

BUILDING MATERIALS AND CONCRETE TECHNOLOGY

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|--------------------------|---------------|---------------------|------------------------------|
| Course Code | 18CV34 | Credits | 03 |
| Course type | PC | CIE Marks | 50 marks |
| Hours/week: L-T-P | 3-0-0 | SEE Marks | 50 marks |
| Total Hours: | 40 | SEE Duration | 3 Hours for 100 marks |

Course Learning Objectives (CLO's)

1. **To study** various properties of building materials.
2. **To study** the properties of different types of cements, aggregates and chemical admixtures used for construction.
3. **To examine** the properties of fresh and hardened concrete and illustrate non-destructive testing.
4. **To illustrate** process of concreting, form work for concrete, Grouting, Shotcreting
5. **To illustrate** different types of advanced building materials and their uses in construction.

Pre-requisites: NIL

UNIT I

08 Hours

INTRODUCTION

Physical, chemical and engineering properties of building materials. Application of building materials.

Bricks: Types of bricks, manufacturing process of bricks, properties of bricks, Standard requirements and grades of bricks as per BIS.

Rocks and Stones: Classification of rocks, Rock products, Characteristics of stones – Structure, texture, strength, gravity, porosity, absorption, hardness, durability, weight. Standard requirement of building stone.

Timber: Types of timber, Uses and application of timber, Defects in timber and wood, Seasoning, Wood products with specific uses.

Self-Learning topics: Important stones used in construction with its suitability.

UNIT II

08 Hours

Cement: Manufacture of Portland cement, types of cement and its chemical composition, hydration of cement.

Aggregates: Classification of aggregates according to the source, aggregate size and shape, properties of aggregate.

Introduction to Chemical and Mineral admixtures: Super-plasticizers, Retarders, accelerators, air entraining admixtures, GGBFS, Fly ash, silica fume, metakaolin.

Case Study: 1) Field Tests on cement to determine the quality
2) Case studies on the production of mineral admixtures
3) Case study on the operation of quarry

Self-Learning topics: Methods of storing the cement

UNIT III

08 Hours

Fresh concrete: Factors affecting fresh concrete properties.

Mix Design- Principles of mix design, grades of concrete, methods of proportioning, trial mixes, Design of concrete mixes using IS: 10262-2019, quality control. Mix Design of concrete with admixtures.

Self-Learning topics: Quality control

UNIT IV

08 Hours

Concreting operations

Process and manufacturing of concrete, Mixing, transporting, placing, compacting and finishing; Curing- methods of curing, cold-weather concreting, hot-weather concreting, pre-packed concrete, form work for concrete, Form work for concrete, Guniting, Shotcreting. Hardened concrete; Factors affecting the strength of hardened concrete

Case study: Visit to Ready Mix Concrete Plant.

Self-Learning topics: Non-destructive testing.

UNIT V

08 Hours

Miscellaneous Construction Materials: Plastics and PVC, Ceramic products, Paints and Varnish, Materials for damp proofing, water proofing, Glass and fiber, Steel and iron materials, Materials used for false ceiling, Asbestos.

Self-Learning topics: Prepare a list of construction materials adopted in your residence.

Text Books:

- 1 Shetty M. S., “**Concrete Technology**”, S. Chand and Company Ltd., Delhi, 1988
- 2 Neville A. M., “**Properties of Concrete**”, Longman Scientific & Technical, England, 2000.
- 3 SanthaKumar A. R., “**Concrete Technology**”, Oxford University Press, New Delhi, 2007
- 4 D.N. Ghose, “**Construction Materials**”, TATA Mc Graw Hill Publications
- 5 S. K. Duggal., “**Building Materials**”, New Age International Publications

Reference Books:

- 1 Dr. Janardan Jha.,” Engineering Materials”, Khanna Publications
- 2 IS: 10262-2009, “**Recommended Guidelines for Concrete Mix Design**”, 2009
- 3 IS: 10262-2019, “**Recommended Guidelines for Concrete Mix Design**”, 2019

E-resources

(<https://www.youtube.com/watch?v=6ju8mig4VoU&list=PLbMVogVj5nJT6RXK4VKPGOfWHp2ZH8xin>
https://www.youtube.com/watch?v=EIDXE28_8eQ&list=PL3xq-dxeLe6nspoZOPXrsZyrgm9axOxgX)

Course Outcome (COs)

| At the end of the course, the student will be able to | | Bloom's Level |
|---|---|---------------|
| 1. | Describe important properties of building materials used in civil engineering construction | L2 |
| 2. | Select appropriate rock /stone products for different uses in building construction | L1 |
| 3. | Describe timber and wood products and its uses in building construction | L2 |
| 4. | Select appropriate ingredients of proper quality for cement concrete as per required BIS codes | L1 |
| 5. | Explain different types of advanced building materials and their uses in construction. | L2 |

Program Outcome (POs)

| | PO No. |
|---|--------|
| 1. Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems. | PO1 |
| 2. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. | PO3 |
| 3. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations | PO5 |
| 4. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. | PO8 |
| 5. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | PO 10 |

Course delivery methods

1. Lecture and Board
2. NPTEL/ Edusat
3. Power Point Presentation
4. Videos

Assessment methods

1. Assignments and Open Book Assignments
2. Quizzes
3. Internal Assessment Tests
4. Semester End Examination

CIE and SEE Pattern:**Scheme of Continuous Internal Evaluation (CIE):**

| Components | Addition of two IA tests | Average of two assignments | Quiz/Seminar/Course Project | Total Marks |
|--|-----------------------------|-------------------------------|--------------------------------|-------------|
| Maximum marks: 50 | 15+15 = 30 | 10 | 10 | 50 |
| Writing two IA tests is compulsory. Minimum marks required to qualify for SEE: 20 out of 50 marks | | | | |

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.