**20CE1201-BUILDING MATERIALS AND CONSTRUCTION**

(Civil Engineering)

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Category:** | Professional Core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3-0-0 |
| **Prerequisite:** | None  | **Sessional Evaluation :****End Exam. Evaluation:****Total Marks:** | 4060100 |

|  |  |
| --- | --- |
| **Course Objectives** | 1. To know the significance of various building materials used in construction industry.
2. To explain the materials used in concrete and different types of mortars and their applications.
3. To explain various types of masonry construction.
4. To explain various types of building components.
5. To explain types of roofs, roof coverings and temporary works used in buildings.
6. To learn about types of wall finishes and thermal and acoustic insulating materials in buildings.
 |
| **Course Outcomes** | CO1 | Select suitable materials for various types of buildings. |
| CO2 | Gain an in-depth knowledge on components of concrete and mortars. |
| CO3 | Compare the various types of masonry and their construction practices. |
| CO4 | Identify various types of building components and their construction techniques. |
| CO5 | Select the appropriate flooring, roof and temporary work for a given building and illustrate their construction techniques. |
| CO6 | Exhibit the knowledge of building finishes and special treatments for thermal and acoustic insulation materials. |
| **Course Content** | **UNIT – I****INTRODUCTION TO BUILDING MATERIALS**Stone: Dressing of stones- artificial stones and applications; wood: classification of timber- characteristics of good timber- ply wood- types and uses; bricks: manufacturing process- testing of bricks; ceramic products: manufacturing process; glass: functions of glass in buildings; building materials for low cost housing- utilization of waste for alternative building materials- sustainable materials in construction- IS specifications.**UNIT- II****CEMENT CONCRETE AND MORTARS****Constituents of Cement Concrete:****Cement:** Manufacturing process - types of cement - Portland cement- hydration of cement- tests on cement- IS specifications.**Aggregate**: Introduction - classification of aggregate – characteristics - IS specifications.**Water:** Quality of mixing water.**Building Mortars:** Introduction- classification (cement mortar, lime mortar, lime-cement mortar, special mortar) - characteristics of good mortar- grouting- guniting.**UNIT- III****MASONRY CONSTRUCTION****Stone masonry:** Technical terms – joints; types: random (un-coarsed) rubble –coarsed rubble – dry rubble masonry – ashlar masonry; ashlar fine – chamfered fine; supervision.**Brick masonry:** Technical terms; bonds in brick work: English bond – single & double Flemish bond; defects; comparison of brick masonry and stone masonry.**Cavity walls**: Brick cavity walls- position of cavity at foundation, roof and opening levels.**UNIT- IV****BUILDING COMPONENTS****Introduction to Building Components:** Types of buildings; components of buildings; types and uses of shallow and deep foundations.**Lintels and arches:** Lintels: types- construction; arches: technical terms- types (brick arches, rough, axed stone arches, flat and semi-circular arches).**Doors:** Location- technical terms – types – suitability.**Windows:** Location – types – suitability – fixtures and fastenings.**Stairs and Stair cases:** technical terms- requirements of good stair – classification- elevators and escalators.**UNIT- V****FLOORS, ROOFS AND TEMPORARY WORKS****Floors:** Introduction- requirements of a good floor; types of floorings: cement concrete (regular and precast) - mosaic- tiled- marble- timber.**Roofs and Roof coverings:** Technical terms- classification (pitched roofs and flat roofs) - advantages and disadvantages; roof coverings: A.C sheets and G.I sheets.**Temporary works:** Form work: Introduction- stripping of formwork- timbering in trenches- types of scaffolding- shoring and underpinning. **UNIT– VI****WALL FINISHES AND SPECIAL TREATMENTS****Wall finishes:** Plastering: objectives of plastering- requirements of good plaster-tools used in plastering; types of pointing.**Thermal Insulation:** Introduction- thermal properties and selection of the insulating materials- classification of thermal insulating materials - methods of thermal insulation.**Acoustic Construction:** Introduction- characteristics of audible sound- behaviour of sound in enclosure- reflection of sound- reverberation and absorption- types of acoustic materials. |

|  |  |
| --- | --- |
| **Textbooks****& Reference Books** | **TEXTBOOKS:** 1. S.C Rangwala, “*Engineering Materials*” Charotar Publishing House Pvt. Ltd, 2008.
2. [Dr. B.C.Punmia](https://www.laxmipublications.com/servlet/lpdispinfo?offset=0&searchtype=Author&text1=Dr.%20B.C.Punmia), [Er. Ashok Kumar Jain](https://www.laxmipublications.com/servlet/lpdispinfo?offset=0&searchtype=Author&text1=Er.%20Ashok%20Kumar%20Jain) and [Dr. Arun Kumar Jain](https://www.laxmipublications.com/servlet/lpdispinfo?offset=0&searchtype=Author&text1=Dr.%20Arun%20Kumar%20Jain), “*Building Construction”* Lakshmi publications, 11th Edition, 2019.
3. T. D. Ahuja and G. S. Birdie, “*A Text Book of Building Construction and Construction Materials*” Dhanpat Rai publishing company, Revised 4th Edition, 2012.

**REFERENCES:** 1. S.C Rangwala, “*Building Construction*” Charotar Publishing House Pvt. Ltd, 33rd Edition, 2019.
2. M. L. Gambhir and Neha Jamwal, “Building *and Construction Materials: Testing and Quality Control*” McGraw Hill Education, 2017.
3. *“National Building Code of India,”* Bureau of Indian Standards, Vol-I, 2016.
 |

**CO-PO Mapping:** 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - - Not Mapping

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **CO1** | 1 | - | 1 | 1 | - | 1 | 1 | - | - | - | 1 | 1 |
| **CO2** | 1 | 1 | 2 | 1 | 1 | - | - | - | - | - | - | 1 |
| **CO3** | 1 | 1 | 2 | - | 2 | - | - | - | - | - | - | 1 |
| **CO4** | 2 | - | 2 | - | 1 | 1 | 1 | - | - | - | 1 | 2 |
| **CO5** | 2 | - | 2 | - | 2 | 1 | - | - | - | - | 1 | 1 |
| **CO6** | 1 | - | 1 | - | 2 | - | - | - | - | - | 1 | 1 |