieve shaker with adaptors.
4	Experimental set up for silt and clay content for fine aggregates as per IS 2386-2 (1963)
5	Measuring Tape, Pegs, Arrows, Line dori, Lime powder, Hammer of standard size and specification as per civil engineering application.

IX. LIST OF REFERENCE BOOKS			
Sr.No.	Title	Author	Publication
1	Engineering Materials	S.C Rangwala	Charotar Publisher, Ahmadabad.
2	Building materials	S. K. Duggal	New Age International
3	Building Construction	B C Punamia	Laxmi Publications ,New Delhi
4	Building Construction	Shushil Kumar	Standard publishers, Delhi
5	Building Construction	Rangwala	Charotar publishing house (P) Ltd

X. LINK OF LEARNING WEB RESOURCE	
1	www.nptel.iitm.ac.in
2	http://www.learningconstruction.com
3	http://www.understandconstruction.com
4	http://www.constructionknowledge.net www.learn-to-draw.com
5	https://www.khanacademy.org/
6	www.igbc.in

XI. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE							
Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	Introduction	CO1	4	3	3	0	6
2	Building Materials: Bricks and Stones	CO1	7	6	4	0	10
3	Binding Materials and Concrete	CO2	7	5	3	2	10
4	Timber and Miscellaneous Materials	CO2	5	3	3	1	7
5	Foundations	CO3	6	3	2	2	7
6	Building Items & Masonry Construction	CO4	10	5	5	4	14
7	Building Maintenance & Safety Measures	CO5	6	3	2	1	6
	Grand Total		45	28	22	10	60

XII. COs AND POs AND PSOs MAPPING		
Course outcome (Cos)	Programme Outcomes (POs)	Programme Specific Outcomes (PSOs)

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