**17CE1101 - BUILDING MATERIALS**

**(Civil Engineering)**

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| **Course Category** | Engineering Science | **Credits** | 3 |
| **Course Type** | Theory | **Lecture - Tutorial - Practical** | 3 - 0 - 0 |
| **Prerequisite** | None | **Sessional Evaluation** | 40 |
| **Semester End Exam Evaluation** | 60 |
| **Total Marks** | 100 |

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| **Course Objectives** | 1. To know the significance of various building materials used in construction industry. 2. To illustrate various classification of stones and their physical and mechanical characteristics. 3. To explain various classification of woods, ferrous metals and ceramic metals and their characteristics. 4. To explain the manufacturing process of basic building materials. 5. To explain the different types of mortars and their applications. 6. To classify the smart building materials and their use in constructions. | |
| **Course** **Outcomes** | CO1 | Gain an in-depth knowledge on the engineering aspects of clay bricks. |
| CO2 | Gain an in-depth knowledge on the engineering aspects of natural and artificial stones used as building material. |
| CO3 | Gain an in-depth knowledge on the use of wood, ferrous metals, and ceramic materials in construction industry. |
| CO4 | Understand the materials and manufacturing process of cement concrete. |
| CO5 | Understand the various types of mortar and their suitability. |
| CO6 | Understand the use of modern construction materials. |
|  | **UNIT - I**  **STRUCTURAL CLAY PRODUCTS:**  **Clay:** Classifications and physical properties of clay.  **Bricks:** Manufacture of bricks – Classification of bricks – Characteristics of good brick – Ingredients of good brick earth – Harmful substances in brick earth – Testing of bricks – Forms of bricks – Defects of bricks. | |
| **Course Content** | **UNIT- II**  **ROCKS AND STONES:**  **Rock:** Introduction, Classification of rocks.  **Stones:** Quarrying of stones – Natural bed of stone – Seasoning of stone – Dressing of stone – Uses of stones – Characteristics of good building stone – Testing of stones – Deterioration of stones – Durability of stones – Preservation of stones – Selection of stones – Common building stones – Artificial stones and applications of stones.  **UNIT- III**  **WOOD, WOOD PRODUCTS, FERROUS METALS AND CERAMIC MATERIALS:**  **Wood:** Introduction – Classification of trees – Classification of timber (IS: 399) – Macro-structure of timber – Characteristics of good timber – Seasoning of timber – Defects in timber – Diseases of timber – Preservation of timber (IS: 401) – Testing of timber (IS: 1708) – Ply-wood – Types and uses.  **Ferrous metals:** Types (iron, pig iron, cast iron, wrought iron, steel, rolled steel sections and reinforcing steel bars) – Rusting and Corrosion – Tensile testing of steel sections (IS: 1608) – Common anti-corrosive coatings.  **Ceramic materials**: Introduction – Classification of ceramic – Glass.  **UNIT- IV**  **MATERIALS FOR MAKING CEMENT CONCRETE:**  **Cement**: Introduction – Manufacture of cement – Portland cement – Hydration of cement – Field tests of cement.  **Aggregates**: Introduction – Classification of aggregates – Characteristics of aggregate – Deleterious materials – Organic impurities.  **Water**: Introduction – Quality of mixing water – Effect of mixing water from different sources – Water for washing aggregates – Standards for curing water.  **UNIT- V**  **BUILDING MORTARS:** Introduction – Classification (cement mortar, lime mortar, surkhi mortar, lime-cement mortar, mud mortar and special mortars) – Characteristics of good mortar – Functions of ingredients – Selection of mortar – Grouting – Guniting.  **UNIT– VI**  **SMART CONSTRUCTION MATERIALS:** Overview and use of fly ash, silica fume, carbon fibers, self-healing materials and fibre reinforced plastics – Benefits of nano-technology in construction industry. | |

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| **Textbooks**  **& Reference Books** | **TEXTBOOKS:**   1. Engineering Materials by S.C Rangwala. 2. Building Materials by S.K Duggal. 3. A Text Book of Building Construction and Construction Materials 4th Edition by T. D. Ahuja, G. S. Birdie.   **REFERENCE BOOKS:**   1. Building Materials Technology by U.K. Shrivastava. 2. Building and Construction Materials: Testing and Quality Control 1st Edition by M. L. Gambhir, Neha Jamwal. 3. Indian Standard Institution, National Building Code of India, ISI, 1984, New Delhi. |