



Lok Jagruti Kendra University
University with a Difference

Diploma in Civil Engineering



Course Code:025050104

Building Materials

Programme / Branch Name			Diploma in Civil Engineering			
Course Name	Building Materials			Course Code	025050104	
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
 ESC: Engineering Science Courses PCC: Program Core Courses
 OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week				Evaluation Scheme			
L	T	P	Total Credit	CCE	SEE (Th)	SEE (Pr)	TOTAL
3	0	2	4	50	50	50	150

Legends:
 L: Lectures T: Tutorial P: Practical
 CCE: Continuous & Comprehensive Evaluation
 SEE (Th): Semester End Evaluation (Theory)
 SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisites

- ✓ No prerequisites

3. Rationale

All the building structures are composed of different types of materials. These materials are either called building materials or materials of construction. It is very essential for a builder, architect or engineer or contractor, to become familiar thoroughly with these building materials. The knowledge of types of material, their properties and uses for different purposes provides an important tool in the hands of the builders in achieving economy in material cost. The material cost in building ranges from 50% to 60% cost of the total cost of construction. In addition to the material economy, the correct use of material results in better structural strength, functional efficiency and aesthetic appearance. This course will enrich students in performing their jobs with ease and confidence and will be able to select an appropriate material for the given item of work on any construction site.

4. Objectives

- ✓ To learn various building materials and understand their relevant characteristics.
- ✓ To identify the suitability of various building materials for different construction purposes.
- ✓ To study natural, artificial, and processed materials available for various purposes of construction activities.
- ✓ To understand the field and laboratory test on various building materials such as brick, cement and aggregate.

5. Contents

Unit No.	Unit Name	Topics	Learning Outcomes	% Weightage	Hours
1.	Introduction	1.1. Building Materials 1.1.1. Importance of Building Materials 1.1.2. Physical Properties of Building Materials 1.1.3. Chemical Properties of Building Materials 1.1.4. Mechanical Properties of Building Materials 1.1.5. Classification of Materials Based Upon Their Uses	<ul style="list-style-type: none"> • Explain the Importance of Building Materials in Civil Engineering. • Describe Important Properties of Building Materials Used in Construction. • Classify the Building Materials Based Upon Their Uses. 	25	12
		1.2. Bricks 1.2.1. General 1.2.2. Composition of Bricks 1.2.3. Harmful Ingredients in Bricks 1.2.4. Manufacturing Process of Bricks 1.2.5. Tests for Bricks 1.2.6. Classification of Bricks 1.2.7. Shape of Bricks 1.2.8. Substitutes for Bricks	<ul style="list-style-type: none"> • Identify Bricks Based on Their Uses and Its Properties. • Understand the Manufacturing Process of Bricks. • Perform Field and Laboratory Tests on Bricks. • Knowledge About the Substitutes for Bricks. 		
2.	Rocks, Stones and Aggregates	2.1. Rocks and Stones 2.1.1. General 2.1.2. Classification of Rocks 2.1.3. Quarrying of Stones 2.1.4. Methods of Quarrying of Stones 2.1.5. Qualities of Stone 2.1.6. Common Building Stones of India and Their Uses	<ul style="list-style-type: none"> • Classify the Rocks According to Their Properties. • Selection of Appropriate Rock for Different Types of Building Construction. • Identify the Methods of Quarrying of Stones. • Explain the Uses of Various Stones Used in India. 	15	8
		2.2. Aggregates 2.2.1. General 2.2.2. Types of Aggregate 2.2.3. Classification of Aggregates 2.2.4. Requirements of Aggregates	<ul style="list-style-type: none"> • To Select an Appropriate Quality of Aggregates for The Construction Work. • Classify the Aggregates Based on Their Properties. 		

		2.2.5. Tests for Aggregate 2.2.6. Fineness Modulus	<ul style="list-style-type: none"> Perform Laboratory Tests on Aggregates. 		
3.	Lime and Cement	3.1. Lime 3.1.1. General 3.1.2. Definitions 3.1.3. Sources of Lime 3.1.4. Classification of Lime 3.1.5. Comparison Between Fat Lime and Hydraulic Lime 3.1.6. Manufacture of Fat Lime 3.1.7. Uses of Lime	<ul style="list-style-type: none"> Knowledge About Lime And its Uses in Building Construction. Explain the Sources of Lime. Describe the Methods of Slaking of Lime. 	25	9
		3.2. Cement 3.2.1. General 3.2.2. Indian Cement Industry 3.2.3. Properties of Cement 3.2.4. Composition of Ordinary Cement 3.2.5. Manufacture of Ordinary Cement 3.2.6. Tests for Cement 3.2.7. Storage of Cement 3.2.8. Varieties of Cement 3.2.9. I.S. Specifications of Ordinary Cement	<ul style="list-style-type: none"> Understand the Manufacturing Process of Cement. Knowledge of Types of Cement with Their Uses. Perform Field and Laboratory Test on Cement. 		
4.	Steel	4.1. General 4.2. Manufacture of Steel 4.3. Uses of Steel 4.4. Factors Affecting Physical Properties of Steel 4.5. Market Forms of Steel	<ul style="list-style-type: none"> Understand the Manufacturing Process of Steel. Classify the Types of Steel Forms. Explain the Properties of Steel. 	10	3
5.	Other Materials	5.1. Timber 5.1.1. General 5.1.2. Classification of Trees 5.1.3. Structure of Tree 5.1.4. Seasoning of Timber 5.1.5. Defects in Timber 5.1.6. Qualities of Good Timber 5.1.7. Market Forms of Timber 5.1.8. Uses of Timber	<ul style="list-style-type: none"> Identify the Other Building Materials Used for Various Works. Classify Various Market Forms of Timber With its Uses. Identify Types of Clay Products. Describe the Composition, Classification, Properties and Uses Of Plastics. Explain the 	25	10
		5.2. Clay Products 5.2.1. Types of Clay Products 5.2.2. Uses of Clay			

	<p>Products</p> <p>5.2.3. Glazing</p> <hr/> <p>5.3. Plastics</p> <p>5.3.1. General</p> <p>5.3.2. Composition</p> <p>5.3.3. Classification of Plastics</p> <p>5.3.4. Properties of Plastics</p> <p>5.3.5. Uses of Plastics</p> <hr/> <p>5.4. Paints and Varnishes</p> <p>5.4.1. General</p> <p>5.4.2. Characteristics of an Ideal Paint</p> <p>5.4.3. Ingredients of an Oil Borne Paint</p> <p>5.4.4. Types of Paints</p> <p>5.4.5. Characteristics of an Ideal Varnish</p> <p>5.4.6. Ingredients of Varnish</p> <p>5.4.7. Types of Varnishes</p> <hr/> <p>5.5. Glass</p> <p>5.5.1. General</p> <p>5.5.2. Classification of Glass</p> <p>5.5.3. Composition of Glass</p> <p>5.5.4. Properties of Glass</p> <p>5.5.5. Types of Glass</p> <p>5.5.6. Uses of Glass</p>	<p>Ingredients and Types of Paints and Varnish.</p> <ul style="list-style-type: none"> • Knowledge About the Composition, Properties, Types and Uses of Glass. 		
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**Total
Hours**

42

6. List of Practicals / Exercises

The practicals/exercises have been properly designed and implemented in an attempt to develop different types of skills, so that students can acquire the competencies/programme outcomes. Following is the list of practicals/exercises.

Sr. No.	Practical / Exercises	Key Competency	Hours
1.	Tests for Bricks: A. Field test on a given sample of bricks. B. Laboratory tests on a given sample of bricks. (a) To study the tolerance limits of bricks. (b) To determine the percentage of water absorption by the given sample of bricks. (c) To find the crushing strength of a given sample of bricks.	Laboratory and Field Test of Bricks	6
2.	Tests for Aggregates: (a) To determine the particle size distribution of coarse and fine aggregates by sieve analysis. (b) To determine the impact value test of aggregates. (c) To determine the crushing value test of aggregates.	Laboratory Test of Aggregates	6
3.	Tests for Cement: A. Field test of cement to determine quality. B. Laboratory test on a given sample of cement. (a) To find the initial setting time and final setting time of a given sample of cement. (b) To determine the compressive strength of Ordinary Portland Cement.	Laboratory and Field Test of Cement	4
4.	Draw the sketches of various market forms of steel with their functions and uses.	Market Forms of Steel	2
5.	Seminar- The topic of the seminar shall be given to a group of students.	Microsoft PowerPoint Skill	2
6.	Conduct a market survey for construction materials regarding quality, cost, suitability and availability.	Market Survey	2
7.	Industrial visit to the nearby brick manufacturing plant and prepare a report on it.	Manufacturing Process of Bricks	2
8.	Collect data regarding types of stones, the manufacturing process and their availability. Prepare a report on it.	Knowledge of Stones	1
9.	Prepare a report on the cement manufacturing process and plants in India.	Cement Manufacturing Process and Plants	1
10.	Prepare a report on the steel manufacturing process and plants in India.	Steel Manufacturing Process and Plants	1
11.	Prepare a report on the market forms of industrial timber.	Knowledge of Timber	1
Total Hours			28

7. Suggested Specification Table for Evaluation Scheme

Unit No.	Unit Name	Distribution of Topics According to Bloom's Taxonomy					
		R %	U %	App %	C %	E %	An %
1.	Introduction	25	25	20	10	0	10
2.	Rocks, Stones and Aggregates	30	20	25	10	0	15
3.	Lime and Cement	25	25	15	5	20	10
4.	Steel	25	30	15	10	10	10
5.	Other Materials	30	30	20	0	0	20

Legends: R: Remembering U: Understanding
App: Applying C: Creating
E: Evaluating An: Analyzing

8. Textbooks

- 1) Engineering Materials by S.C. Rangwala, Charotar Publishing House Pvt. Ltd.

9. Reference Books

- 1) Building Materials and Construction by S.K.Soni, S.K.Kataria & Sons.
- 2) Civil Engineering Materials by Parbin Singh, S.K.Kataria & Sons.
- 3) Building Materials Testing and Sustainability by N. Subramanian, Oxford University Press.
- 4) Construction Materials by D. N. Ghose, Tata McGraw Hill, New Delhi.

10. List of Publications

- 1) National Building Code of India 2016- Volume I & II by Bureau of Indian Standards.
- 2) Indian Practical Civil Engineering Handbook by P. N. Khanna.
- 3) PWD Handbooks.
- 4) IS Codes for Testing Construction Materials.

11. Open Sources (Website, Video, Movie)

- 1) www.nptel.ac.in
- 2) LJP-Civil-Building Materials (YouTube)