CE221 Building Materials & Technology (3L-0T-P0: 3Cr, 3Hr)

Pre-requisite – None

Introduction:

Introduction to structures of solids, ductility, brittleness, strength, stiffness, durability, hardness, toughness; Weakness of materials, Introduction to building materials.

Cement & aggregate:

Chemical composition, manufacturing, physical characteristics, hydration, properties of cement compounds, different types of cements, tests on cement. Coarse and fine aggregates, Influence of aggregate on the properties of concrete, aggregate selection.

Concrete:

Fresh Concrete: Batching, Mixing, workability, effect of admixture, Hardened Concrete: mechanical properties of hardened concrete, Water-cement ratio, Porosity, curing of concrete, Design of concrete mix: IS code recommendation.

High performance concrete:

Introduction to special concretes, acid resistant concrete, roller compacted concrete etc.

Bricks and stones:

Clay bricks – classes and qualities; Production: Raw materials, drying and burning, Strength and durability, mortar for masonry and strength of masonry. Hollow concrete bricks, fly ash bricks, aerated autoclaved concrete blocks. Stones for construction.

Glass:

Various types of glasses, strengthening of glasses, uses.

Tiles and flooring materials:

Use of tiles, materials - ceramic and other types of tiles, stone slabs and other flooring materials, interlocking concrete blocks.

Metals:

Steel for reinforced concrete and prestressed concrete construction, structural steel sections, aluminium, galvanized steel, stainless steel, Roofing sheets.

Timber and wood products:

Uses of timber in construction, engineered wood – plywood, particle board, etc.

Deterioration of building materials:

Corrosion, chloride and sulphate attack on concrete, alkali-aggregate reaction, acid aggregate reactions.

Course Plan

Module	Торіс	Lectures					
No.							
Module 1	Introduction: Introduction to structures of solids, ductility, brittleness, strength, stiffness, durability, hardness, toughness; Weakness of materials, Introduction to building materials.						
Module 2	Cement & aggregate: Chemical composition, manufacturing, physical characteristics, hydration, properties of cement compounds, different types of cements, tests on cement. Coarse and fine aggregates, Influence of aggregate on the properties of concrete, aggregate selection.	8					
Module 3	Concrete: Fresh Concrete: Batching, Mixing, workability, effect of admixture, Hardened Concrete: mechanical properties of hardened concrete, Water-cement ratio, Porosity, curing of concrete, Design of concrete mix: IS code recommendation.	7					
Module 4	High performance concrete: introduction to special concretes, acid resistant concrete, roller compacted concrete etc.	2					
Module 5	Bricks and stones: Clay bricks – classes and qualities; Production: Raw materials, drying and burning, Strength and durability, mortar for masonry and strength of masonry. Hollow concrete bricks, fly ash bricks, aerated autoclaved concrete blocks. Stones for construction.	6					
Module 6	Glass: Various types of glasses, strengthening of glasses, uses.	2					
Module 7	Tiles and flooring materials: use of tiles, materials - ceramic and other types of tiles, stone slabs and other flooring materials, interlocking concrete blocks.	2					
Module 8	Metals: Steel for reinforced concrete and prestressed concrete construction, structural steel sections, aluminium, galvanized steel, stainless steel, Roofing sheets.	4					
Module 9	Timber and wood products: Uses of timber in construction, engineered wood – plywood, particle board, etc	3					
Module 10	Deterioration of building materials: Corrosion, chloride and sulphate attack on concrete, alkali-aggregate reaction, acid aggregate reactions	3					
	Total Lectures	40					

COURSE OUTCOME:

- CO 1: Identify the materials required for various construction activities along with their purposes.
- CO 2: Analyse the building materials based on their sources.
- CO 3: Examine and evaluate the physical chemical and engineering properties of different building materials.
- CO 4: Search for suitable methods or techniques involved in using the most commonly used construction materials keeping the sustainability factor in mind.

СО	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO 1	Identify the materials required for various construction activities along with their purposes	2	-	-	1	-	1	_	-	-	-	-	1	2	1	2
CO 2	Analyse the building materials based on their sources	2	1	-	1	1	1	1	1	-		-	1	2	2	2
CO 3	Examine and evaluate the physical chemical and engineering properties of different building materials	2	2	_	1	1	-			-		-	1	2	2	2
CO 4	Search for suitable methods or techniques involved in using the most commonly used construction materials keeping the sustainability factor in mind	1	1	-	1	1	2	3		-		-	1	2	2	2
CE431		1.75	1.33	-	1	1	1.33	2	1	-	-	-	1	2	1.75	2

Textbooks:

- 1. Neil Jackson and R. K. Dhir, Civil Engineering materials, Macmillan Education, UK, 1997.
- 2. S. C. Rangwala, Engineering Materials, Chaortar Publishing House, Anand, 2014.

Reference:

1. A. M. Neville and J. J. Brooks, Concrete Technology, 2nd Ed., Prentice Hall, 2010.