

Dr. Vasanthaodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF  
TECHNOLOGY, BUDHGAON, SANGLI- 416304.**

**An Autonomous Institute**

Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**



**Curriculum for**

**M.Tech. STRUCTURAL ENGINEERING**

In accordance with the *National Education Policy (NEP) 2020*,  
including curriculum structure and evaluation scheme  
**Effective from Academic Year 2025–2026**



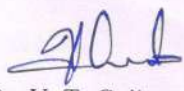
### SEMESTER I

| Course Code                  | Course Name                                        | Teaching Scheme |    |    |        | Evaluation Scheme |        |                           |           |                           | TOTAL |
|------------------------------|----------------------------------------------------|-----------------|----|----|--------|-------------------|--------|---------------------------|-----------|---------------------------|-------|
|                              |                                                    | L               | T  | P  | Credit | Scheme            | Theory |                           | Practical |                           |       |
|                              |                                                    |                 |    |    |        |                   | Max    | Minimum Marks for Passing | Max       | Minimum Marks for Passing |       |
| 0CEPCC501                    | Design of Bridges                                  | 3               | -  | -  | 3      | ISE 1             | 10     | 40                        | -         | -                         | 100   |
|                              |                                                    |                 |    |    |        | MSE               | 20     |                           |           |                           |       |
|                              |                                                    |                 |    |    |        | ISE 2             | 10     |                           |           |                           |       |
|                              |                                                    |                 |    |    |        | ESE               | 60     |                           |           |                           |       |
| 0CEPCC502                    | Earthquake Engineering and Structural Dynamics     | 3               | -  | -  | 3      | ISE 1             | 10     | 40                        | -         | -                         | 100   |
|                              |                                                    |                 |    |    |        | MSE               | 20     |                           |           |                           |       |
|                              |                                                    |                 |    |    |        | ISE 2             | 10     |                           |           |                           |       |
|                              |                                                    |                 |    |    |        | ESE               | 60     |                           |           |                           |       |
| 0CEPCC503                    | Advanced Structural Analysis                       | 3               | -  | -  | 3      | ISE 1             | 10     | 40                        | -         | -                         | 100   |
|                              |                                                    |                 |    |    |        | MSE               | 20     |                           |           |                           |       |
|                              |                                                    |                 |    |    |        | ISE 2             | 10     |                           |           |                           |       |
|                              |                                                    |                 |    |    |        | ESE               | 60     |                           |           |                           |       |
| 0CERMC504                    | Research Methodology, IPR and Research Ethics      | 3               | 1  | -  | 4      | ISE 1             | 10     | 40                        | -         | -                         | 100   |
|                              |                                                    |                 |    |    |        | MSE               | 20     |                           |           |                           |       |
|                              |                                                    |                 |    |    |        | ISE 2             | 10     |                           |           |                           |       |
|                              |                                                    |                 |    |    |        | ESE               | 60     |                           |           |                           |       |
| 0CEPEC505                    | Program Elective Course– I                         | 3               | -  | -  | 3      | ISE 1             | 10     | 40                        | -         | -                         | 100   |
|                              |                                                    |                 |    |    |        | MSE               | 20     |                           |           |                           |       |
|                              |                                                    |                 |    |    |        | ISE 2             | 10     |                           |           |                           |       |
|                              |                                                    |                 |    |    |        | ESE               | 60     |                           |           |                           |       |
| 0CEPCC506                    | Structural Dynamics Lab                            | -               | -  | 2  | 1      | ISE               | -      | -                         | 25        | 20                        | 50    |
|                              |                                                    |                 |    |    |        | ESE               | -      |                           | 25        |                           |       |
| 0CEPCC507                    | Modern Material Lab                                | -               | -  | 2  | 1      | ISE               | -      | -                         | 25        | 20                        | 50    |
|                              |                                                    |                 |    |    |        | ESE               | -      |                           | 25        |                           |       |
| 0CEAEC508                    | Software Applications in Civil Engineering Lab - I | -               | -  | 4  | 2      | ISE               | -      | -                         | 50        | 20                        | 50    |
| 0CECCC509                    | YOGA for Stress Management                         | -               | -  | 2  | AU     | ISE               | -      | -                         | -         | -                         | AU    |
| TOTAL                        |                                                    | 15              | 01 | 10 | 20     | TOTAL MARKS       |        |                           |           |                           | 650   |
| Total Contact Hours Per Week |                                                    | 26              |    |    | 20     |                   |        |                           |           |                           |       |

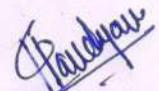
| Course Category | PCC | PEC | RMC | VSE | CCC | Total |
|-----------------|-----|-----|-----|-----|-----|-------|
| Credit          | 12  | 3   | 3   | 2   | AU  | 20    |

#### List of Program Elective Course- I

|                                  |                                        |
|----------------------------------|----------------------------------------|
| 1. Advanced Prestressed Concrete | 2. Design of Pre-Engineered Buildings  |
| 3. Design of Tall Buildings      | 4. Theory of Elasticity and Plasticity |

  
 Dr. V. T. Gaikwad

HOD-Civil

  
 Dr. K. K. Pandeyaji

Dean Academics



  
 Dr. S. S. Mohite

Director



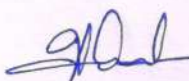
Dr. Vasantodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**  
 An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
 (Accredited by NAAC)  
**M.Tech. STRUCTURAL ENGINEERING**  
 Curriculum Structure and Evaluation Scheme  
 (2025-27 Batch)

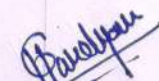
### SEMESTER II

| Course Code                  | Course Name                                       | Teaching Scheme |   |   |        | Evaluation Scheme |        |                           |           |                           | Total |
|------------------------------|---------------------------------------------------|-----------------|---|---|--------|-------------------|--------|---------------------------|-----------|---------------------------|-------|
|                              |                                                   | L               | T | P | Credit | Scheme            | Theory |                           | Practical |                           |       |
|                              |                                                   |                 |   |   |        |                   | Max    | Minimum Marks for Passing | Max       | Minimum Marks for Passing |       |
| 0CEPCC551                    | Finite Element Analysis                           | 3               | - | - | 3      | ISE 1             | 10     | 40                        | -         | -                         | 100   |
|                              |                                                   |                 |   |   |        | MSE               | 20     |                           |           |                           |       |
|                              |                                                   |                 |   |   |        | ISE 2             | 10     |                           |           |                           |       |
|                              |                                                   |                 |   |   |        | ESE               | 60     |                           |           |                           |       |
| 0CEPCC552                    | Advanced Design of R.C. Structures                | 3               | - | - | 3      | ISE 1             | 10     | 40                        | -         | -                         | 100   |
|                              |                                                   |                 |   |   |        | MSE               | 20     |                           |           |                           |       |
|                              |                                                   |                 |   |   |        | ISE 2             | 10     |                           |           |                           |       |
|                              |                                                   |                 |   |   |        | ESE               | 60     |                           |           |                           |       |
| 0CEPEC553                    | Program Elective Course- II                       | 3               | - | - | 3      | ISE 1             | 10     | 40                        | -         | -                         | 100   |
|                              |                                                   |                 |   |   |        | MSE               | 20     |                           |           |                           |       |
|                              |                                                   |                 |   |   |        | ISE 2             | 10     |                           |           |                           |       |
|                              |                                                   |                 |   |   |        | ESE               | 60     |                           |           |                           |       |
| 0CEPEC554                    | Program Elective Course– III                      | 2               | - | - | 2      | ISE 1             | 10     | 40                        | -         | -                         | 100   |
|                              |                                                   |                 |   |   |        | MSE               | 20     |                           |           |                           |       |
|                              |                                                   |                 |   |   |        | ISE 2             | 10     |                           |           |                           |       |
|                              |                                                   |                 |   |   |        | ESE               | 60     |                           |           |                           |       |
| 0CEOEC555                    | Open Elective Course- I                           | 3               | - | - | 3      | ISE I             | 10     | 40                        | -         | -                         | 100   |
|                              |                                                   |                 |   |   |        | MSE               | 20     |                           |           |                           |       |
|                              |                                                   |                 |   |   |        | ISE 2             | 10     |                           |           |                           |       |
|                              |                                                   |                 |   |   |        | ESE               | 60     |                           |           |                           |       |
| 0CEVSE556                    | Mini Project                                      | -               | - | 4 | 2      | ISE               | -      | -                         | 25        | 20                        | 50    |
|                              |                                                   |                 |   |   |        | ESE               | -      |                           | 25        |                           |       |
| 0CEAEC557                    | Software Applications in Civil Engineering Lab II | -               | - | 4 | 2      | ISE               | -      | -                         | 25        | 20                        | 50    |
|                              |                                                   |                 |   |   |        | ESE               | -      |                           | 25        |                           |       |
| 0CEEEM558                    | Entrepreneurship/ Economics/ Management Course    | 2               | - | - | 2      | ISE I             | 10     | 40                        | -         | -                         | 100   |
|                              |                                                   |                 |   |   |        | MSE               | 20     |                           |           |                           |       |
|                              |                                                   |                 |   |   |        | ISE 2             | 10     |                           |           |                           |       |
|                              |                                                   |                 |   |   |        | ESE               | 60     |                           |           |                           |       |
| TOTAL                        |                                                   | 16              | - | 8 | 20     | TOTAL MARKS       |        |                           |           |                           | 700   |
| Total Contact Hours Per Week |                                                   | 24              |   |   | 20     | TOTAL MARKS       |        |                           |           |                           | 700   |

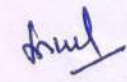
| Course Category | PCC | PEC | OEC | AEC | VSE | EEM | Total |
|-----------------|-----|-----|-----|-----|-----|-----|-------|
| Credit          | 6   | 5   | 3   | 2   | 2   | 2   | 20    |

| PEC II                              | PEC III                                | OEC I                                        | EEM                                                |
|-------------------------------------|----------------------------------------|----------------------------------------------|----------------------------------------------------|
| Advanced Design of Steel Structures | Application of AIML in Structural Engg | Structural Optimization                      | Innovation, Entrepreneurship & Start-up Management |
| Design of Industrial Structure      | Structural Health Monitoring and Audit | Industrial Safety                            | Project Management & Strategic Planning            |
| Theory of Plates and Shells         | Advanced Construction Materials        | Project Management in Structural Engineering | Engineering Economics & Cost Analysis              |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

  
 Dr. K. K. Pandeyaji  
 Dean Academics



  
 Dr. S. S. Mohite  
 Director



### SEMESTER III

| Course Code                  | Course Name                                | Teaching Scheme |   |    |        | Evaluation Scheme |        |                           |           |                           | TOTAL |
|------------------------------|--------------------------------------------|-----------------|---|----|--------|-------------------|--------|---------------------------|-----------|---------------------------|-------|
|                              |                                            | L               | T | P  | Credit | Scheme            | Theory |                           | Practical |                           |       |
|                              |                                            |                 |   |    |        |                   | Max    | Minimum Marks for Passing | Max       | Minimum Marks for Passing |       |
| 0CEPCC601                    | Advanced Concrete Technology               | 3               | - | -  | 3      | ISE 1             | 10     | 40                        | -         | -                         | 100   |
|                              |                                            |                 |   |    |        | MSE               | 20     |                           |           |                           |       |
|                              |                                            |                 |   |    |        | ISE 2             | 10     |                           |           |                           |       |
|                              |                                            |                 |   |    |        | ESE               | 60     |                           |           |                           |       |
| 0CEPEC602                    | SWAYAM/ NPTEL PLATFORM COURSES/Self Study. | 3               | - | -  | 3      | ISE               | 100    | 40                        | -         | -                         | 100   |
| 0CEOEC603                    | Introduction to Engineering Seismology     | 3               | - | -  | 3      | ISE 1             | 10     | 40                        | -         | -                         | 100   |
|                              |                                            |                 |   |    |        | MSE               | 20     |                           |           |                           |       |
|                              |                                            |                 |   |    |        | ISE 2             | 10     |                           |           |                           |       |
|                              |                                            |                 |   |    |        | ESE               | 60     |                           |           |                           |       |
| 0CEINT604                    | Internship                                 | -               |   | 4  | 2      | ISE               | -      | -                         | 50        | 20                        | 50    |
| 0CEAEC605                    | Seminar                                    | -               | - | 2  | 1      | ISE               | -      | -                         | 25        | 20                        | 50    |
|                              |                                            |                 |   |    |        | ESE               | -      |                           | 25        |                           |       |
| 0CEDIS606                    | Dissertation Phase-I                       | -               | - | 16 | 8      | ISE               | -      | -                         | 50        | 40                        | 100   |
|                              |                                            |                 |   |    |        | ESE               | -      |                           | 50        |                           |       |
| Total                        |                                            | 9               | 0 | 22 | 20     | TOTAL MARKS       |        |                           |           |                           | 500   |
| Total Contact Hours Per Week |                                            | 31              |   |    |        |                   |        |                           |           |                           |       |

| Sr.No | Course Code | Name of Course                            |
|-------|-------------|-------------------------------------------|
| 01    | 0CEPCC601   | Advanced Concrete Technology              |
| 02    | 0CEPEC602   | SWAYAM/ NPTEL PLATFORM COURSES/Self Study |
| 03    | 0CEOEC603   | Introduction to Engineering Seismology    |

| Course Category | PCC | PEC | OEC | DIS/INT | AEC | Total |
|-----------------|-----|-----|-----|---------|-----|-------|
| Credit          | 3   | 3   | 3   | 10      | 1   | 20    |

| Course Category | DIS/INT | Total |
|-----------------|---------|-------|
| Credit          | 20      | 20    |

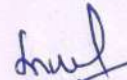
  
Dr. V. T. Gaikwad

HOD-Civil

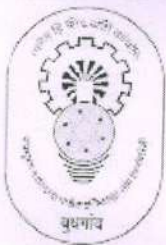
  
Dr. K. K. Pandeyaji

Dean Academics



  
Dr. S. S. Mohite

Director



#### SEMESTER IV

| Course Code                  | Course Name            | Teaching Scheme |   |    |        | Evaluation Scheme |        |                           |           |                           | TOTAL |
|------------------------------|------------------------|-----------------|---|----|--------|-------------------|--------|---------------------------|-----------|---------------------------|-------|
|                              |                        | L               | T | P  | Credit | Scheme            | Theory |                           | Practical |                           |       |
|                              |                        |                 |   |    |        |                   | Max    | Minimum Marks for Passing | Max       | Minimum Marks for Passing |       |
| OCEINT651                    | Internship             | -               |   | 4  | 2      | ISE               | -      | -                         | 50        | 40                        | 100   |
|                              |                        |                 |   |    |        | ESE               | -      | -                         | 50        |                           |       |
| OCEDIS652                    | Dissertation Phase -II | -               | - | 36 | 18     | ISE               | -      | -                         | 100       | 80                        | 200   |
|                              |                        |                 |   |    |        | ESE               | -      |                           | 100       |                           |       |
|                              | Total                  | -               | - | 40 | 20     | TOTAL MARKS       |        |                           |           |                           | 300   |
| Total Contact Hours Per Week |                        | 40              |   |    |        |                   |        |                           |           |                           |       |

| Course Category | DIS/INT | Total |
|-----------------|---------|-------|
| Credit          | 20      | 20    |

#### Summary of Semester wise Credits

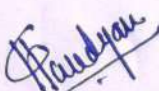
| Semester I | Semester II | Semester III | Semester IV | Total Credits |
|------------|-------------|--------------|-------------|---------------|
| 20         | 20          | 20           | 20          | 80            |

#### Summary of Programme Components and Credits

| Component                                          | Semester I | Semester II | Semester III | Semester IV | Total Credits |
|----------------------------------------------------|------------|-------------|--------------|-------------|---------------|
| Programme Core Course (PCC)                        | 11         | 06          | 03           | -           | 20            |
| Programme Elective Course (PEC)                    | 03         | 05          | 03           | -           | 11            |
| Open Elective Course (OEC)                         | -          | 03          | 03           | -           | 06            |
| Vocational and Skill Enhancement Course (VSE)      | -          | 02          | -            | -           | 02            |
| Ability Enhancement Course (AEC)                   | 02         | 02          | 01           | -           | 05            |
| Entrepreneurship/Economics/Management Course (EEM) | -          | 02          | -            | -           | 02            |
| Research Methodology (RMC)                         | 04         | -           | -            | -           | 04            |
| Dissertation/Project/Internship (DIS/INT)          | -          | -           | 10           | 20          | 30            |
| Co-Curricular Course (CCC)                         | AU         | -           | -            | -           | AU            |
| Total                                              | 20         | 20          | 20           | 20          | 80            |

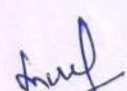
  
 Dr. V. T. Gaikwad

HOD-Civil

  
 Dr. K. K. Pandey

Dean Academics



  
 Dr. S. S. Mohite

Director



### SEMESTER I

#### Design of Bridges

| Course Code and Course Title                                                                      |                                                                                                                                                                                                                                                                                  | 0CVPCC501 Design of Bridges                           |           |          |     |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-----------|----------|-----|
| Semester                                                                                          |                                                                                                                                                                                                                                                                                  | I                                                     |           |          |     |
| Pre-requisite's                                                                                   |                                                                                                                                                                                                                                                                                  | UG -Bridge engineering, Design of concrete structures |           |          |     |
| Teaching Scheme<br>(Hours per week)                                                               | Lecture                                                                                                                                                                                                                                                                          | Tutorial                                              | Practical |          |     |
|                                                                                                   | 03                                                                                                                                                                                                                                                                               | -                                                     | -         |          |     |
| Credit                                                                                            |                                                                                                                                                                                                                                                                                  | 03                                                    |           |          |     |
| Evaluation Scheme                                                                                 | ISE 1                                                                                                                                                                                                                                                                            | MSE                                                   | ISE 2     | ESE      |     |
|                                                                                                   | 10 Marks                                                                                                                                                                                                                                                                         | 20 Marks                                              | 10 Marks  | 60 Marks |     |
| Course Outcomes (CO's): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                  |                                                       |           |          | BL  |
| CO 1                                                                                              | Understand the fundamentals of bridge engineering                                                                                                                                                                                                                                |                                                       |           |          | 2   |
| CO 2                                                                                              | Evaluate various loadings on bridges.                                                                                                                                                                                                                                            |                                                       |           |          | 3   |
| CO 3                                                                                              | Analyse various type of bridges with appropriate loads and methods.                                                                                                                                                                                                              |                                                       |           |          | 4   |
| CO4                                                                                               | Design various bridges and bearings with reinforcement detail.                                                                                                                                                                                                                   |                                                       |           |          | 5   |
| Course Content                                                                                    |                                                                                                                                                                                                                                                                                  |                                                       |           |          | Hrs |
| Unit 1                                                                                            | Introduction to Bridge Engineering: Introduction, Importance of bridges, Selection of bridge type and site, Economic span, General arrangement of various types of bridges, Geometric design parameters.                                                                         |                                                       |           |          | 04  |
| Unit 2                                                                                            | Loading on Bridges: Loading standards for roads and railway bridges as per IRC standards and IRS standards, Analysis of other loads like Impact factor, Centrifugal forces, Wind load, Earthquake load, Hydraulic forces, Longitudinal forces, Earth pressure, Buoyancy effects. |                                                       |           |          | 05  |
| Unit 3                                                                                            | Analysis and design of culvert: Design of RC culvert, Box culvert, Pipe culvert.                                                                                                                                                                                                 |                                                       |           |          | 06  |
| Unit 4                                                                                            | RC and Prestressed deck slab: Design of R. C. deck slab, Beam and slab, T beam, Pigweed's theory, Courbon's theory.<br><br>Prestressed concrete bridges: General aspect, Advantages, Analysis and design of prestressed bridges decks.                                           |                                                       |           |          | 10  |

Dr. V. T. Gaikwad  
HOD-Civil

Dr. K. K. Pandeyaji  
Dean Academics

Dr. S. S. Mohite  
Director

Prof. R. A. Kanai  
Executive Director



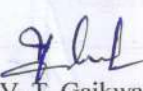
|                    |                                                                                                                                                                                                             |           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 5</b>      | <b>Foundation design:</b> Design of bridge foundation, piers, abutments, wing walls.                                                                                                                        | <b>06</b> |
| <b>Unit 6</b>      | <b>Bearing and Joint:</b> Bearing and expansion joints, forces on bearings, Types of bearings, design of unreinforced elastomeric bearings, expansion joints, Inspection maintenance and repair of bridges. | <b>05</b> |
| <b>Total Hours</b> |                                                                                                                                                                                                             | <b>36</b> |

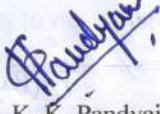
**Text Books:**

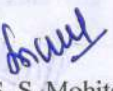
|          |                                                                                                                     |
|----------|---------------------------------------------------------------------------------------------------------------------|
| <b>1</b> | Dr. V. K. Raina, Concrete Bridge Practice: Analysis, Design and Economics, Shroff Publishers & Distributors Pvt Ltd |
| <b>2</b> | Jagadish & Jayaram, Design of Concrete Bridges, Tata McGraw Hill.                                                   |
| <b>3</b> | Ponnuswamy S., Bridge Engineering, Tata McGraw Hill.                                                                |
| <b>4</b> | Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Reinforced Concrete Structures, Vol. II, Laxmi Publications    |

**Reference Books:**

|           |                                                                                                                               |
|-----------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>1</b>  | Victor, Design of Concrete Bridges, Tata McGraw Hill.                                                                         |
| <b>2</b>  | N. Krishnaraju, Prestressed Concrete Bridges, CBS Publishers & Distributors Pvt. Ltd.                                         |
| <b>3</b>  | Dr. V. K. Raina., Concrete Bridge Practice: Construction, Maintenance & Rehabilitation, Shroff Publishers & Distrib. Pvt Ltd. |
| <b>4</b>  | Dr.V.K.Raina, Field Manual for Highway & Bridge Engineers, Shroff Publishers & Distributors Pvt Ltd                           |
| <b>5.</b> | David Lee, Bridge Bearing and Expansion Joints.                                                                               |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

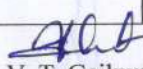
  
Dr. S. S. Mohite  
Director

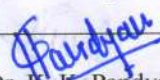
  
Prof. R. A. Kanai  
Executive Director

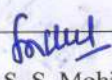


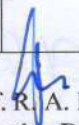
### Earthquake Engineering and Structural Dynamics

| Course Code and Course Title                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                              | OCEPCC502<br>Earthquake Engineering and Structural Dynamics |             |             |             |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-------------|-------------|-------------|
| Semester                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                              | I                                                           |             |             |             |
| Pre-requisite's                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                              | UG Earthquake Engineering.                                  |             |             |             |
| Teaching Scheme<br>(Hours per week)                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                              | Lecture                                                     | Tutorial    | Practical   |             |
|                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                              | 03                                                          | -           | -           |             |
| Credit                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                              | 03                                                          |             |             |             |
| Evaluation Scheme                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                              | ISE 1                                                       | MSE         | ISE 2       | ESE         |
|                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                              | 10<br>Marks                                                 | 20<br>Marks | 10<br>Marks | 60<br>Marks |
| Course Outcomes (CO's): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                             |             |             | BL          |
| CO 1                                                                                              | Analyze SDOF and MDOF structural systems under dynamic and seismic loading.                                                                                                                                                                                                                                                                                                                                                                  |                                                             |             |             | 4           |
| CO 2                                                                                              | Evaluate earthquake ground motion characteristics and construct response spectra.                                                                                                                                                                                                                                                                                                                                                            |                                                             |             |             | 5           |
| CO 3                                                                                              | Apply IS 1893:2016 and IS 13920:2016 provisions for seismic design of RC structures.                                                                                                                                                                                                                                                                                                                                                         |                                                             |             |             | 3           |
| CO4                                                                                               | Design beams, columns, and structural elements with ductile detailing.                                                                                                                                                                                                                                                                                                                                                                       |                                                             |             |             | 6           |
| CO5                                                                                               | Implement vibration control techniques and isolation measures in structures.                                                                                                                                                                                                                                                                                                                                                                 |                                                             |             |             | 3           |
| Course Content                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                             |             |             | Hrs.        |
| Unit 1                                                                                            | Fundamentals of Structural Dynamics<br>Simple Structures, Characteristics of dynamic loading, SDOF systems, Free vibrations, Harmonic loading, Harmonic base motion, Resonance, Dynamic Amplification Factor, Transmissibility, Vibration Isolation, Force-Displacement Relation, Damping Force, Equation of Motion, Mass-Spring-Damper Systems, Free vibration (un-damped & viscously damped), Response to harmonic & periodic excitations. |                                                             |             |             | 07          |
| Unit 2                                                                                            | Multi-Degree-of-Freedom Systems<br>MDOF systems, Two-storey shear buildings, General approach for linear systems, Static condensation, Symmetric & asymmetric systems subjected to ground motion.                                                                                                                                                                                                                                            |                                                             |             |             | 06          |
| Unit 3                                                                                            | Earthquake Ground Motion & Response Spectra<br>Strong motion measurement, Characteristics of earthquake ground motion, Response spectrum, Displacement, pseudo-velocity & pseudo-acceleration spectra, Tripartite spectra, Maximum Considered Earthquake (MCE) & Design Basis Earthquake (DBE), Construction of site-specific design spectra.                                                                                                |                                                             |             |             | 06          |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

  
 Dr. R. K. Pandey  
 Dean Academics

  
 Dr. S. S. Mohite  
 Director

  
 Prof. R. A. Kanai  
 Executive Director



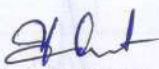
|                    |                                                                                                                                                                                                                                                                                   |           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 4</b>      | <b>Seismic Design Philosophy &amp; Code Provisions</b><br>Earthquake-resistant design philosophy, Provisions of IS 1893:2016 (Part I), Estimation of earthquake forces, Seismic coefficient method, Response spectrum analysis, Asymmetrical structures, Accidental eccentricity. | <b>06</b> |
| <b>Unit 5</b>      | <b>Earthquake Resistant Design</b><br>Earthquake-resistant design principles, Ductility, Inelastic behaviour, Ductile detailing of RC members (IS 13920:2016), Design of beams & columns.                                                                                         | <b>06</b> |
| <b>Unit 6</b>      | <b>Advanced Techniques in Seismic Design</b><br>Vibration control techniques, Base isolation, Energy dissipation devices, and Performance-based seismic design.                                                                                                                   | <b>06</b> |
| <b>Total Hours</b> |                                                                                                                                                                                                                                                                                   | <b>36</b> |

**Text Books:**

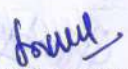
|          |                                                                                                                  |
|----------|------------------------------------------------------------------------------------------------------------------|
| <b>1</b> | R.W. Clough & Joseph Penziene, Dynamics of Structures, Mc-Graw Hill Publications.                                |
| <b>2</b> | A.K. Chopra, Dynamics of Structures: Theory & Application to Earthquake Engineering, Prentice Hall Publications. |
| <b>3</b> | Mario Paz, Structural Dynamics, CBS Publication.                                                                 |
| <b>4</b> | Roy Craig, Structural Dynamics, John-Wiley & Sons.                                                               |
| <b>5</b> | Jagmohan L. Humar, Dynamics of Structures, Swetsand, Zeitlinger, Netherlands.                                    |

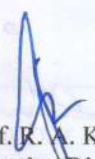
**Reference Books:**

|          |                                                                                                |
|----------|------------------------------------------------------------------------------------------------|
| <b>1</b> | Jaikrishna, A.R. Chandrashekharan, Elements of earthquake Engineering, South Asian Publishers. |
| <b>2</b> | Mukhopadhyay Madhujit, Structural Dynamics Vibration and systems, And Books India Publisher.   |
| <b>3</b> | Patrick Paultre, Dynamics of Structures, Wiley India                                           |
| <b>4</b> | IS 1893:2016 (Part I), Criteria for Earthquake Resistant Design of Structures                  |
| <b>5</b> | IS 13920:2016, Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

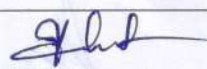
  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director

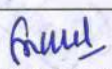


### Advanced Structural Analysis

| Course Code and Course Title                                                                    |                                                                                                                                                                                                                                                                                   | 0CEPCC503<br>Advanced Structural Analysis |           |       |      |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-----------|-------|------|
| Semester                                                                                        |                                                                                                                                                                                                                                                                                   | I                                         |           |       |      |
| Prerequisites                                                                                   |                                                                                                                                                                                                                                                                                   | Mechanics of Solids, Structural Mechanics |           |       |      |
| Teaching Scheme (hours per week)                                                                | Lecture                                                                                                                                                                                                                                                                           | Tutorial                                  | Practical |       |      |
|                                                                                                 | 3                                                                                                                                                                                                                                                                                 | -                                         | -         |       |      |
| Credit                                                                                          |                                                                                                                                                                                                                                                                                   | 03                                        |           |       |      |
| Evaluation Scheme                                                                               | ISE 1                                                                                                                                                                                                                                                                             | MSE                                       | ISE 2     | ESE   |      |
|                                                                                                 | 10                                                                                                                                                                                                                                                                                | 20                                        | 10        | 60    |      |
|                                                                                                 | Marks                                                                                                                                                                                                                                                                             | Marks                                     | Marks     | Marks |      |
| Course Outcomes (COs): -Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                   |                                           |           |       | BL   |
| CO1                                                                                             | Analyse the structure by applying the stiffness matrix and flexibility matrix                                                                                                                                                                                                     |                                           |           |       | 4    |
| CO2                                                                                             | Develop ILD for reactions, shear forces, and bending moments for indeterminate structures.                                                                                                                                                                                        |                                           |           |       | 4    |
| CO3                                                                                             | Analyze infinite, semi-infinite, and finite beams subjected to various loading                                                                                                                                                                                                    |                                           |           |       | 4    |
| CO4                                                                                             | Construct SFD, BMD, and TMD for curved beams under various loading and support conditions.                                                                                                                                                                                        |                                           |           |       | 4    |
| CO5                                                                                             | Apply the concept of plastic analysis to determine collapse loads, plastic moments, and load-carrying capacity of beams.                                                                                                                                                          |                                           |           |       | 3    |
| Course Content                                                                                  |                                                                                                                                                                                                                                                                                   |                                           |           |       |      |
| Unit No.                                                                                        | Contents                                                                                                                                                                                                                                                                          |                                           |           |       | Hrs. |
| Unit 1                                                                                          | Flexibility Matrix Method: Introduction, flexibility matrix, analysis of continuous beams, plane frame and trusses by flexibility matrix method.                                                                                                                                  |                                           |           |       | 6    |
| Unit 2                                                                                          | Stiffness Matrix Method: Introduction, stiffness matrix, relation between stiffness and flexibility matrices, analysis of continuous beams, plane frame and trusses by stiffness matrix method.                                                                                   |                                           |           |       | 6    |
| Unit 3                                                                                          | Influence Line Diagrams for Indeterminate Structures: Concept of ILD, Muller-Breslau's Principle and its application to Continuous beams. ILD for two hinged arches.                                                                                                              |                                           |           |       | 6    |
| Unit 4                                                                                          | Beams on Elastic Foundations: Basic concept of beams on elastic Foundations, Analysis of infinite, semi-infinite & finite beams.                                                                                                                                                  |                                           |           |       | 6    |
| Unit 5                                                                                          | Beams Curved in Plan: Introduction, structural behavior of curved beam, analysis of determinate & indeterminate beams curved in plan.                                                                                                                                             |                                           |           |       | 6    |
| Unit 6                                                                                          | Plastic Analysis: Introduction to plastic analysis concepts, Assumptions in plastic analysis, Shape factor for different cross sections, Collapse load and load factor, Plastic modulus and moment of resistance, Calculation of collapse load for fixed beams, continuous beams. |                                           |           |       | 6    |
| Total Hours                                                                                     |                                                                                                                                                                                                                                                                                   |                                           |           |       | 36   |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

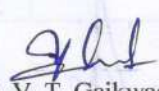
  
 Dr. K. K. Pandey  
 Dean Academics

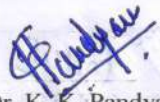
  
 Dr. S. S. Mohite  
 Director

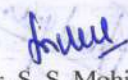
  
 Prof. R. A. Kanai  
 Executive Director



|                                                                                                     |
|-----------------------------------------------------------------------------------------------------|
| <b>Text Books:</b>                                                                                  |
| 1. Vazirani and Ratwani, "Advanced Theory of Structures & Matrix method", Khanna Publisher, Delhi.  |
| 2. Reddy C.S., "Basic structural Analysis", Tata McGraw Hill, Delhi.                                |
| 3. Matrix methods of structural Analysis- S. S. Bhavikatti, Vikas Publishing House Pvt Ltd          |
| 4. Advanced Structural Analysis – Ashok K. Jain, New Channel Brothers                               |
| <b>Reference Book:</b>                                                                              |
| 1. Timoshenko and Gere, "Strength of Materials", East West Press Ltd.                               |
| 2. Gere and Weaver, "Matrix Analysis of Framed Structures", CBS Publishing, Delhi.                  |
| 3. Pandit & Gupta, "Structural Analysis - A matrix approach", Tata McGraw Hill, Delhi.              |
| 4. Negi and Jangid, "Structural Analysis", Tata McGraw Hill Pub. Co. Delhi                          |
| 5. N. Krishnaraju and D.R. Gururaja, "Advanced Mechanics of Solids & Structures", Narosa Pub. House |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



### Research Methodology, IPR and Professional Ethics

| Course Code and Course Title                                                                 |                                                                                                                                                                                                                                                                                                                                                                      | Research Methodology, IPR and Professional Ethics |             |             |             |
|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-------------|-------------|-------------|
| Semester                                                                                     |                                                                                                                                                                                                                                                                                                                                                                      | I                                                 |             |             |             |
| Prerequisites                                                                                |                                                                                                                                                                                                                                                                                                                                                                      | B.Tech in Civil Engineering and allied Branches   |             |             |             |
| Teaching Scheme (hours per week)                                                             |                                                                                                                                                                                                                                                                                                                                                                      | Lecture                                           | Tutorial    | Practical   |             |
|                                                                                              |                                                                                                                                                                                                                                                                                                                                                                      | 3                                                 | 1           | -           |             |
| Credit                                                                                       |                                                                                                                                                                                                                                                                                                                                                                      | 04                                                |             |             |             |
| Evaluation Scheme                                                                            |                                                                                                                                                                                                                                                                                                                                                                      | ISE 1                                             | MSE         | ISE 2       | ESE         |
|                                                                                              |                                                                                                                                                                                                                                                                                                                                                                      | 10<br>Marks                                       | 20<br>Marks | 10<br>Marks | 60<br>Marks |
| Course Outcomes (COs): -Upon successful completion of this course, the student will able to: |                                                                                                                                                                                                                                                                                                                                                                      |                                                   |             |             | BL          |
| CO 1                                                                                         | Understand the scope and purpose of research in engineering                                                                                                                                                                                                                                                                                                          |                                                   |             |             | 2           |
| CO 2                                                                                         | Apply research methods to identify research problems and conduct                                                                                                                                                                                                                                                                                                     |                                                   |             |             | 3           |
| CO 3                                                                                         | Examine methodology and interpret data accurately.                                                                                                                                                                                                                                                                                                                   |                                                   |             |             | 4           |
| CO 4                                                                                         | Apply IPR principles to protect engineering innovations.                                                                                                                                                                                                                                                                                                             |                                                   |             |             | 3           |
| CO 5                                                                                         | Demonstrate awareness of ethical research and integrity.                                                                                                                                                                                                                                                                                                             |                                                   |             |             | 3           |
| CO 6                                                                                         | Prepare professional research reports and proposals.                                                                                                                                                                                                                                                                                                                 |                                                   |             |             | 6           |
| Course Content                                                                               |                                                                                                                                                                                                                                                                                                                                                                      |                                                   |             |             |             |
| Unit No.                                                                                     | Contents                                                                                                                                                                                                                                                                                                                                                             |                                                   |             |             | Hrs.        |
| Unit 1                                                                                       | Introduction to Research and Its Significance<br>Meaning, objectives, and importance of research, Research types: Fundamental, Applied, Analytical, Experimental, and Interdisciplinary, Research process, characteristics, and scope in civil/structural engineering, Recent trends in structural engineering research (sustainability, materials, resilience).     |                                                   |             |             | 6           |
| Unit 2                                                                                       | Research Problem Identification and Literature Review<br>Identifying and formulating research problems, Defining objectives, hypothesis, and scope, Sources of problems: field issues, industrial challenges, academic gaps, Literature survey: process, tools, and databases (Scopus, Web of Science, ASCE), Use of reference managers (Mendeley, Zotero, EndNote). |                                                   |             |             | 6           |
| Unit 3                                                                                       | Research Design, Data Collection and Analysis<br>Research design: concepts, types, and applications, Data collection: primary and secondary sources, Sampling methods, reliability, and validity, Statistical analysis: descriptive statistics, correlation, regression, hypothesis testing, Use of analysis tools (Excel, SPSS, MATLAB).                            |                                                   |             |             |             |

Dr. V. T. Gaikwad  
HOD-Civil

Dr. K. K. Pandeyaji  
Dean Academics

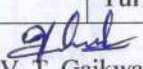
Dr. S. S. Mohite  
Director

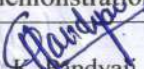
Prof. R. A. Kanai  
Executive Director

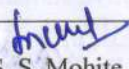


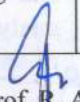
|                    |                                                                                                                                                                                                                                                                                                                                                                                    |           |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit<br/>4</b>  | <b>Intellectual Property Rights (IPR) and Patents</b><br>Introduction to IPR and its significance, Types: Patents, Copyrights, Trademarks, Industrial Designs, Trade Secrets, Patent structure and filing procedure (India & International), Case studies: Patents in concrete technology and smart structures, Technology transfer, commercialization, and innovation management. | <b>6</b>  |
| <b>Unit<br/>5</b>  | <b>Research Ethics, Plagiarism and Publication Practices</b><br>Ethics in research: honesty, transparency, accountability, Fabrication, falsification, plagiarism: definitions and consequences, Plagiarism detection software (Turnitin, Urkund), Publication ethics: predatory journals, peer review, impact factor, authorship criteria, Case studies on ethical misconduct.    | <b>6</b>  |
| <b>Unit<br/>6</b>  | <b>Research Documentation, Proposal and Report Writing</b><br>Research proposal components: title, objectives, methodology, timeline, budget; Technical paper writing: structure, formatting, referencing (APA, IEEE); Dissertation / Thesis writing structure and presentation; Seminar, defence, and publication preparation.                                                    | <b>6</b>  |
| <b>Total Hours</b> |                                                                                                                                                                                                                                                                                                                                                                                    | <b>36</b> |

| <b>List of Tutorials</b> |                                                                                                                   |             |
|--------------------------|-------------------------------------------------------------------------------------------------------------------|-------------|
| <b>Tutorial<br/>No.</b>  | <b>Title</b>                                                                                                      | <b>Hrs.</b> |
| 1                        | Discussion on real-life structural engineering problems; review of recent journal articles (ASCE / Elsevier).     | 1           |
| 2                        | Group mapping of research stages from topic identification to report writing; flowchart preparation.              | 1           |
| 3                        | Identify a topic, write problem statement, objectives, and hypothesis. Peer review for clarity.                   | 1           |
| 4                        | Practical session on use of Google Scholar, Scopus; citation management using Mendeley/Zotero.                    | 1           |
| 5                        | Choose one problem and define research design, variables, and                                                     | 1           |
| 6                        | Hands-on analysis using Excel/SPSS — correlation, regression,                                                     | 1           |
| 7                        | Select one published experimental study (e.g., concrete mix, beam test) and interpret data trends.                | 1           |
| 8                        | Discuss types of IPR and identify examples related to civil engineering                                           | 1           |
| 9                        | Each student prepares a one-page abstract for a hypothetical patent on an innovative structural material/product. | 1           |
| 10                       | Analyze a given report with plagiarized text; check similarity using Turnitin/Urkund (demonstration).             | 1           |

  
 Dr. V. T. Gaikwad  
**HOD-Civil**

  
 Dr. K. K. Pandey  
**Dean Academics**

  
 Dr. S. S. Mohite  
**Director**

  
 Prof. R. A. Kanai  
**Executive Director**

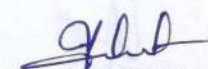


|    |                                                                                                        |   |
|----|--------------------------------------------------------------------------------------------------------|---|
| 11 | Examine journal websites (Elsevier, Springer) and distinguish predatory vs. authentic publishers.      | 1 |
| 12 | Prepare and present a mini research proposal including objectives, methodology, and expected outcomes. | 1 |

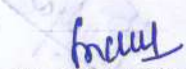
**Text Books:**

**Reference Book:**

- 1.Research Methodology:** Methods and Techniques, New Age International, C.R. Kothari & Gaurav Garg
- 2.Research Methodology:** A Step-by-Step Guide for Beginners, Sage, Ranjit Kumar
- 3.Indian Patents Law and Practice,** Taxman Publications, D.P. Mittal
- 4.Law Relating to Patents, Trade Marks, Copyright, and Designs,** B.L. Wadehra
- 5.On Being a Scientist: Responsible Conduct in Research,** National Academy of Sciences

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

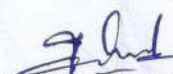
  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director

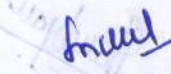


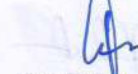
### Advanced Prestressed Concrete

| Course Code and Course Title                                                                     |                                                                                                                                                                                                                                                                                                                                           | 0CEPEC505<br>Advanced Prestressed concrete             |             |             |             |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------|-------------|-------------|
| Semester                                                                                         |                                                                                                                                                                                                                                                                                                                                           | I                                                      |             |             |             |
| Prerequisites                                                                                    |                                                                                                                                                                                                                                                                                                                                           | Design of Concrete Structures and Structural Analysis. |             |             |             |
| Teaching Scheme (hours per week)                                                                 |                                                                                                                                                                                                                                                                                                                                           | Lecture                                                | Tutorial    | Practical   |             |
|                                                                                                  |                                                                                                                                                                                                                                                                                                                                           | 3                                                      | -           | -           |             |
| Credit                                                                                           |                                                                                                                                                                                                                                                                                                                                           | 03                                                     |             |             |             |
| Evaluation Scheme                                                                                |                                                                                                                                                                                                                                                                                                                                           | ISE 1                                                  | MSE         | ISE 2       | ESE         |
|                                                                                                  |                                                                                                                                                                                                                                                                                                                                           | 10<br>Marks                                            | 20<br>Marks | 10<br>Marks | 60<br>Marks |
| Course Outcomes (COs): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                                                                           |                                                        |             |             | BL          |
| CO1                                                                                              | Analyze the PSC member for flexural, shear strength and deflection.                                                                                                                                                                                                                                                                       |                                                        |             |             | 4           |
| CO2                                                                                              | Analyze and design of the anchor blocks.                                                                                                                                                                                                                                                                                                  |                                                        |             |             | 5           |
| CO3                                                                                              | Design the simple and indeterminate structures like continuous beams and portal frames.                                                                                                                                                                                                                                                   |                                                        |             |             | 6           |
| CO4                                                                                              | Analyze and design composite section and various slabs.                                                                                                                                                                                                                                                                                   |                                                        |             |             | 5           |
| CO5                                                                                              | Design various special types of PSC structures like pipes, poles, tanks, sleepers.                                                                                                                                                                                                                                                        |                                                        |             |             | 6           |
| CO6                                                                                              | Understand the causes of various defects in PSC structure and remedies for it.                                                                                                                                                                                                                                                            |                                                        |             |             | 2           |
| Course Content                                                                                   |                                                                                                                                                                                                                                                                                                                                           |                                                        |             |             |             |
| Unit No.                                                                                         | Contents                                                                                                                                                                                                                                                                                                                                  |                                                        |             |             | Hrs.        |
| Unit 1                                                                                           | Introduction to Pre-stressed Concrete: Basic Principle of Pre-stressing, Methods and Systems of Pre-stressing, Material Requirements, Losses of Pre-stressing, Analysis of Rectangular, Symmetrical and Unsymmetrical, Flanged Beams, Concept of Cable Profile, Pressure Line, Thrust Lines, etc.                                         |                                                        |             |             | 6           |
| Unit 2                                                                                           | Analysis and Design of PSC Members: Analysis of PSC section for Flexural Strength, Shear Strength and Deflection, Design of Pre-stressed Concrete section for Flexural Strength by Analytical procedure and Magnet's Graphical method, Shear Strength and Deflection, Design of Statically Indeterminate Beams, Concordant Cable Profile. |                                                        |             |             | 8           |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

  
 Dr. K. K. Pandey  
 Dean Academics

  
 Dr. S. S. Mohite  
 Director

  
 Prof. R. A. Kanai  
 Executive Director



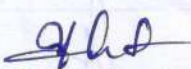
|                    |                                                                                                                                                                                                                                                                                                                                                  |           |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 3</b>      | <b>Design of Anchor Blocks:</b> Transfer of pre-stress in pretension members: Pretension transfer bond, Transmission length, endzone reinforcement<br><br><b>Post tensioned members:</b> Design of Anchor Blocks using Mangle's Method, Guyon's Method and IS Code Method.                                                                       | <b>6</b>  |
| <b>Unit 4</b>      | <b>Composite Section:</b> Analysis and Design of Composite Construction of Pre-stressed and in-situ Concrete Structures, Design of One way and Two-way Slab, Grid Slab.                                                                                                                                                                          | <b>6</b>  |
| <b>Unit 5</b>      | <b>Design of Various PSC Structures:</b> Circular Pre-stressing for Water Tanks, Design of Cylindrical and Non-cylindrical Pipes, Design of Sleepers, Design of Poles.                                                                                                                                                                           | <b>4</b>  |
| <b>Unit 6</b>      | <b>Causes and Remedies of Various Defects in PSC:</b> Causes of various Defects in Pre-stressed Concrete like Cracking, Buckling, Deflection, Deterioration, Corrosion of Pre-stressing Steel, Concrete Crushing at End Anchorages, Grouting of Post Tensioned Tendons, Congested Connections, Dimensional Tolerances etc. and Remedial Measures | <b>6</b>  |
| <b>Total Hours</b> |                                                                                                                                                                                                                                                                                                                                                  | <b>36</b> |

**Text Books:**

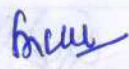
1. N. Krishnaraju, Pre-stressed Concrete, Tata McGraw-Hill Publishing Company.
2. Sinha and Roy, Fundamentals of Pre-stressed Concrete, S. Chand Ltd.
3. S. Ramamruthm, Pre-stressed Concrete, Dhanpat Rai and Sons.
4. N. Rajagopalan, Pre-stressed Concrete, Narosa Publishing House.

**Reference Book:**

1. T. Y. Lin & Nedbhurns, Design of Pre-stressed Concrete Structures, John Wiley & Sons
2. James R. Libby, Modern Pre-stressed Concrete, CBS Publishers & Distributors Pvt. Ltd.
3. IS 1343: 2012, Indian Standard Code of Practice for Pre-stressed Concrete.
4. IS 784: 2001, Indian Standard Code for Circular Pre-stressing in pre-stressed concrete pipes.

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

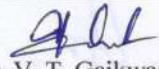
  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



### Design of Tall Building

| Course Code and Course Title                                                                        |                                                                                                                                                                                                                                                                                                                 | 0CEPEC505<br>Design of Tall Building                  |          |           |           |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------|-----------|-----------|
| Semester                                                                                            |                                                                                                                                                                                                                                                                                                                 | I                                                     |          |           |           |
| Prerequisites                                                                                       |                                                                                                                                                                                                                                                                                                                 | Analysis and Design of Reinforced concrete structures |          |           |           |
| Teaching Scheme (hours per week)                                                                    |                                                                                                                                                                                                                                                                                                                 | Lecture                                               | Tutorial | Practical |           |
|                                                                                                     |                                                                                                                                                                                                                                                                                                                 | 3                                                     | -        | -         |           |
| Credit                                                                                              |                                                                                                                                                                                                                                                                                                                 | 03                                                    |          |           |           |
| Evaluation Scheme                                                                                   |                                                                                                                                                                                                                                                                                                                 | ISE 1                                                 | MSE      | ISE 2     | ESE       |
|                                                                                                     |                                                                                                                                                                                                                                                                                                                 | 10 Marks                                              | 20 Marks | 10 Marks  | 60 Marks  |
| <b>Course Outcomes (COs):</b> -Upon successful completion of this course, the student will able to: |                                                                                                                                                                                                                                                                                                                 |                                                       |          |           | <b>BL</b> |
| CO1                                                                                                 | The students will understand fundamental concept, design philosophy of high-rise structure.                                                                                                                                                                                                                     |                                                       |          |           | 2         |
| CO2                                                                                                 | Construct SFD and BMD in building frame by approximate analysis method.                                                                                                                                                                                                                                         |                                                       |          |           | 4         |
| CO3                                                                                                 | Design RC shear wall and chimney.                                                                                                                                                                                                                                                                               |                                                       |          |           | 6         |
| CO4                                                                                                 | Analyze, design and detail Transmission/ TV tower, Mast and Trestles with different loading conditions.                                                                                                                                                                                                         |                                                       |          |           | 4         |
| <b>Course Content</b>                                                                               |                                                                                                                                                                                                                                                                                                                 |                                                       |          |           |           |
| Unit No.                                                                                            | Contents                                                                                                                                                                                                                                                                                                        |                                                       |          |           | Hrs.      |
| Unit 1                                                                                              | Introduction to Tall Buildings: Tall buildings – Design process, Philosophy, Scope and design criteria – design philosophy, Strength and stability, Stiffness, Creep and temperature effects, Fire loading, gravity, Wind, earthquake and combine loading.                                                      |                                                       |          |           | 6         |
| Unit 2                                                                                              | Analysis of Multistorey Building Frames: I: Analysis of Multistorey Building Frames for lateral loads by Cantilever method and Portal method.                                                                                                                                                                   |                                                       |          |           | 6         |
| Unit 3                                                                                              | Analysis of Multistorey Building Frames: II: Analysis of Multistorey Building Frames for lateral loads by Factor method and Substitute Frame Method.                                                                                                                                                            |                                                       |          |           | 6         |
| Unit 4                                                                                              | Design of RCC Chimney: Introduction, Wind pressure, Stress in chimney shaft due to self-weight and wind, Stress in horizontal reinforcement due to wind shear, Stresses due to temperature difference, Design of RC chimney.                                                                                    |                                                       |          |           | 6         |
| Unit 5                                                                                              | Design of Shear Wall: Introduction, Types of shear walls, Behaviour of cantilever wall with rectangular cross-section, flange cantilever shear walls, Moment-Axial load interaction for shear wall section, Interaction of shear walls and rigid joined frames, Shear walls with openings, Coupled shear walls. |                                                       |          |           | 6         |
| Unit 6                                                                                              | Cooling & Transmission Towers: Types, Components, Analysis and Design. Types of Loads, Tower Configuration, Analysis and Design.                                                                                                                                                                                |                                                       |          |           | 6         |
| Total Hours                                                                                         |                                                                                                                                                                                                                                                                                                                 |                                                       |          |           | 36        |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

  
 Dr. K. K. Pandey  
 Dean Academics

  
 Dr. S. S. Mohite  
 Director

  
 Prof. R. A. Kanai  
 Executive Director

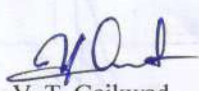


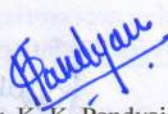
**Text Books:**

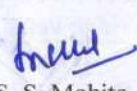
1. Krishnaraju N., "Advanced Reinforced Concrete Design", CBS Publisher.
2. Punmia B. C. & Jain A. K., "Reinforced Concrete Structures", Laxmi Publications.
3. Manohar S. N., "Tall Chimneys", Mcgraw-Hill Publications.
4. A. R. Shanthakumar and S. S. Murthy, Transmission Line Structures, Tata Mcgraw-Hill, 1990

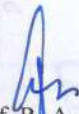
**Reference Book:**

1. Park R. & Paulay T., Reinforced Concrete Structures, John Wiley & Sons.
2. Shah H. J., "Reinforced Concrete design", Charotar Publishing House.
3. Varghese P.C., "Advanced Reinforced Concrete Design", Prentice Hall of India.
4. Purushothaman P., "Reinforced Concrete Structural Elements", Tata McGraw-Hill Publishing.

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



### Design of Pre – Engineered Buildings

| Course Code and Course Title                                                                     |                                                                                                                                                                                                                                                                                                              | 0CEPEC505<br>Design of Pre- Engineering buildings |             |             |      |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-------------|-------------|------|
| Semester                                                                                         |                                                                                                                                                                                                                                                                                                              | I                                                 |             |             |      |
| Prerequisites                                                                                    |                                                                                                                                                                                                                                                                                                              | Structural Analysis.                              |             |             |      |
| Teaching Scheme (hours per week)                                                                 | Lecture                                                                                                                                                                                                                                                                                                      | Tutorial                                          | Practical   |             |      |
|                                                                                                  | 3                                                                                                                                                                                                                                                                                                            | -                                                 | -           |             |      |
| Credit                                                                                           |                                                                                                                                                                                                                                                                                                              | 03                                                |             |             |      |
| Evaluation Scheme                                                                                | ISE 1                                                                                                                                                                                                                                                                                                        | MSE                                               | ISE 2       | ESE         |      |
|                                                                                                  | 10<br>Marks                                                                                                                                                                                                                                                                                                  | 20<br>Marks                                       | 10<br>Marks | 60<br>Marks |      |
| Course Outcomes (COs): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                                              |                                                   |             |             | BL   |
| CO1                                                                                              | Understand the various components of pre-engineered structures                                                                                                                                                                                                                                               |                                                   |             |             | 2    |
| CO2                                                                                              | To Analyze the different types of stresses acting on the structures while lifting the prefabricated structures and type of equipment required to support such stresses                                                                                                                                       |                                                   |             |             | 3    |
| CO3                                                                                              | Apply the latest Pre-Engineered Buildings equipment technique in the construction industry                                                                                                                                                                                                                   |                                                   |             |             | 5    |
| CO4                                                                                              | Application of Pre-engineered structure in various sectors of building industry                                                                                                                                                                                                                              |                                                   |             |             | 4    |
| CO5                                                                                              | Design of Pre-engineered structure                                                                                                                                                                                                                                                                           |                                                   |             |             | 5    |
| Course Content                                                                                   |                                                                                                                                                                                                                                                                                                              |                                                   |             |             |      |
| Unit No.                                                                                         | Contents                                                                                                                                                                                                                                                                                                     |                                                   |             |             | Hrs. |
| Unit 1                                                                                           | Introduction: -<br>Pre- engineered building's introduction, history, advantage of PEB, application of PB, materials used for manufacturing of PB, difference between conventional Steel buildings and pre-engineered buildings.                                                                              |                                                   |             |             | 6    |
| Unit 2                                                                                           | Pre- Engineering buildings components: -<br>Primary system main frames cable and frame, secondary frame system, size and properties of Berlin and gears, bracing system and cladding, Roof sheeting and wall seating accessories, Turbo ventilators, ridge vents, skylights, louvers insulation, staircases. |                                                   |             |             | 7    |

Dr. V. T. Gaikwad  
HOD-Civil

Dr. K. R. Pandeyaji  
Dean Academics

Dr. S. S. Mohite  
Director

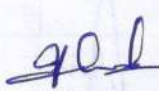
Prof. R. A. Kanai  
Executive Director



|                    |                                                                                                                                                                                                                                                                                                                                             |           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 3</b>      | <b>Design loads on pre-engineered buildings: -</b><br>Design PB frame under the influence of dead load, Live load<br>Collateral wind seismic and other applicable loads, service ability<br>limits as per code.                                                                                                                             | <b>8</b>  |
| <b>Unit 4</b>      | <b>PEB design methodology: -</b><br>Design parameters of PEB frames- Depth of the section, depth to<br>flange width ratios, thickness of the flange to the thickness of web<br>ratio, d/tw, h/tw ratios of sections as per Indian Standard code, section<br>sizes as per manufacturing limitations, analysis and design of rigid<br>frames. | <b>7</b>  |
| <b>Unit 5</b>      | <b>PEB frame connection design methodology: -</b><br>Rigid frame moment connection,<br>Shear connection, high strength bolts and grades, Lever arm, Bolt<br>pattern, its effect on connection design, thickness of connection plate,<br>and selection of governing forces for connection design.                                            | <b>8</b>  |
| <b>Total Hours</b> |                                                                                                                                                                                                                                                                                                                                             | <b>36</b> |

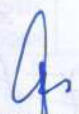
**Reference Book:**

1. Design of steel structures" by S.K. Duggal Dr. B.C. Punmia.
2. "Design of steel structures" Dr. B.C. Punmia.
3. Indian Standards codes IS 800
4. Indian Standards codes IS 875
5. Technical Specification For Pre Engineered Building-Bhel Ltd.

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

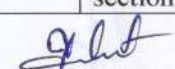
  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director

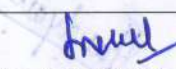


### Theory of Elasticity and Plasticity

| Course Code and Course Title                                                                 |                                                                                                                                                                                                                                                     | 0CEPEC505<br>Theory Of Elasticity and Plasticity                                                         |          |           |          |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------|-----------|----------|
| Semester                                                                                     |                                                                                                                                                                                                                                                     | I                                                                                                        |          |           |          |
| Prerequisites                                                                                |                                                                                                                                                                                                                                                     | Basic knowledge of Solid Mechanics, Structural Analysis, Engineering Mathematics, and Material Behavior. |          |           |          |
| Teaching Scheme (hours per week)                                                             |                                                                                                                                                                                                                                                     | Lecture                                                                                                  | Tutorial | Practical |          |
|                                                                                              |                                                                                                                                                                                                                                                     | 3                                                                                                        |          | -         |          |
| Credit                                                                                       |                                                                                                                                                                                                                                                     | 03                                                                                                       |          |           |          |
| Evaluation Scheme                                                                            |                                                                                                                                                                                                                                                     | ISE 1                                                                                                    | MSE      | ISE 2     | ESE      |
|                                                                                              |                                                                                                                                                                                                                                                     | 10 Marks                                                                                                 | 20 Marks | 10 Marks  | 60 Marks |
| Course Outcomes (COs): -Upon successful completion of this course, the student will able to: |                                                                                                                                                                                                                                                     |                                                                                                          |          |           | BL       |
| CO1                                                                                          | Analyze stress and strain at a point in 3D, derive equilibrium and compatibility equations.                                                                                                                                                         |                                                                                                          |          |           | 4        |
| CO2                                                                                          | Apply generalized Hooke's law and Airy's stress function to solve plane stress/strain problems.                                                                                                                                                     |                                                                                                          |          |           | 3        |
| CO3                                                                                          | Solve classical problems in elasticity including stress concentration and axisymmetric problems.                                                                                                                                                    |                                                                                                          |          |           | 3        |
| CO4                                                                                          | Analyze members under torsion using St. Venant's theory, membrane analogy, and energy principles.                                                                                                                                                   |                                                                                                          |          |           | 4        |
| CO5                                                                                          | Evaluate plastic behavior, yield criteria, and plastic deformation in structural members.                                                                                                                                                           |                                                                                                          |          |           | 5        |
| Course Content                                                                               |                                                                                                                                                                                                                                                     |                                                                                                          |          |           |          |
| Unit No.                                                                                     | Contents                                                                                                                                                                                                                                            |                                                                                                          |          |           | Hrs.     |
| Unit 1                                                                                       | Module 1: Analysis of Stress and Strain<br>Concept of stress at a point, stress tensor, principal stresses, Mohr's circle, strain displacement, strain compatibility, Navier-Lame's equations, Beltrami-Michell equations, boundary value problems. |                                                                                                          |          |           | 7        |
| Unit 2                                                                                       | Module 2: Stress-Strain Relationship<br>Generalized Hooke's law for isotropic and orthotropic materials, Plane stress/strain, Airy's stress function, bending of beams, and shear centre in open sections.                                          |                                                                                                          |          |           | 7        |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

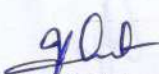
  
 Dr. K. K. Pandey  
 Dean Academics

  
 Dr. S. S. Mohite  
 Director

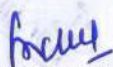
  
 Prof. R. A. Kanai  
 Executive Director



|                                                                                                                    |                                                                                                                                                                                                                           |           |
|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 3</b>                                                                                                      | <b>Module 3: Stress Concentration Problems</b><br>Kausch's problem, Michell's and Flamant's problems, Lamé's thick cylinder problem, stress concentration due to holes and concentrated loads.                            | <b>6</b>  |
| <b>Unit 4</b>                                                                                                      | <b>Module 4: Torsion</b><br>St. Venant's theory, torsion of circular and non-circular sections, Prandtl's membrane analogy, warping, shear flow in thin-walled sections.                                                  | <b>6</b>  |
| <b>Unit 5</b>                                                                                                      | <b>Module 5: Plasticity</b><br>Idealized plastic behavior, Coulomb friction, yield criteria (Rankine, Tresca, von Mises, Saint Venant), stress-strain relations, perfectly plastic flow, beam bending, torsion of shafts. | <b>6</b>  |
| <b>Unit 6</b>                                                                                                      | <b>Module 6: Plastic Analysis of Structures</b><br>Plastic hinge, shape factor, upper/lower bound theorems, plastic collapse load of beams and frames.                                                                    | <b>4</b>  |
| <b>Total Hours</b>                                                                                                 |                                                                                                                                                                                                                           | <b>36</b> |
| <b>Text Books:</b>                                                                                                 |                                                                                                                                                                                                                           |           |
| 1. Timoshenko, S. P. & Goodier, J. N. Theory of Elasticity, 3rd Edition, McGraw-Hill, 1970.                        |                                                                                                                                                                                                                           |           |
| 2. Sadhu Singh. Theory of Plasticity & Metal Forming Processes, 3rd Edition, Khanna Publishers, 1999.              |                                                                                                                                                                                                                           |           |
| 3. Martin H. Sadd. Elasticity: Theory, Applications & Numerics, (Latest / 5th Edition), Academic Press / Elsevier. |                                                                                                                                                                                                                           |           |
| 4. L. S. Srinath. Advanced Solid Mechanics, Tata McGraw-Hill.                                                      |                                                                                                                                                                                                                           |           |
| <b>Reference Books:</b>                                                                                            |                                                                                                                                                                                                                           |           |
| 1. Shames, Irving H. Mechanics of Deformable Solids, Prentice Hall, 1964.                                          |                                                                                                                                                                                                                           |           |
| 2. Chakrabarty, J. Theory of Plasticity, 3rd Edition, McGraw-Hill / Butterworth-Heinemann, 2006.                   |                                                                                                                                                                                                                           |           |
| 3. Johnson, W. & Mellor, J. Engineering Plasticity, Van Nostrand (edition / year not confirmed).                   |                                                                                                                                                                                                                           |           |
| 4. Kazimi, M. A. Solid Mechanics, Tata McGraw-Hill (edition / year not confirmed).                                 |                                                                                                                                                                                                                           |           |
| 5. Wang, Applied Elasticity, Dover Publications (edition / year not confirmed).                                    |                                                                                                                                                                                                                           |           |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

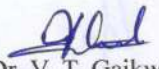
  
Dr. S. S. Mohite  
Director

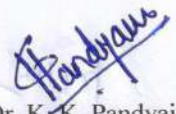
  
Prof. R. A. Kanai  
Executive Director

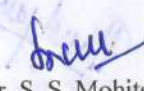


### Structural Dynamics Lab

| Course Code and Course Title                                                                 |                                                                                                                 | 0CEPCC506<br>Structural Dynamics Laboratory |           |                 |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------|-----------|-----------------|
| Semester                                                                                     |                                                                                                                 | I                                           |           |                 |
| Prerequisites                                                                                |                                                                                                                 | UG Earthquake Engineering                   |           |                 |
| Teaching Scheme (hours per week)                                                             | Lecture                                                                                                         | Tutorial                                    | Practical |                 |
|                                                                                              | -                                                                                                               | -                                           | 02        |                 |
| Credits                                                                                      |                                                                                                                 | 01                                          |           |                 |
| Evaluation Scheme                                                                            |                                                                                                                 | ISE: - 50 Marks                             |           |                 |
| Course Outcomes (COs): -Upon successful completion of this course, the student will able to: |                                                                                                                 |                                             |           | BL              |
| CO1                                                                                          | Demonstrate understanding of fundamental vibration concepts through experiments on S.D.O.F and M.D.O.F systems. |                                             |           | 3               |
| CO2                                                                                          | Conduct experiments to determine natural frequency, damping ratio, and mode shapes of structural systems.       |                                             |           | 4               |
| CO3                                                                                          | Analyze and interpret the impulse response, response spectrum, and torsional behavior of structural models.     |                                             |           | 5               |
| CO4                                                                                          | Apply suitable vibration control techniques and evaluate their effectiveness for structural safety.             |                                             |           | 6               |
| Experiment List (Any 7 performance are compulsory)                                           |                                                                                                                 |                                             |           |                 |
| Expt. No.                                                                                    | Title                                                                                                           |                                             |           | Duration in Hrs |
| 1                                                                                            | Simple Harmonic Oscillator                                                                                      |                                             |           | 2               |
| 2                                                                                            | Free Vibration of S.D.O.F System                                                                                |                                             |           | 2               |
| 3                                                                                            | Forced Vibration of S.D.O.F System                                                                              |                                             |           | 2               |
| 4                                                                                            | Impulse Response of S.D.O.F system                                                                              |                                             |           | 2               |
| 5                                                                                            | Concept of Response Spectrum                                                                                    |                                             |           | 2               |
| 6                                                                                            | Vibration of M.D.O.F system                                                                                     |                                             |           | 2               |
| 7                                                                                            | Behaviour of Rigid Blocks                                                                                       |                                             |           | 2               |
| 8                                                                                            | Torsional Response of Building                                                                                  |                                             |           | 2               |
| 9                                                                                            | Continuous Systems                                                                                              |                                             |           | 2               |
| 10                                                                                           | Vibration Control                                                                                               |                                             |           | 2               |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

  
 Dr. K. K. Pandey  
 Dean Academics

  
 Dr. S. S. Mohite  
 Director

  
 Prof. B. A. Kanai  
 Executive Director



**References books :**

**Chopra, A.K.** — Dynamics of Structures: Theory and Applications to Earthquake Engineering, Pearson Education.

**Clough, R.W. and Penzien, J.** — Dynamics of Structures, McGraw-Hill.

**Rao, S.S.** — Mechanical Vibrations, Pearson Education.

**Biggs, J.M.** — Introduction to Structural Dynamics, McGraw-Hill.

**Humar, J.L.** — Dynamics of Structures, CRC Press.

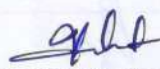
**Virtual Lab Resources (NPTEL & MOE Virtual Labs)**

1. **Structural Dynamics Virtual Lab** – IIT Roorkee  
<https://sdvlab.iitr.ac.in>
2. **Vibration and Acoustics Lab** – IIT Kharagpur  
<https://va-iitkgp.vlabs.ac.in>
3. **Earthquake Engineering Virtual Lab** – IIT Kanpur  
<https://eev.iitk.ac.in>
4. **Mechanical Vibrations Virtual Lab** – IIT Guwahati  
<https://mv-iitg.vlabs.ac.in>

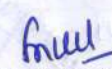
**NPTEL Courses:**

Structural Dynamics by Prof. S. Chakraborty (IIT Kharagpur)

Advanced Structural Analysis by Prof. Devdas Menon (IIT Madras)

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

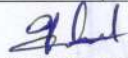
  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director

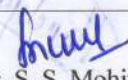


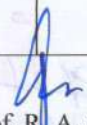
### Modern Material Lab

| Course Code and Course Title                                                                 |                                                                                                   | 0CEPCC507<br>Modern Material Laboratory |           |                 |
|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------|-----------|-----------------|
| Semester                                                                                     |                                                                                                   | I                                       |           |                 |
| Prerequisites                                                                                |                                                                                                   | U.G. Concrete Technology Lab            |           |                 |
| Teaching Scheme (hours per week)                                                             | Lecture                                                                                           | Tutorial                                | Practical |                 |
|                                                                                              | -                                                                                                 | -                                       | 02        |                 |
| Credits                                                                                      |                                                                                                   | 01                                      |           |                 |
| Evaluation Scheme                                                                            |                                                                                                   | ISE: - 50 Marks                         |           |                 |
| Course Outcomes (COs): -Upon successful completion of this course, the student will able to: |                                                                                                   |                                         |           | BL              |
| CO1                                                                                          | Design and prepare high-performance, self-compacting, and fiber-reinforced concretes.             |                                         |           | 3               |
| CO2                                                                                          | Experimentally evaluate mechanical and durability properties of modern concretes.                 |                                         |           | 4               |
| CO3                                                                                          | Conduct and interpret results from NDT and microstructural tests on advanced materials.           |                                         |           | 5               |
| CO4                                                                                          | Assess sustainable and green concrete using industrial by-products and waste materials.           |                                         |           | 4               |
| CO5                                                                                          | Develop experimental reports and recommendations for innovative construction materials.           |                                         |           | 6               |
| Experiment List (Any 7 performance are compulsory)                                           |                                                                                                   |                                         |           |                 |
| Expt. No.                                                                                    | Title                                                                                             |                                         |           | Duration in Hrs |
| 1                                                                                            | Mix design and preparation of High-Performance Concrete (HPC) as per IS 10262.                    |                                         |           | 2               |
| 2                                                                                            | Workability tests (slump, flow table, compaction factor) and compressive strength testing of HPC. |                                         |           | 2               |
| 3                                                                                            | Design and testing of Self-Compacting Concrete (SCC) – Slump flow, L-box, U-box tests.            |                                         |           | 2               |
| 4                                                                                            | Preparation and testing of Fiber Reinforced Concrete (FRC) for flexural and tensile behavior.     |                                         |           | 2               |
| 5                                                                                            | Study of Polymer Modified or Nano-Modified Concrete – preparation and durability testing.         |                                         |           | 2               |
| 6                                                                                            | Geopolymer Concrete preparation using fly ash or GGBS – evaluation of strength and setting time.  |                                         |           | 2               |
| 7                                                                                            | Non-Destructive Testing (NDT) – Rebound Hammer, Ultrasonic Pulse Velocity (UPV).                  |                                         |           | 2               |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

  
 Dr. K. K. Pandey  
 Dean Academics

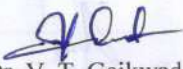
  
 Dr. S. S. Mohite  
 Director

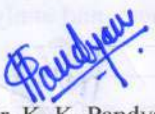
  
 Prof. R. A. Kanai  
 Executive Director

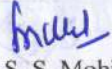


|   |                                                                                      |   |
|---|--------------------------------------------------------------------------------------|---|
| 8 | Durability Tests – water absorption, acid attack, or chloride permeability.          | 2 |
| 9 | Microstructural Characterization (demonstration/visit) – SEM, XRD, or FTIR analysis. | 2 |

|                    |                                                                                                                 |
|--------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>References:</b> |                                                                                                                 |
| 1.                 | Li, V.C., Engineered Cementitious Composites (ECC): Material, Structural, and Durability Performance, Springer. |
| 2.                 | Chung, D.D.L., Composite Materials: Science and Applications, Springer.                                         |
| 3.                 | Siddique, R. & Naik, T.R., Sustainable Construction Materials and Technologies, Woodhead Publishing.            |
| 4.                 | Neville, A.M., Concrete Technology, Addison Wesley.                                                             |
| 5.                 | IS Codes: IS 516, IS 5816, IS 10262, IS 1199, IS 13311 (Part 1 & 2).                                            |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



### Software Application in Civil Engineering Lab-I

| Course Code and Course Title                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0CEAEC508<br>Software Application in Civil Engineering Lab-I |           |      |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-----------|------|
| Semester                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | I                                                            |           |      |
| Prerequisites                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Basic knowledge of structural analysis and design            |           |      |
| Teaching Scheme (hours per week)                                                                 | Lecture                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Tutorial                                                     | Practical |      |
|                                                                                                  | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -                                                            | 4         |      |
| Credit                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 02                                                           |           |      |
| Evaluation Scheme                                                                                | ISE 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ISE 2                                                        |           |      |
|                                                                                                  | 25<br>Marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 25<br>Marks                                                  |           |      |
| Course Outcomes (COs): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                              |           | BL   |
| CO1                                                                                              | Analyze RCC structural systems (building, retaining wall, flat slab, foundations, etc.) using structural design software as per IS 456:2000 and relevant codes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                              |           | 3    |
| CO2                                                                                              | Design RCC structural elements and foundations using software and validate results with manual checks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                              |           | 4    |
| CO3                                                                                              | Prepare reinforcement detailing drawings, interpret results, and compile a professional design report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                              |           | 6    |
| Course Content                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                              |           |      |
| Unit No.                                                                                         | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                              |           | Hrs. |
| 1                                                                                                | <b>Activity 1: Analysis of RCC Structures using Software</b> <ul style="list-style-type: none"><li>• Introduction to RCC analysis software (STAAD.Pro / ETABS / SAP2000/SAFE).</li><li>• Modeling and analysis of one of the following structures:<ul style="list-style-type: none"><li>– Multi-storey RCC building frame</li><li>– RCC retaining wall</li><li>– Flat slab system</li><li>– RCC isolated / combined / raft foundation</li></ul></li><li>• Application of loads (DL, LL, WL, Earth pressure) as per IS 875 and IS 1893.</li><li>• Extraction and interpretation of analysis results (bending moments, shear forces, reactions, deflections).</li><li>• Validation of software results through theoretical comparison.</li></ul> Deliverables: Model file, load application sheet, and analysis report (member forces & deflection summary) |                                                              |           | 14   |

Dr. V. T. Gaikwad  
HOD-Civil

Dr. K. K. Pandeyaji  
Dean Academics

Dr. S. S. Mohite  
Director

Prof. R. A. Kanai  
Executive Director

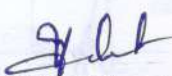


Dr. Vasantodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

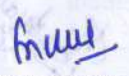
An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 2                                                                                 | <b>Activity 2: Design and Detailing of RCC Structures</b><br>Design of RCC members as per IS 456:2000 and IS 3370 / IS 875 (as applicable):<br>– Beams, slabs, columns, and footings<br>– Retaining wall or flat slab panels<br>– Reinforcement detailing for structural elements<br>• Preparation of reinforcement detailing drawings using AutoCAD / CAD RC.<br>• Compilation of design report and presentation of results.<br>Deliverables: Design calculations, reinforcement detailing drawings, final report, and presentation. | 14        |
| 3                                                                                 | <b>Viva-Voce / Presentation / Report Submission</b><br>• Oral examination and evaluation of analytical and design work.<br>• Assessment of report preparation, teamwork, and presentation skills.                                                                                                                                                                                                                                                                                                                                     | 8         |
|                                                                                   | <b>Note:</b><br>Students shall select any one of the mentioned RCC structures (Building / Retaining Wall / Flat Slab / Foundation) and perform both mandatory activities<br>1. Analysis and Design & Detailing for the same selected structure                                                                                                                                                                                                                                                                                        |           |
| <b>Total Hours</b>                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>36</b> |
| <b>Text Books:</b>                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |
| 1. S. Unnikrishna Pillai & Devdas Menon, Reinforced Concrete Design, McGraw-Hill. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |
| 2. N. Krishna Raju, Design of Reinforced Concrete Structures, CBS Publishers.     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |
| 3. P. C. Varghese, Advanced Reinforced Concrete Design, PHI Learning.             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |
| 4. IS 456:2000, Plain and Reinforced Concrete – Code of Practice.                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |
| 5. IS 875 (Part I-V) and IS 1893:2016, Load and Earthquake Codes.                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



### YOGA for Stress Management

| Course Code and Course Title                                                                     |                                                                                                                                                                                                                                                                                                   | 0CECCC509<br>YOGA for Stress Management           |          |           |      |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|----------|-----------|------|
| Semester                                                                                         |                                                                                                                                                                                                                                                                                                   | I                                                 |          |           |      |
| Prerequisites                                                                                    |                                                                                                                                                                                                                                                                                                   | Basic knowledge of structural analysis and design |          |           |      |
| Teaching Scheme (hours per week)                                                                 |                                                                                                                                                                                                                                                                                                   | Lecture                                           | Tutorial | Practical |      |
|                                                                                                  |                                                                                                                                                                                                                                                                                                   | -                                                 | -        | 2         |      |
| Credit                                                                                           |                                                                                                                                                                                                                                                                                                   | AU                                                |          |           |      |
| Evaluation Scheme                                                                                |                                                                                                                                                                                                                                                                                                   | ISE 1                                             |          | ISE 2     |      |
|                                                                                                  |                                                                                                                                                                                                                                                                                                   | -                                                 |          | -         |      |
| Course Outcomes (COs): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                                   |                                                   |          |           | BL   |
| CO1                                                                                              | Understand the physiological and psychological aspects of stress and its impact on overall wellbeing.                                                                                                                                                                                             |                                                   |          |           |      |
| CO2                                                                                              | Learn and practice specific yoga postures, breathing exercises, and relaxation techniques to alleviate stress.                                                                                                                                                                                    |                                                   |          |           |      |
| CO3                                                                                              | Explore the connection between mindfulness, meditation, and stress reduction, fostering mental clarity.                                                                                                                                                                                           |                                                   |          |           |      |
| CO4                                                                                              | Discover holistic practices that promote better sleep, nutrition, and overall lifestyle habits for stress management.                                                                                                                                                                             |                                                   |          |           |      |
| CO5                                                                                              | Develop practical skills to manage stress in daily life, enhancing resilience and promoting emotional balance                                                                                                                                                                                     |                                                   |          |           |      |
| Course Content                                                                                   |                                                                                                                                                                                                                                                                                                   |                                                   |          |           |      |
| Unit No.                                                                                         | Contents                                                                                                                                                                                                                                                                                          |                                                   |          |           | Hrs. |
| Unit 1                                                                                           | <b>Introduction to Yoga for Stress Management</b> <ul style="list-style-type: none"><li>Stress according to Western perspective</li><li>Stress according to Eastern perspective</li><li>Developmental process: Western and Eastern perspectives</li><li>Stress hazards and role of Yoga</li></ul> |                                                   |          |           | 6    |
| Unit 2                                                                                           | <b>Meeting the Challenges of Stress</b> <ul style="list-style-type: none"><li>Introduction to stress physiology</li><li>Stress, appetite, and dietary management – Modern &amp; Yogic perspectives</li><li>Sleep and stress: understanding the relationship for effective management</li></ul>    |                                                   |          |           | 6    |

Dr. V. T. Gaikwad  
HOD-Civil

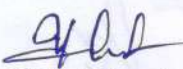
Dr. K. K. Pandeyaji  
Dean Academics

Dr. S. S. Mohite  
Director

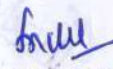
Prof. R. A. Kanai  
Executive Director



|                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |
|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 3</b>                                                                                                                        | <b>Stress Assessment Methods</b> <ul style="list-style-type: none"><li>Tools for stress assessment as a valuable aid in management</li><li>Role of Yoga in prevention and management of stress-related disorders – research evidence</li><li>Concept of stress and its management – perspectives from Patanjali Yoga Sutra (Part 1/2/3)</li></ul>                                                                                                                                                                                                                                                                                                                                                    | <b>6</b>  |
| <b>Unit 4</b>                                                                                                                        | <b>Stress Management</b><br>Concept of stress and its management – perspectives from Bhagavad Gita (Part 1/2/3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>6</b>  |
| <b>Unit 5</b>                                                                                                                        | <b>Yoga Practices for Stress Management</b> <ul style="list-style-type: none"><li>Bio-Psycho-Socio-Spiritual model of stress management</li><li>Practical Yoga techniques for stress management</li><li>Breathing practices</li><li>Asana practices including:<ul style="list-style-type: none"><li>Tadasana, Ardhakati Chakrasana, Ardha Chakrasana, Trikonasana, Vrikshasana, Vakarasana, Janu Sirshasana, Ushtrasana, Sashankasana, Ardhamatseyndrasana, Paschimottanasana, Poorvottanasana, Gomukhasana, Makarasana, Bhujangasana, Salambha Shalabhasana, Dhanurasana, Setubandhasana, Sarvangasana, Matsyasana</li></ul></li><li>Relaxation practice: Deep Relaxation Technique (DRT)</li></ul> | <b>8</b>  |
| <b>Total Hours</b>                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>32</b> |
| <b>Text Books:</b>                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |
| 1. H. R. Nagendra and R. Nagarathna, Yoga for Promotion of Positive Health, Swami Vivekananda Yoga Prakashana, 2011.                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |
| 2. R. Contrada & A. Baum (Eds.), The Handbook of Stress Science: Biology, Psychology, and Health, Springer Publishing Company, 2010. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |
| 3. M. Al'Absi (Ed.), Stress and Addiction: Biological and Psychological Mechanisms, Elsevier, 2011.                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |
| 4. O. Van den Bergh, Principles and Practice of Stress Management, Guilford Publications, 2021.                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |
| 5. Swami Muktibodhananda, Hatha Yoga Pradipika, Bihar School of Yoga, 1998                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |
| <b>Reference Book:</b>                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |
| 1. Swami Satyananda Saraswati, Four Chapters on Freedom, Bihar School of Yoga, 1975.                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |
| 2. Swami Tapasyananda, Srimad Bhagavad Gita, Sri Ramakrishna Math, 2012.                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

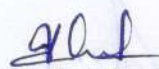
  
Dr. S. S. Mohite  
Director

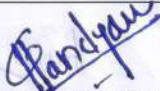
  
Prof. R. A. Kanai  
Executive Director

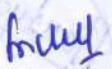


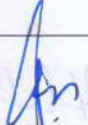
**SEMESTER II**  
**Finite Element Analysis**

| Course Code and Course Title                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0CEPCC551<br>Finite Element Analysis |             |             |             |
|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------|-------------|-------------|
| Semester                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                         | II                                   |             |             |             |
| Prerequisites                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Structural Mechanics                 |             |             |             |
| Teaching Scheme (hours per week)                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Lecture                              | Tutorial    | Practical   |             |
|                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3                                    |             | -           |             |
| Credit                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 03                                   |             |             |             |
| Evaluation Scheme                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ISE 1                                | MSE         | ISE 2       | ESE         |
|                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 10<br>Marks                          | 20<br>Marks | 10<br>Marks | 60<br>Marks |
| Course Outcomes (COs): -Upon successful completion of this course, the student will able to: |                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      |             |             | BL          |
| CO1                                                                                          | Understand the different methods in structural analysis and basic concepts of finite element method.                                                                                                                                                                                                                                                                                                                                                    |                                      |             |             | 2           |
| CO2                                                                                          | Analyze 1-D problems related to structural analysis like Bars, spring, Beams and solve by generating stiffness matrix.                                                                                                                                                                                                                                                                                                                                  |                                      |             |             | 4           |
| CO3                                                                                          | Examine the effect of element type selection (CST, LST, or QST) on the overall performance and computational efficiency of structural models.                                                                                                                                                                                                                                                                                                           |                                      |             |             | 3           |
| CO4                                                                                          | Develop element stiffness matrix for thin plate and shell element.                                                                                                                                                                                                                                                                                                                                                                                      |                                      |             |             | 4           |
| CO5                                                                                          | Interpret stress distribution in axisymmetric structures with symmetric and asymmetric loading using 3D elements.                                                                                                                                                                                                                                                                                                                                       |                                      |             |             | 4           |
| Course Content                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      |             |             |             |
| Unit No.                                                                                     | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |             |             | Hrs.        |
| Unit 1                                                                                       | Introduction to FEM & Approximate Methods: Introduction, Discretization, Types of Elements, Overview of Various Methods to Solve Integral & Differential Equations (Point Collocation Method, Method of Least Square, Weighted Residual Method, Galerkin's Method), Minimum Potential Energy Principle, Local & Global Finite Element Methods (Rayleigh-Ritz Method), Stepwise Procedure in FEM                                                         |                                      |             |             | 6           |
| Unit 2                                                                                       | 1D Element: Application of FEM to Solve various 1-D problems (Shape Functions for 1-D Elements, Properties of Shape Functions, Lagrange Interpolating Polynomials), C0 Continuity, 1-D FE Analysis (Selection of Shape Function, Direct Approach for Assembly, Boundary Conditions (Geometric, Natural), Concept of Sub- Structuring (Static Condensation), Stiffness Matrix for Basic Bar & Beam Element, Solution of Differential Equation using FEM. |                                      |             |             | 6           |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

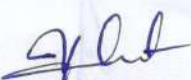
  
 Dr. K. K. Pandey  
 Dean Academics

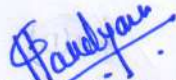
  
 Dr. S. S. Mohite  
 Director

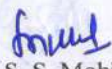
  
 Prof. R. A. Kanai  
 Executive Director



|                                                                                                                      |                                                                                                                                                                                                                                                   |           |
|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 3</b>                                                                                                        | <b>Development of stiffness matrix for 1D element:</b> C0 & C1 Continuity, Formulation of 1-D Beam Element, Classical Beam Theory, Element Equation Formulation, Application to Fixed and Continuous Beams.                                       | <b>6</b>  |
| <b>Unit 4</b>                                                                                                        | <b>2D Element:</b> Types of 2D elements, Conditions of Symmetry & Anti Symmetry (Applications), CST, LST, QST Element (3- Node Triangular Element), 4-noded Rectangular Element, Pascal's Triangle and Pyramid, Stepwise Formulation.             | <b>6</b>  |
| <b>Unit 5</b>                                                                                                        | <b>Plate and Shell Elements:</b> Formation of stiffness matrix for plate bending elements of triangular and quadrilateral shapes, cylindrical thin shell elements.                                                                                | <b>6</b>  |
| <b>Unit 6</b>                                                                                                        | <b>3D Element:</b> 3-D Stress Analysis using FEM, Iso-parametric Formulation, 3-D Brick Element, Application to 3-D Analysis, FEA of Axi- symmetric Solids Subjected to Axi-symmetric geometry and Asymmetric Loads (Application of Partial FEM). | <b>6</b>  |
| <b>Total Hours</b>                                                                                                   |                                                                                                                                                                                                                                                   | <b>36</b> |
| <b>Text Books:</b>                                                                                                   |                                                                                                                                                                                                                                                   |           |
| 1 O.C.Zienkiewicz & R.L.Taylor, The Finite Element Method Vol .I & II, Tata McGraw Hill                              |                                                                                                                                                                                                                                                   |           |
| 2 J.N.Reddy, An introduction to the Finite Element Method , Tata McGraw Hill Pub.                                    |                                                                                                                                                                                                                                                   |           |
| 3 R. D. Cook, Concept and Application of Finite Element Analysis, John Wiley & sons                                  |                                                                                                                                                                                                                                                   |           |
| 4 Hutton D.V., Fundamentals of Finite Element Analysis, Tata McGraw Hill Pub.                                        |                                                                                                                                                                                                                                                   |           |
| 5 Bathe K.J., Finite Element Procedures, PHI learning pvt.ltd                                                        |                                                                                                                                                                                                                                                   |           |
| <b>Reference Book:</b>                                                                                               |                                                                                                                                                                                                                                                   |           |
| 1. M. Mukhopdhyay, Concept and Application of Finite Element Analysis, Oxford and IBH Publishing Co. Pvt. Ltd.       |                                                                                                                                                                                                                                                   |           |
| 2. C. S. Desai & J. F. Abel, Introduction to the Finite Element Method, CBS Pub.                                     |                                                                                                                                                                                                                                                   |           |
| 3. C. S .Krishnamoorthy, Programming in the Finite Element Method, Tata McGraw Hill                                  |                                                                                                                                                                                                                                                   |           |
| 4. T.R.Chandrupatla and Belegundu, Introduction to the Finite Element in Engineering Prentice Hall of India, pvt.ltd |                                                                                                                                                                                                                                                   |           |
| 5. Y. M. Desai, T.I Eldho, Finite Element Method with application in Engineering, Pearson , Delhi                    |                                                                                                                                                                                                                                                   |           |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director

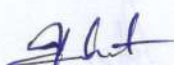


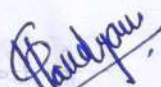
**Text Books:**

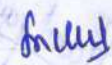
1. Reinforced concrete, Limit state design by Ashok K. Jain, New Chand & bros. Roorkee
2. Advanced Reinforced Concrete design by P.C. Vargese – Prentice Hall of India, Delhi
3. Advanced Reinforced Concrete design by N. Krishnaraju – CBS Publishers & Distributors, Delhi.
4. Design of Reinforced Concrete Structures - S. Ramamrutham, Dhanpat rai Publication

**Reference Book:**

1. IS 456-2000 - Plain and Reinforced Concrete - Code of Practice
2. IS 3370- 2009- Part 1 - 4 Code of Practice for concrete structures for the storage of liquids
3. Pillai.S.V.and Menon.D. Reinforced concrete design, Tata McGraw Hill Book Co.
4. Purushothaman, P. Reinforced concrete Structural Element Tata McGraw Hill Co.

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



### Advanced Design of R.C. Structures

| Course Code and Course Title                                                                 |                                                                                                                                                                                         | 0CEPCC552<br>Advanced Design of R.C. Structures                |          |           |          |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------|-----------|----------|
| Semester                                                                                     |                                                                                                                                                                                         | I                                                              |          |           |          |
| Prerequisites                                                                                |                                                                                                                                                                                         | Theory of Structures, Design of Reinforced concrete structures |          |           |          |
| Teaching Scheme (hours per week)                                                             |                                                                                                                                                                                         | Lecture                                                        | Tutorial | Practical |          |
|                                                                                              |                                                                                                                                                                                         | 3                                                              | -        | -         |          |
| Credit                                                                                       |                                                                                                                                                                                         | 03                                                             |          |           |          |
| Evaluation Scheme                                                                            |                                                                                                                                                                                         | ISE 1                                                          | MSE      | ISE 2     | ESE      |
|                                                                                              |                                                                                                                                                                                         | 10 Marks                                                       | 20 Marks | 10 Marks  | 60 Marks |
| Course Outcomes (COs): -Upon successful completion of this course, the student will able to: |                                                                                                                                                                                         |                                                                |          |           | BL       |
| CO1                                                                                          | Design flat slab and grid slab.                                                                                                                                                         |                                                                |          |           | 6        |
| CO2                                                                                          | Design R.C.C. Deep beams.                                                                                                                                                               |                                                                |          |           | 6        |
| CO3                                                                                          | Design R.C.C. elevated service reservoir and retaining wall.                                                                                                                            |                                                                |          |           | 6        |
| CO4                                                                                          | Analyse and design combined footing, raft foundation & pile foundation.                                                                                                                 |                                                                |          |           | 6        |
| CO5                                                                                          | Design bunkers and silos using Airy's theory to ensure structural stability and safe load-bearing performance.                                                                          |                                                                |          |           | 6        |
| Course Content                                                                               |                                                                                                                                                                                         |                                                                |          |           |          |
| Unit No.                                                                                     | Contents                                                                                                                                                                                |                                                                |          |           | Hrs.     |
| Unit 1                                                                                       | Flat Slab and Grid Slab<br>Classification, Behaviour of Flat slabs, Direct design and equivalent frame method, IS codal provisions, Analysis and design of grid Slab.                   |                                                                |          |           | 6        |
| Unit 2                                                                                       | Deep Beams<br>Introduction, Minimum thickness, Analysis and Design of deep beams as per IS 456-2000, Checking for local failures, Detailing of deep beams.                              |                                                                |          |           | 6        |
| Unit 3                                                                                       | Water Tanks<br>Introduction to working stress method for water tank design, Design criteria, permissible stresses, Analysis and design of overhead water tank – Rectangular & circular. |                                                                |          |           | 6        |
| Unit 4                                                                                       | Design of Foundation<br>Analysis and design of combined footing, raft foundation & pile foundation.                                                                                     |                                                                |          |           | 6        |
| Unit 5                                                                                       | Retaining wall<br>Function, Theories of earth pressure, Stability of retaining wall. Analysis and Design of cantilever retaining walls and counter-fort retaining walls.                |                                                                |          |           | 6        |
| Unit 6                                                                                       | Bunker and silos<br>Classification, Design of Square and circular bunkers. Silos, Airy's theory, Design of shallow bins and deep bins.                                                  |                                                                |          |           | 6        |
| Total Hours                                                                                  |                                                                                                                                                                                         |                                                                |          |           | 36       |

Dr. V. T. Gaikwad  
HOD-Civil

Dr. K. K. Pandeyaji  
Dean Academics

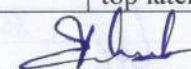
Dr. S. S. Mohite  
Director

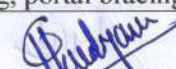
Prof. R. A. Kanai  
Executive Director

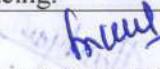


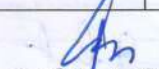
### Advanced Design of Steel Structures

| Course Code and Course Title                                                                        |                                                                                                                                                                                                                                                                                                                                                              | 0EPEC553<br>Advanced Design of Steel Structures |           |          |           |
|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----------|----------|-----------|
| Semester                                                                                            |                                                                                                                                                                                                                                                                                                                                                              | II                                              |           |          |           |
| Prerequisites                                                                                       |                                                                                                                                                                                                                                                                                                                                                              | UG -Design of steel structures                  |           |          |           |
| Teaching Scheme (hours per week)                                                                    | Lecture                                                                                                                                                                                                                                                                                                                                                      | Tutorial                                        | Practical |          |           |
|                                                                                                     | 3                                                                                                                                                                                                                                                                                                                                                            | -                                               | -         |          |           |
| Credit                                                                                              |                                                                                                                                                                                                                                                                                                                                                              | 03                                              |           |          |           |
| Evaluation Scheme                                                                                   | ISE 1                                                                                                                                                                                                                                                                                                                                                        | MSE                                             | ISE 2     | ESE      |           |
|                                                                                                     | 10 Marks                                                                                                                                                                                                                                                                                                                                                     | 20 Marks                                        | 10 Marks  | 60 Marks |           |
| <b>Course Outcomes (COs):</b> -Upon successful completion of this course, the student will able to: |                                                                                                                                                                                                                                                                                                                                                              |                                                 |           |          | <b>BL</b> |
| CO1                                                                                                 | Analyse and Design of Portal Frames.                                                                                                                                                                                                                                                                                                                         |                                                 |           |          | 6         |
| CO2                                                                                                 | Design Pre –Engineered Buildings.                                                                                                                                                                                                                                                                                                                            |                                                 |           |          | 6         |
| CO3                                                                                                 | Design of Truss Girder Bridge.                                                                                                                                                                                                                                                                                                                               |                                                 |           |          | 6         |
| CO4                                                                                                 | Design of steel beams with Web openings.                                                                                                                                                                                                                                                                                                                     |                                                 |           |          | 6         |
| CO5                                                                                                 | Analyse and Design Cold Formed light gauge steel sections.                                                                                                                                                                                                                                                                                                   |                                                 |           |          | 6         |
| <b>Course Content</b>                                                                               |                                                                                                                                                                                                                                                                                                                                                              |                                                 |           |          |           |
| Unit No.                                                                                            | Contents                                                                                                                                                                                                                                                                                                                                                     |                                                 |           |          | Hrs.      |
| Unit 1                                                                                              | <b>Plastic Analysis:</b><br>Plastic bending of beams, plastic hinge, upper and lower bond theorems, uniqueness theorem, yield criteria, analysis and design of fixed and continuous beams                                                                                                                                                                    |                                                 |           |          | 5         |
| Unit 2                                                                                              | <b>Design of Portal frames:</b> Plastic analysis, Collapse mechanism, analysis and design of Gables, multistorey- multi bay frames, checks for stability of frames, plastic moment distribution method.                                                                                                                                                      |                                                 |           |          | 6         |
| Unit 3                                                                                              | <b>Design of Pre-Engineered Buildings:</b> Applications of PEB, Components of PEB, Analysis of PEB frame under the influence of dead, live, collateral, wind, seismic loads. Serviceability limits as per code, PEB design methodology, Design parameters of PEB frames, Section sizes as per manufacturing limitations, Analysis and Design of Rigid Frame. |                                                 |           |          | 7         |
| Unit 4                                                                                              | <b>Design of truss girder bridge:</b> Types of truss bridges, component part of a truss bridges, Self-weight of truss girder, design of bridge, compression member, Tension member, wind load on truss girder bridges, wind effect on top lateral bracing. portal bracing. sway bracing.                                                                     |                                                 |           |          | 7         |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

  
 Dr. K. R. Pandey  
 Dean Academics

  
 Dr. S. S. Mohite  
 Director

  
 Prof. R. A. Kanai  
 Executive Director



Dr. Vasanttraodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**

Curriculum Structure and Evaluation Scheme

(2025-27 Batch)

|                    |                                                                                                                                                                                                                                                                                    |           |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 5</b>      | <b>Design of steel beams with web openings:</b> Shape of web openings, Practical guidelines, Force distribution and failure pattern, Analysis of beam with perforated thin and thick webs, Design of laterally restrained beams for given sectional properties, Vierendeel girders | <b>6</b>  |
| <b>Unit 6</b>      | <b>Cold formed light gauge steel sections:</b> Techniques and properties, Advantages, Typical profiles, Stiffened and un stiffened elements, Local buckling effects, effective section properties, IS 801 & 811 code provisions-numerical examples, beam design.                   | <b>5</b>  |
| <b>Total Hours</b> |                                                                                                                                                                                                                                                                                    | <b>36</b> |

**Codes of practice:**

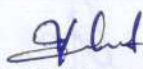
1. IS 800 (2007) General construction in steel -Code of practice, Bureau of Indian Standard.
2. IS: 875 (Part3) (2015), Wind load on Buildings and Structures, Bureau of Indian Standard.
3. Handbook No. 1(SP 16) or Steel table, (1964), Handbook for Structural Engineers, Bureau of Indian Standard.

**Text Books:**

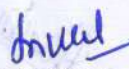
|          |                                                                                               |
|----------|-----------------------------------------------------------------------------------------------|
| <b>1</b> | Duggal S. K., "Design of Steel Structures", Tata McGraw Hill Pub. Co. Ltd., New Delhi         |
| <b>2</b> | Sairam K. S. "Design of Steel Structures", Pearson Publication.                               |
| <b>3</b> | Shah V. L. & Gore V., "Limit state Design of Steel Structures", Structures Publication.       |
| <b>4</b> | Gambhir, "Fundamentals of Structural Steel Design", Tata McGraw Hill Pub. Co. Ltd., New Delhi |

**Reference Books:**

|           |                                                                                                       |
|-----------|-------------------------------------------------------------------------------------------------------|
| <b>1</b>  | N. Subramanian, "Design of Steel Structures", Oxford University Press.                                |
| <b>2</b>  | Chandra Ram, "Design of Steel Structures", Vol. I & Vol. II, Standard Book House, New Delhi           |
| <b>3</b>  | Dayaratnam P., "Design of Steel Structures", Wheeler Publishing, New Delhi                            |
| <b>4</b>  | Vazirani V.N. and Ratwani M.M., "Design and Analysis of Steel Structures", ISBN NO: 978-81-7409-295-3 |
| <b>5.</b> | Gaylord E.H. and Gaylord C.N., "Design of Steel Structures" McGraw Hill, New York                     |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

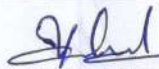
  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director

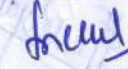


### Design of Industrial Structures

| Course Code and Course Title                                                                     |                                                                                                                                                                                                              | 0CEPEC553<br>Design Of Industrial Structures        |             |             |             |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------|-------------|-------------|
| Semester                                                                                         |                                                                                                                                                                                                              | II                                                  |             |             |             |
| Prerequisites                                                                                    |                                                                                                                                                                                                              | Design of Steel Structures and Structural Analysis. |             |             |             |
| Teaching Scheme (hours per week)                                                                 |                                                                                                                                                                                                              | Lecture                                             | Tutorial    | Practical   |             |
|                                                                                                  |                                                                                                                                                                                                              | 3                                                   | -           | -           |             |
| Credit                                                                                           |                                                                                                                                                                                                              | 03                                                  |             |             |             |
| Evaluation Scheme                                                                                |                                                                                                                                                                                                              | ISE 1                                               | MSE         | ISE 2       | ESE         |
|                                                                                                  |                                                                                                                                                                                                              | 10<br>Marks                                         | 20<br>Marks | 10<br>Marks | 60<br>Marks |
| Course Outcomes (COs): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                              |                                                     |             |             | BL          |
| CO1                                                                                              | Apply knowledge of structural behavior and codal provisions to plan industrial structures efficiently.                                                                                                       |                                                     |             |             | 3           |
| CO2                                                                                              | Analyze thin-walled/cold-formed steel members for buckling, compression, and tension.                                                                                                                        |                                                     |             |             | 4           |
| CO3                                                                                              | Analyze RC bunkers, silos, and chimneys under self-weight, wind, and temperature effects.                                                                                                                    |                                                     |             |             | 4           |
| CO4                                                                                              | Evaluate design solutions for cylindrical shells and complex industrial components.                                                                                                                          |                                                     |             |             | 5           |
| CO5                                                                                              | Create safe and optimized designs of industrial structures using advanced design principles and structural detailing.                                                                                        |                                                     |             |             | 6           |
| Course Content                                                                                   |                                                                                                                                                                                                              |                                                     |             |             |             |
| Unit No.                                                                                         | Contents                                                                                                                                                                                                     |                                                     |             |             | Hrs.        |
| Unit 1                                                                                           | Planning of Industrial Structures: Covers types and components of industrial structures, layout planning, bracings, and design principles of steel industrial buildings.                                     |                                                     |             |             | 6           |
| Unit 2                                                                                           | Cold-Formed / Thin-Walled Steel Members: Focuses on local and post-buckling behavior, light-gauge columns and compression members, stiffened elements, effective length considerations, and tension members. |                                                     |             |             | 6           |
| Unit 3                                                                                           | RC Bunkers & Silos: Introduces Janssen's and Airy's theories for pressure distribution and design of square, rectangular, and circular bunkers and silos.                                                    |                                                     |             |             | 6           |
| Unit 4                                                                                           | RC Chimneys: self-weight, wind, and temperature-induced stresses, combined loading effects, and design of shaft and horizontal reinforcement.                                                                |                                                     |             |             | 6           |
| Unit 5                                                                                           | Cylindrical Shells: Covers design principles, stress distribution, stability considerations, and practical design problems of cylindrical shells.                                                            |                                                     |             |             | 6           |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

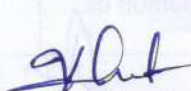
  
 Dr. R. K. Pandeyaji  
 Dean Academics

  
 Dr. S. S. Mohite  
 Director

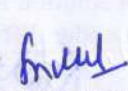
  
 Prof. R. A. Kanai  
 Executive Director



|                                                                                 |                                                                                                                                                                                                    |           |
|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 6</b>                                                                   | <b>Design Integration &amp; Case Studies:</b> Integrates concepts from all units, emphasizing hybrid systems, optimization strategies, and case studies of industrial plants, silos, and chimneys. | <b>6</b>  |
| <b>Total Hours</b>                                                              |                                                                                                                                                                                                    | <b>36</b> |
| <b>Text Books:</b>                                                              |                                                                                                                                                                                                    |           |
| 1. N. Krishna Raju, Advanced Reinforced Concrete Design, CBS Publishers, 2005.  |                                                                                                                                                                                                    |           |
| 2. Ram Chandra & Virendra Gehlot, Design of Steel Structures, Vol-II, 2007.     |                                                                                                                                                                                                    |           |
| 3. Duggal, Design of Steel Structures, Tata McGraw-Hill, 2010.                  |                                                                                                                                                                                                    |           |
| <b>Reference Books:</b>                                                         |                                                                                                                                                                                                    |           |
| 1. Mallick & Gupta, Design of Industrial Structures, Tata McGraw-Hill, 2015.    |                                                                                                                                                                                                    |           |
| 2. P. Dayaratnam, Design of Reinforced Concrete Structures, Oxford & IBH, 2010. |                                                                                                                                                                                                    |           |
| 3. IS Codes: IS 456, IS 800, IS 4995, IS 875.                                   |                                                                                                                                                                                                    |           |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



### Theory of Plates and Shell

| Course Code and Course Title                                                                     |                                                                                                                                                                                                                                                                                                           | 0CEPEC553<br>Theory of Plates and Shells |             |             |      |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-------------|-------------|------|
| Semester                                                                                         |                                                                                                                                                                                                                                                                                                           | II                                       |             |             |      |
| Prerequisites                                                                                    |                                                                                                                                                                                                                                                                                                           | Structural Analysis.                     |             |             |      |
| Teaching Scheme (hours per week)                                                                 | Lecture                                                                                                                                                                                                                                                                                                   | Tutorial                                 | Practical   |             |      |
|                                                                                                  | 03                                                                                                                                                                                                                                                                                                        | -                                        | -           |             |      |
| Credit                                                                                           |                                                                                                                                                                                                                                                                                                           | 03                                       |             |             |      |
| Evaluation Scheme                                                                                | ISE 1                                                                                                                                                                                                                                                                                                     | MSE                                      | ISE 2       | ESE         |      |
|                                                                                                  | 10<br>Marks                                                                                                                                                                                                                                                                                               | 20<br>Marks                              | 10<br>Marks | 60<br>Marks |      |
| Course Outcomes (COs): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                                           |                                          |             |             | BL   |
| CO1                                                                                              | Understand and derive governing differential equation for deflected shape of rectangular plates.                                                                                                                                                                                                          |                                          |             |             | 1    |
| CO2                                                                                              | Solve governing differential equation of deflected shape of rectangular plate for various loading and support conditions.                                                                                                                                                                                 |                                          |             |             | 3    |
| CO3                                                                                              | Understand and derive governing differential equation for deflected shape of rectangular plates.                                                                                                                                                                                                          |                                          |             |             | 2    |
| CO4                                                                                              | Solve governing differential equation of deflected shape of rectangular plate for various loading and support conditions.                                                                                                                                                                                 |                                          |             |             | 3    |
| CO5                                                                                              | Understand and derive governing differential equation for deflected shape of circular plates                                                                                                                                                                                                              |                                          |             |             | 2    |
| CO6                                                                                              | Understand membrane theory for internal forces in different shells.                                                                                                                                                                                                                                       |                                          |             |             | 2    |
| Course Content                                                                                   |                                                                                                                                                                                                                                                                                                           |                                          |             |             |      |
| Unit No.                                                                                         | Contents                                                                                                                                                                                                                                                                                                  |                                          |             |             | Hrs. |
| Unit 1                                                                                           | Introduction to Plate Theory: Thin and Thick Plates, Small and Large Deflection Theory of Thin Plate, Assumptions in Analysis of Thin Plates, Slope Curvature Relations, Moment - Curvature Relations, Stress Resultants, Governing Differential Equations for Bending of Plates, Various Boundary Condit |                                          |             |             | 6    |
| Unit 2                                                                                           | Navier's and Levy's Solution: Analysis of Rectangular Plates Subjected to various loading, Navier's method of solution for simply supported plates, Leavy's method of Solution for plates under different boundary conditions.                                                                            |                                          |             |             | 6    |

*[Signature]*  
 Dr. V. T. Gaikwad  
 HOD-Civil

*[Signature]*  
 Dr. K. K. Pandeyaji  
 Dean Academics

*[Signature]*  
 Dr. S. S. Mohite  
 Director

*[Signature]*  
 Prof. R. A. Kanai  
 Executive Director



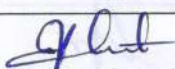
|                    |                                                                                                                                                                                                                                                                                                                                                                                          |           |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 3</b>      | <b>Circular Plates:</b> Analysis of Circular Plates under Axis-Symmetric Loading, Moment Curvature Relations, Governing Differential Equation in Polar Co-Ordinates, Simply Supported and Fixed Edges, Distributed Load, Ring Load, a Plate with Hole at Centre. Numerical examples                                                                                                      | 6         |
| <b>Unit 4</b>      | <b>Theory of shells:</b><br><b>Introduction to Shell Structures:</b> Classification of Shells on basis of Geometry, Thin Shell Theory, Equation of Shell Surfaces, Stress Resultants, Stress Displacement Relations, Compatibility and Equilibrium Equations.                                                                                                                            | 6         |
| <b>Unit 5</b>      | <b>Membrane Analysis:</b><br>Equation of Equilibrium for Synclastic Shells, Solution for Shells Subjected to Weight and Live Load, Cylindrical Shells - Equation of Equilibrium, Open Shells with Parabolic, Circular, Elliptical Directrix, Simple Problems, Shells with Closed Directrix-Circular, Elliptical-Simple Problems, Problems on Pipes Carrying Fluid/Liquid Under Pressure. | 6         |
| <b>Unit 6</b>      | <b>Bending of Cylindrical Shells:</b> Symmetrically Loaded Circular Cylindrical Shells, Beam Theory, Finster walder's Theory, D.K.J. Theory- Donnell's Equation, Characteristic Equation, Schorer's Theory.                                                                                                                                                                              | 6         |
| <b>Total Hours</b> |                                                                                                                                                                                                                                                                                                                                                                                          | <b>36</b> |

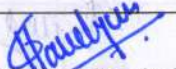
**Text Books:**

1. S. Timoshenko and W. Krieger, Theory of Plates and Shells, Mc Graw Hill.
2. Chandrasekhara K., Analysis of Plates, New Age International Edition
3. Chandrasekhara K., Analysis of Concrete Shells, New Age International Edition

**Reference Books:**

1. Ansel C. Ugural, Stresses in Plates and Shells, Mc Graw Hill.
2. G. S Ramaswamy, Design and Construction of Concrete Shell Roofs, CBS Publications.
3. Reddy, J. N.; Theory and Analysis of Elastic Plates and Shells, Taylor & Francis.
4. Ugural, A. C. "Stresses in Plates and Shells", 2nd edition, McGraw-Hill, 1999.

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

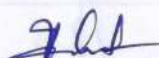
  
Dr. S. S. Mohite  
Director

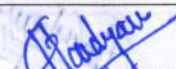
  
Prof. R. A. Kanai  
Executive Director

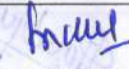


### Applications of ALML in Structural Engineering

| Course Code and Course Title                                                                     |                                                                                                                                                                                                                                                                                         | 0CEPEC554<br>Application Of Artificial Intelligence and Machine Learning in Structural Engineering                 |          |           |          |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------|-----------|----------|
| Semester                                                                                         |                                                                                                                                                                                                                                                                                         | II                                                                                                                 |          |           |          |
| Prerequisites                                                                                    |                                                                                                                                                                                                                                                                                         | Basic knowledge of structural analysis, dynamics, probability and statistics, and MATLAB programming fundamentals. |          |           |          |
| Teaching Scheme (hours per week)                                                                 |                                                                                                                                                                                                                                                                                         | Lecture                                                                                                            | Tutorial | Practical |          |
|                                                                                                  |                                                                                                                                                                                                                                                                                         | 3                                                                                                                  | -        | -         |          |
| Credit                                                                                           |                                                                                                                                                                                                                                                                                         | 03                                                                                                                 |          |           |          |
| Evaluation Scheme                                                                                |                                                                                                                                                                                                                                                                                         | ISE 1                                                                                                              | MSE      | ISE 2     | ESE      |
|                                                                                                  |                                                                                                                                                                                                                                                                                         | 10 Marks                                                                                                           | 20 Marks | 10 Marks  | 60 Marks |
| Course Outcomes (COs): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                         |                                                                                                                    |          |           | BL       |
| CO1                                                                                              | Explain the fundamental concepts of Artificial Intelligence and Machine Learning relevant to structural engineering.                                                                                                                                                                    |                                                                                                                    |          |           | 2        |
| CO2                                                                                              | Preprocess and analyze structural datasets using data-driven and feature engineering techniques.                                                                                                                                                                                        |                                                                                                                    |          |           | 3        |
| CO3                                                                                              | Apply Machine Learning algorithms for prediction, classification, and clustering in structural problems.                                                                                                                                                                                |                                                                                                                    |          |           | 3        |
| CO4                                                                                              | Develop and analyze deep learning models such as ANN, CNN, and RNN for structural applications.                                                                                                                                                                                         |                                                                                                                    |          |           | 4        |
| CO5                                                                                              | Evaluate AI/ML-based approaches for structural health monitoring, optimization, and reliability assessment.                                                                                                                                                                             |                                                                                                                    |          |           | 5        |
| Course Content                                                                                   |                                                                                                                                                                                                                                                                                         |                                                                                                                    |          |           |          |
| Unit No.                                                                                         | Contents                                                                                                                                                                                                                                                                                |                                                                                                                    |          |           | Hrs.     |
| Unit 1                                                                                           | Introduction to AI/ML in Structural Engineering: Overview of Artificial Intelligence and Machine Learning; Data-driven approaches in civil and structural engineering; Role of AI/ML in analysis, design automation, and monitoring; Supervised and unsupervised learning fundamentals. |                                                                                                                    |          |           | 6        |
| Unit 2                                                                                           | Data for Structural Engineering: Types of structural datasets: experimental, field monitoring, and numerical (FEA); Data pre-processing, cleaning, normalization, and transformation; Feature extraction, dimensionality reduction, and dataset preparation for ML models.              |                                                                                                                    |          |           | 6        |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

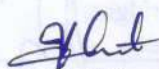
  
 Dr. K. K. Pandey  
 Dean Academics

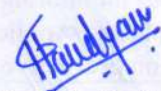
  
 Dr. S. S. Mohite  
 Director

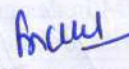
  
 Prof. R. A. Kanai  
 Executive Director



|                                                                                                     |                                                                                                                                                                                                                                                                              |           |
|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 3</b>                                                                                       | <b>ML Algorithms for Structural Problems:</b> Regression and classification techniques, clustering methods, and pattern recognition; Applications in load–response prediction, damage detection, and material property estimation; Evaluation metrics for model performance. | <b>6</b>  |
| <b>Unit 4</b>                                                                                       | <b>Deep Learning Applications:</b> Fundamentals of Artificial Neural Networks (ANN); Convolutional Neural Networks (CNN) for crack and defect detection (image-based); Recurrent Neural Networks (RNN) and LSTM models for time-dependent and vibration response prediction. | <b>6</b>  |
| <b>Unit 5</b>                                                                                       | <b>AI in Structural Health Monitoring and Optimization:</b> AI and ML in SHM, life-cycle prediction, and residual strength assessment; Optimization-based design using AI; Applications in reliability analysis, structural maintenance, and smart infrastructure systems.   | <b>6</b>  |
| <b>Unit 6</b>                                                                                       | <b>Tools, Integration, and Future Trends:</b> AI/ML implementation using MATLAB; Integration with structural software (ETABS, ABAQUS); Challenges, limitations, and ethical use of AI in civil engineering; Emerging trends in digital twins and intelligent structures.     | <b>6</b>  |
| <b>Total Hours</b>                                                                                  |                                                                                                                                                                                                                                                                              | <b>36</b> |
| <b>Text Books:</b>                                                                                  |                                                                                                                                                                                                                                                                              |           |
| 1. S. Rajasekaran, Structural Health Monitoring with AI Techniques, Springer, 2019.                 |                                                                                                                                                                                                                                                                              |           |
| 2. C. S. Krishnamoorthy, Artificial Intelligence and Expert Systems for Engineers, CRC Press, 1996. |                                                                                                                                                                                                                                                                              |           |
| 3. D. Boström, Applied Machine Learning for Civil and Structural Engineers, Wiley, 2021.            |                                                                                                                                                                                                                                                                              |           |
| <b>Reference Books:</b>                                                                             |                                                                                                                                                                                                                                                                              |           |
| 1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016.                  |                                                                                                                                                                                                                                                                              |           |
| 2. Hastie, Tibshirani, Friedman, The Elements of Statistical Learning, Springer, 2017.              |                                                                                                                                                                                                                                                                              |           |
| 3. M. Z. Naser, AI and Machine Learning in Civil Engineering, Elsevier, 2024.                       |                                                                                                                                                                                                                                                                              |           |
| 4. IS 1893, IS 456, and IRC Codes (for case-based applications and dataset modeling).               |                                                                                                                                                                                                                                                                              |           |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



### Structural Health Monitoring and Audit

| Course Code and Course Title                                                                     |                                                                                                                                                                                                                                                                                                                                                        | 0CEPEC554<br>Structural Health Monitoring and Audit                                                               |          |           |          |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|----------|-----------|----------|
| Semester                                                                                         |                                                                                                                                                                                                                                                                                                                                                        | II                                                                                                                |          |           |          |
| Prerequisites                                                                                    |                                                                                                                                                                                                                                                                                                                                                        | Basic knowledge of structural analysis, design of concrete and steel structures, and civil engineering materials. |          |           |          |
| Teaching Scheme (hours per week)                                                                 |                                                                                                                                                                                                                                                                                                                                                        | Lecture                                                                                                           | Tutorial | Practical |          |
|                                                                                                  |                                                                                                                                                                                                                                                                                                                                                        | 3                                                                                                                 | -        | -         |          |
| Credit                                                                                           |                                                                                                                                                                                                                                                                                                                                                        | 03                                                                                                                |          |           |          |
| Evaluation Scheme                                                                                |                                                                                                                                                                                                                                                                                                                                                        | ISE 1                                                                                                             | MSE      | ISE 2     | ESE      |
|                                                                                                  |                                                                                                                                                                                                                                                                                                                                                        | 10 Marks                                                                                                          | 20 Marks | 10 Marks  | 60 Marks |
| Course Outcomes (COs): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                   |          |           | BL       |
| CO1                                                                                              | Apply knowledge of structural behavior to diagnose distress and identify influencing factors affecting performance.                                                                                                                                                                                                                                    |                                                                                                                   |          |           | 3        |
| CO2                                                                                              | Analyze structural health using static field-testing methods and interpret assessment data.                                                                                                                                                                                                                                                            |                                                                                                                   |          |           | 4        |
| CO3                                                                                              | Analyze dynamic response data and assess health using vibration-based and remote sensing techniques.                                                                                                                                                                                                                                                   |                                                                                                                   |          |           | 4        |
| CO4                                                                                              | Evaluate and recommend suitable repair, strengthening, and rehabilitation strategies for distressed structures.                                                                                                                                                                                                                                        |                                                                                                                   |          |           | 5        |
| CO5                                                                                              | Create smart monitoring solutions using advanced materials and sensor technologies for continuous structural health monitoring.                                                                                                                                                                                                                        |                                                                                                                   |          |           | 6        |
| Course Content                                                                                   |                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                   |          |           |          |
| Unit No.                                                                                         | Contents                                                                                                                                                                                                                                                                                                                                               |                                                                                                                   |          |           | Hrs.     |
| Unit 1                                                                                           | Introduction to Structural Health and Distress: Overview of structural health concepts and parameters affecting performance. Major causes of distress such as design errors, material degradation, and environmental effects. Significance of durability, service life assessment, maintenance, and sustainability in preserving structural integrity. |                                                                                                                   |          |           | 6        |
| Unit 2                                                                                           | Structural Health Monitoring: Concept, importance, and basic methods of SHM. Visual inspection, NDT, and continuous monitoring approaches. Integration of SHM in design and operation phases. Applications in bridges, buildings, and heritage structures with focus on preventive maintenance.                                                        |                                                                                                                   |          |           | 6        |

Dr. V. T. Gaikwad  
HOD-Civil

Dr. K. K. Pandeyaji  
Dean Academics

Dr. S. S. Mohite  
Director

Prof. R. A. Kanai  
Executive Director



Dr. Vasantraodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad

(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**

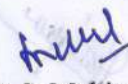
Curriculum Structure and Evaluation Scheme

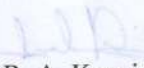
(2025-27 Batch)

|                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                          |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 3</b>                                                                                                                                                                                                           | <b>Structural Audit and Condition Assessment:</b> Principles and stages of structural audit—inspection, data collection, analysis, and reporting. Use of grading systems for condition evaluation. Investigation procedures for distress or collapse. Reference to IS codes and preparation of audit documentation       | <b>6</b>  |
| <b>Unit 4</b>                                                                                                                                                                                                           | <b>Static Field Testing and Instrumentation:</b> Fundamentals of static testing and load assessment. Basic loading arrangements, use of strain gauges, displacement and crack measurement tools. Data acquisition and comparison with analytical models for validation and safety assessment.                            | <b>6</b>  |
| <b>Unit 5</b>                                                                                                                                                                                                           | <b>Dynamic Field Testing and Smart Monitoring:</b> Concepts of dynamic testing, vibration analysis, and modal studies. Overview of ambient and forced vibration tests. Introduction to remote sensing, wireless sensors, and data acquisition systems for real-time health monitoring.                                   | <b>6</b>  |
| <b>Unit 6</b>                                                                                                                                                                                                           | <b>Repairs, Rehabilitation, and Smart Materials:</b> Essential repair and retrofitting techniques including jacketing and FRP wrapping. Brief case examples of rehabilitation practices. Introduction to piezoelectric and EMI-based smart sensing materials. Emphasis on sustainable and performance-based maintenance. | <b>6</b>  |
| Laboratory / Field Component (NEP 2020 Suggested): Mini-project on structural audit or SHM study; demonstration of NDT tools and sensors; data collection, interpretation, and short report on rehabilitation measures. |                                                                                                                                                                                                                                                                                                                          |           |
| <b>Total Hours</b>                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                          | <b>36</b> |
| <b>Text Books:</b>                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                          |           |
| 1. Daniel Balageas, Claus-Peter Fritzen, and Alfredo Güemes, Structural Health Monitoring, John Wiley & Sons, 2006.                                                                                                     |                                                                                                                                                                                                                                                                                                                          |           |
| 2. Douglas E. Adams, Health Monitoring of Structural Materials and Components – Methods with Applications, Wiley, 2007                                                                                                  |                                                                                                                                                                                                                                                                                                                          |           |
| <b>Reference Books:</b>                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                          |           |
| 1. J. P. Ou, H. Li, and Z. D. Duan, Structural Health Monitoring and Intelligent Infrastructure (Vol. 1), Taylor & Francis, 2006.                                                                                       |                                                                                                                                                                                                                                                                                                                          |           |
| 2. Victor Giurgiutiu, Structural Health Monitoring with Piezoelectric Wafer Active Sensors, Academic Press, 2007.                                                                                                       |                                                                                                                                                                                                                                                                                                                          |           |
| 3. Rolf Eligehausen & fib Bulletin 24, Monitoring and Assessment of Structures, Federation Internationale du Béton (fib), 2003.                                                                                         |                                                                                                                                                                                                                                                                                                                          |           |
| 4. J. H. Bungey and S. G. Millard, Testing of Concrete in Structures, Taylor & Francis, 2014.                                                                                                                           |                                                                                                                                                                                                                                                                                                                          |           |
| 5. <b>IS Codes:</b> IS 15988, IS 13935, IS 13311.                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                          |           |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandeyaji  
Dean Academics

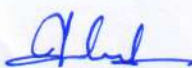
  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



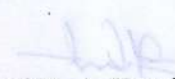
### Advanced Construction Materials

| Course Code and Course Title                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0CEPEC554<br>Advanced Construction Material. |             |             |             |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-------------|-------------|-------------|
| Semester                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | II                                           |             |             |             |
| Pre-requisites                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Basics of material science                   |             |             |             |
| Teaching Scheme (hours per week)                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Lecture                                      | Tutorial    | Practical   |             |
|                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 02                                           | -           | -           |             |
| Credit                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 02                                           |             |             |             |
| Evaluation Scheme                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ISE 1                                        | MSE         | ISE 2       | ESE         |
|                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 10<br>Marks                                  | 20<br>Marks | 10<br>Marks | 60<br>Marks |
| Course Outcomes (COs): -Upon successful completion of this course, the student will able to: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                              |             |             | BL          |
| CO1                                                                                          | Select suitable advanced materials for specific engineering applications.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                              |             |             | 5           |
| CO2                                                                                          | Integrate sustainability and smart technology into material design.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                              |             |             | 4           |
| CO3                                                                                          | Conduct laboratory and field-level assessment of new materials                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                              |             |             | 4           |
| Course Content                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                              |             |             |             |
| Unit No.                                                                                     | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |             |             | Hrs.        |
| Unit 1                                                                                       | Sustainable and Green Construction Materials<br>Principles of sustainable materials design and life-cycle analysis (LCA), Use of industrial by-products: fly ash, GGBS, red mud, rice husk ash, Alkali-activated binders and geopolymer concrete, Recycled aggregates, construction and demolition (C&D) waste utilization, Low-carbon cements and carbon capture in construction materials, Introduction to advanced concretes-High Strength concrete, High performance concrete, Fibre reinforced concrete, Self-compacting concrete. |                                              |             |             | 6           |
| Unit 2                                                                                       | Smart and Functional Materials<br>Smart materials in civil engineering: overview and types, Self-sensing, self-healing, and self-cleaning materials, Photo catalytic concrete and hydrophobic coatings, Shape memory alloys and their structural applications, Embedded sensors and smart concrete systems for structural health monitoring (SHM).                                                                                                                                                                                      |                                              |             |             | 6           |
| Unit 3                                                                                       | Advanced Metallic, Polymeric, and Composite Materials<br>High-performance steel and aluminium alloys in construction, Corrosion-resistant and weathering steels, Advanced polymers and FRP composites: manufacturing, mechanical behaviour, and field applications, Nano-materials and Nano-modified composites, Hybrid composites and sandwich panels for lightweight structures.                                                                                                                                                      |                                              |             |             | 6           |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

  
 Dr. K. K. Pandeyaji  
 Dean Academics

  
 Dr. S. S. Mohite  
 Director

  
 Prof. R. A. Kanai  
 Executive Director



Dr. Vasanttraodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)  
**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

|                         |                                                                                                                                                                                                                                                                                                                                                                                |           |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit</b><br><b>4</b> | <b>Testing, Characterization, and Field Applications</b><br>Micro structural characterization: SEM, XRD, FTIR, and TGA, Mechanical and durability testing of advanced materials, Non-destructive testing (NDT) and evaluation methods. Field applications and performance monitoring of advanced materials, Case studies from recent research and mega infrastructure projects | <b>6</b>  |
| <b>Total Hours</b>      |                                                                                                                                                                                                                                                                                                                                                                                | <b>24</b> |

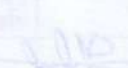
**Reference Book:**

1. Mehta, P.K. and Monteiro, P.J.M., Concrete: Microstructure, Properties, and Materials, McGraw-Hill.
2. . Gambhir, M.L., Concrete Technology, Tata McGraw-Hill.
3. Mindess, S. and Young, J.F., Concrete, Prentice Hall
4. Nawy, E.G., High Performance Concrete: Technology and Applications, CRC Press.
5. Neville, A.M., Properties of Concrete, Pearson Education
6. Advanced Civil Infrastructure Materials — Hwai-Chung Wu (Elsevier)

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



Dr. Vasantodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
 (Accredited by NAAC)  
**M.Tech. STRUCTURAL ENGINEERING**  
 Curriculum Structure and Evaluation Scheme  
 (2025-27 Batch)

### Structural Optimization

| Course Code and Course Title                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0CEOEC555<br>Structural Optimization                                                                                                                                |             |             |             |
|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|
| Semester                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | II                                                                                                                                                                  |             |             |             |
| Pre-requisite's                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1)Engineering Mathematics<br>(optimization basics, matrices, calculus)<br>2)Computer Applications in Civil Engineering<br>(basic programming and numerical methods) |             |             |             |
| Teaching Scheme (Hours per week)                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Lecture                                                                                                                                                             | Tutorial    | Practical   |             |
|                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 03                                                                                                                                                                  | -           | -           |             |
| Credit                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 03                                                                                                                                                                  |             |             |             |
| Evaluation Scheme                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ISE 1                                                                                                                                                               | MSE         | ISE 2       | ESE         |
|                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 10<br>Marks                                                                                                                                                         | 20<br>Marks | 10<br>Marks | 60<br>Marks |
| Course Outcomes (CO's): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                     |             |             | BL          |
| CO 1                                                                                              | Explain the fundamental concepts of optimization and formulate engineering problems as mathematical programming models.                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                     |             |             | 2           |
| CO 2                                                                                              | Apply classical and linear programming techniques to solve single and multivariable structural optimization problems.                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                     |             |             | 3           |
| CO 3                                                                                              | Utilize non-linear and constrained optimization methods to analyse and optimize structural systems.                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                     |             |             | 4           |
| CO4                                                                                               | Employ advanced optimization techniques such as geometric and dynamic programming for solving complex structural design problems.                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                     |             |             | 5           |
| Course Content                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                     |             |             | Hrs         |
| Unit 1                                                                                            | Introduction to optimization, engineering applications of optimization, Formulation of structural optimization problems as programming problems. Optimization Techniques: Classical optimization techniques, single variable optimization, multivariable optimization with no constraints, unconstrained minimization techniques and algorithms constrained optimization solutions by penalty function techniques, Lagrange multipliers techniques and feasibility techniques |                                                                                                                                                                     |             |             | 08          |
| Unit 2                                                                                            | Linear Programming: Linear programming, standard form of linear programming, geometry of linear programming problems, solution of a system of linear simultaneous equations, pivotal production of general systems of equations, simplex algorithms, revised simpler methods, duality in linear programming.                                                                                                                                                                  |                                                                                                                                                                     |             |             | 06          |

Dr. V. T. Gaikwad  
HOD-Civil

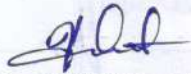
Dr. B. K. Pandeyaji  
Dean Academics

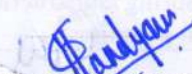
Dr. S. S. Mohite  
Director

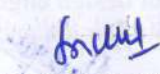
Prof. R. A. Kanai  
Executive Director



|                         |                                                                                                                                                                                                                                                                                                           |           |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 3</b>           | Non-linear programming: Non-linear programming, one dimensional minimization methods, elimination methods, Fibonacci method, golden section method, interpolation methods, quadratic and cubic methods, Unconstrained optimization methods, direct search methods, random search methods, descent methods | <b>06</b> |
| <b>Unit 4</b>           | Constrained optimization techniques such as direct methods, the complex methods, cutting plane method, exterior penalty function methods for structural engineering problems. Formulation and solution of structural optimization problems by different technique.                                        | <b>06</b> |
| <b>Unit 5</b>           | Geometric programming: Geometric programming, conversion of NLP as a sequence of LP / geometric programming.                                                                                                                                                                                              | <b>06</b> |
| <b>Unit 6</b>           | Dynamic programming: Dynamic programming conversion of NLP as a sequence of LP/ Dynamic programming.                                                                                                                                                                                                      | <b>04</b> |
| <b>Total Hours</b>      |                                                                                                                                                                                                                                                                                                           | <b>36</b> |
| <b>Text Books:</b>      |                                                                                                                                                                                                                                                                                                           |           |
| 1                       | Spunt, L. (1971). Optimum Structural Design. Prentice Hall.                                                                                                                                                                                                                                               |           |
| 2                       | Rao, S. S. (1978). Optimization – Theory and Practice. Wiley Eastern Ltd.                                                                                                                                                                                                                                 |           |
| 3                       | Kirsch, U. (1981). Optimum Structural Design. McGraw-Hill, New York.                                                                                                                                                                                                                                      |           |
| 4                       | Bronson, R., & Govindsami, N. (2017). Operations Research. Schaum's Outline Series.                                                                                                                                                                                                                       |           |
| <b>Reference Books:</b> |                                                                                                                                                                                                                                                                                                           |           |
| 1                       | Bhavikatti, S. S. (2003). Structural Optimization Using Sequential Linear Programming. Vikas Publishing.                                                                                                                                                                                                  |           |
| 2                       | Fox, R. L. (1971). Optimization Methods for Engineering Design. Addison-Wesley.                                                                                                                                                                                                                           |           |
| 3                       | Deo, N. (1989). System Simulation with Digital Computer. Prentice Hall of India, New Delhi.                                                                                                                                                                                                               |           |
| 4                       | Stark, R. M., & Nicholls, R. L. (1972). Mathematical Foundations for Design. McGraw-Hill, New York.                                                                                                                                                                                                       |           |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



### Industrial Safety

| Course Code and Course Title                                                                      |                                                                                                                                                                                                                                                                                                                                                      | 0CEOEC555<br>Industrial Safety                                                                                                                                      |             |             |             |
|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|
| Semester                                                                                          |                                                                                                                                                                                                                                                                                                                                                      | II                                                                                                                                                                  |             |             |             |
| Pre-requisite's                                                                                   |                                                                                                                                                                                                                                                                                                                                                      | 1)Engineering Mathematics<br>(optimization basics, matrices, calculus)<br>2)Computer Applications in Civil Engineering<br>(basic programming and numerical methods) |             |             |             |
| Teaching Scheme (Hours per week)                                                                  |                                                                                                                                                                                                                                                                                                                                                      | Lecture                                                                                                                                                             | Tutorial    | Practical   |             |
|                                                                                                   |                                                                                                                                                                                                                                                                                                                                                      | 03                                                                                                                                                                  | -           | -           |             |
| Credit                                                                                            |                                                                                                                                                                                                                                                                                                                                                      | 03                                                                                                                                                                  |             |             |             |
| Evaluation Scheme                                                                                 |                                                                                                                                                                                                                                                                                                                                                      | ISE 1                                                                                                                                                               | MSE         | ISE 2       | ESE         |
|                                                                                                   |                                                                                                                                                                                                                                                                                                                                                      | 10<br>Marks                                                                                                                                                         | 20<br>Marks | 10<br>Marks | 60<br>Marks |
| Course Outcomes (CO's): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                     |             |             | BL          |
| CO 1                                                                                              | Understand the importance and scope of safety in structural engineering                                                                                                                                                                                                                                                                              |                                                                                                                                                                     |             |             | 2           |
| CO 2                                                                                              | Apply safety principles in design and construction phases                                                                                                                                                                                                                                                                                            |                                                                                                                                                                     |             |             | 3           |
| CO 3                                                                                              | Conduct risk assessment and safety audits effectively                                                                                                                                                                                                                                                                                                |                                                                                                                                                                     |             |             | 4           |
| CO4                                                                                               | Interpret legal requirements and safety codes                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                     |             |             | 3           |
| CO5                                                                                               | Integrate digital tools and sustainability in safety planning                                                                                                                                                                                                                                                                                        |                                                                                                                                                                     |             |             | 5           |
| CO6                                                                                               | Design and propose safety improvement measures for real projects                                                                                                                                                                                                                                                                                     |                                                                                                                                                                     |             |             | 6           |
| Course Content                                                                                    |                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                     |             |             | Hrs         |
| Unit 1                                                                                            | Introduction to Industrial & Construction Safety<br>Importance and objectives of safety in structural engineering. Types of hazards: physical, mechanical, chemical, and ergonomic. Accident causation theories and analysis. Concepts of hazard, risk, and safety culture. Case studies: Major industrial/structural accidents and lessons learned. |                                                                                                                                                                     |             |             | 06          |
| Unit 2                                                                                            | Safety in Structural Design<br>Principles of design for safety and reliability. Design considerations for earthquake, fire, and wind safety. Fail-safe and redundancy in design. Role of design engineer in ensuring construction safety. Design stage risk identification and mitigation planning.                                                  |                                                                                                                                                                     |             |             | 06          |

Dr. V. T. Gaikwad  
HOD-Civil

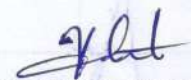
Dr. K. K. Pandeyaji  
Dean Academics

Dr. S. S. Mohite  
Director

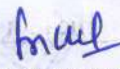
Prof. R. A. Kanai  
Executive Director



|                         |                                                                                                                                                                                                                                                                                                                                                                                              |           |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 3</b>           | Construction Site Safety Management<br>Safety in formwork, scaffolding, concreting, and erection. Lifting operations and material handling safety. Working at heights, excavation safety, confined space safety. PPE (Personal Protective Equipment) and safety signage. Site layout and traffic management for safe operation.                                                              | <b>06</b> |
| <b>Unit 4</b>           | Risk Assessment and Safety Systems<br>Risk identification, evaluation, and control hierarchy. Techniques: Job Safety Analysis (JSA), FMEA, HAZOP, Fault Tree Analysis. Safety management systems: OHSAS 18001, ISO 45001. Accident investigation and root cause analysis. Documentation, inspection, and safety audit procedures.                                                            | <b>06</b> |
| <b>Unit 5</b>           | Legal Framework, Standards, and Regulations<br>Indian Factories Act, BOCW Act, and Contract Labour Act. BIS codes for construction safety (IS 3764, IS 7205, IS 7293, IS 14687). OSHA and ILO guidelines. Safety certification, statutory approvals, and reporting procedures. Roles and responsibilities of engineers, contractors, and clients.                                            | <b>06</b> |
| <b>Unit 6</b>           | Emerging Technologies & Sustainable Safety Practices<br>Digital safety management using BIM, drones, IoT, and AI. Monitoring and predictive analytics for accident prevention. Disaster preparedness, emergency response, and evacuation planning. Ethical and sustainable aspects of safety in design and construction. Case studies on innovative safety practices in structural projects. | <b>06</b> |
| <b>Total Hours</b>      |                                                                                                                                                                                                                                                                                                                                                                                              | <b>36</b> |
| <b>Reference Books:</b> |                                                                                                                                                                                                                                                                                                                                                                                              |           |
| <b>1</b>                | K. U. Mistry, Safety and Accident Prevention in Engineering Industries, McGraw Hill.                                                                                                                                                                                                                                                                                                         |           |
| <b>2</b>                | John Ridley, Safety at Work, Routledge.                                                                                                                                                                                                                                                                                                                                                      |           |
| <b>3</b>                | S. L. Goel, Construction Safety Management, New Age International.                                                                                                                                                                                                                                                                                                                           |           |
| <b>4</b>                | R. Choudhury, Construction Safety Management and Engineering, McGraw Hill.                                                                                                                                                                                                                                                                                                                   |           |
| <b>5</b>                | ILO and OSHA Manuals on Occupational Safety and Health.                                                                                                                                                                                                                                                                                                                                      |           |
| <b>6</b>                | BIS Handbook SP 70 – Safety in Construction.                                                                                                                                                                                                                                                                                                                                                 |           |
| <b>7</b>                | Relevant IS Codes: IS 3764, IS 7205, IS 7293, IS 14687.                                                                                                                                                                                                                                                                                                                                      |           |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



Dr. Vasantraodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
 (Accredited by NAAC)  
**M.Tech. STRUCTURAL ENGINEERING**  
 Curriculum Structure and Evaluation Scheme  
 (2025-27 Batch)

**Project Management in Structural Engineering**

| Course Code and Course Title                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0CEOEC555<br>Project Management in Structural Engineering                                                                                                     |             |             |             |
|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|
| Semester                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | II                                                                                                                                                            |             |             |             |
| Pre-requisite's                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1)Engineering Mathematics (optimization basics, matrices, calculus)<br>2)Computer Applications in Civil Engineering (basic programming and numerical methods) |             |             |             |
| Teaching Scheme (Hours per week)                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Lecture                                                                                                                                                       | Tutorial    | Practical   |             |
|                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 03                                                                                                                                                            | -           | -           |             |
| Credit                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 03                                                                                                                                                            |             |             |             |
| Evaluation Scheme                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ISE 1                                                                                                                                                         | MSE         | ISE 2       | ESE         |
|                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 10<br>Marks                                                                                                                                                   | 20<br>Marks | 10<br>Marks | 60<br>Marks |
| Course Outcomes (CO's): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                               |             |             | BL          |
| CO 1                                                                                              | Demonstrate understanding of project management principles applied to structural engineering projects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                               |             |             | 2           |
| CO 2                                                                                              | Develop detailed project schedules and control systems using CPM, PERT, and BIM tools.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                               |             |             | 6           |
| CO 3                                                                                              | Optimize structural resources and cost through effective planning and monitoring.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                               |             |             | 5           |
| CO4                                                                                               | Assess and mitigate risks related to structural design, construction safety, and quality.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                               |             |             | 5           |
| CO5                                                                                               | Apply sustainability, digital tools, and performance management approaches in structural projects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                               |             |             | 3           |
| Course Content                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                               |             |             | Hrs         |
| Unit 1                                                                                            | <b>Fundamentals of Project Management in Structural Engineering</b> <ul style="list-style-type: none"><li>• Concept, objectives, and characteristics of engineering projects</li><li>• Classification of projects: structural, infrastructure, industrial, and special structures</li><li>• Project life cycle phases: feasibility, design, construction, operation, and maintenance</li><li>• Role of structural engineer in project management and coordination with other disciplines</li><li>• Organizational structures for structural projects (functional, matrix, and projectized)</li><li>• Case studies: bridges, high-rise buildings, industrial sheds, and precast structures</li></ul> |                                                                                                                                                               |             |             | 06          |

Dr. V. T. Gaikwad  
HOD-Civil

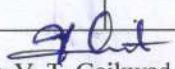
Dr. K. K. Pandey  
Dean Academics

Dr. S. S. Mohite  
Director

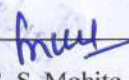
Prof. R. A. Kanai  
Executive Director

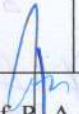


|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |           |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 2</b> | <b>Project Planning and Scheduling for Structural Works</b> <ul style="list-style-type: none"><li>• Work Breakdown Structure (WBS) and sequencing of structural activities (foundation to superstructure)</li><li>• CPM and PERT analysis with examples related to RCC and steel structures</li><li>• Time-cost optimization and crashing of structural project networks</li><li>• Gantt charts, milestone charts, and line of balance techniques</li><li>• Application of software: MS Project, Primavera, and BIM-based planning</li><li>• Case study: planning a reinforced concrete frame structure project</li></ul>                                                                   | <b>08</b> |
| <b>Unit 3</b> | <b>Resource, Cost, and Financial Management</b> <ul style="list-style-type: none"><li>• Material, manpower, and equipment management for structural works</li><li>• Resource levelling and resource smoothing in multi-storey building construction</li><li>• Estimation and cost control for structural components (footing, columns, beams, slabs, etc.)</li><li>• Cash flow forecasting and earned value analysis (EVA)</li><li>• Cost overrun analysis and control strategies</li><li>• Value Engineering in structural projects</li></ul>                                                                                                                                              | <b>08</b> |
| <b>Unit 4</b> | <b>Risk, Quality, and Safety Management in Structural Projects</b> <ul style="list-style-type: none"><li>• Identification and classification of risks in structural design and execution</li><li>• Design risk (loading assumptions, detailing errors) vs. construction risk (formwork failure, curing issues)</li><li>• Safety protocols during erection of steel and RCC structures</li><li>• Quality assurance and control: concrete testing, NDT, structural audit, and documentation</li><li>• Legal and contractual frameworks in structural construction projects (BIS codes, contract clauses)</li><li>• Case study: structural failure analysis and risk lessons learned</li></ul> | <b>07</b> |
| <b>Unit 5</b> | <b>Advanced and Emerging Tools in Structural Project Management</b> <ul style="list-style-type: none"><li>• Building Information Modelling (BIM) in structural coordination</li><li>• 4D and 5D BIM for project visualization, scheduling, and costing</li><li>• Digital Twin concept for lifecycle management of structures</li><li>• Use of AI and IoT in structural health monitoring and predictive maintenance</li><li>• Sustainable structural project management: lifecycle cost analysis, embodied carbon assessment</li><li>• Integration of safety, quality, and environmental performance indicators</li></ul>                                                                   | <b>06</b> |

  
Dr. V. T. Gaikwad  
HOD-Civil

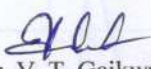
  
Dr. K. K. Pandeyaji  
Dean Academics

  
Dr. S. S. Mohite  
Director

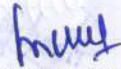
  
Prof. R. A. Kanai  
Executive Director

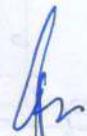


|                         |                                                                                                                                                                                                                                                                                                                                                                                                                   |           |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 6</b>           | <b>Case Studies and Industry Practices</b> <ul style="list-style-type: none"><li>• Project management approach in iconic Indian structural projects (bridges, metro viaducts, towers)</li><li>• Challenges in fast-track construction projects</li><li>• Performance evaluation of project management systems in structural engineering firms</li><li>• Guest lectures / seminars from industry experts</li></ul> | <b>05</b> |
| <b>Total Hours</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>36</b> |
| <b>Reference Books:</b> |                                                                                                                                                                                                                                                                                                                                                                                                                   |           |
| <b>1</b>                | Chitkara, K.K. – Construction Project Management: Planning, Scheduling and Controlling, Tata McGraw Hill.                                                                                                                                                                                                                                                                                                         |           |
| <b>2</b>                | 2. Kerzner, H. – Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Wiley.                                                                                                                                                                                                                                                                                                          |           |
| <b>3</b>                | 3. Punmia & Khandelwal – Project Planning and Control with PERT and CPM, Laxmi Publications.                                                                                                                                                                                                                                                                                                                      |           |
| <b>4</b>                | 4. Oberlender, G.D. – Project Management for Engineering and Construction, McGraw-Hill.                                                                                                                                                                                                                                                                                                                           |           |
| <b>5</b>                | 5. PMI – PMBOK® Guide (7th Edition), Project Management Institute.                                                                                                                                                                                                                                                                                                                                                |           |
| <b>6</b>                | 6. Raina, V.K. – Concrete Bridge Practice: Construction, Maintenance, and Rehabilitation, Shroff Publishers.                                                                                                                                                                                                                                                                                                      |           |
| <b>7</b>                | 7. IS 15883 (Part 1-7) – Guidelines for Construction Project Management.                                                                                                                                                                                                                                                                                                                                          |           |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

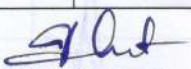
  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director

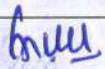


### Mini Project

| Course Code and Course Title                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0CEVSE556<br>Mini Project |           |           |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------|-----------|
| Semester                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | II                        |           |           |
| Prerequisites                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | -                         |           |           |
| Teaching Scheme (hours per week)                                                                        | Lecture                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Tutorial                  | Practical |           |
|                                                                                                         | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | -                         | 4         |           |
| Credit                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 02                        |           |           |
| Evaluation Scheme                                                                                       | ISE 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                           | ISE 2     |           |
|                                                                                                         | 25 Marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                           | 25 Marks  |           |
| <b>Course Outcomes (COs):</b> - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                           |           | <b>BL</b> |
| CO1                                                                                                     | Identify relevant research problems in structural engineering through literature review                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                           |           | 4         |
| CO2                                                                                                     | Formulate clear and concise objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                           |           | 5         |
| CO 3                                                                                                    | Analyze structural engineering problems using appropriate tools and techniques                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                           |           | 4         |
| CO 4                                                                                                    | Validate the results of research work from literature by principle of replication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                           |           | 5         |
| CO5                                                                                                     | Prepare a detailed technical report and present project findings clearly and confidently                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                           |           | 5         |
| <b>Course Content</b>                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                           |           |           |
|                                                                                                         | <b>Note:</b><br>The 'Mini Project' course offers students an opportunity to explore advanced topics in structural engineering. Students choose a topic in consultation with their supervisor, focusing on dissertation work, societal problems, or special structures using standard software. The students should apply any tool such as software, mathematical method, and development of programming, experimental method or solving selected problem. Here parametric study is not expected. This course emphasizes practical application, fostering skills such as problem identification, report preparation, and effective communication. Students are expected to develop lifelong learning abilities and deliver presentations, showcasing their findings. A comprehensive report must be submitted to the Department Post Graduate Committee in both hard and soft copy formats. |                           |           |           |

  
 Dr. V. T. Gaikwad  
 HOD-Civil

  
 Dr. K. K. Pandey  
 Dean Academics

  
 Dr. S. S. Mohite  
 Director

  
 Prof. R. A. Kanai  
 Executive Director



### Software Applications in Civil Engineering Lab II

| Course Code and Course Title                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0CEAEC557<br>Software Application in Civil Engineering8 Lab-II |          |           |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------|-----------|
| Semester                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | II                                                             |          |           |
| Prerequisites                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Basic knowledge of structural analysis and design              |          |           |
| Teaching Scheme (hours per week)                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Lecture                                                        | Tutorial | Practical |
|                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | -                                                              | -        | 4         |
| Credit                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 02                                                             |          |           |
| Evaluation Scheme                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ISE 1                                                          | ISE 2    |           |
|                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 25 Marks                                                       | 25 Marks |           |
| Course Outcomes (COs): - Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                |          |           |
|                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                |          | BL        |
| CO1                                                                                              | Analyze steel structural systems (truss, tower, frame, hoarding, etc.) using standard software and IS codes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                |          | 4         |
| CO2                                                                                              | Design structural members and connections as per IS 800:2007 using software and manual validation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                |          | 4         |
| CO3                                                                                              | Prepare detailing drawings, interpret results, and compile a professional design report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                |          | 6         |
| Course Content                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                |          |           |
| Unit No.                                                                                         | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                |          | Hrs.      |
|                                                                                                  | <b>Activity 1: Analysis of Steel Structures using Software</b> <ul style="list-style-type: none"><li>• Introduction to structural analysis tools (STAAD. Pro / ETABS / SAP2000).</li><li>• Modeling and analysis of one of the following structures:<ul style="list-style-type: none"><li>○ Roof truss</li><li>○ Transmission / Telecom tower</li><li>○ Steel building frame / Industrial shed</li><li>○ Hoarding / Billboard support structure</li></ul></li><li>• Application of loads (DL, LL, WL) as per IS 875.</li><li>• Extraction and interpretation of analysis results (member forces, reactions, deflections).</li><li>• Validation of software output with theoretical calculations.</li></ul> <b>Deliverables:</b> Model file, load application sheet, analysis report (member forces & deflection summary) |                                                                |          | 14        |

Dr. V. T. Gaikwad  
HOD-Civil

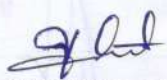
Dr. K. K. Pandeyaji  
Dean Academics

Dr. S. S. Mohite  
Director

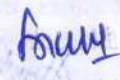
Prof. R. A. Kanai  
Executive Director



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Activity 2: Design and Detailing of Steel Structures</b> <ul style="list-style-type: none"><li>Design of structural members as per IS 800:2007 (Limit State Method):<ul style="list-style-type: none"><li>Tension and compression members</li><li>Beams, columns, and base plates</li><li>Welded and bolted connections</li></ul></li><li>Preparation of structural detailing drawings using AutoCAD / Tekla.</li><li>Compilation of design report and presentation of results.</li></ul> <b>Deliverables:</b> Design calculations, detailing drawings, final report, and presentation. | <b>14</b> |
| <b>Viva-Voce / Presentation / Report Submission</b> <ul style="list-style-type: none"><li>Oral examination and evaluation of analytical and design work.</li><li>Assessment of report preparation, teamwork, and presentation skills.</li></ul>                                                                                                                                                                                                                                                                                                                                            | <b>8</b>  |
| <b>Note: Students shall select any one of the mentioned steel structures (Roof Truss / Tower / Frame / Hoarding) and perform both mandatory activities —</b> <ol style="list-style-type: none"><li>Analysis, and</li><li>Design &amp; Detailing —<br/>for the same selected structure.</li></ol>                                                                                                                                                                                                                                                                                           |           |
| <b>Total Hours</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>36</b> |
| <b>Text Books:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |           |
| 1. S.K. Duggal, Limit State Design of Steel Structures, McGraw-Hill.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |
| 2. N. Subramanian, Design of Steel Structures, Oxford University Press.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |
| 3. IS 800:2007, General Construction in Steel – Code of Practice.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |           |
| 4. IS 875 (Part I–V), Loading Standards.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



### Innovation, Entrepreneurship & Start-up Management

| Course Code and Course Title                                            |                                                                                                                                                                                                                                  | 0CEEM558<br>Innovation, Entrepreneurship & Start-up Management |          |           |       |
|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------|-----------|-------|
| Prerequisites                                                           |                                                                                                                                                                                                                                  | Basics of Management, Engineering Economics                    |          |           |       |
| Teaching Scheme                                                         |                                                                                                                                                                                                                                  | Lecture                                                        | Tutorial | Practical |       |
|                                                                         |                                                                                                                                                                                                                                  | 3                                                              | -        | -         |       |
| Credits                                                                 |                                                                                                                                                                                                                                  | 03                                                             |          |           |       |
| Evaluation Scheme                                                       |                                                                                                                                                                                                                                  | ISE 1                                                          | MSE      | ISE 2     | ESE   |
|                                                                         |                                                                                                                                                                                                                                  | 10                                                             | 20       | 10        | 60    |
|                                                                         |                                                                                                                                                                                                                                  | Marks                                                          | Marks    | Marks     | Marks |
| Course Outcomes (CO)                                                    |                                                                                                                                                                                                                                  |                                                                |          |           | BTL   |
| Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                  |                                                                |          |           |       |
| CO1                                                                     | Apply the concepts of innovation, creativity, and design thinking to develop new product and service ideas                                                                                                                       |                                                                |          |           | 3     |
| CO2                                                                     | Analyze entrepreneurial opportunities, business models, and market feasibility for start-ups                                                                                                                                     |                                                                |          |           | 4     |
| CO3                                                                     | Evaluate funding options, financial planning, and risk management strategies for entrepreneurial ventures                                                                                                                        |                                                                |          |           | 5     |
| CO4                                                                     | Apply knowledge of legal, ethical, and intellectual property (IPR) frameworks to start-up management                                                                                                                             |                                                                |          |           | 3     |
| CO5                                                                     | Assess strategies for scaling, sustainability, and leadership in entrepreneurship through case studies of successful start-ups                                                                                                   |                                                                |          |           | 5     |
| Course Content                                                          |                                                                                                                                                                                                                                  |                                                                |          |           | Hrs   |
| Unit 1                                                                  | Fundamentals of Innovation & Entrepreneurship<br>Concept of innovation and entrepreneurship, Types of innovation, Creativity and idea generation techniques, Role of entrepreneurship in economic development, Intrapreneurship. |                                                                |          |           | 07    |
| Unit 2                                                                  | Business Models & Opportunity Identification<br>Business model canvas, Value proposition, Customer development, Market analysis, Identifying business opportunities, Feasibility analysis.                                       |                                                                |          |           | 06    |
| Unit 3                                                                  | Start-up Ecosystem & Funding<br>Start-up life cycle, Start-up India initiative, Incubators and accelerators, Angel investors, Venture capital, Crowdfunding, Government policies and schemes.                                    |                                                                |          |           | 06    |
| Unit 4                                                                  | Business Planning & Risk Management<br>Components of a business plan, Financial planning and projections, Technology commercialization, Managing risks and uncertainties, Exit strategies.                                       |                                                                |          |           | 06    |
| Unit 5                                                                  | Innovation for Sustainability & Social Entrepreneurship<br>Sustainable business models, Social entrepreneurship, Green innovations, Circular economy opportunities.                                                              |                                                                |          |           | 06    |

Dr. V. T. Gaikwad  
HOD-Civil

Dr. K. K. Pandeyaji  
Dean Academics

Dr. S. S. Mohite  
Director

Prof. R. A. Kanai  
Executive Director



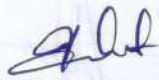
|                    |                                                                                                                                                                                                          |           |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 6</b>      | <b>Leadership, IPR, and Case Studies</b><br>Intellectual property in entrepreneurship, Leadership in start-ups,<br>Strategic growth management, Case studies of successful innovations<br>and start-ups. | <b>06</b> |
| <b>Total Hours</b> |                                                                                                                                                                                                          | <b>37</b> |

**Text Books:**

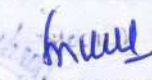
|          |                                                                                                 |
|----------|-------------------------------------------------------------------------------------------------|
| <b>1</b> | S.S. Khanka, Entrepreneurial Development, S. Chand & Co.                                        |
| <b>2</b> | Peter F. Drucker, Innovation and Entrepreneurship, Harper Business.                             |
| <b>3</b> | Vijay Govindarajan & Chris Trimble, The Other Side of Innovation, Harvard Business Review Press |

**Reference Books:**

|          |                                                                                               |
|----------|-----------------------------------------------------------------------------------------------|
| <b>1</b> | Barringer & Ireland, Entrepreneurship: Successfully Launching New Ventures, Pearson.          |
| <b>2</b> | Timmons & Spinelli, New Venture Creation: Entrepreneurship for the 21st Century, McGraw-Hill. |
| <b>3</b> | Ries, Eric, The Lean Startup, Crown Publishing.                                               |
| <b>4</b> | Hisrich, Peters & Shepherd, Entrepreneurship, McGraw-Hill.                                    |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



### Project Management & Strategic Planning

| Course Code and Course Title                                            |                                                                                                                                                                                                                                      | 0CEEEEM558                                                         |          |           |       |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------|-----------|-------|
| Prerequisites                                                           |                                                                                                                                                                                                                                      | Project Management & Strategic Planning                            |          |           |       |
| Teaching Scheme                                                         |                                                                                                                                                                                                                                      | Basics of Management, Engineering Economics, Operations Management |          |           |       |
|                                                                         |                                                                                                                                                                                                                                      | Lecture                                                            | Tutorial | Practical |       |
|                                                                         |                                                                                                                                                                                                                                      | 3                                                                  | -        | -         |       |
| Credits                                                                 |                                                                                                                                                                                                                                      | 03                                                                 |          |           |       |
| Evaluation Scheme                                                       |                                                                                                                                                                                                                                      | ISE 1                                                              | MSE      | ISE 2     | ESE   |
|                                                                         |                                                                                                                                                                                                                                      | 10                                                                 | 20       | 10        | 60    |
|                                                                         |                                                                                                                                                                                                                                      | Marks                                                              | Marks    | Marks     | Marks |
| Course Outcomes (CO)                                                    |                                                                                                                                                                                                                                      |                                                                    |          |           | BTL   |
| Upon successful completion of this course, the student will be able to: |                                                                                                                                                                                                                                      |                                                                    |          |           |       |
| CO1                                                                     | Apply principles of project management, life cycle, and project organization.                                                                                                                                                        |                                                                    |          |           | 3     |
| CO2                                                                     | Apply project planning, scheduling, resource allocation, and cost estimation techniques.                                                                                                                                             |                                                                    |          |           | 3     |
| CO3                                                                     | Analyze project risks, quality, and performance metrics for effective decision-making.                                                                                                                                               |                                                                    |          |           | 4     |
| CO4                                                                     | Demonstrate knowledge of strategic planning, portfolio management, and project alignment with business objectives.                                                                                                                   |                                                                    |          |           | 3     |
| CO5                                                                     | Design project management frameworks for real-world engineering and industrial projects, ensuring sustainability and efficiency.                                                                                                     |                                                                    |          |           | 5     |
| Course Contents                                                         |                                                                                                                                                                                                                                      |                                                                    |          |           |       |
| Unit No                                                                 | Contents                                                                                                                                                                                                                             |                                                                    |          |           | Hrs   |
| Unit 1                                                                  | Fundamentals of Project Management<br>Introduction to projects and project management, project life cycle, roles and responsibilities, project organization structures, project objectives and scope, project selection methods.     |                                                                    |          |           | 07    |
| Unit 2                                                                  | Project Planning and Scheduling<br>Work Breakdown Structure (WBS), Gantt charts, Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), resource allocation, cost estimation, budgeting.                        |                                                                    |          |           | 06    |
| Unit 3                                                                  | Project Risk Management<br>Risk identification, risk assessment methods, qualitative and quantitative risk analysis, risk mitigation strategies, contingency planning.                                                               |                                                                    |          |           | 06    |
| Unit 4                                                                  | Project Quality and Performance Management<br>Quality management principles, Six Sigma, Total Quality Management (TQM), Key Performance Indicators (KPIs), Earned Value Management (EVM), project monitoring and control techniques. |                                                                    |          |           | 07    |

Dr. V. T. Gaikwad  
HOD-Civil

Dr. K. K. Pandeyaji  
Dean Academics

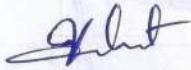
Dr. S. S. Mohite  
Director

Prof. R. A. Kanai  
Executive Director

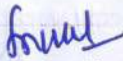


|                    |                                                                                                                                                                                                                                                   |           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 5</b>      | <b>Strategic Planning &amp; Project Alignment</b><br>Strategic planning process, mission, vision, and objectives; Portfolio and program management, project prioritization, alignment of projects with business strategy, decision-making models. | <b>06</b> |
| <b>Unit 6</b>      | <b>Applications and Contemporary Trends</b><br>Agile and Lean project management, project management software (MS Project, Primavera), sustainable project management, case studies of engineering projects, global trends and best practices.    | <b>07</b> |
| <b>Total Hours</b> |                                                                                                                                                                                                                                                   | <b>39</b> |

|                         |                                                                                                       |
|-------------------------|-------------------------------------------------------------------------------------------------------|
| <b>Text Books:</b>      |                                                                                                       |
| <b>1</b>                | Meredith, J.R., Mantel, S.J. – Project Management: A Managerial Approach, Wiley.                      |
| <b>2</b>                | Kerzner, H. – Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Wiley. |
| <b>3</b>                | Cleland, D.I., Ireland, L.R. – Project Management: Strategic Design and Implementation, McGraw-Hill.  |
| <b>Reference Books:</b> |                                                                                                       |
| <b>1</b>                | Pinto, J.K. – Project Management: Achieving Competitive Advantage, Pearson.                           |
| <b>2</b>                | Schwalbe, K. – Information Technology Project Management, Cengage.                                    |
| <b>3</b>                | PMI – A Guide to the Project Management Body of Knowledge (PMBOK® Guide), PMI Publications.           |
| <b>4</b>                | Gido, J., Clements, J. – Successful Project Management, Cengage.                                      |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director



### Engineering Economics & Cost Analysis

| Course Code and Course Title                                            |                                                                                                                        | 0CEEEM558<br>Engineering Economics & Cost Analysis                                                                                                                                                                                        |             |             |             |
|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|
| Prerequisites                                                           |                                                                                                                        | Basics of Economics, Mathematics, Fundamentals of Engineering Management                                                                                                                                                                  |             |             |             |
| Teaching Scheme                                                         |                                                                                                                        | Lecture                                                                                                                                                                                                                                   | Tutorial    | Practical   |             |
|                                                                         |                                                                                                                        | 3                                                                                                                                                                                                                                         | -           | -           |             |
| Credits                                                                 |                                                                                                                        | 03                                                                                                                                                                                                                                        |             |             |             |
| Evaluation Scheme                                                       |                                                                                                                        | ISE 1                                                                                                                                                                                                                                     | MSE         | ISE 2       | ESE         |
|                                                                         |                                                                                                                        | 10<br>Marks                                                                                                                                                                                                                               | 20<br>Marks | 10<br>Marks | 60<br>Marks |
| Course Outcomes (CO)                                                    |                                                                                                                        |                                                                                                                                                                                                                                           |             |             | BTL         |
| Upon successful completion of this course, the student will be able to: |                                                                                                                        |                                                                                                                                                                                                                                           |             |             |             |
| CO1                                                                     | Apply principles of engineering economics, demand-supply analysis, and cost concepts in engineering decision-making.   |                                                                                                                                                                                                                                           |             |             | 3           |
| CO2                                                                     | Analyze cost estimation, cost-volume-profit relationships, and break-even analysis for projects.                       |                                                                                                                                                                                                                                           |             |             | 4           |
| CO3                                                                     | Evaluate investment alternatives using capital budgeting techniques such as NPV, IRR, and Payback Period.              |                                                                                                                                                                                                                                           |             |             | 5           |
| CO4                                                                     | Apply knowledge of depreciation, inflation, and replacement analysis in economic evaluation.                           |                                                                                                                                                                                                                                           |             |             | 3           |
| CO5                                                                     | Assess economic feasibility and sustainability of engineering projects through case studies and cost-benefit analysis. |                                                                                                                                                                                                                                           |             |             | 5           |
| Course Contents                                                         |                                                                                                                        |                                                                                                                                                                                                                                           |             |             |             |
| Unit No                                                                 |                                                                                                                        | Contents                                                                                                                                                                                                                                  |             |             | Hrs         |
| Unit 1                                                                  |                                                                                                                        | Fundamentals of Engineering Economics<br>Nature and scope of economics, demand and supply analysis, elasticity, cost concepts, types of costs, opportunity cost, time value of money, interest formulas.                                  |             |             | 06          |
| Unit 2                                                                  |                                                                                                                        | Cost Estimation and Analysis<br>Elements of cost, cost classification, cost estimation methods, cost-volume-profit (CVP) analysis, break-even analysis, marginal costing, contribution analysis                                           |             |             | 06          |
| Unit 3                                                                  |                                                                                                                        | Capital Budgeting & Investment Decisions<br>Methods of project evaluation: Payback Period, Net Present Value (NPV), Internal Rate of Return (IRR), Benefit-Cost Ratio, Annual Equivalent Method. Decision under risk and uncertainty.     |             |             | 07          |
| Unit 4                                                                  |                                                                                                                        | Depreciation and Replacement Analysis<br>Depreciation concepts and methods: Straight-line, Declining Balance, Sum of Years' Digits, Units of Production. Replacement analysis of assets and equipment, inflation impact on cost analysis. |             |             | 07          |

Dr. V. T. Gaikwad  
HOD-Civil

Dr. K. K. Pandey  
Dean Academics

Dr. S. S. Mohite  
Director

Prof. R. A. Kanai  
Executive Director



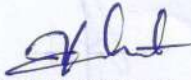
|               |                                                                                                                                                                                                                                 |           |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit 5</b> | <b>Cost-Benefit and Financial Analysis of Projects</b><br>Economic feasibility, life-cycle costing, cost-benefit analysis, sensitivity analysis, financial statements for project evaluation, working capital management.       | <b>07</b> |
| <b>Unit 6</b> | <b>Applications and Case Studies</b><br>Applications in engineering projects, industrial case studies, sustainability and green economics in engineering decisions, contemporary issues in cost analysis and project economics. | <b>06</b> |
|               | <b>Total Hours</b>                                                                                                                                                                                                              | <b>39</b> |

**Text Books:**

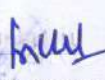
|          |                                                                                                                 |
|----------|-----------------------------------------------------------------------------------------------------------------|
| <b>1</b> | Riggs, J.L., Bedworth, D.D., Randhawa, S.U. – Engineering Economics, McGraw-Hill.                               |
| <b>2</b> | Prasanna Chandra – Projects: Planning, Analysis, Selection, Financing, Implementation, and Review, McGraw-Hill. |
| <b>3</b> | Sullivan, W.G., Wicks, E.M., Koelling, C.P. – Engineering Economy, Pearson.                                     |

**Reference Books:**

|          |                                                                               |
|----------|-------------------------------------------------------------------------------|
| <b>1</b> | R.Paneer Selvam – Engineering Economics, PHI Learning.                        |
| <b>2</b> | Blank, L.T., Tarquin, A.J. – Engineering Economy, McGraw-Hill.                |
| <b>3</b> | DeGarmo, E.P., Canada, J.R., Sullivan, W.G. – Engineering Economy, Macmillan. |
| <b>4</b> | Gupta, R.L. – Cost Accounting: Principles and Practice, Sultan Chand.         |

  
Dr. V. T. Gaikwad  
HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics

  
Dr. S. S. Mohite  
Director

  
Prof. R. A. Kanai  
Executive Director

Dr. Vasantnraodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF  
TECHNOLOGY, BUDHGAON, SANGLI- 416304.**

**An Autonomous Institute**

Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**



**Curriculum for**

**M.Tech. STRUCTURAL ENGINEERING**

In accordance with the *National Education Policy (NEP) 2020*,  
including curriculum structure and evaluation scheme

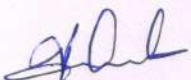
**Effective from Academic Year 2025–2026**



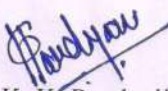
|                                      |                                          |          |           |       |
|--------------------------------------|------------------------------------------|----------|-----------|-------|
| Class                                | Second Year M. Tech., Semester III       |          |           |       |
| Course Code and Course Title         | 0CEPCC601 - Advanced Concrete Technology |          |           |       |
| Prerequisites                        | Concrete technology                      |          |           |       |
| Teaching Scheme<br>(Hours per week ) | Lecture                                  | Tutorial | Practical |       |
|                                      | 03                                       | —        | —         |       |
| Credit                               | 3                                        |          |           |       |
| Evaluation Scheme<br>(Marks)         | ISE                                      | MSE      | ESE       | Total |
|                                      | 20                                       | 20       | 60        | 100   |

| <b>Course Outcomes ( CO'S):-</b> Upon successful completion of this course , the student will able to: |                                                                                                                                      |  | <b>BL</b> |
|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--|-----------|
| <b>CO1</b>                                                                                             | <b>Explain</b> the composition of different types of cement and their basic chemical and physical properties                         |  | 2         |
| <b>CO2</b>                                                                                             | <b>Evaluate</b> the suitability of aggregates and chemical admixtures for specific concrete applications                             |  | 5         |
| <b>CO3</b>                                                                                             | <b>Assess</b> the effects of mineral admixtures on concrete properties and performance                                               |  | 4         |
| <b>CO4</b>                                                                                             | <b>Compare</b> and contrast different mixture proportioning methods and their impact on concrete properties                          |  | 4         |
| <b>CO5</b>                                                                                             | <b>Assess</b> the factors influencing the properties of hardened concrete over time and propose potential solutions or improvements. |  | 5         |
| <b>CO6</b>                                                                                             | <b>Evaluate</b> maintenance strategies for enhancing the durability and longevity of concrete infrastructure.                        |  | 5         |

| <b>Course Contents</b> |                                                                                                                                                                                                                                                                                                                                                                         |                 |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Unit No.</b>        | <b>Contents</b>                                                                                                                                                                                                                                                                                                                                                         | <b>Duration</b> |
| 1                      | <b>Cement Production and Composition, Cement Chemistry</b> – Cement raw materials, manufacturing process, clinker formation and grinding; chemical composition and Bogue's compounds; hydration of cement, hydration products, C-S-H, calcium hydroxide and ettringite; heat of hydration, setting and hardening; factors affecting hydration and strength development. | 7               |
| 2                      | <b>Aggregates for Concrete, Chemical Admixtures</b> – Classification and properties of aggregates; grading, particle shape and texture, specific gravity, absorption, moisture content and deleterious materials; mechanical                                                                                                                                            | 7               |

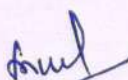
  
Dr. V. T. Gaiwad

HOD-Civil

  
Dr. K. K. Pandeyaji

Dean Academics



  
Dr. S. S. Mohite

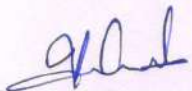
Director



|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|                    | properties of aggregates; types and mechanisms of chemical admixtures; plasticizers, superplasticizers, accelerators, retarders and air-entraining admixtures; effects and compatibility with cement.                                                                                                                                                                                                                             |           |
| 3                  | <b>Chemical and Mineral Admixtures, Mineral Admixtures</b> – Classification and applications of chemical and mineral admixtures; fly ash, GGBS, silica fume, metakaolin and natural pozzolans; pozzolanic and hydraulic reactions; effects on workability, hydration, strength, permeability and durability; compatibility and sustainable use of admixtures.                                                                     | 6         |
| 4                  | <b>High Performance Concrete Mixture Proportioning, Fresh Concrete</b> – Concept and characteristics of high-performance concrete; selection of constituent materials; water–binder ratio; role of superplasticizers and mineral admixtures; mixture proportioning and trial mixes; workability, consistency, segregation, bleeding, setting, air content, rheology, placing, compaction, finishing and curing of fresh concrete. | 7         |
| 5                  | <b>Hardened Concrete, Creep and Shrinkage</b> – Compressive, tensile and flexural strength; stress–strain behaviour; strength development; modulus of elasticity and Poisson's ratio; microstructure, transition zone, porosity and permeability; cracking and fracture behaviour; creep mechanisms, basic and drying creep; plastic, drying, autogenous and carbonation shrinkage; influencing factors and shrinkage cracking.   | 6         |
| 6                  | <b>Durability of Concrete</b> – Concept and mechanisms of durability; permeability and transport properties; carbonation, chloride ingress, sulphate and acid attack; alkali–aggregate reaction; reinforcement corrosion, abrasion and erosion; factors affecting durability; durability-based mix design, methods of improving durability and service-life considerations.                                                       | 6         |
| <b>Total Hours</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>39</b> |

**Text Books:**

| Sr. No. | Title                                              | Author                              | Publisher                        | Edition         | Year of Edition |
|---------|----------------------------------------------------|-------------------------------------|----------------------------------|-----------------|-----------------|
| 01      | Concrete: Microstructure, Properties, and Material | Mehta, P. K., and Monteiro, P. J. M | McGraw Hill, Delhi               | 4 <sup>th</sup> | 2014            |
| 02      | Special Structural Concretes                       | Rafat Siddique                      | Galgotia Publication Private Ltd | 1 <sup>st</sup> | 2000            |

  
Dr. V. T. Gaikwad

HOD-Civil

  
Dr. K. K. Pandey

Dean Academics



  
Dr. S. S. Mohite

Director



**Reference Book:**

| Sr. No. | Title                            | Author                                  | Publisher                           | Edition         | Year of Edition |
|---------|----------------------------------|-----------------------------------------|-------------------------------------|-----------------|-----------------|
| 01      | Properties of Concrete           | Neville, A. M                           | Pitman Publishing                   | 3 <sup>rd</sup> | 1881            |
| 02      | Chemistry of Cement and Concrete | Hewlett, P. C                           | Arnold Publishers                   | 4 <sup>th</sup> | 1998            |
| 03      | Steel Corrosion in Concrete      | Bentur, A., Diamond, S., and Berke, N.S | E&FN Spon, UK                       | 1 <sup>st</sup> | 1997            |
| 04      | Cement Chemistry                 | Taylor, H. W. F                         | Academic Press, Inc., San Diego, CA | 2 <sup>nd</sup> | 1990            |
| 05      | Advanced Concrete Technology     | J. Newman and B. S. Choo                | Four Volume Set, Elsevier           | 1 <sup>st</sup> | 2003            |

**Useful link: -**

1. <https://onlinecourses.nptel.ac.in/>
2. NPTEL-Civil Engineering-Concrete Engineering and Technology

Dr. V. T. Gaikwad

HOD-Civil

Dr. K. K. Pandeyaji

Dean Academics



Dr. S. S. Mohite

Director



Dr. Vasantodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

|                                      |                                    |          |           |       |
|--------------------------------------|------------------------------------|----------|-----------|-------|
| Class                                | Second Year M. Tech., Semester III |          |           |       |
| Course Code and Course Title         | 0CEPEC602, SWAYAM-NPTEL Course     |          |           |       |
| Prerequisites                        | Concrete technology                |          |           |       |
| Teaching Scheme<br>(Hours per week ) | Lecture                            | Tutorial | Practical |       |
|                                      | 03                                 | —        | —         |       |
| Credit                               | 3                                  |          |           |       |
| Evaluation Scheme<br>(Marks)         | ISE                                | MSE      | ESE       | Total |
|                                      | 100                                | -        | -         | 100   |

|                                                                                                        |                                                                                                                      |           |
|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Course Outcomes ( CO'S):-</b> Upon successful completion of this course , the student will able to: |                                                                                                                      | <b>BL</b> |
| <b>CO1</b>                                                                                             | <b>Explain</b> fundamental concepts and principles related to the selected area of Structural Engineering.           | 3         |
| <b>CO2</b>                                                                                             | <b>Apply</b> relevant engineering principles, methods, and techniques to solve structural engineering problems.      | 3         |
| <b>CO3</b>                                                                                             | <b>Analyze</b> structural engineering problems using appropriate analytical, computational, or modelling techniques. | 4         |
| <b>CO4</b>                                                                                             | <b>Evaluate</b> available approaches and solutions based on technical, practical, and engineering considerations.    | 4         |

**Course Guidelines:**

Guidelines for SWAYAM-NPTEL Course

1. Students shall undertake a SWAYAM-NPTEL course relevant to Structural Engineering.
2. The selected SWAYAM-NPTEL course shall have credits equal to or higher than the credits prescribed for the respective course in the curriculum structure.
3. Students shall select the course in consultation with the Supervisor/Faculty Advisor and obtain prior approval from the Head of Programme.
4. Students shall complete all assignments, assessments, and other academic requirements prescribed for the selected SWAYAM-NPTEL course.
5. Students shall appear for and successfully complete the final certification examination conducted through the SWAYAM-NPTEL platform at the allotted examination centre.

Dr. V. T. Gaiwad

HOD-Civil

Dr. K. K. Pandey

Dean Academics



Dr. S. S. Mohite

Director



Dr. Vasantodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

6. Students shall obtain the SWAYAM-NPTEL course completion certificate within the stipulated programme duration and submit a copy to the Head of Programme, duly verified/signed by the Supervisor or concerned faculty member for ISE evaluation.
7. If a student fails to obtain certification in the selected SWAYAM-NPTEL course, he/she may register for an equivalent SWAYAM-NPTEL course relevant to Structural Engineering in the subsequent semester, subject to approval of the concerned authorities.
8. Successful completion of the SWAYAM-NPTEL course and submission of the valid certificate shall be mandatory for final evaluation of the course.

#### **Course Description**

The course enables students to acquire advanced knowledge and technical skills through a SWAYAM-NPTEL certification course relevant to Structural Engineering or allied areas. Students shall select a suitable course having credits equal to or higher than those prescribed in the curriculum structure, in consultation with the Supervisor/Faculty Advisor. The selected course should enhance students' understanding of contemporary developments, methodologies, analytical techniques, and professional practices. Upon successful completion, students shall submit the course completion certificate and prescribed documentation to the Head of Programme for evaluation.

Dr. V. T. Gaikwad

**HOD-Civil**

Dr. K. K. Pandey

**Dean Academics**



Dr. S. S. Mohite

**Director**



Dr. Vasantodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad

(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**

Curriculum Structure and Evaluation Scheme

(2025-27 Batch)

|                                   |                                                    |          |           |       |
|-----------------------------------|----------------------------------------------------|----------|-----------|-------|
| Class                             | Second Year M. Tech., Semester III                 |          |           |       |
| Course Code and Course Title      | 0CEOEC603 - Introduction to Engineering Seismology |          |           |       |
| Prerequisites                     | Earthquake Engineering                             |          |           |       |
| Teaching Scheme (Hours per week ) | Lecture                                            | Tutorial | Practical |       |
|                                   | 03                                                 | —        | —         |       |
| Credit                            | 3                                                  |          |           |       |
| Evaluation Scheme (Marks)         | ISE                                                | MSE      | ESE       | Total |
|                                   | 20                                                 | 20       | 60        | 100   |

| <b>Course Outcomes ( CO'S):-</b> Upon successful completion of this course , the student will able to: |                                                                                                                                    | <b>BL</b> |
|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>CO1</b>                                                                                             | <b>Apply</b> the concept of plate tectonics and its relation to seismic activity                                                   | 3         |
| <b>CO2</b>                                                                                             | <b>Utilize</b> knowledge of seismic wave characteristics to interpret earthquake intensity and magnitude.                          | 3         |
| <b>CO3</b>                                                                                             | <b>Interpret</b> seismic records effectively using earthquake instrumentation.                                                     | 3         |
| <b>CO4</b>                                                                                             | <b>Implement</b> predictive models to estimate seismic hazard parameters for specific regions.                                     | 3         |
| <b>CO5</b>                                                                                             | <b>Analyse</b> tectonic maps generated from earthquake catalogue data to interpret their                                           | 4         |
| <b>CO6</b>                                                                                             | <b>Analyse</b> seismic hazard using deterministic and probabilistic methods, integrating rupture-based approaches and case studies | 4         |

| <b>Course Contents</b> |                                                                                                                                                                                                                                                                               |                 |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Unit No.</b>        | <b>Contents</b>                                                                                                                                                                                                                                                               | <b>Duration</b> |
| 1                      | Earthquake Hazard and Basic Seismology Introduction to earthquake hazards- Global seismicity and Seismic risk, History of Engineering Seismology and Earthquake types. Elastic Rebound Theory; Earthquake sources; Plate tectonics, and Plate Boundaries: Continental Drift   | 6               |
| 2                      | Seismic Waves and Energy Theory of Wave Propagation Seismic wave propagation, Types of seismic waves, Wave characteristics and Shadow zones Concept of Earthquake Measurement, Seismic Intensity and Magnitudes Scales, Past earthquake Energy and Comparable Explosive tests | 6               |

Dr. V. T. Gaikwad

HOD-Civil

Dr. K. K. Pandey

Dean Academics



Dr. S. S. Mohite

Director



Dr. Vasanttraodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

|                    |                                                                                                                                                                                                                                                                                                                                                       |           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 3                  | Earthquake Instrumentation Earthquake Instruments, Sensors and Data Loggers, Mechanical and Digital sensors; Seismic Station, Interpretation of Seismic Records: Identification of made events and natural earthquake; Time and frequency domain characteristic of ground motion                                                                      | 6         |
| 4                  | Seismic Zonation and Predictive Models<br>Regional Seismicity, Earthquakes in India and Most Important Global Earthquakes; Concept of Seismic Zonation and Methodology for Seismic micro-zonation, Predictive Models in Earthquake Engineering-Attenuation Relation; Intensity, Duration and Ground Motion Predictive Relations                       | 6         |
| 5                  | Seismotectonic Maps Earthquake Catalog preparation, Source Map preparation; Homogenization and Declustering of earthquake data and preparation of Seismotectonic maps Seismic Hazard Parameters: a and b values, Recurrence relations and Maximum magnitude: Region Specific Approach for estimation Parameters and Selection of predictive equations | 7         |
| 6                  | Seismic Hazard Analysis Deterministic and Probabilistic Methods; Rupture based approach Seismic Hazard Analysis Case studies and Worked examples                                                                                                                                                                                                      | 8         |
| <b>Total Hours</b> |                                                                                                                                                                                                                                                                                                                                                       | <b>39</b> |

**Text Books:**

| Sr. No. | Title                                                                 | Author                       | Publisher             | Edition         | Year of Edition |
|---------|-----------------------------------------------------------------------|------------------------------|-----------------------|-----------------|-----------------|
| 01      | Dynamics of Structure: Theory & Application to Earthquake Engineering | A.K. Chopra                  | Pearson Education Lim | 4 <sup>th</sup> | 2014            |
| 02      | Earthquake Resistant Design of Structures                             | P. Agarwal and M. Shrikhande | PHI publications      | 3 <sup>rd</sup> | 2006            |
| 03      | Earthquake Resistant Design for Engineers & Architects                | D. J. Dowrick                | John Wiley & Sons     | 2 <sup>nd</sup> | 1987            |

  
Dr. V. T. Gaikwad

HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics



  
Dr. S. S. Mohite  
Director



Dr. Vasanttraodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

**Reference Book:**

| Sr. No. | Title                                    | Author         | Publisher                           | Edition         | Year of Edition |
|---------|------------------------------------------|----------------|-------------------------------------|-----------------|-----------------|
| 01      | Earthquake Design Practice for Buildings | David Key      | Thomas Telford Publication, London  | 2 <sup>nd</sup> | 2006            |
| 02      | Earthquake Resistant Design with Rubber  | James M. Kelly | Springer-Verlag Publication, London | 2 <sup>nd</sup> | 2012            |

**Useful link: -**

1. <https://onlinecourses.nptel.ac.in/>
2. NPTEL-Civil Engineering-Concrete Engineering and Technology

Dr. V. T. Gaikwad

**HOD-Civil**

Dr. K. K. Pandeyaji

**Dean Academics**



Dr. S. S. Mohite

**Director**



Dr. Vasantodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

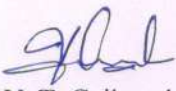
An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

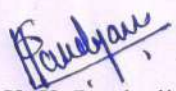
|                                         |                                                    |                 |                  |
|-----------------------------------------|----------------------------------------------------|-----------------|------------------|
| <b>Class</b>                            | Second Year M. Tech., Semester III                 |                 |                  |
| <b>Course Code and Course Title</b>     | <b>0CEINT604 - Internship</b>                      |                 |                  |
| <b>Prerequisites</b>                    | Basic knowledge of Structural Analysis and Design. |                 |                  |
| <b>Teaching Scheme (Hours per week)</b> | <b>Lecture</b>                                     | <b>Tutorial</b> | <b>Practical</b> |
|                                         | -                                                  | -               | 4                |
| <b>Credit</b>                           | 2                                                  |                 |                  |
| <b>Evaluation Scheme (Marks)</b>        | <b>ISE</b>                                         | <b>MSE</b>      | <b>ESE</b>       |
|                                         | 50                                                 | -               | -                |
|                                         |                                                    |                 | <b>Total</b>     |
|                                         |                                                    |                 | 50               |

| <b>Course Outcomes ( CO'S):-</b> Upon successful completion of this course , the student will able to: |                                                                                                                                                                                                                              | <b>BL</b> |
|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>CO1</b>                                                                                             | Identify and select appropriate industrial, consultancy, research, or field-based internship opportunities relevant to Structural Engineering and professional development.                                                  | <b>3</b>  |
| <b>CO2</b>                                                                                             | Analyze organizational practices, project execution procedures, quality assurance systems, safety standards, and emerging technologies adopted in the structural engineering industry.                                       | <b>4</b>  |
| <b>CO3</b>                                                                                             | Apply engineering knowledge and professional skills to understand real-world structural engineering problems, design practices, construction methodologies, and decision-making processes encountered during the internship. | <b>3</b>  |
| <b>CO4</b>                                                                                             | Prepare and present a comprehensive technical report documenting internship activities, observations, learning outcomes, and professional engineering practices in a systematic and professional manner.                     | <b>6</b>  |

| <b>Course Guidelines:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Contents</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| The Industry Internship course is designed to provide students with practical exposure to professional practices in the field of Structural Engineering through experiential learning in industries, consultancy organizations, research institutions, construction projects, government agencies, testing laboratories, or other relevant professional environments.<br>During the internship, students are expected to work with a recognized organization referred by concerned research supervisor or department, as trainee professionals, gaining first-hand experience of engineering operations, project execution methodologies, organizational practices, quality assurance procedures, safety standards, and emerging technologies relevant to structural engineering. |

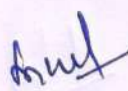
  
Dr. V. T. Gaikwad

HOD-Civil

  
Dr. K. K. Pandey

Dean Academics



  
Dr. S. S. Mohite

Director



Dr. Vasantraodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

The internship enables students to bridge the gap between academic learning and industry requirements by applying theoretical concepts to real-world engineering problems. It also provides opportunities to develop professional competencies such as technical communication, teamwork, leadership, problem-solving, project management, ethical practices, and technical documentation.

Students shall undergo a minimum of two weeks of on-site training and maintain a record of the activities performed, observations made, software/tools used, engineering practices observed, and skills acquired during the internship period.

At the completion of the internship, each student shall submit a comprehensive internship report and a certificate issued by the host organization. The report and presentation shall be evaluated by the Departmental Quality Improvement Committee (DQIC) at the end of the third semester.

## Assessment Methodology

### In-Semester Evaluation (ISE1) – 25Marks

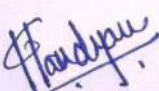
| Assessment Component                         | Marks     |
|----------------------------------------------|-----------|
| Internship Performance and Industry Exposure | 5         |
| Internship Technical Documentation           | 10        |
| Internship Report                            | 10        |
| <b>Total</b>                                 | <b>25</b> |

### End Semester Evaluation (ISE2) – 25 Marks

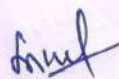
| Assessment Component                                     | Marks     |
|----------------------------------------------------------|-----------|
| Technical Presentation                                   | 5         |
| Learning Outcomes and Professional Competencies Acquired | 10        |
| Viva-Voce Examination                                    | 10        |
| <b>Total</b>                                             | <b>25</b> |

  
Dr. V. T. Gaikwad

HOD-Civil

  
Dr. K. K. Pandey  
Dean Academics



  
Dr. S. S. Mohite  
Director



Dr. Vasantodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad

(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**

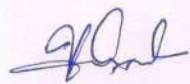
Curriculum Structure and Evaluation Scheme

(2025-27 Batch)

|                                         |                                                                          |                 |                  |
|-----------------------------------------|--------------------------------------------------------------------------|-----------------|------------------|
| <b>Class</b>                            | Second Year M. Tech., Semester III                                       |                 |                  |
| <b>Course Code and Course Title</b>     | <b>OCEAEC605 - Seminar</b>                                               |                 |                  |
| <b>Prerequisites</b>                    | Basic knowledge of the relevant specialization and research methodology. |                 |                  |
| <b>Teaching Scheme (Hours per week)</b> | <b>Lecture</b>                                                           | <b>Tutorial</b> | <b>Practical</b> |
|                                         | -                                                                        | -               | 2                |
| <b>Credit</b>                           | 01                                                                       |                 |                  |
| <b>Evaluation Scheme (Marks)</b>        | <b>ISE</b>                                                               | <b>MSE</b>      | <b>ESE</b>       |
|                                         | 25                                                                       | -               | 25               |
|                                         |                                                                          |                 | <b>Total</b>     |
|                                         |                                                                          |                 | 50               |

| <b>Course Outcomes ( CO'S):-</b> Upon successful completion of this course , the student will able to: |                                                                                                                                                                           | <b>BL</b> |
|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>CO1</b>                                                                                             | Conduct a comprehensive review of technical literature to identify current research trends, challenges, and research gaps in the selected area of Structural Engineering. | <b>4</b>  |
| <b>CO2</b>                                                                                             | Analyse and synthesize information from scholarly publications to evaluate the significance, scope, and applicability of contemporary research.                           | <b>4</b>  |
| <b>CO3</b>                                                                                             | Prepare a technically sound seminar report demonstrating critical understanding of the selected topic and its research implications.                                      | <b>6</b>  |
| <b>CO4</b>                                                                                             | Deliver an effective technical presentation and defend the seminar topic through professional communication and discussion.                                               | <b>6</b>  |

| <b>Course Guidelines:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Contents</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| The Seminar course is designed to develop students' ability to independently explore emerging areas of research and technological developments in Structural Engineering through extensive literature review and technical study.<br>Students shall select a contemporary topic relevant to their specialization in consultation with the faculty guide. The selected topic may be related to recent advances in structural analysis, design methodologies, construction technologies, smart materials, computational techniques, sustainability, disaster resilience, structural health monitoring, artificial intelligence applications, or other emerging research areas.<br>Students shall conduct a comprehensive literature review by referring to research papers published in reputed journals, conference proceedings, standards, technical reports, and other scholarly resources. The review should focus on understanding the current state of knowledge, |

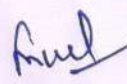
  
Dr. V. T. Gaikwad

HOD-Civil

  
Dr. K. K. Pandey

Dean Academics



  
Dr. S. S. Mohite

Director



Dr. Vasantodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)  
**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

identifying research gaps, evaluating methodologies, and assessing the practical significance of the selected topic.

Based on the literature survey, students shall prepare a seminar report in the prescribed format and deliver a technical presentation before the Departmental Quality Improvement Committee (DQIC). The seminar presentation shall demonstrate technical understanding, analytical ability, communication skills, and awareness of current research developments.

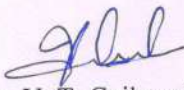
### Assessment Methodology

#### In-Semester Evaluation (ISE) – 25 Marks

| Assessment Component                              | Marks     |
|---------------------------------------------------|-----------|
| Literature Review and Technical Content           | 10        |
| Research Gap Identification and Critical Analysis | 10        |
| Progress Review and Interaction                   | 5         |
| <b>Total</b>                                      | <b>25</b> |

#### End Semester Evaluation (ESE) – 25 Marks

| Assessment Component     | Marks     |
|--------------------------|-----------|
| Seminar Report           | 10        |
| Technical Presentation   | 10        |
| Viva-Voce and Discussion | 5         |
| <b>Total</b>             | <b>25</b> |

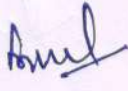
  
Dr. V. T. Gaikwad

HOD-Civil

  
Dr. K. K. Pandeyaji

Dean Academics



  
Dr. S. S. Mohite

Director



Dr. Vasantodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**

Curriculum Structure and Evaluation Scheme

(2025-27 Batch)

|                                         |                                                                                                                                       |                 |                  |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| <b>Class</b>                            | Second Year M. Tech., Semester III                                                                                                    |                 |                  |
| <b>Course Code and Course Title</b>     | 0CEDIS606 - Dissertation Phase - I                                                                                                    |                 |                  |
| <b>Prerequisites</b>                    | Completion of relevant courses and basic knowledge of research methodology, literature review, and the chosen area of specialization. |                 |                  |
| <b>Teaching Scheme (Hours per week)</b> | <b>Lecture</b>                                                                                                                        | <b>Tutorial</b> | <b>Practical</b> |
|                                         | -                                                                                                                                     | -               | 16               |
| <b>Credit</b>                           | 08                                                                                                                                    |                 |                  |
| <b>Evaluation Scheme (Marks)</b>        | <b>ISE</b>                                                                                                                            | <b>MSE</b>      | <b>ESE</b>       |
|                                         | 50                                                                                                                                    | -               | 50               |
|                                         |                                                                                                                                       |                 | <b>Total</b>     |
|                                         |                                                                                                                                       |                 | 100              |

| <b>Course Outcomes ( CO'S):-</b> Upon successful completion of this course , the student will able to: |                                                                                                                                                                 | <b>BL</b> |
|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>CO1</b>                                                                                             | Conduct a comprehensive literature survey and critically analyze existing research to identify trends, challenges, and opportunities in the selected domain.    | <b>4</b>  |
| <b>CO2</b>                                                                                             | Formulate a research problem, identify research gaps, and define clear research objectives based on critical analysis of literature.                            | <b>5</b>  |
| <b>CO3</b>                                                                                             | Design an appropriate research methodology and assess its feasibility for addressing complex engineering problems.                                              | <b>5</b>  |
| <b>CO4</b>                                                                                             | Prepare and defend a dissertation synopsis incorporating literature review, research objectives, methodology, and implementation plan in a professional manner. | <b>6</b>  |

**Course Guidelines:**

| <b>Contents</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The student shall undertake innovative and research-oriented dissertation work relevant to the field of Structural Engineering under the guidance of a faculty supervisor. The dissertation may involve analytical formulation, experimentation, computational studies, simulation, software-based development, design-oriented work, or interdisciplinary research. Interdisciplinary dissertation topics may be undertaken with prior approval of the Departmental Quality Improvement Committee (DQIC) and the concerned department(s).<br>Students shall conduct a rigorous literature survey in consultation with the supervisor by referring to a minimum of 25 research papers published in reputed national and international journals, conference proceedings, standards, and other scholarly sources. Based on the literature |

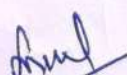
  
Dr. V. T. Gaikwad

HOD-Civil

  
Dr. K. K. Pandey

Dean Academics



  
Dr. S. S. Mohite

Director



Dr. Vasantodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

review, students shall critically analyse the existing research, identify research gaps, formulate a clear problem statement, and define measurable research objectives.

Students shall assess the relevance, significance, feasibility, and expected outcomes of the proposed research work and develop an appropriate research methodology for addressing the identified problem. The proposed methodology may include analytical, experimental, numerical, computational, simulation-based, or hybrid approaches as applicable to the selected research topic.

The student shall prepare a dissertation synopsis containing the literature review, research gap, problem statement, objectives and scope of work, proposed methodology, expected outcomes, work plan, and timeline for completion of the research work. The synopsis shall be presented before the Departmental Quality Improvement Committee (DQIC) for evaluation and approval. At the time of synopsis presentation, the student shall submit the literature review file and supporting technical documentation.

After the synopsis presentation, the student shall incorporate all suggestions and recommendations made by the Departmental Quality Improvement Committee (DQIC) and submit the revised synopsis in the prescribed format. The revised synopsis shall be scrutinized by the Departmental Quality Improvement Committee (DQIC), and final approval shall be granted after ensuring compliance with the recommended modifications.

Once approved, changes in the dissertation title, objectives, or methodology shall not ordinarily be permitted. However, under exceptional circumstances, such modifications may be considered only with prior approval of the competent authority as per institute rules and regulations.

Students shall maintain regular interaction with the supervisor and periodically review the progress of literature review, problem formulation, methodology development, and feasibility assessment. All technical documentation shall follow the prescribed format and comply with academic integrity and plagiarism regulations of the institute.

### Assessment Methodology

#### In-Semester Evaluation – I (ISE-I)

| Assessment Component                                | Marks     |
|-----------------------------------------------------|-----------|
| Literature Review and Critical Analysis             | 10        |
| Research Gap Identification and Problem Formulation | 10        |
| Presentation and Viva-Voce (Internal)               | 05        |
| <b>Total</b>                                        | <b>25</b> |

Dr. V. T. Gaikwad

HOD-Civil

Dr. K. K. Pandey

Dean Academics

Dr. S. S. Mohite

Director

15 | 21





Dr. Vasantodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)  
**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

**In-Semester Evaluation – II (ISE-II)**

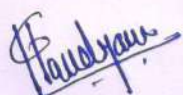
| Assessment Component                             | Marks     |
|--------------------------------------------------|-----------|
| Research Methodology and Feasibility Assessment  | 10        |
| Synopsis Preparation and Technical Documentation | 10        |
| Presentation and Viva-Voce (Internal)            | 05        |
| <b>Total</b>                                     | <b>25</b> |

**End Semester Evaluation (ESE)**

| Assessment Component                          | Marks     |
|-----------------------------------------------|-----------|
| Dissertation Synopsis Report                  | 15        |
| Synopsis Presentation and Methodology Defense | 15        |
| Viva-Voce Examination (Internal)              | 20        |
| <b>Total</b>                                  | <b>50</b> |

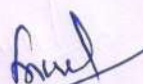
  
Dr. V. T. Gaikwad

**HOD-Civil**

  
Dr. K. K. Pandey

**Dean Academics**



  
Dr. S. S. Mohite

**Director**



Dr. Vasanttraodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

|                                   |                                                    |          |           |       |
|-----------------------------------|----------------------------------------------------|----------|-----------|-------|
| Class                             | Second Year M. Tech., Semester IV                  |          |           |       |
| Course Code and Course Title      | 0CEINT651 - Internship                             |          |           |       |
| Prerequisites                     | Basic knowledge of Structural Analysis and Design. |          |           |       |
| Teaching Scheme (Hours per week ) | Lecture                                            | Tutorial | Practical |       |
|                                   | -                                                  | -        | 04        |       |
| Credit                            | 02                                                 |          |           |       |
| Evaluation Scheme (Marks)         | ISE                                                | MSE      | ESE       | Total |
|                                   | 50                                                 | -        | 50        | 100   |

|                                                                                                        |                                                                                                                                                                                                                              |  |           |
|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------|
| <b>Course Outcomes ( CO'S):-</b> Upon successful completion of this course , the student will able to: |                                                                                                                                                                                                                              |  | <b>BL</b> |
| <b>CO1</b>                                                                                             | Identify and select appropriate industrial, consultancy, research, or field-based internship opportunities relevant to Structural Engineering and professional development.                                                  |  | <b>3</b>  |
| <b>CO2</b>                                                                                             | Analyze organizational practices, project execution procedures, quality assurance systems, safety standards, and emerging technologies adopted in the structural engineering industry.                                       |  | <b>4</b>  |
| <b>CO3</b>                                                                                             | Apply engineering knowledge and professional skills to understand real-world structural engineering problems, design practices, construction methodologies, and decision-making processes encountered during the internship. |  | <b>3</b>  |
| <b>CO4</b>                                                                                             | Prepare and present a comprehensive technical report documenting internship activities, observations, learning outcomes, and professional engineering practices in a systematic and professional manner.                     |  | <b>6</b>  |

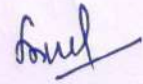
**Course Guidelines:**

| Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The Industry Internship course is designed to provide students with practical exposure to professional practices in the field of Structural Engineering through experiential learning in industries, consultancy organizations, research institutions, construction projects, government agencies, testing laboratories, or other relevant professional environments.</p> <p>During the internship, students are expected to work with a recognized organization referred by concerned research supervisor or department, as trainee professionals, gaining first-hand experience of engineering operations, project execution methodologies, organizational practices, quality assurance procedures, safety standards, and emerging technologies relevant to structural engineering.</p> |

  
Dr. V. T. Gaikwad

HOD-Civil

  
Dr. K. K. Pandeyaji  
Dean Academics

  
Dr. S. S. Mohite  
Director





Dr. Vasantodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad

(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**

Curriculum Structure and Evaluation Scheme

(2025-27 Batch)

The internship enables students to bridge the gap between academic learning and industry requirements by applying theoretical concepts to real-world engineering problems. It also provides opportunities to develop professional competencies such as technical communication, teamwork, leadership, problem-solving, project management, ethical practices, and technical documentation.

Students shall undergo a minimum of two weeks of on-site training and maintain a record of the activities performed, observations made, software/tools used, engineering practices observed, and skills acquired during the internship period.

At the completion of the internship, each student shall submit a comprehensive internship report and a certificate issued by the host organization. The report and presentation shall be evaluated by the Departmental Quality Improvement Committee (DQIC) at the end of the third semester.

## Assessment Methodology

### In-Semester Evaluation (ISE) – 50 Marks

| Assessment Component                         | Marks     |
|----------------------------------------------|-----------|
| Internship Performance and Industry Exposure | 20        |
| Internship Technical Documentation           | 15        |
| Internship Report                            | 15        |
| <b>Total</b>                                 | <b>50</b> |

### End Semester Evaluation (ESE) – 50 Marks

| Assessment Component                                     | Marks     |
|----------------------------------------------------------|-----------|
| Technical Presentation                                   | 20        |
| Learning Outcomes and Professional Competencies Acquired | 15        |
| Viva-Voce Examination                                    | 15        |
| <b>Total</b>                                             | <b>50</b> |

Dr. V. T. Gaikwad

HOD-Civil

Dr. K. K. Pandeyaji

Dean Academics



Dr. S. S. Mohite

Director



Dr. Vasanttraodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

|                                         |                                                                                                                                   |                 |                  |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| <b>Class</b>                            | Second Year M. Tech., Semester IV                                                                                                 |                 |                  |
| <b>Course Code and Course Title</b>     | 0CEDIS652 - Dissertation Phase - II                                                                                               |                 |                  |
| <b>Prerequisites</b>                    | Successful completion of Dissertation Phase-I, including approval of the dissertation synopsis and proposed research methodology. |                 |                  |
| <b>Teaching Scheme (Hours per week)</b> | <b>Lecture</b>                                                                                                                    | <b>Tutorial</b> | <b>Practical</b> |
|                                         | -                                                                                                                                 | -               | 04               |
| <b>Credit</b>                           | 02                                                                                                                                |                 |                  |
| <b>Evaluation Scheme (Marks)</b>        | <b>ISE</b>                                                                                                                        | <b>MSE</b>      | <b>ESE</b>       |
|                                         | 100                                                                                                                               | -               | 100              |
|                                         |                                                                                                                                   |                 | <b>Total</b>     |
|                                         |                                                                                                                                   |                 | 200              |

| <b>Course Outcomes ( CO'S):-</b> Upon successful completion of this course , the student will able to: |                                                                                                                                                                                          | <b>BL</b> |
|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>CO1</b>                                                                                             | Implement the proposed research methodology using appropriate experimental, analytical, computational, modelling, or simulation techniques to address the identified research problem.   | 3         |
| <b>CO2</b>                                                                                             | Analyse, validate, and evaluate research findings through interpretation of results and comparison with established literature to assess the achievement of research objectives.         | 5         |
| <b>CO3</b>                                                                                             | Develop innovative and effective solutions to complex engineering problems by applying advanced domain knowledge, research methodologies, and critical thinking.                         | 6         |
| <b>CO4</b>                                                                                             | Prepare, present, publish, and defend a comprehensive dissertation demonstrating research quality, technical communication skills, and adherence to academic and professional standards. | 6         |

  
Dr. V. T. Gaikwad

HOD-Civil

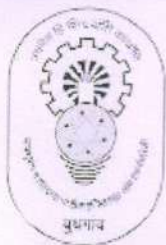
  
Dr. K. K. Pandeyaji

Dean Academics



  
Dr. S. S. Mohite

Director



Dr. Vasantraodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

**Course Guidelines:**

**Contents**

Dissertation Phase-II focuses on the execution, completion, evaluation, and dissemination of the research work initiated in Dissertation Phase-I. Students are expected to implement the approved research methodology and carry out analytical, experimental, computational, simulation-based, field-based, or design-oriented investigations relevant to the identified research problem.

Students shall systematically execute the proposed research plan, conduct experiments, perform simulations, develop computational models, collect and validate data, and generate meaningful research outcomes. The work shall demonstrate the application of advanced engineering principles, research methodologies, and analytical skills to address the stated research objectives.

Students shall periodically present the progress of their dissertation work before the supervisor and the Departmental Quality Improvement Committee (DQIC). The progress evaluation shall focus on research implementation, data collection, validation of results, achievement of objectives, technical contributions, and alignment with the approved synopsis. By the time of the second progress review (ISE-II), students are expected to have completed approximately 90% of the dissertation work and shall present substantial research outcomes along with the dissertation draft for evaluation.

Students shall critically analyse and interpret the obtained results, compare the findings with published literature, standards, and existing research, and assess the significance, reliability, and applicability of the outcomes. Based on the findings, students shall formulate conclusions, recommendations, and future scope for further research.

Students are encouraged to disseminate their research findings through technical papers, conference publications, journal publications, patents, technology disclosures, prototype development, or other scholarly contributions, wherever applicable. The research work carried out under the course should be disseminated through publication in a UGC-CARE-listed or peer-reviewed journal, preferably in a Scopus-indexed journal. The quality of publications arising from the dissertation work shall be considered during evaluation.

Students shall prepare a comprehensive dissertation report in the prescribed institute format covering the objectives, literature review, methodology, experimental/computational investigations, results and discussion, conclusions, recommendations, publications, and future scope. Proper citation, referencing, plagiarism compliance, and academic integrity shall be maintained throughout the dissertation work.

Students shall be permitted to appear for the final dissertation presentation and viva-voce examination only after submitting a duly completed and certified dissertation report. A soft-

Dr. V. T. Gaikwad

HOD-Civil

Dr. K. K. Pandey

Dean Academics



Dr. S. S. Mohite

Director



Dr. Vasantraodada Patil Shetkari Shikshan Mandal's  
**PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY,**  
**BUDHGAON, SANGLI. 416304**

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad  
(Accredited by NAAC)

**M.Tech. STRUCTURAL ENGINEERING**  
Curriculum Structure and Evaluation Scheme  
(2025-27 Batch)

bound copy of the dissertation report shall be submitted at least one week prior to the scheduled presentation.

The final dissertation presentation shall be conducted in the presence of the supervisor, the Departmental Quality Improvement Committee (DQIC), and an external examiner. The evaluation shall assess the alignment of the completed work with the approved synopsis, depth and quality of research, achievement of objectives, originality, technical contribution, effort invested, quality of publications, dissertation report, presentation skills, and viva-voce performance.

If a student's performance is found to be unsatisfactory during evaluation, a grace period of two weeks may be granted for improvement and resubmission. The revised work shall thereafter be re-evaluated as per institute regulations, with applicable grade penalties wherever prescribed.

### Assessment Methodology

#### In-Semester Evaluation – I (ISE-I)

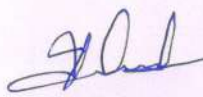
| Assessment Component                                  | Marks     |
|-------------------------------------------------------|-----------|
| Research Implementation and Progress Review           | 25        |
| Data Collection, Validation, and Preliminary Findings | 15        |
| Presentation and Viva-Voce (Internal)                 | 10        |
| <b>Total</b>                                          | <b>50</b> |

#### In-Semester Evaluation – II (ISE-II)

| Assessment Component                                       | Marks     |
|------------------------------------------------------------|-----------|
| Analysis of Results and Achievement of Objectives          | 20        |
| Dissertation Draft / Publication / Technical Documentation | 20        |
| Presentation and Viva-Voce (Internal)                      | 10        |
| <b>Total</b>                                               | <b>50</b> |

#### End Semester Evaluation (ESE)

| Assessment Component                 | Marks      |
|--------------------------------------|------------|
| Dissertation Report Evaluation       | 40         |
| Final Presentation and Demonstration | 30         |
| Viva-Voce Examination (External)     | 30         |
| <b>Total</b>                         | <b>100</b> |

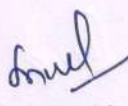
  
Dr. V. T. Gaikwad

HOD-Civil

  
Dr. K. K. Pandeyaji

Dean Academics



  
Dr. S. S. Mohite

Director