# Course Title: STRUCTURAL ANALYSIS

[As per Choice Based Credit System (CBCS) scheme]

<table>
<thead>
<tr>
<th>SEMESTER – IV</th>
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<tbody>
<tr>
<td>Subject Code</td>
</tr>
<tr>
<td>I.A. Marks</td>
</tr>
<tr>
<td>Number of Lecture Hours/Week</td>
</tr>
<tr>
<td>Exam. Marks</td>
</tr>
<tr>
<td>Total Number of Lecture Hours</td>
</tr>
<tr>
<td>Exam. Hours</td>
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</tbody>
</table>

CREDITS – 04

**Course objectives:** This course will enable students;
1. Apply knowledge of mathematics and engineering in calculating slope and deflections
2. Identify, formulate and solve engineering problems
3. Analyse structural systems and interpret data
4. Engage in lifelong learning with the advances in Structural Engineering

## Modules

<table>
<thead>
<tr>
<th>Modules</th>
<th>Teaching Hours</th>
<th>Revised Bloom’s Taxonomy (RBT) Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module -1: Introduction and Analysis of Plane Trusses</td>
<td>5 Hours</td>
<td>L2, L4, L5</td>
</tr>
<tr>
<td>Introduction- Conditions of Equilibrium, Degrees of freedom, Determinate and indeterminate structures</td>
<td>5 Hours</td>
<td>L2, L4, L5</td>
</tr>
<tr>
<td>Analysis of plane trusses – Method of Joints and Method of Sections</td>
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<td></td>
</tr>
<tr>
<td>Determination of Deflection of determinate beams by using geometric methods- moment area and conjugate beam approach</td>
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<td></td>
</tr>
<tr>
<td>Module -2: Energy Principles and Energy Theorems</td>
<td>10 Hours</td>
<td>L2, L4, L5</td>
</tr>
<tr>
<td>Strain energy and complementary strain energy, strain energy due to axial load bending and shear, law of conservation of energy, principles of virtual work, Castiglano’s first theorem, Belti’s law, Clarke – Max well theorem of reciprocal deflection. Deflection of beams and trusses using strain energy and unit local methods</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Module-3: Arches and Cable Structures

Analysis of three hinged parabolic arch with supports at same levels – determination of thrust, shear and bending moment. Analysis of cables under point load and u.d.l length of cables (supports at same level).

<table>
<thead>
<tr>
<th>10 Hours</th>
<th>L2, L4, L5</th>
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</table>

### Module -4: Deflection of Beams

Analysis of statically indeterminate beam- Propped cantilever using consistent deformation method
Analysis of continuous beams using Clapeyron’s three moment equation

<table>
<thead>
<tr>
<th>10 Hours</th>
<th>L2, L4, L5</th>
</tr>
</thead>
</table>

### Module -5: Deflection of Beams

Analysis of continuous beams and simple orthogonal portal frames (without sway) by slope deflection method
Analysis of continuous beams and simple orthogonal portal frames (without sway) by moment distribution method.

<table>
<thead>
<tr>
<th>5 Hours</th>
<th>L2, L4, L5</th>
</tr>
</thead>
</table>

### Course outcomes:

After studying this course, students will be able;
1. Evaluate the forces in determinate trusses by method of joints and sections.
2. Evaluate the deflection of cantilever, simply supported and overhanging beams by different methods
3. Understand the energy principles and energy theorems and its applications to determine the deflections of trusses and bent frames.
4. Determine the stress resultants in arches and cables.

### Program Objectives (as per NBA)

1. Engineering Knowledge.
2. Problem Analysis.
3. Interpretation of data.
**Question paper pattern:**
- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- *The students shall answer Five full questions selecting one full question from each module.*
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

**Text Books:**
1. Pundit Gupta – Structural Analysis Vol. 1 and II.
2. C.S. Reddy – Basic Structural Analysis, TMH.

**Reference Books:**
1. Indeterminate Structural Analysis – J. Sterling Kinney
2. Elemental Structural Analysis – Noris C H, Wilbur J.B
Course Title: SURVEYING - II  
[As per Choice Based Credit System (CBCS) scheme]  
SEMESTER – IV  

<table>
<thead>
<tr>
<th>Subject Code</th>
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<th>Exam Marks</th>
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<th>Exam Hours</th>
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<tbody>
<tr>
<td>15CT43</td>
<td>20</td>
<td>04</td>
<td>80</td>
<td>50</td>
<td>03</td>
</tr>
</tbody>
</table>

CREDITS – 04

Course objectives:

The objectives of this course is to make students to learn:

1. Understand the basic principles of Surveying
2. Learn Linear and Angular measurements to arrive at solutions to basic surveying problems.
3. Employ conventional surveying methods for curve setting
4. Acquire the surveying data to compute areas and volumes and draw contours.

<table>
<thead>
<tr>
<th>Modules</th>
<th>Teaching Hours</th>
<th>Revised Bloom’s Taxonomy (RBT) Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module -1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THEODOLITE SURVEY</td>
<td>6 Hours</td>
<td>L1, L2</td>
</tr>
<tr>
<td>Theodolite and types, Fundamental axes and parts of a transit theodolite, uses of theodolite, Temporary adjustments of a transit theodolite, Measurement of horizontal angles – Method of repetitions and reiterations, Measurements of vertical angles, Prolonging a straight line by a theodolite in adjustment and theodolite not in adjustment</td>
<td>4 Hours</td>
<td>L1, L2</td>
</tr>
<tr>
<td>PERMANENT ADJUSTMENT OF DUMPY LEVEL AND TRANSIT THEODOLITE: Interrelationship between fundamental axes for instrument to be in adjustment and step by step procedure of obtaining permanent adjustments</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Module -2

**TRIGONOMETRIC LEVELLING**

Determination of elevation of objects when the base is accessible and inaccessible by single plane and double plane method, Distance and difference in elevation between two inaccessible objects by double plane method. Salient features of Total Station, Advantages of Total Station over conventional instruments, Application of Total Station.

<table>
<thead>
<tr>
<th>Hours</th>
<th>L1, L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

### Module -3

**TACHEOMETRY**

Basic principle, Types of tacheometric survey, Tacheometric equation for horizontal line of sight and inclined line of sight in fixed hair method, Anallactic lens in external focusing telescopes, Reducing the constants in internal focusing telescope, Moving hair method and tangential method, Substance bar, Beaman stadia arc.

<table>
<thead>
<tr>
<th>Hours</th>
<th>L1, L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**CURVE SETTING (Simple curves)**

Curves – Necessity – Types, Simple curves, Elements, Designation of curves, Setting out simple curves by linear methods, Setting out curves by Rankines deflection angle method.

<table>
<thead>
<tr>
<th>Hours</th>
<th>L1, L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

### Module -4

**CURVE SETTING (Compound and Reverse curves)**

Compound curves, Elements, Design of compound curves, Setting out of compound curves, Reverse curve between two parallel straights (Equal radius and unequal radius).

<table>
<thead>
<tr>
<th>Hours</th>
<th>L1, L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
CURVE SETTING (Transition and Vertical curves)

Transition curves, Characteristics, Length of Transition curve, Setting out cubic Parabola and Bernoulli’s Lemniscates, Vertical curves – Types – Simple numerical problems.

Module -5

AREAS AND VOLUMES

Calculation of area from cross staff surveying, Calculation of area of a closed traverse by coordinates method. Planimeter – principle of working and use of planimeter to measure areas, digital planimeter, Computations of volumes by trapezoidal and prismoidal rule, Capacity contours

Course outcomes:

After successful completion of the course, the student will be able to:

1. Possess a sound knowledge of fundamental principles of surveying
2. Measurement of vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems
3. Apply the knowledge of conventional surveying methods for curve setting
4. Analyse the data to compute areas and volumes and draw contours.

Program Objectives (as per NBA)

1. Engineering Knowledge.
2. Problem Analysis.
3. Interpretation of data.

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum Three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- The students shall answer Five full questions selecting one full question from each module.
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.
<table>
<thead>
<tr>
<th><strong>Text Books:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ‘Surveying’ Vol 2 and Vol 3  - B. C. Punmia, Laxmi Publications</td>
<td></td>
</tr>
<tr>
<td>2. ‘Plane Surveying’ A. M. Chandra – New age international (P) Ltd</td>
<td></td>
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<tr>
<td>3. ‘Higher Surveying’ A.M. Chandra New age international (P) Ltd</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Reference Books:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Fundamentals of Surveying - S.K. Roy – Prentice Hall of India</td>
<td></td>
</tr>
<tr>
<td>3. Surveying, Arther Bannister et al., Pearson Education, India</td>
<td></td>
</tr>
</tbody>
</table>
Course Title: Concrete Technology

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – IV

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>I.A. Marks</th>
<th>Exam. Marks</th>
<th>Exam. Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>15CV/CT44</td>
<td>20</td>
<td>80</td>
<td>03</td>
</tr>
</tbody>
</table>

Number of Lecture Hours/Week: 04

Total Number of Lecture Hours: 50

Credits: 04

Course objectives: This course will enable students;

1. Recognize the importance of material characteristics and their contributions to strength development in Concrete
2. Proportion ingredients of Concrete to arrive at most desirable mechanical properties of Concrete.
3. Ascertain and measure engineering properties of concrete in fresh and hardened state which meet the requirement of real time structures.

<table>
<thead>
<tr>
<th>Modules</th>
<th>Teaching Hours</th>
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</thead>
<tbody>
<tr>
<td>Module-1: Concrete Ingredients</td>
<td>10 Hours</td>
<td>L1,L2,L3</td>
</tr>
</tbody>
</table>

Cement – Cement manufacturing process, steps to reduce carbon footprint, chemical composition and their importance, hydration of cement, types of cement. Testing of cement.

Fine aggregate: Functions, requirement, Alternatives to River sand, M-sand introduction and manufacturing.


Recycled aggregates

Water – qualities of water.

Chemical admixtures – plasticizers, accelerators, retarders and air entraining agents.

Mineral admixtures – Pozzolanic and cementitious materials, Fly ash, GGBS, silica fumes, Metakaolin and rice husk ash.
<table>
<thead>
<tr>
<th>Module -2: Fresh Concrete</th>
<th>10 Hours</th>
<th>L1,L2,L3</th>
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</thead>
<tbody>
<tr>
<td>Module -3: Hardened Concrete</td>
<td>10 Hours</td>
<td>L1,L2,L3</td>
</tr>
<tr>
<td>Module -4: Concrete Mix Proportioning</td>
<td>10 Hours</td>
<td>L1, L2, L3, L4</td>
</tr>
<tr>
<td>Concept of Mix Design with and without admixtures, variables in proportioning and Exposure conditions, Selection criteria of ingredients used for mix design, Procedure of mix</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
proportioning. Numerical Examples of Mix Proportioning using IS-10262

<table>
<thead>
<tr>
<th><strong>Module -5:</strong></th>
<th>10 Hours</th>
<th>L1, L2, L3, L4</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMC- manufacture and requirement as per QCI-RMCPCCS, properties, advantages and disadvantages. Self-Compacting concrete- concept, materials, tests, properties, application and typical mix Fiber reinforced concrete - Fibers types, properties, application of FRC. Light weight concrete-material properties and types. Typical light weight concrete mix and applications</td>
<td>L1, L2, L3, L4</td>
<td>10 Hours</td>
</tr>
</tbody>
</table>

**Course outcomes:**

After studying this course, students will be able;

**CO1:** Relate material characteristics and their influence on microstructure of concrete. (L2,L3)(PO1)

**CO 2:** Distinguish concrete behaviour based on its fresh and hardened properties. [L2, L4] (PO1, PO2)

**CO 3:** Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes. [L3] (PO1, PO2, PO3)

**Program Objectives (as per NBA)**

1. Engineering Knowledge.
2. Problem Analysis.
3. Interpretation of data.

**Question paper pattern:**

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- **The students shall answer Five full questions selecting one full question from each module.**
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.
### Text Books:

2. M.S. Shetty, Concrete Technology - Theory and Practice Published by S. Chand and Company, New Delhi.

### Reference Books:

5. Criteria for RMC Production Control, Basic Level Certification for Production Control of Ready Mixed Concrete-BMTPC\Association House
6. Specification and Guidelines for Self-Compacting Concrete, EFNARC, Association House
## Course Title: BUILDING CONSTRUCTION

[As per Choice Based Credit System (CBCS) scheme]

**SEMESTER – IV**

<table>
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<tr>
<th>Subject Code</th>
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<tbody>
<tr>
<td>15CT45</td>
<td>20</td>
<td>80</td>
<td>03</td>
</tr>
</tbody>
</table>

**Number of Lecture Hours/Week:** 04

**Total Number of Lecture Hours:** 50

**CREDITS – 04**

### Course objectives:

This course will enable students to;

1. In investigation of soil condition, Deciding suitable foundation for different structures
2. In supervision of different types of masonry and suitable lintel, chejja and canopy
3. In selection of materials, design and supervision of suitable type of floor, roof and stairs.
4. To gain knowledge about doors, windows, plastering, painting, damp proofing, scaffolding, shoring, underpinning and to take suitable engineering measures.

<table>
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<tbody>
<tr>
<td><strong>Module -1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FOUNDATION:</strong> Preliminary Investigation of Soil, Bearing Capacity of Soil – Introduction, Safe Bearing Capacity of Soil, Allowable Bearing Capacity of Soil, Determination of Bearing Capacity by Plate Load Test and by method of dropping weight</td>
<td>4 Hours</td>
<td>L1, L2, L4</td>
</tr>
<tr>
<td><strong>Classification of Foundations:</strong> Introduction to different types of foundation, Masonry footings, Isolated footings, Combined and Strap RCC footings, Raft footing, Grillage foundation, Pile foundations (Friction and Load bearing piles), Foundation in black cotton soils.</td>
<td>6 Hours</td>
<td>L1, L2</td>
</tr>
</tbody>
</table>
## Module -2

| **BRICK MASONRY:** Definition of terms used in masonry, Bonds in brickwork, English Bond, Flemish Bond, Reinforced brickwork, Hollow Block construction, Damp Proof construction, Masonry arches classification, Stability of an arch, Joints in Masonry, Load Bearing and partition walls. | **5 Hours** | **L1,L2,L3** |
| **STONE MASONRY:** Rubble Masonry, Coursed Rubble Masonry, Uncoursed rubble masonry, Random rubble masonry, Ashlar Masonry. Shoring, Underpinning, Scaffolding | **5 Hours** | **L1,L2,L3** |

## Module -3

| **LINTELS, CHEJJA, CANOPY BALCONY:** Lintels - Types and classifications, Functions & Method of construction. Chejja -Types and classifications, Functions & Method of construction. Canopy -Types and classifications, Functions & Method of construction. | **2 Hours** | **L2, L3** |
| **ROOFS:** Flat Roof (R.C.C), Sloped roof (R.C.C. and Tile roof), Lean to roof, Wooden truss (King post and queen post trusses), Steel trusses- for various spans up to 15m using structural steel sections including Tubular and Hollow sections with Details such as purlins, roof coverings and joints. Weather proof course for RCC Roof. Roof Coverings. | **4 Hours** | **L2, L3** |
| **STAIRS:** Types (Classification) and Technical terms in stairs, Requirements of a good stair. Geometric Design of RCC Dog Legged and open well stairs (Plan and sectional elevation of stairs) | **4 Hours** | **L2, L3,L4** |
### Module -4

**PLASTERING:** Purpose of plastering, Materials of plastering, Lime mortar, Cement Mortar Methods of plastering, Lath plastering

**FLOORING:** Types of flooring (Materials and method of laying), Granolithic, Mosaic, Ceramic, Marble, Polished granite, Industrial flooring

**DOORS AND WINDOWS:** Door Types: Paneled doors, Glazed doors, Flush doors, Collapsible and rolling shutters, Louvered doors, Revolving, sliding and swing doors

Windows Types: Paneled, Glazed, Bat window, Dormer window, Louvered and corner window, Ventilators

| 10Hours | L2, L3 |

### Module -5:

**PAINTING:** Purpose, Types, Application of paints to new and old surfaces, Distemper, Plastic emulsion, Enamel, Powder coated painting to walls and iron and steel surfaces, Polishing of wood surface

**INTRODUCTION TO COST EFFECTIVE CONSTRUCTION:** Necessity, Advantages, Materials and composites, Stabilized and bocks, Precast roofing elements, L-Panel, Channel section, Micro concrete tiles, Pre cast doors and windows (Pre cast frames and shutters), Pre fabrication techniques

**FORM WORK:** Form work details, RCC columns, Beams, Floors, Slip forming

| 10Hours | L1,L2,L3 |

### Course outcomes:

After a successful completion of the course, the student will be able to:

1. Select suitable materials and adopt suitable construction techniques for buildings
2. Adopt suitable cost effective construction techniques to enhance durability of buildings.

### Program Objectives (as per NBA)

1. Engineering Knowledge.
2. Problem Analysis.
3. Interpretation of data.
**Question paper pattern:**
- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum Three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- The students shall answer Five full questions selecting one full question from each module.
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

**Text Books:**
1. Building Construction by S.C. Rangwala
2. Building Construction by Sushil Kumar
3. Building Construction by Punmia B.C.

**Reference Books:**
1. Construction Technology Vol. 1 to Vol. 4 by Chutley
Course Title: FINANCIAL AND COST ACCOUNTING

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – IV

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</thead>
<tbody>
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<td>15CT46</td>
<td>20</td>
<td>04</td>
<td>80</td>
<td>50</td>
<td>04</td>
</tr>
</tbody>
</table>

CREDITS – 04

Course objectives:
This course will enable students;
1. To understand the basic concepts of finance and cost accounting
2. To comprehend the methods used to assess the financial accounting and cost of different projects
3. To evaluate the financial position to investment in a project by various methods

<table>
<thead>
<tr>
<th>Modules</th>
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</thead>
<tbody>
<tr>
<td>Module -1</td>
<td>10 Hours</td>
<td>L2,L3,L4</td>
</tr>
</tbody>
</table>


Preparation of Final Accounts – Adjusting Entry – Trading, Profit and Loss Account and Balance Sheet.

| Module -2 | 10 Hours | L1,L2 |

Budget - Meaning and definitions – Preparation of Functional Budgets – Cash Budget - Sales Budget – Purchases and Production Budget – Flexible Budget.

### Module -3

**Methods of Evaluating Investment Proposals** –
- Payback method – Payback profitability method –
- Discounted Cash Flow method – Net present – Value method

| 10 Hours | L2, L3, L5 |

### Module -4

**Costing concepts** – Meaning and Definition –
- Objectives – Difference between Cost of Financial Accounting

| 10 Hours | L1, L2 |

### Module -5:

**Project Accounts** – Preparation of Contract Accounts for each project – Methods of Recording and Reporting Site Accounts to Project Office and from Project Office to Head Office.

| 10 Hours | L1, L2 |

### Course outcomes:

After a successful completion of the course, the student will be able to:

1. Apply the knowledge of concepts of finance and cost accounting in construction.
2. Analyze the financial accounting and cost of construction projects.
3. Assess the financial position to investment in a project.

### Program Objectives (as per NBA)

1. Engineering Knowledge.
2. Problem Analysis.
3. Interpretation of data.

### Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum Three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- The students shall answer Five full questions selecting one full question from each module.
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.
**Reference Books:**

3. B.S. Raman “Accountancy”.
**Course Title:** SURVEYING PRACTICE-II  
[As per Choice Based Credit System (CBCS) scheme]  
**SEMESTER – IV**

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<th>Exam Hours</th>
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<tbody>
<tr>
<td>15CTL47</td>
<td>20</td>
<td>03</td>
<td>80</td>
<td>42</td>
<td>03</td>
</tr>
</tbody>
</table>

**CREDITS – 02**

**Course objectives:** This course will enable students to

**The objectives of this course is to make students to learn:**

1. *Apply the basic principles of engineering surveying and measurements*
2. *Follow effectively field procedures required for a professional surveyor*
3. *Use techniques, skills and conventional surveying instruments necessary for engineering practice.*

<table>
<thead>
<tr>
<th>Modules</th>
<th>Teaching Hours</th>
<th>Revised Bloom’s Taxonomy (RBT) Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Measurement of horizontal angles with method of repetition and reiteration using theodolite.</td>
<td>03</td>
<td>L3, L4</td>
</tr>
<tr>
<td>2. Measurement of vertical angles using theodolite.</td>
<td>03</td>
<td>L3,L4</td>
</tr>
<tr>
<td>3. To determine the elevation of an object using single plane method when base is accessible and inaccessible.</td>
<td>03</td>
<td>L3, L4</td>
</tr>
<tr>
<td>4. To determine the distance and difference in elevation between two inaccessible points using double plane method.</td>
<td>03</td>
<td>L3</td>
</tr>
<tr>
<td>5. To determine the tacheometric constants using horizontal and inclined line of sight.</td>
<td>03</td>
<td>L3, L4</td>
</tr>
<tr>
<td>6. To set out simple curves using linear methods – perpendicular offsets from long chord and offsets from chords produced.</td>
<td>03</td>
<td>L3, L4</td>
</tr>
<tr>
<td>7. To set out simple curves using Rankine's deflection angles method.</td>
<td>03</td>
<td>L3, L4</td>
</tr>
<tr>
<td>8. To set out compound curve with angular methods with suing theodolite only.</td>
<td>03</td>
<td>L3, L4</td>
</tr>
</tbody>
</table>
9. To set out the center line of a simple rectangular room using offset from base line  
   03  
   L3, L4

10. To set out center lines of columns of a building using two base lines at right angles  
    03  
    L3, L4

11. Calculation of area from cross staff surveying  
    03  
    L3, L4

12. Calculation of area of a closed traverse by coordinates method  
    03  
    L3, L4

13. Demonstration: Exposure to use of Total Station. Traversing, Longitudinal sections, Block levelling  
    03  
    L1, L2

    03  
    L1, L2

**Course outcomes:**  
After a successful completion of the course, the student will be able to:  
1. Apply the basic principles of engineering surveying and for linear and angular measurements.  
2. Comprehend effectively field procedures required for a professional surveyor.  
3. Use techniques, skills and conventional surveying instruments necessary for engineering practice.[L3,L4][PO5]

**Program Objectives (as per NBA)**  
1. *Engineering Knowledge.*  
2. *Problem Analysis.*  
3. *Interpretation of data.*

**Question paper pattern:**  
- All are individual experiments.  
- Instructions as printed on the cover page of answer script for split up of marks to be strictly followed.  
- All exercises are to be included for practical examination.

**Text Books:**  
Course Title: CONSTRUCTION MATERIALS TESTING LAB- II
[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – IV

Subject Code 15CTL48  IA Marks  20
Number of Lecture Hours/Week 03  Exam Marks  80
Total Number of Lecture Hours 42  Exam Hours  03

CREDITS – 02

Course objectives:
The objectives of this course is to make students to learn:

1. Ability to apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials.
2. Ability to function on multi-disciplinary teams in the area of materials testing.
3. Ability to use the techniques and skills necessary for selecting suitable structural materials.
4. Understanding of professional and ethical responsibility in the areas of material testing.

<table>
<thead>
<tr>
<th>Modules</th>
<th>Teaching Hours</th>
<th>Revised Bloom's Taxonomy (RBT) Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CEMENT: Normal consistency, Soundness by Autoclave method, Compression strength test.</td>
<td>03 Hours</td>
<td>L2, L3, L5</td>
</tr>
<tr>
<td>2. AGGREGATES: Coarse Aggregate- Crushing, abrasion, impact and Specific gravity and water absorption. Fine Aggregate- Specific gravity and water absorption.</td>
<td>06 Hours</td>
<td>L1, L2, L3, L5</td>
</tr>
<tr>
<td>3. Mix Proportioning of Concrete using IS-10262</td>
<td>06 Hours</td>
<td>L1, L2, L3, L5</td>
</tr>
<tr>
<td>4. FRESH CONCRETE: Workability – slump, Compaction factor and Vee Bee tests.</td>
<td>06 Hours</td>
<td>L1, L2, L3, L5</td>
</tr>
<tr>
<td>5. Self-Compacting Concrete: Typical Mix by EFNARC, Workability- Slump Flow Test, V Funnel Test, L-Box test</td>
<td>06 Hours</td>
<td>L1, L2, L3, L5</td>
</tr>
<tr>
<td>6. HARDENED CONCRETE: Compression Strength and Split tensile tests.</td>
<td>06 Hours</td>
<td>L1, L2, L3, L5</td>
</tr>
<tr>
<td>7. BITUMINOUS MATERIALS AND MIXES: Specific Gravity, Penetration, Ductility, Softening point, Flash and fire point, Viscosity. Marshall Stability tests</td>
<td>06 Hours</td>
<td>L1, L2, L4, L5</td>
</tr>
<tr>
<td>8. SUBGRADE SOIL: CBR Test</td>
<td>03 Hours</td>
<td>L2, L3, L4, L5</td>
</tr>
</tbody>
</table>
Course outcomes:
After successful completion of the course, the students will be able to:
1. Reproduce the basic knowledge of mathematics and engineering in finding the strength in compression and split tensile strength of hardened concrete
2. Identify and compare suitable structural materials used in construction.
3. Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials.

Program Objectives (as per NBA)
1. Engineering Knowledge.
2. Evaluation of mechanical properties of structural materials.
3. Interpretation of test results.

Question paper pattern:
• Group experiments - Compression Strength, Split tensile tests.
• Individual Experiments - Remaining tests.
• Two questions are to be set - One from group experiments and the other as individual experiment.
• Instructions as printed on the cover page of answer script for split up of marks to be strictly followed.
• All exercises are to be included for practical examination.

Reference Books:
1. Relevant IS Codes, EFNARC code and IRC Codes
3. M.S. Shetty, Concrete Technology - Theory and Practice Published by S. Chand and Company, New Delhi.