



**SCHOOL OF ENGINEERING**  
**CIVIL ENGINEERING**  
**SYLLABUS BOOK**  
**AY 2026-27**

### INSTITUTE VISION

To emerge as an Institute of Excellence by imparting value-based education aided with Research, Innovation and Entrepreneurial skills.

### INSTITUTE MISSION

|   |                                                                                                                                                 |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | To impart the holistic engineering education of highest quality & prepare socially responsible professionals with entrepreneurial skills.       |
| 2 | To prepare value-aided engineering professionals to meet up global industry requirements by imparting cutting edge professional education.      |
| 3 | To inculcate the attitude of research and innovation among the stake holders through experiential and project-based teaching-learning pedagogy. |
| 4 | To acquire global talent pool by providing world class amenities for teaching, learning & research.                                             |

**Graduates will demonstrate ability to:**

| PEO No | PROGRAMME EDUCATIONAL OBJECTIVES                                                                                                                                             |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PEO 1  | Solve real-world engineering problems, design and develop innovative and cost-effective solutions exhibiting engineering skills/fundamentals to cater needs of society.      |
| PEO 2  | Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting comprehensive competitiveness.                                                       |
| PEO 3  | Exhibit professional ethics & values, effective communication, teamwork, multidisciplinary approach, and ability to relate engineering issues to broader societal framework. |

| PO No | PROGRAMME OUTCOMES                                                                                                                                                                                                                                                                                                                                                                               |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PO 1  | <b>Engineering Knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.                                                                                                                                                                                                           |
| PO 2  | <b>Problem Analysis:</b> Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first-principles of mathematics, natural sciences and engineering sciences.                                                                                                                                                          |
| PO 3  | <b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system-components or processes that meet specified needs with appropriate consideration for public health & safety, cultural, societal and environmental considerations.                                                                                                                    |
| PO 4  | <b>Conduct Investigations of Complex Problems:</b> Use research-based knowledge and research methods including design of experiments, analysis & interpretation of data, and synthesis of information to provide valid conclusions for complex problems.                                                                                                                                         |
| PO 5  | <b>Engineering Tool Usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering & IT tools including prediction and modelling to engineering activities, with an understanding of their limitations.                                                                                                                                                          |
| PO 6  | <b>The Engineer and The World:</b> Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice; understand the impact of engineering solutions in societal and environmental contexts, and demonstrate knowledge of, and need for, sustainable development. |
| PO 7  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.                                                                                                                                                                                                                                                                |
| PO 8  | <b>Individual and Collaborative Team Work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.                                                                                                                                                                                                                             |
| PO 9  | <b>Communication:</b> Communicate effectively on engineering activities with the                                                                                                                                                                                                                                                                                                                 |

|              |                                                                                                                                                                                                                                               |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | engineering community and with society at large--such as being able to write reports, design documentation, make effective presentations and give/receive instructions.                                                                       |
| <b>PO 10</b> | <b>Project Management and Finance:</b> Demonstrate knowledge and understanding of engineering and management principles and apply these to one's work, as a member or leader in a team in a multidisciplinary environment to manage projects. |
| <b>PO 11</b> | <b>Life-Long Learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.                                                      |

| <b>PSO No</b> | <b>PROGRAMME SPECIFIC OUTCOMES (PSO)</b>                                                                                                                                                                                                                                           |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PSO 1</b>  | Apply advanced analytical techniques, latest technologies, and management skills in solving real-world challenges that involve technical aspects as well as human management.                                                                                                      |
| <b>PSO 2</b>  | Design solutions for complex civil engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health & safety, cultural, societal, and environmental considerations with modern engineering tools. |
| <b>PSO 3</b>  | Design innovative, sustainable, and cost-effective Civil Engineering projects by giving importance to the required safety measures and ethical practices.                                                                                                                          |

### Credit Guidelines (General)

One (1) credit represents 30 hours of learning, comprising an appropriate combination of Theory, Practical, Tutorial, Project, Group Discussion, Case Study, Field Visit, Presentation, Assignment, Term Work, Self-Learning, and other curriculum-approved learning activities.

### CO-PO Mapping Guidelines

| <b>Mapping Level</b> | <b>%age Mapping</b> | <b>Indicator</b>                 |
|----------------------|---------------------|----------------------------------|
| 0                    | 0                   | No Mapping                       |
| 1                    | 0-33                | Low Level (Slightly Mapped)      |
| 2                    | 33-66               | Medium Level (Moderately Mapped) |
| 3                    | >66                 | High Level (Strongly Mapped)     |

# Syllabus Book



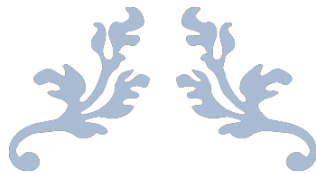
**P P Savani University**  
School of Engineering

Effective From: 2026-27

Authored by: P P Savani University

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FIRST YEAR B.TECH (2026-27)

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| P P SAVANI UNIVERSITY                                                                        |             |                                                  |            |                      |           |          |                        |              |            |           |               |       |        |                    |           |          |          |              |            |           |               |            |        |      |
|----------------------------------------------------------------------------------------------|-------------|--------------------------------------------------|------------|----------------------|-----------|----------|------------------------|--------------|------------|-----------|---------------|-------|--------|--------------------|-----------|----------|----------|--------------|------------|-----------|---------------|------------|--------|------|
| SCHOOL OF ENGINEERING                                                                        |             |                                                  |            |                      |           |          |                        |              |            |           |               |       |        |                    |           |          |          |              |            |           |               |            |        |      |
| TEACHING & EXAMINATION SCHEME FOR FIRST YEAR B.TECH. CIVIL ENGINEERING PROGRAMME AY: 2026-27 |             |                                                  |            |                      |           |          |                        |              |            |           |               |       |        |                    |           |          |          |              |            |           |               |            |        |      |
| Sem                                                                                          | Course Code | Course Title                                     | Offered By | Teaching Scheme      |           |          |                        |              |            |           |               |       |        | Examination Scheme |           |          |          |              |            |           |               |            |        |      |
|                                                                                              |             |                                                  |            | Direct Contact Hours |           |          | Indirect Contact Hours |              |            |           |               | Total | Credit | Theory             | Practical | Tutorial | Project  | GD/CS/FV/PPT | Assignment | Term Work | Self Learning | Total      |        |      |
|                                                                                              |             |                                                  |            | Theory               | Practical | Tutorial | Project                | GD/CS/FV/PPT | Assignment | Term Work | Self Learning |       |        | CE/ESE             | CE/ESE    | CE/ESE   | CE/ESE   | CE/ESE       | CE/ESE     | CE/ESE    | CE/ESE        | CE/ESE     | CE/ESE |      |
| G1                                                                                           | SOESH1010   | Calculus                                         | S & H      | 45                   | 0         | 30       | 0                      | 0            | 30         | 0         | 15            | 120   | 4      | 30<br>50           | 0         | 30<br>50 | 0        | 0            | 20<br>00   | 0         | 20<br>00      | 100<br>100 |        |      |
|                                                                                              | SOESH1030   | Engineering Physics                              | S & H      | 45                   | 30        | 0        | 0                      | 15           | 0          | 0         | 30            | 120   | 4      | 30<br>50           | 30<br>50  | 0        | 0        | 20<br>00     | 0          | 0         | 20<br>00      | 100<br>100 |        |      |
|                                                                                              | SOEME1010   | Basics of Mechanical Engineering                 | ME         | 45                   | 0         | 30       | 0                      | 0            | 30         | 0         | 15            | 120   | 4      | 30<br>50           | 0         | 30<br>50 | 0        | 0            | 20<br>00   | 0         | 20<br>00      | 100<br>100 |        |      |
|                                                                                              | SOECE1010   | Programming for Problem Solving with C           | CE         | 45                   | 30        | 0        | 30                     | 0            | 0          | 0         | 15            | 120   | 4      | 30<br>50           | 30<br>50  | 0        | 20<br>00 | 0            | 0          | 0         | 20<br>00      | 100<br>100 |        |      |
|                                                                                              | CFLS2130    | Intermediate Communicative English               | CFLS       | 45                   | 0         | 0        | 0                      | 0            | 45         | 0         | 0             | 90    | 3      | 100<br>00          | 0         | 0        | 0        | 0            | 0          | 0         | 0             | 100<br>00  |        |      |
|                                                                                              | SOESH1040   | Project Studio                                   | S & H      | 0                    | 0         | 0        | 60                     | 30           | 0          | 30        | 0             | 120   | 4      | 0                  | 0         | 0        | 50<br>00 | 25<br>00     | 0          | 25<br>00  | 0             | 100<br>0   |        |      |
| Total                                                                                        |             |                                                  |            |                      |           |          |                        |              |            |           |               | 690   | 23     |                    |           |          |          |              |            |           |               |            |        | 900  |
| G2                                                                                           | SOESH1020   | Linear Algebra                                   | S & H      | 45                   | 0         | 30       | 0                      | 0            | 30         | 0         | 15            | 120   | 4      | 30<br>50           | 0         | 30<br>50 | 0        | 0            | 20<br>00   | 0         | 20<br>00      | 100<br>100 |        |      |
|                                                                                              | SOECV1010   | Basics of Civil Engineering                      | CV         | 45                   | 0         | 30       | 0                      | 30           | 0          | 0         | 15            | 120   | 4      | 30<br>50           | 0         | 30<br>50 | 0        | 20<br>00     | 0          | 0         | 20<br>00      | 100<br>100 |        |      |
|                                                                                              | SOEEC1010   | Basics of Electrical and Electronics Engineering | E&C        | 45                   | 30        | 0        | 30                     | 0            | 0          | 0         | 15            | 120   | 4      | 30<br>50           | 30<br>50  | 0        | 20<br>00 | 0            | 0          | 0         | 20<br>00      | 100<br>100 |        |      |
|                                                                                              | SOEML1010   | AI for Everyone                                  | ML         | 30                   | 30        | 0        | 0                      | 30           | 0          | 0         | 30            | 120   | 4      | 30<br>50           | 30<br>50  | 0        | 0        | 20<br>00     | 0          | 0         | 20<br>00      | 100<br>100 |        |      |
|                                                                                              | SOEMS1010   | Introduction to Sustainable Development          | MT         | 45                   | 0         | 30       | 0                      | 30           | 0          | 0         | 15            | 120   | 4      | 30<br>50           | 0         | 30<br>50 | 0        | 20<br>00     | 0          | 0         | 20<br>00      | 100<br>100 |        |      |
|                                                                                              | CLSC2090    | Constitutional Empowerment                       | CLSC       | 30                   | 0         | 0        | 0                      | 0            | 30         | 0         | 0             | 60    | 2      | 100<br>00          | 0         | 0        | 0        | 0            | 0          | 0         | 0             | 100<br>00  |        |      |
| Total                                                                                        |             |                                                  |            |                      |           |          |                        |              |            |           |               | 660   | 22     |                    |           |          |          |              |            |           |               |            |        | 1100 |

**P P Savani University**  
**School of Engineering**  
**Offered by: Department of Science & Humanities**

**COURSE DETAILS:**

|                       |           |
|-----------------------|-----------|
| Course Code           | SOESH1010 |
| Course Name           | Calculus  |
| Prerequisite Course/s | None      |

**TEACHING SCHEME:**

| Credit | Total Learning Hours | Direct Contact Hours |           |          | Indirect Contact Hours |    |            |           |               |
|--------|----------------------|----------------------|-----------|----------|------------------------|----|------------|-----------|---------------|
|        |                      | Theory               | Practical | Tutorial | Project                | CS | Assignment | Term Work | Self-Learning |
| 4      | 120                  | 45                   | 00        | 30       | 00                     | 00 | 30         | 00        | 15            |

GD = Group Discussion | CS = Case Study | FV = Field Visit | PPT = Presentation

**EXAMINATION SCHEME:**

| Theory |     | Practical |     | Tutorial |     | Project |     | CS |     | Assignment |     | Term Work |     | Self-Learning |     | Total |
|--------|-----|-----------|-----|----------|-----|---------|-----|----|-----|------------|-----|-----------|-----|---------------|-----|-------|
| CE     | ESE | CE        | ESE | CE       | ESE | CE      | ESE | CE | ESE | CE         | ESE | CE        | ESE | CE            | ESE |       |
| 30     | 50  | 00        | 00  | 30       | 50  | 00      | 00  | 20 | 00  | 00         | 00  | 00        | 00  | 20            | 00  | 200   |

CE: Continuous Evaluation, ESE: End Semester Exam

**OBJECTIVE OF THE COURSE:**

To help learners to:

- Summarize concept of calculus to enhance ability of analysing mathematical problems.
- Acquire knowledge and ability to work with differentiation and integration for applications of mathematical techniques in engineering.
- Develop the tool of convergence or divergence of any infinite series and power series for learning advanced Engineering Mathematics.
- Acquire knowledge of partial differentiation and ability to work with applications to advanced Engineering Mathematics.
- Application of concavity of graph and find out points of inflection.

**COURSE CONTENT:**

| Module No. | Content                                                                                                                                                                       | Hours | Weightage in% |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| 1          | <b>Foundations of Differential Calculus:</b><br>Limits, Continuity, Types of Discontinuity, Successive Differentiation.                                                       | 06    | 10            |
| 2          | <b>Mean Value Theorems and Applications:</b><br>Rolle's Theorem, LMVT, CMVT, Maxima and Minima.                                                                               | 06    | 10            |
| 3          | <b>Sequence and Series-I:</b><br>Convergence and Divergence, Comparison Test, Integral Test, Ratio Test, Root Test, Alternating Series, Absolute and Conditional Convergence. | 10    | 20            |
| 4          | <b>Sequence and Series-II:</b><br>Power series, Taylor and Maclaurin series, Indeterminate                                                                                    | 06    | 10            |



|              |                                                                                                                                                                                                                          |           |             |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|
|              | forms and L'Hôpital's Rule.                                                                                                                                                                                              |           |             |
| 5            | <b>Partial Derivatives:</b><br>Function of several variables, Partial differentiation, Applications, Chain rule, Maxima and Minima, Euler's theorem, Lagrange multiplier.                                                | 12        | 30          |
| 6            | <b>Curve Tracing:</b><br>Tracing of curves in Cartesian, polar, and parametric forms; symmetry, intercepts, asymptotes, monotonicity, concavity, maxima, minima, points of inflection, and sketching of standard curves. | 5         | 20          |
| <b>TOTAL</b> |                                                                                                                                                                                                                          | <b>45</b> | <b>100%</b> |

**LIST OF PRACTICAL / TUTORIAL:**

| Sr. No       | Practical / Tutorial                    | Hours     |
|--------------|-----------------------------------------|-----------|
| 1            | Foundations of Differential Calculus-I  | 02        |
| 2            | Foundations of Differential Calculus-II | 04        |
| 3            | Mean Value Theorems and Applications    | 04        |
| 4            | Sequence and Series-I                   | 02        |
| 5            | Sequence and Series-II                  | 02        |
| 6            | Sequence and Series-III                 | 02        |
| 7            | Sequence and Series-IV                  | 02        |
| 8            | Partial Derivatives-I                   | 04        |
| 9            | Partial Derivatives-II                  | 04        |
| 10           | Curve Tracing                           | 04        |
| <b>TOTAL</b> |                                         | <b>30</b> |

**SELF-LEARNING ONLINE RESOURCES:**

| Sr. No | Link / Description                                                                                                                                                                                                       | Self-Learning Hours |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1      | <a href="https://www.youtube.com/watch?v=54_XRjHhZzI&amp;list=PLF797E961509B4EB5&amp;index=7">https://www.youtube.com/watch?v=54_XRjHhZzI&amp;list=PLF797E961509B4EB5&amp;index=7</a> – An introduction to limits        | 05                  |
| 2      | <a href="https://www.youtube.com/watch?v=qr1WXiq3S3k&amp;list=PLF797E961509B4EB5&amp;index=15">https://www.youtube.com/watch?v=qr1WXiq3S3k&amp;list=PLF797E961509B4EB5&amp;index=15</a> – Applications of the Derivative | 05                  |
| 3      | <a href="https://www.youtube.com/watch?v=8u6woY05aL0">https://www.youtube.com/watch?v=8u6woY05aL0</a> - How to Sketch Graphs of Functions                                                                                | 05                  |

**COURSE EVALUATION & ASSESSMENT RUBRICS:**

| Component | CE/ESE | Evaluation Methodology / Rubrics                                                                                                           | Marks | Passing Marks |
|-----------|--------|--------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| Theory    | CE     | Two Internal Tests of 30 marks each shall be conducted during the semester. The average of both tests will be converted to 30 marks.       | 30    | 00            |
|           | ESE    | Comprehensive written examination covering all modules of the course. Duration: 2 Hours                                                    | 50    | 20            |
| Tutorial  | CE     | Performance of tutorial which should be evaluated out of 10 marks for each tutorial and average of the same will be converted to 30 marks. | 30    | 00            |
|           | ESE    | Performance – 25Marks<br>External Viva Voce – 25 Marks                                                                                     | 50    | 20            |

|                    |    |                                                                                                                                                                                         |            |           |
|--------------------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|
| Assignment         | CE | Assignment Rubrics<br>Conceptual Understanding – 5 Marks<br>Problem Solving Methodology – 5 Marks<br>Application of Theorems and Techniques – 5 Marks<br>Clarity and Neatness – 5 Marks | 20         | 00        |
| Self Learning      | CE | 40 MCQ questions based on self-study resources and online learning   0.5 marks per question   Total = 20 marks                                                                          | 20         | 00        |
| <b>TOTAL MARKS</b> |    |                                                                                                                                                                                         | <b>200</b> | <b>80</b> |

**TEXT BOOK(S):**

| Title                                 | Author/s                 | Publication        |
|---------------------------------------|--------------------------|--------------------|
| Calculus and Analytic Geometry        | Thomas & Finney          | Pearson            |
| A Textbook of Engineering Mathematics | N.P. Bali & Manish Goyal | Laxmi Publications |

**REFERENCE BOOK(S):**

| Title                            | Author/s                                        | Publication       |
|----------------------------------|-------------------------------------------------|-------------------|
| Thomas' Calculus                 | George B. Thomas, Maurice D. Weir and Joel Hass | Pearson           |
| Advanced Engineering Mathematics | Erwin Kreyszig                                  | Wiley             |
| Engineering Mathematics          | H.K. Dass                                       | S. Chand          |
| Higher Engineering Mathematics   | B.S. Grewal                                     | Khanna Publishers |

**COURSE OUTCOME(S):**

After the completion of the course, the students will be able to:

| SOESH1010 | Calculus                                                                                                           |
|-----------|--------------------------------------------------------------------------------------------------------------------|
| CO 1      | Recall the concepts of limit, continuity and differentiability for analysing mathematical problems.                |
| CO 2      | Analyze the series for its convergence and divergence to solve real world problems.                                |
| CO 3      | Evaluate various limit problems using L' Hospital's rule.                                                          |
| CO 4      | Identify the ordinary differentials and partial differentials and solve the maximum and minimum value of function. |
| CO 5      | Construct the graphs for function with intervals and identify more application for function.                       |

**MAPPING OF CO WITH PO:**

| SOESH1010 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO 1      | 3   | 2   |     |     |     |     |     |     |     |      |      |
| CO 2      | 3   | 3   |     | 2   |     |     |     |     |     |      |      |
| CO 3      | 3   | 2   |     | 2   |     |     |     |     |     |      |      |
| CO 4      | 3   | 3   | 2   | 2   |     |     |     |     |     |      |      |
| CO 5      | 3   | 3   | 2   | 2   | 1   |     |     |     |     | 1    |      |

**MAPPING OF CO WITH PSO:**

| SOESH1010 | PSO1 | PSO2 | PSO3 |
|-----------|------|------|------|
| CO 1      | 2    | 2    | 1    |
| CO 2      | 2    | 3    | 2    |

|      |   |   |   |
|------|---|---|---|
| CO 3 | 2 | 2 | 1 |
| CO 4 | 2 | 3 | 2 |
| CO 5 | 2 | 2 | 2 |

**LEVEL OF REVISED BLOOM'S TAXONOMY IN ASSESSMENT**

|             |               |           |
|-------------|---------------|-----------|
| 1: Remember | 2: Understand | 3: Apply  |
| 4: Analyze  | 5: Evaluate   | 6: Create |

| Module No | Content                               | RBT Level |
|-----------|---------------------------------------|-----------|
| 1         | Foundations of Differential Calculus: | 2         |
| 2         | Mean Value Theorems and Applications: | 3         |
| 3         | Sequence and Series-I:                | 4         |
| 4         | Sequence and Series-II:               | 4         |
| 5         | Partial Derivatives:                  | 5         |
| 6         | Curve Tracing:                        | 5         |

**P P Savani University**  
**School of Engineering**  
**Offered by: Department of Science & Humanities**

**COURSE DETAILS:**

|                       |                     |
|-----------------------|---------------------|
| Course Code           | SOESH1030           |
| Course Name           | Engineering Physics |
| Prerequisite Course/s | 10+2 Science stream |

**TEACHING SCHEME:**

| Credit | Total Learning Hours | Direct Contact Hours |           |          | Indirect Contact Hours |    |            |           |               |
|--------|----------------------|----------------------|-----------|----------|------------------------|----|------------|-----------|---------------|
|        |                      | Theory               | Practical | Tutorial | Project                | GD | Assignment | Term Work | Self-Learning |
| 4      | 120                  | 45                   | 30        | 0        | 0                      | 15 | 0          | 0         | 30            |

GD = Group Discussion | CS = Case Study | FV = Field Visit | PPT = Presentation

**EXAMINATION SCHEME:**

| Theory |     | Practical |     | Tutorial |     | Project |     | GD |     | Assignment |     | Term Work |     | Self-Learning |     | Total |
|--------|-----|-----------|-----|----------|-----|---------|-----|----|-----|------------|-----|-----------|-----|---------------|-----|-------|
| CE     | ESE | CE        | ESE | CE       | ESE | CE      | ESE | CE | ESE | CE         | ESE | CE        | ESE | CE            | ESE |       |
| 30     | 50  | 30        | 50  | 0        | 0   | 0       | 0   | 20 | 0   | 0          | 0   | 0         | 0   | 20            | 0   | 200   |

CE: Continuous Evaluation, ESE: End Semester Exam

**OBJECTIVE OF THE COURSE:**

To help learners to:

- Develop a strong foundation in modern physics concepts.
- Understand the application of physics principles in engineering and technology.
- Gain knowledge of advanced materials and emerging technologies.
- Apply physics principles to solve engineering and interdisciplinary problems.

**COURSE CONTENT:**

| Module No. | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Hours | Weightage in% |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| 1          | <b>QUANTUM PHYSICS:</b><br>Basic Introduction: Classical and Quantum Physics, Waves & Particles, Wave-Particle duality; De Broglie hypothesis of matter waves; Properties/Characteristics of matter waves; Phase and Group velocity, Relation between Phase and Group velocity; Heisenberg's uncertainty principle; Wave function, its properties, its physical significance; Schrodinger's wave equation: time independent and time dependent wave equation; Numericals. | 8     | 18            |
| 2          | <b>ACOUSTIC AND ULTRASONIC:</b><br>Acoustic – Introduction; Classification and Characterization of Sound; Intensity; Reverberation and reverberation time; Sabine's formula for reverberation (without derivation); Absorption Coefficients; Sound Absorbing Materials; Factors affecting the acoustics of buildings and remedies, Sound Insulation. Numericals                                                                                                           | 8     | 18            |

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |             |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|
|              | Ultrasonic – Introduction; Properties of Ultrasonic waves; Generation of Ultrasonic waves: Piezoelectric & Magnetostriction effect, Applications of Ultrasonic. Numericals.                                                                                                                                                                                                                                                                                                                                                                                                                        |           |             |
| 3            | <b>LASER AND FIBRE OPTICS:</b><br>LASER – Introduction; Characteristics; Absorption, Spontaneous and Stimulated emission; Working of LASER: Population Inversion, Pumping mechanism, Life time, Metastable state; Components of LASER; Nd:YAG LASER & its applications, Applications of LASERS. FIBRE OPTICS – Introduction; Optical Fiber construction; Working principle; Propagation of light: Numerical Aperture, Acceptance angle; Types of Optical Fiber (brief); Attenuation; Optical fibre in communication system; Advantages of Optical fibre; Applications of Optical Fiber. Numericals | 9         | 20          |
| 4            | <b>NANOSCIENCE AND NANOTECHNOLOGY:</b><br>Introduction; Usual Properties: increase in surface area to volume ratio, Quantum confinement: Unusual Properties: Physical, Chemical, Electrical, Optical, Magnetic, Mechanical; Synthesis of Nanomaterials: SolGel Method; Physical Vapor Deposition Method; Characterization of nanomaterials: Scanning electron microscope & Transmission electron microscope and its respective applications; Applications of Nanomaterials.                                                                                                                        | 7         | 16          |
| 5            | <b>SUPERCONDUCTORS:</b><br>Introduction; Critical temperature; Properties of superconductors; Type of superconductors: Type I and Type II; High T <sub>c</sub> superconductors: Low temperature superconductors and High temperature superconductors; Applications of Superconductors: Magnetic levitation and its application: Maglev, Josephson effect and its application: SQUID, other applications. Numericals.                                                                                                                                                                               | 8         | 18          |
| 6            | <b>SEMICONDUCTOR PHYSICS:</b><br>Introduction: Classification of Conductors, Semiconductors and Insulators; Classification of Conductors, Semiconductors and Insulators on the basis of energy band; Intrinsic & Extrinsic Semiconductors; Diodes; p-n junction diode, characteristics of p-n junction diode: forward bias and reverse bias; Applications of semiconductors: Solar cells; Advantages of Semiconductor Devices.                                                                                                                                                                     | 5         | 10          |
| <b>TOTAL</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>45</b> | <b>100%</b> |

**LIST OF PRACTICAL / TUTORIAL:**

| Sr. No | Practical / Tutorial                                                              | Hours |
|--------|-----------------------------------------------------------------------------------|-------|
| 1      | To understand some basic aspects of the graph drawing.                            | 4     |
| 2      | To understand some basic aspects of error analysis.                               | 2     |
| 3      | Finding the energy band gap of semiconductor material of a P-N junction of diode. | 4     |
| 4      | To study the series and parallel connections of resistors.                        | 4     |
| 5      | To study the series and parallel connections of capacitors.                       | 2     |
| 6      | To study the I-V characteristic of LED and dynamic resistance of a given LED.     | 2     |
| 7      | To study the I-V characteristic of ZENER diode.                                   | 2     |

|              |                                                                                                                          |           |
|--------------|--------------------------------------------------------------------------------------------------------------------------|-----------|
| 8            | To determine the Numerical Aperture and acceptance angle of an optical fiber.                                            | 2         |
| 9            | To determine wavelength of laser using diffraction grating.                                                              | 4         |
| 10           | To determine the velocity of ultrasonic waves in a given liquid and also to determine the compressibility of the liquid. | 4         |
| <b>TOTAL</b> |                                                                                                                          | <b>30</b> |

**SELF-LEARNING ONLINE RESOURCES:**

| Sr. No | Link / Description                                                                                                                                                                     | Self-Learning Hours |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1      | <a href="https://youtu.be/HQdy2Z-GmdY?si=KBzbZBJDei-HDvrC">https://youtu.be/HQdy2Z-GmdY?si=KBzbZBJDei-HDvrC</a> – Unit of Measurements, System of Units, Fundamental and derived Units | 5                   |
| 2      | <a href="https://www.youtube.com/watch?v=DqYl42JtaQg">https://www.youtube.com/watch?v=DqYl42JtaQg</a> – Electricity & Magnetism                                                        | 5                   |
| 3      | <a href="https://youtu.be/l-Xo6Xv3amc?si=Y7frdohG_b_nRQE_">https://youtu.be/l-Xo6Xv3amc?si=Y7frdohG_b_nRQE_</a> – Physical World                                                       | 5                   |
| 4      | <a href="https://www.youtube.com/watch?v=t06aTX9jM34&amp;t=227s">https://www.youtube.com/watch?v=t06aTX9jM34&amp;t=227s</a> - Quantum Physics                                          | 5                   |
| 5      | <a href="https://www.youtube.com/watch?v=i8fp0MQ-3zE&amp;t=1293s">https://www.youtube.com/watch?v=i8fp0MQ-3zE&amp;t=1293s</a> - Quantum effects                                        | 5                   |
| 6      | <a href="https://www.youtube.com/watch?v=9LU1pE07yTk&amp;t=355s">https://www.youtube.com/watch?v=9LU1pE07yTk&amp;t=355s</a> - History of the universe                                  | 5                   |

**COURSE EVALUATION & ASSESSMENT RUBRICS:**

| Component          | CE/ESE | Evaluation Methodology / Rubrics                                                                                                                                                                                                                                                                                                     | Marks      | Passing Marks |
|--------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------|
| Theory             | CE     | Two Internal Tests of 30 marks each shall be conducted during the semester. The average of both tests will be converted to 30 marks.                                                                                                                                                                                                 | 30         | 0             |
|                    | ESE    | Comprehensive written examination covering all modules of the course. Duration: 2 Hours                                                                                                                                                                                                                                              | 50         | 20            |
| Practical          | CE     | Performance of practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 30 marks.                                                                                                                                                                                         | 30         | 0             |
|                    | ESE    | Quiz / Practical Performance – 25 Marks<br>External Viva Voce – 25 Marks                                                                                                                                                                                                                                                             | 50         | 20            |
| Group Discussion   | CE     | Group Discussion (GD) Evaluation Rubrics <ul style="list-style-type: none"> <li>Understanding of Physics Concepts and Principles – 5 Marks</li> <li>Scientific Reasoning and Analytical Ability – 5 Marks</li> <li>Participation and Communication Skills – 5 Marks</li> <li>Teamwork and Response to Questions – 5 Marks</li> </ul> | 20         | 0             |
| Self Learning      | CE     | 40 MCQ questions based on self-study resources and online learning   0.5 marks per question   Total = 20 marks                                                                                                                                                                                                                       | 20         | 0             |
| <b>TOTAL MARKS</b> |        |                                                                                                                                                                                                                                                                                                                                      | <b>200</b> | <b>80</b>     |

**TEXT BOOK(S):**

| Title                         | Author/s       | Publication                    |
|-------------------------------|----------------|--------------------------------|
| Concept of the Modern Physics | A. Beiser      | Tata McGraw-Hill Education     |
| Engineering Physics           | G Vijayakumari | Vikas Publishing house PVT LTD |

**REFERENCE BOOK(S):**

| Title                                          | Author/s                   | Publication                |
|------------------------------------------------|----------------------------|----------------------------|
| Basic electrical engineering                   | Kothari and Nagrath        | Tata McGraw-Hill Education |
| Quantum Mechanics                              | P.M. Mathew, K. Venkatesan | Tata McGraw-Hill Education |
| Basic Electronics for Scientists and Engineers | Dennis L. Eggleston        | Cambridge University Press |
| Lasers and Nonlinear Optics                    | G.D. Baruah                | Pragati Prakashan          |

**COURSE OUTCOME(S):**

After the completion of the course, the students will be able to:

| SOESH1030 | Engineering Physics                                                                                                                                                                                                                                     |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO 1      | Understand the framework of quantum mechanics and apply the knowledge of basic quantum mechanics to construct one-dimensional Schrodinger's wave equation.                                                                                              |
| CO 2      | Classify the phenomenon of acoustics and ultrasonic in various engineering field and apply it for various engineering and medical fields.                                                                                                               |
| CO 3      | Describe the laser and articulate the idea of optical fiber communications and apply the concepts of lasers and optical fiber communications in every possible sector.                                                                                  |
| CO 4      | Interpret the concept of Nanotechnology and understand the synthesis and applications of Nanomaterials from technological prospect. Discover the types and properties of Superconductors. Relate the behaviour of superconductors at high temperatures. |
| CO 5      | Distinguish pure, impure semiconductors and characteristics of semiconductor devices. Thus, will be able to use basic concepts to analyze and design a wide range of semiconductor devices.                                                             |

**MAPPING OF CO WITH PO:**

| SOESH1030 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO 1      | 3   | 2   | 1   | 2   | 1   | -   | -   | -   | -   | 1    | 2    |
| CO 2      | 2   | 3   | 2   | 3   | 2   | 1   | 1   | -   | 1   | 1    | 2    |
| CO 3      | 2   | 2   | 2   | 2   | 2   | -   | 1   | -   | 1   | 2    | 2    |
| CO 4      | 3   | 2   | 2   | 2   | 1   | 1   | 2   | 1   | 1   | 1    | 3    |
| CO 5      | 2   | 2   | 3   | 2   | 2   | 1   | 1   | -   | 1   | 1    | 2    |

**MAPPING OF CO WITH PSO:**

| SOESH1030 | PSO1 | PSO2 | PSO3 |
|-----------|------|------|------|
| CO 1      | 1    | 2    | 1    |
| CO 2      | 1    | 2    | 1    |
| CO 3      | 2    | 2    | 2    |
| CO 4      | 2    | 2    | 2    |

|      |   |   |   |
|------|---|---|---|
| CO 5 | 3 | 2 | 2 |
|------|---|---|---|

**LEVEL OF REVISED BLOOM'S TAXONOMY IN ASSESSMENT**

|             |               |           |
|-------------|---------------|-----------|
| 1: Remember | 2: Understand | 3: Apply  |
| 4: Analyze  | 5: Evaluate   | 6: Create |

| Module No | Content                        | RBT Level |
|-----------|--------------------------------|-----------|
| 1         | Quantum Physics                | 2         |
| 2         | Acoustic and Ultrasonic        | 3         |
| 3         | Laser and Fibre Optics         | 2,3       |
| 4         | Nanoscience and Nanotechnology | 2,3,6     |
| 5         | Superconductors                | 1,2,3     |
| 6         | Semiconductor Physics          | 1,6       |



**P P Savani University**  
**School of Engineering**  
**Offered by: Department of Mechanical Engineering**

**COURSE DETAILS:**

|                       |                                  |
|-----------------------|----------------------------------|
| Course Code           | SOEME1010                        |
| Course Name           | Basics of Mechanical Engineering |
| Prerequisite Course/s | None                             |

**TEACHING SCHEME:**

| Credit | Total Learning Hours | Direct Contact Hours |           |          | Indirect Contact Hours |    |            |           |               |
|--------|----------------------|----------------------|-----------|----------|------------------------|----|------------|-----------|---------------|
|        |                      | Theory               | Practical | Tutorial | Project                | CS | Assignment | Term Work | Self-Learning |
| 4      | 120                  | 45                   | 0         | 30       | 0                      | 0  | 30         | 0         | 15            |

GD = Group Discussion | CS = Case Study | FV = Field Visit | PPT = Presentation

**EXAMINATION SCHEME:**

| Theory |     | Practical |     | Tutorial |     | Project |     | CS |     | Assignment |     | Term Work |     | Self-Learning |     | Total |
|--------|-----|-----------|-----|----------|-----|---------|-----|----|-----|------------|-----|-----------|-----|---------------|-----|-------|
| CE     | ESE | CE        | ESE | CE       | ESE | CE      | ESE | CE | ESE | CE         | ESE | CE        | ESE | CE            | ESE |       |
| 30     | 50  | 0         | 0   | 30       | 50  | 0       | 0   | 0  | 0   | 20         | 0   | 0         | 0   | 20            | 0   | 200   |

CE: Continuous Evaluation, ESE: End Semester Exam

**OBJECTIVE OF THE COURSE:**

To help learners to:

- Understand fundamental concept of Thermodynamics.
- Explain the construction, working, and performance characteristics of internal combustion engines, boilers, and steam systems.
- Apply the principles of engineering materials.
- Describe various manufacturing processes.
- Understand the basic properties of fluids and the operation of power transmission elements

**COURSE CONTENT:**

| Module No. | Content                                                                                                                                                                                                                                                                                                                                                                                                               | Hours | Weightage in% |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| 1          | <b>Basic concept of thermodynamics:</b><br>Heat, Temperature, Specific heat capacity, Change of state, Path, Process, Cycle, Internal energy, Enthalpy, Zeroth law and First law, Second Law, Heat engine, Classification of heat engines, Enthalpy, Specific volume, Internal energy; Thermodynamic Cycles: Efficiency of Carnot, Otto, Diesel cycle, Concept of heat addition, heat rejection, work and efficiency. | 08    | 20            |
| 2          | <b>Basics of I.C Engines:</b><br>Construction and working of 2 Stroke & 4 Stroke Petrol and Diesel Engines, Difference Between 2-Stroke - 4 Stroke Engine & Petrol Diesel Engine, Efficiency of I. C. Engines.                                                                                                                                                                                                        | 05    | 10            |
| 3          | <b>Basic of Boilers &amp; Steam:</b>                                                                                                                                                                                                                                                                                                                                                                                  | 07    | 12            |

|              |                                                                                                                                                                                                                                                                                                                                                                                                  |           |             |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|
|              | Steam Properties: Steam formation, Types of steam (wet, dry, superheated), Steam properties, Use of steam tables Boilers: Classification, Cochran, Babcock and Wilcox boilers, Functions' of Boiler mountings and accessories                                                                                                                                                                    |           |             |
| 4            | <b>Engineering Materials:</b><br>Fundamentals of Stress and strain, Thermal Strain and Stress, Poisson Ratio, Elastic Constants, Types & properties of engineering materials, Use of materials under different environmental conditions, applications of Ferrous & Nonferrous metals, Ceramics, Polymers and alloys.                                                                             | 08        | 18          |
| 5            | <b>Basic Manufacturing Process:</b><br>Description of the manufacturing processes – Sand Casting, Forging, Rolling, Extrusion and their applications. Types of Metal Joining Processes, Arc Welding, Soldering, Brazing and their applications, Machine tools and basic machining operations such as Turning, Drilling, Milling and Grinding.                                                    | 09        | 20          |
| 6            | <b>Basic of Fluids &amp; Power Transmission Elements: :</b><br>Basic concept and properties of fluids: pressure, Density, viscosity, Thermal Conductivity, Bulk modulus, Specific Heats Surface Tension, Classification of Fluid flow. Basic of Power transmission components: Belt, Chain and Gear Drive – Arrangement and Applications; Clutches: Disc, Centrifugal; Brakes: Block, Shoe, Disc | 08        | 20          |
| <b>TOTAL</b> |                                                                                                                                                                                                                                                                                                                                                                                                  | <b>45</b> | <b>100%</b> |

**LIST OF PRACTICAL / TUTORIAL:**

| Sr. No       | Practical / Tutorial                                                                                                                | Hours     |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 1            | Basic concepts and laws of thermodynamics.                                                                                          | 02        |
| 2            | Thermodynamic processes, cycles, and the efficiency of Carnot, Otto, and Diesel cycles.                                             | 02        |
| 3            | Construction, working, and comparison of two-stroke and four-stroke I.C. engines                                                    | 02        |
| 4            | Construction, working, performance, and efficiency of petrol and diesel engines.                                                    | 02        |
| 5            | Steam formation, steam properties, and the use of steam tables.                                                                     | 04        |
| 6            | Classification, construction, working, mountings, and accessories of boilers.                                                       | 02        |
| 7            | Stress, strain, thermal stress, Poisson's ratio, elastic constants, and engineering materials.                                      | 04        |
| 8            | To study manufacturing processes such as casting, forging, rolling, and extrusion along with their applications.                    | 04        |
| 9            | To understand metal joining processes and machine tools used in manufacturing operations.                                           | 04        |
| 10           | To study fluid properties, types of fluid flow, and power transmission elements such as belts, chains, gears, clutches, and brakes. | 04        |
| <b>TOTAL</b> |                                                                                                                                     | <b>30</b> |

**SELF-LEARNING ONLINE RESOURCES:**

| Sr. No | Link / Description                                                                                                                                                                                                  | Self-Learning Hours |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1      | <a href="https://www.youtube.com/watch?v=H_RgFXjg5s&amp;list=PLyqSpQzTE6M9G2SNxKfsVEjcM9Mljau4F">https://www.youtube.com/watch?v=H_RgFXjg5s&amp;list=PLyqSpQzTE6M9G2SNxKfsVEjcM9Mljau4F</a> - Basics of I.C Engines | 02                  |

|   |                                                                                                                                                                                                                           |    |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 2 | <a href="https://youtu.be/9GMBpZZtjXM?si=xub19V-rE5_bUgEp">https://youtu.be/9GMBpZZtjXM?si=xub19V-rE5_bUgEp</a> - Basic concept of thermodynamics                                                                         | 02 |
| 3 | <a href="https://www.youtube.com/watch?v=w8tQ9FSYzm0&amp;list=PLdohVhbPQV6nmSlVMi7rk2za0y1jFJeL">https://www.youtube.com/watch?v=w8tQ9FSYzm0&amp;list=PLdohVhbPQV6nmSlVMi7rk2za0y1jFJeL</a> - Basic of Boilers & Steam    | 02 |
| 4 | #1 Introduction   Basics of Materials Engineering- Engineering Materials                                                                                                                                                  | 03 |
| 5 | <a href="https://www.youtube.com/watch?v=jdFrBtHeJbs&amp;list=PLSGws_74K01g9nnTMBssGURHawYYQfMQ">https://www.youtube.com/watch?v=jdFrBtHeJbs&amp;list=PLSGws_74K01g9nnTMBssGURHawYYQfMQ</a> - Basic Manufacturing Process | 03 |
| 6 | Fluid Mechanics Introduction - Properties of Fluid - Fluid Mechanics 1- Basic of Fluids                                                                                                                                   | 03 |

**COURSE EVALUATION & ASSESSMENT RUBRICS:**

| Component          | CE/ESE | Evaluation Methodology / Rubrics                                                                                                                                                                                   | Marks      | Passing Marks |
|--------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------|
| Theory             | CE     | Two Internal Tests of 30 marks each shall be conducted during the semester. The average of both tests will be converted to 30 marks.                                                                               | 30         | 00            |
|                    | ESE    | Comprehensive written examination covering all modules of the course. Duration: 2 Hours                                                                                                                            | 50         | 20            |
| Tutorial           | CE     | Performance of tutorial which should be evaluated out of 10 marks for each practical and average of the same will be converted to 30 marks.                                                                        | 30         | 00            |
|                    | ESE    | Quiz / Performance – 25Marks<br>External Viva Voce – 25 Marks                                                                                                                                                      | 50         | 20            |
| Assignment         | CE     | Assignment<br>Evaluation Rubrics<br>Problem Formulations & Assumptions – 5 Marks<br>Description/methodology/calculations – 5 Marks<br>Analysis & Interpretations – 5 Marks<br>Technical delivery & Units – 5 Marks | 20         | 00            |
| Self Learning      | CE     | 40 MCQ questions based on self-study resources and online learning   0.5 marks per question   Total = 20 marks                                                                                                     | 20         | 00            |
| <b>TOTAL MARKS</b> |        |                                                                                                                                                                                                                    | <b>200</b> | <b>80</b>     |

**TEXT BOOK(S):**

| Title                              | Author/s                    | Publication                     |
|------------------------------------|-----------------------------|---------------------------------|
| Elements of Mechanical Engineering | S. B. Mathur, S. Domkundwar | Dhanpat Rai & Sons Publications |
| Material Science                   | Narula                      | TMH                             |
| Basic Mechanical Engineering       | Agrawal B & CM              | TMH                             |
| Instrumentation and Measurement    | Nakra and Chaudhary         | TMH                             |
| Combustion Engines                 | Ganesan                     | TMH.                            |

**REFERENCE BOOK(S):**

| Title                        | Author/s     | Publication        |
|------------------------------|--------------|--------------------|
| Thermal Engineering          | R. K. Rajput | Laxmi Publications |
| Basic Mechanical Engineering | T.S. Rajan   | Wiley              |

### COURSE OUTCOME(S):

After the completion of the course, the students will be able to:

| <b>SOEME1010</b> | <b>Basics of Mechanical Engineering</b>                                                                               |
|------------------|-----------------------------------------------------------------------------------------------------------------------|
| CO 1             | Understand the concept of Boiler, Material types and its application.                                                 |
| CO 2             | Understand the Fluid properties and measurement process.                                                              |
| CO 3             | Understand the concept of basic thermodynamics                                                                        |
| CO 4             | Comprehend the importance of mechanical engineering equipment like IC engine and power transmission elements.         |
| CO 5             | Analyse mechanical properties of materials and apply concepts of stress-strain relationships & manufacturing process. |

### MAPPING OF CO WITH PO:

| <b>SOEME1010</b> | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> | <b>PO6</b> | <b>PO7</b> | <b>PO8</b> | <b>PO9</b> | <b>PO10</b> | <b>PO11</b> |
|------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|
| CO 1             | 2          | 3          | 1          | 3          | 2          | 2          |            |            |            |             | 2           |
| CO 2             | 2          | 3          | 1          | 3          | 2          | 2          |            |            |            |             | 2           |
| CO 3             | 1          | 3          | 1          | 3          | 2          | 2          |            |            |            |             | 2           |
| CO 4             | 1          | 3          | 1          | 1          | 2          | 2          |            |            |            |             | 2           |
| CO 5             | 1          | 3          | 1          | 1          | 2          | 2          |            |            |            |             | 2           |

### MAPPING OF CO WITH PSO:

| <b>SOEME1010</b> | <b>PSO1</b> | <b>PSO2</b> | <b>PSO3</b> |
|------------------|-------------|-------------|-------------|
| CO 1             | 2           | 2           | 2           |
| CO 2             | 2           | 2           | 2           |
| CO 3             | 3           | 3           | 2           |
| CO 4             | 3           | 2           | 2           |
| CO 5             | 2           | 2           | 2           |

### LEVEL OF REVISED BLOOM'S TAXONOMY IN ASSESSMENT

|             |               |           |
|-------------|---------------|-----------|
| 1: Remember | 2: Understand | 3: Apply  |
| 4: Analyze  | 5: Evaluate   | 6: Create |

| <b>Module No</b> | <b>Content</b>                                | <b>RBT Level</b>          |
|------------------|-----------------------------------------------|---------------------------|
| 1                | Basic concept of thermodynamics               | Remember/Understand/Apply |
| 2                | Basics of I.C Engines                         | Remember/Understand/Apply |
| 3                | Basic of Boilers & Steam                      | Evaluate                  |
| 4                | Engineering Materials                         | Analyze/Evaluate          |
| 5                | Basic Manufacturing Process                   | Analyze                   |
| 6                | Basic of Fluids & Power Transmission Elements | Create                    |

**P P Savani University**  
**School of Engineering**  
**Offered by: Department of Computer Engineering**

**COURSE DETAILS:**

|                       |                                        |
|-----------------------|----------------------------------------|
| Course Code           | SOECE1010                              |
| Course Name           | Programming for Problem Solving with C |
| Prerequisite Course/s | None                                   |

**TEACHING SCHEME:**

| Credit | Total Learning Hours | Direct Contact Hours |           |          | Indirect Contact Hours |    |            |           |               |
|--------|----------------------|----------------------|-----------|----------|------------------------|----|------------|-----------|---------------|
|        |                      | Theory               | Practical | Tutorial | Project                | CS | Assignment | Term Work | Self-Learning |
| 4      | 120                  | 45                   | 30        | 0        | 30                     | 0  | 0          | 0         | 15            |

GD = Group Discussion | CS = Case Study | FV = Field Visit | PPT = Presentation

**EXAMINATION SCHEME:**

| Theory |     | Practical |     | Tutorial |     | Project |     | CS |     | Assignment |     | Term Work |     | Self-Learning |     | Total |
|--------|-----|-----------|-----|----------|-----|---------|-----|----|-----|------------|-----|-----------|-----|---------------|-----|-------|
| CE     | ESE | CE        | ESE | CE       | ESE | CE      | ESE | CE | ESE | CE         | ESE | CE        | ESE | CE            | ESE |       |
| 30     | 50  | 30        | 50  | 0        | 0   | 20      | 0   | 0  | 0   | 0          | 0   | 0         | 0   | 20            | 0   | 200   |

CE: Continuous Evaluation, ESE: End Semester Exam

**OBJECTIVE OF THE COURSE:**

To help learners to:

- Understand the fundamentals of programming and problem-solving using C language.
- Develop logical thinking and algorithm design skills.
- Apply C programming constructs to solve real-world computational problems.
- Design modular programs using functions, arrays, pointers, and structures.
- Build debugging, testing, and documentation skills for software development.

**COURSE CONTENT:**

| Module No. | Content                                                                                                                                                                                 | Hours | Weightage in% |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| 1          | <b>Introduction to Programming and C Basics:</b><br>Problem solving, algorithms, flowcharts, C history, structure of C program, tokens, variables, data types, operators, input/output. | 08    | 18            |
| 2          | <b>Decision Making and Looping:</b><br>if, if-else, nested if, switch, for, while, do-while loops, break, continue.                                                                     | 08    | 18            |
| 3          | <b>Functions and Arrays:</b><br>Functions, recursion, storage classes, 1D and 2D arrays, string handling.                                                                               | 10    | 22            |
| 4          | <b>Pointers and Dynamic Concepts:</b><br>Pointers, pointer arithmetic, pointers with arrays and functions, dynamic memory concepts.                                                     | 07    | 16            |
| 5          | <b>Structures, Unions and File Handling:</b><br>Structures, unions, typedef, file operations, command line                                                                              | 06    | 13            |

|   |                                                                                                                               |           |             |
|---|-------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|
|   | arguments.                                                                                                                    |           |             |
| 6 | <b>Problem Solving Applications:</b><br>Case studies, mini-projects, debugging, testing, real-world programming applications. | 06        | 13          |
|   | <b>TOTAL</b>                                                                                                                  | <b>45</b> | <b>100%</b> |

**LIST OF PRACTICAL / TUTORIAL:**

| Sr. No | Practical / Tutorial                    | Hours     |
|--------|-----------------------------------------|-----------|
| 1      | Programs on input/output and operators. | 02        |
| 2      | Decision making programs.               | 02        |
| 3      | Loop-based applications                 | 04        |
| 4      | Functions and recursion programs        | 04        |
| 5      | Arrays and strings applications         | 02        |
| 6      | Pointer-based programs                  | 04        |
| 7      | Structures and unions                   | 04        |
| 8      | File handling programs                  | 04        |
| 9      | Mini Project in C                       | 04        |
|        | <b>TOTAL</b>                            | <b>30</b> |

**SELF-LEARNING ONLINE RESOURCES:**

| Sr. No | Link / Description                                                                                                                                                                                                                     | Self-Learning Hours |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1      | Algorithm and Flowchart:<br><a href="https://www.youtube.com/watch?v=MUkvVLGz89k">https://www.youtube.com/watch?v=MUkvVLGz89k</a>                                                                                                      | 05                  |
| 2      | Pillars of Computational Thinking:<br><a href="https://www.coursera.org/learn/computational-thinking-problem-solving/home/module/1">https://www.coursera.org/learn/computational-thinking-problem-solving/home/module/1</a>            | 05                  |
| 3      | Fundamentals Operations of a Modern Computer:<br><a href="https://www.coursera.org/learn/computational-thinking-problem-solving/home/module/3">https://www.coursera.org/learn/computational-thinking-problem-solving/home/module/3</a> | 05                  |

**COURSE EVALUATION & ASSESSMENT RUBRICS:**

| Component | CE/ESE | Evaluation Methodology / Rubrics                                                                                                                                                                                                   | Marks | Passing Marks |
|-----------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| Theory    | CE     | Two Internal Tests of 30 marks each shall be conducted during the semester. The average of both tests will be converted to 30 marks.                                                                                               | 30    | 00            |
|           | ESE    | Comprehensive written examination covering all modules of the course. Duration: 2 Hours                                                                                                                                            | 50    | 20            |
| Practical | CE     | Performance of practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 30 marks.                                                                                       | 30    | 00            |
|           | ESE    | Quiz / Practical Performance – 25Marks<br>External Viva Voce – 25 Marks                                                                                                                                                            | 50    | 20            |
| Project   | CE     | Project Evaluation Rubrics <ul style="list-style-type: none"> <li>• Problem Identification &amp; Understanding – 5 Marks</li> <li>• Relevance of Application – 5 Marks</li> <li>• Creativity &amp; Innovation – 5 Marks</li> </ul> | 20    | 00            |

|                    |    |                                                                                                                |            |           |
|--------------------|----|----------------------------------------------------------------------------------------------------------------|------------|-----------|
|                    |    | • Presentation Quality – 5 Marks                                                                               |            |           |
| Self Learning      | CE | 40 MCQ questions based on self-study resources and online learning   0.5 marks per question   Total = 20 marks | 20         | 00        |
| <b>TOTAL MARKS</b> |    |                                                                                                                | <b>200</b> | <b>80</b> |

**TEXT BOOK(S):**

| Title                 | Author/s        | Publication                 |
|-----------------------|-----------------|-----------------------------|
| Programming in ANSI C | E. Balagurusamy | McGraw Hill Education India |

**REFERENCE BOOK(S):**

| Title              | Author/s        | Publication             |
|--------------------|-----------------|-------------------------|
| Programming with C | Byron Gottfried | Schaum Series           |
| Programming in C   | Reema Thareja   | Oxford University Press |

**COURSE OUTCOME(S):**

After the completion of the course, the students will be able to:

| SOECE1010 | Programming for Problem Solving with C                                              |
|-----------|-------------------------------------------------------------------------------------|
| CO 1      | Explain fundamental concepts of C programming and problem-solving techniques.       |
| CO 2      | Develop algorithms and implement them using decision-making and looping constructs. |
| CO 3      | Apply functions, arrays, strings, and pointers to develop modular programs.         |
| CO 4      | Use structures, unions, and file handling for data management applications.         |
| CO 5      | Design and implement complete C-based solutions for real-world problems.            |

**MAPPING OF CO WITH PO:**

| SOECE1010 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO 1      | 3   | 2   | 1   | -   | 2   | -   | -   | -   | -   | -    | -    |
| CO 2      | 2   | 3   | 2   | -   | 2   | -   | -   | -   | -   | -    | -    |
| CO 3      | 2   | 3   | 3   | 2   | 3   | -   | -   | -   | -   | -    | -    |
| CO 4      | 2   | 2   | 3   | 2   | 3   | -   | -   | -   | -   | -    | -    |
| CO 5      | 2   | 3   | 3   | 3   | 3   | 1   | -   | -   | 2   | 1    | 2    |

**MAPPING OF CO WITH PSO:**

| SOECE1010 | PSO1 | PSO2 | PSO3 |
|-----------|------|------|------|
| CO 1      | 3    | 1    | 1    |
| CO 2      | 3    | 2    | 1    |
| CO 3      | 3    | 2    | 1    |
| CO 4      | 3    | 2    | 1    |
| CO 5      | 3    | 3    | 2    |

**LEVEL OF REVISED BLOOM'S TAXONOMY IN ASSESSMENT**

|             |               |           |
|-------------|---------------|-----------|
| 1: Remember | 2: Understand | 3: Apply  |
| 4: Analyze  | 5: Evaluate   | 6: Create |

| Module No | Content                                  | RBT Level |
|-----------|------------------------------------------|-----------|
| 1         | Introduction to Programming and C Basics | 1,2       |
| 2         | Decision Making and Looping              | 2,3       |
| 3         | Functions and Arrays                     | 3,4       |
| 4         | Pointers and Dynamic Concepts            | 3,4       |
| 5         | Structures, Unions and File Handling     | 3,4       |
| 6         | Problem Solving Applications             | 5,6       |



**P P Savani University**  
**School of Engineering**  
**Offered by: Department of Science & Humanities**

**COURSE DETAILS:**

|                       |                |
|-----------------------|----------------|
| Course Code           | SOESH1040      |
| Course Name           | Project Studio |
| Prerequisite Course/s | None           |

**TEACHING SCHEME:**

| Credit | Total Learning Hours | Direct Contact Hours |           |          | Indirect Contact Hours |     |            |           |               |
|--------|----------------------|----------------------|-----------|----------|------------------------|-----|------------|-----------|---------------|
|        |                      | Theory               | Practical | Tutorial | Project                | PPT | Assignment | Term Work | Self-Learning |
| 4      | 120                  | 0                    | 0         | 0        | 60                     | 30  | 0          | 30        | 0             |

GD = Group Discussion | CS = Case Study | FV = Field Visit | PPT = Presentation

**EXAMINATION SCHEME:**

| Theory |     | Practical |     | Tutorial |     | Project |     | PPT |     | Assignment |     | Term Work |     | Self-Learning |     | Total |
|--------|-----|-----------|-----|----------|-----|---------|-----|-----|-----|------------|-----|-----------|-----|---------------|-----|-------|
| CE     | ESE | CE        | ESE | CE       | ESE | CE      | ESE | CE  | ESE | CE         | ESE | CE        | ESE | CE            | ESE |       |
| 0      | 0   | 0         | 0   | 0        | 0   | 50      | 0   | 25  | 0   | 0          | 0   | 25        | 0   | 0             | 0   | 100   |

CE: Continuous Evaluation, ESE: End Semester Exam

**OBJECTIVE OF THE COURSE:**

To help learners to:

- To provide a platform for students to conceive, plan, and independently execute an engineering/interdisciplinary project.
- To develop skills in problem identification, need analysis, and literature review for real-world challenges.
- To enable students to design, implement, and test a prototype/model/solution using appropriate engineering tools and techniques.
- To enhance technical documentation, report writing, and presentation skills.

**COURSE CONTENT:**

| Module No. | Content                                                                                                                                                                                                                                                                                                                     | Hours | Weightage in% |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| 1          | <b>Project Identification, Problem Formulation &amp; Literature Review:</b><br>Identification of a real-life engineering/societal problem; need analysis; scope definition; review of existing literature, products, and technologies; identification of research/technology gaps; formulation of clear project objectives. | 0     | 17            |
| 2          | <b>Feasibility Study &amp; Project Planning:</b><br>Technical, economic, and operational feasibility study; work breakdown structure; project scheduling using Gantt chart/PERT-CPM; resource and role allocation within the team; risk identification and mitigation planning.                                             | 0     | 17            |

|              |                                                                                                                                                                                                                                                                      |          |             |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|
| 3            | <b>Design &amp; Methodology Development:</b><br>Conceptual and detailed design/methodology; selection of appropriate tools, technologies, and standards; design calculations/algorithms; preparation of process flow, block diagrams, or system architecture.        | 0        | 20          |
| 4            | <b>Implementation / Prototype Development:</b><br>Development of working prototype/model/software solution; fabrication, coding, or experimentation as applicable; iterative development with mentor feedback; troubleshooting and refinement.                       | 0        | 23          |
| 5            | <b>Testing, Validation &amp; Result Analysis:</b><br>Testing of the developed prototype/solution against defined objectives; validation of results; comparison with expected outcomes; performance evaluation and interpretation of results.                         | 0        | 13          |
| 6            | <b>Documentation, Reporting &amp; Final Presentation:</b><br>Compilation of the project report as per prescribed format; preparation of final presentation/poster; demonstration of the project to a review panel; reflection on learning outcomes and future scope. | 0        | 10          |
| <b>TOTAL</b> |                                                                                                                                                                                                                                                                      | <b>0</b> | <b>100%</b> |

#### COURSE EVALUATION & ASSESSMENT RUBRICS:

| Component          | CE/ESE | Evaluation Methodology / Rubrics                                                                                                                                                                                              | Marks      | Passing Marks |
|--------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------|
| Project            | CE     | Problem Identification & Objective Clarity – 10 Marks<br>Design/Methodology & Technical Content – 15 Marks<br>Implementation, Functionality & Innovation – 15 Marks<br>Result Analysis & Achievement of Objectives – 10 Marks | 50         | 00            |
| Presentation       | CE     | Four reviews covering all project phases, evaluated out of 25 marks each on completeness, correctness, and timely submission; average converted to 25 marks.                                                                  | 25         | 00            |
| Term Work          | CE     | Log book/diary maintenance - 5 Marks<br>Prototype/model submission - 10 Marks<br>Final report compilation - 10 Marks                                                                                                          | 25         | 00            |
| <b>TOTAL MARKS</b> |        |                                                                                                                                                                                                                               | <b>100</b> | <b>40</b>     |

#### COURSE OUTCOME(S):

After the completion of the course, the students will be able to:

| SOESH1040 | Project Studio                                                                                               |
|-----------|--------------------------------------------------------------------------------------------------------------|
| CO 1      | Identify and formulate a real-life engineering/societal problem through need analysis and literature review. |
| CO 2      | Plan and design a project methodology by selecting appropriate engineering tools, techniques, and resources. |
| CO 3      | Develop and implement a working prototype/model/solution demonstrating technical and practical skills.       |

|      |                                                                                                                                       |
|------|---------------------------------------------------------------------------------------------------------------------------------------|
| CO 4 | Test, validate, and analyze results to evaluate project outcomes against defined objectives.                                          |
| CO 5 | Communicate project work effectively through documentation, reports, and presentations while functioning as an effective team member. |

**MAPPING OF CO WITH PO:**

| SOESH1040 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO 1      | 2   | 2   | 1   |     | 1   |     |     | 2   |     |      | 1    |
| CO 2      | 2   | 3   | 2   | 1   | 2   |     |     | 2   | 1   | 1    | 1    |
| CO 3      | 3   | 3   | 3   | 2   | 3   | 1   | 1   | 2   | 1   | 1    | 2    |
| CO 4      | 2   | 3   | 2   | 1   | 2   |     |     | 1   | 1   | 1    | 1    |
| CO 5      | 1   | 2   | 2   | 1   | 2   | 2   | 2   | 3   | 2   | 2    | 3    |

**MAPPING OF CO WITH PSO:**

| SOESH1040 | PSO1 | PSO2 | PSO3 |
|-----------|------|------|------|
| CO 1      | 2    | 1    | 1    |
| CO 2      | 2    | 2    | 2    |
| CO 3      | 3    | 3    | 2    |
| CO 4      | 2    | 2    | 3    |
| CO 5      | 3    | 3    | 3    |

**LEVEL OF REVISED BLOOM'S TAXONOMY IN ASSESSMENT**

|             |               |           |
|-------------|---------------|-----------|
| 1: Remember | 2: Understand | 3: Apply  |
| 4: Analyze  | 5: Evaluate   | 6: Create |

| Module No | Content                                                          | RBT Level |
|-----------|------------------------------------------------------------------|-----------|
| 1         | Project Identification, Problem Formulation & Literature Review: | 2,3       |
| 2         | Feasibility Study & Project Planning:                            | 4,5       |
| 3         | Design & Methodology Development:                                | 3,6       |
| 4         | Implementation / Prototype Development:                          | 6         |
| 5         | Testing, Validation & Result Analysis:                           | 4,5       |
| 6         | Documentation, Reporting & Final Presentation:                   | 3         |

**P P Savani University**  
**School of Engineering**  
**Offered by: Department of Science & Humanities**

**COURSE DETAILS:**

|                       |                |
|-----------------------|----------------|
| Course Code           | SOESH1020      |
| Course Name           | Linear Algebra |
| Prerequisite Course/s | None           |

**TEACHING SCHEME:**

| Credit | Total Learning Hours | Direct Contact Hours |           |          | Indirect Contact Hours |    |            |           |               |
|--------|----------------------|----------------------|-----------|----------|------------------------|----|------------|-----------|---------------|
|        |                      | Theory               | Practical | Tutorial | Project                | CS | Assignment | Term Work | Self-Learning |
| 4      | 120                  | 45                   | 00        | 30       | 0                      | 00 | 30         | 0         | 15            |

GD = Group Discussion | CS = Case Study | FV = Field Visit | PPT = Presentation

**EXAMINATION SCHEME:**

| Theory |     | Practical |     | Tutorial |     | Project |     | CS |     | Assignment |     | Term Work |     | Self-Learning |     | Total |
|--------|-----|-----------|-----|----------|-----|---------|-----|----|-----|------------|-----|-----------|-----|---------------|-----|-------|
| CE     | ESE | CE        | ESE | CE       | ESE | CE      | ESE | CE | ESE | CE         | ESE | CE        | ESE | CE            | ESE |       |
| 30     | 50  | 00        | 00  | 30       | 50  | 0       | 0   | 00 | 0   | 20         | 0   | 0         | 0   | 20            | 0   | 200   |

CE: Continuous Evaluation, ESE: End Semester Exam

**OBJECTIVE OF THE COURSE:**

To help learners to:

- Analyses and solve system of linear equations and understand characteristics of Matrices.
- Learn about and work with vector space, linear transformation and inner product space.
- Apply concepts of linear algebra for solving science and engineering problems.
- Introduce the concept of improper integral and Beta-Gamma Function.

**COURSE CONTENT:**

| Module No. | Content                                                                                                                                                                                                 | Hours | Weightage in% |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| 1          | <b>Matrix Algebra I:</b><br>Elementary Row and Column operations, Inverse of matrix, Rank of matrix, System of Linear Equations.                                                                        | 06    | 15            |
| 2          | <b>Matrix Algebra II:</b><br>Characteristic Equation, Eigen values and Eigen vector, Diagonalization, Cayley Hamilton Theorem.                                                                          | 06    | 15            |
| 3          | <b>Vector Space:</b><br>Concept of vector space, Subspace, Linear Combination, Linear Dependence and Independence, Span, Basis and Dimension, Row Space, Column Space and Null Space, Rank and Nullity. | 11    | 20            |
| 4          | <b>Linear Transformation:</b><br>Introduction of Linear Transformation, Kernel and Range, Rank and Nullity, Inverse of Linear Transformation, Rank Nullity Theorem, Composition of Linear Maps.         | 09    | 20            |
| 5          | <b>Inner Product Space:</b>                                                                                                                                                                             | 08    | 20            |

|   |                                                                                                                                                |           |             |
|---|------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|
|   | Inner Product, Angle and Orthogonality, Orthogonal projection, Gram- Schmidt process and QR Decomposition, least square decomposition.         |           |             |
| 6 | <b>Beta and Gamma function:</b><br>Improper Integrals, Convergence, Properties of Beta and Gamma Function, Duplication Formula (without proof) | 05        | 10          |
|   | <b>TOTAL</b>                                                                                                                                   | <b>45</b> | <b>100%</b> |

**LIST OF PRACTICAL / TUTORIAL:**

| Sr. No | Practical / Tutorial      | Hours     |
|--------|---------------------------|-----------|
| 1      | Matrix Algebra-1          | 04        |
| 2      | Matrix Algebra-2          | 02        |
| 3      | Vector Space-1            | 04        |
| 4      | Vector Space-2            | 02        |
| 5      | Linear Transformation-1   | 04        |
| 6      | Linear Transformation-2   | 02        |
| 7      | Inner Product Space-1     | 04        |
| 8      | Inner Product Space-2     | 02        |
| 9      | Beta and Gamma function-1 | 04        |
| 10     | Beta and Gamma function-2 | 02        |
|        | <b>TOTAL</b>              | <b>30</b> |

**SELF-LEARNING ONLINE RESOURCES:**

| Sr. No | Link / Description                                                                                                                                                                                            | Self-Learning Hours |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1      | <a href="https://youtu.be/5hGjimutBEo?si=KMmcyV3DLZildfIF">https://youtu.be/5hGjimutBEo?si=KMmcyV3DLZildfIF</a> -Inner product space                                                                          | 2                   |
| 2      | <a href="https://youtu.be/Li4PfR7v7n8?si=5ulu-CbfrKulK8-C">https://youtu.be/Li4PfR7v7n8?si=5ulu-CbfrKulK8-C</a> – Linear Transformation                                                                       | 3                   |
| 3      | <a href="https://youtu.be/cdZnhQjJu4I?si=3RwZuBApR9-gjUFE">https://youtu.be/cdZnhQjJu4I?si=3RwZuBApR9-gjUFE</a> -Eigen Values & Eigen Vectors                                                                 | 5                   |
| 4      | <a href="https://www.youtube.com/watch?v=fNk_zzaMoSs&amp;list=PLZHQObOWTQDPD3MizzM2xVFitgF8hE_ab">https://www.youtube.com/watch?v=fNk_zzaMoSs&amp;list=PLZHQObOWTQDPD3MizzM2xVFitgF8hE_ab</a> -Linear Algebra | 5                   |

**COURSE EVALUATION & ASSESSMENT RUBRICS:**

| Component  | CE/ESE | Evaluation Methodology / Rubrics                                                                                                                     | Marks | Passing Marks |
|------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| Theory     | CE     | Two Internal Tests of 30 marks each shall be conducted during the semester. The average of both tests will be converted to 30 marks.                 | 30    | 00            |
|            | ESE    | Comprehensive written examination covering all modules of the course. Duration: 2 Hours                                                              | 50    | 20            |
| Tutorial   | CE     | Performance of tutorial which should be evaluated out of 10 marks for each tutorial and average of the same will be converted to 30 marks.           | 30    | 00            |
|            | ESE    | Quiz / Tutorial Performance – 25Marks<br>External Viva Voce – 25 Marks                                                                               | 50    | 20            |
| Assignment | CE     | Assignment Evaluation Rubrics<br>Understanding of Concepts– 5 Marks<br>Problem Solving & Accuracy – 5 Marks<br>Presentation & Organization – 5 Marks | 20    | 00            |

|                    |    |                                                                                                                |            |           |
|--------------------|----|----------------------------------------------------------------------------------------------------------------|------------|-----------|
|                    |    | Timeliness & Originality – 5 Marks                                                                             |            |           |
| Self Learning      | CE | 40 MCQ questions based on self-study resources and online learning   0.5 marks per question   Total = 20 marks | 20         | 00        |
| <b>TOTAL MARKS</b> |    |                                                                                                                | <b>200</b> | <b>80</b> |

**TEXT BOOK(S):**

| Title                     | Author/s                                        | Publication |
|---------------------------|-------------------------------------------------|-------------|
| Thomas' Calculus          | George B. Thomas, Maurice D. Weir and Joel Hass | Pearson     |
| Elementary Linear Algebra | Howard Anton and Chris Rorres                   | Wiley       |

**REFERENCE BOOK(S):**

| Title                                  | Author/s                      | Publication       |
|----------------------------------------|-------------------------------|-------------------|
| Advanced Engineering Mathematics       | E Kreyszig                    | John Wiley & Sons |
| A textbook of Engineering Mathematics  | N P Bali and Manish Goyal     | Laxmi             |
| Higher Engineering Mathematics         | B S Grewal                    | Khanna            |
| Engineering Mathematics for First Year | T Veerarajan                  | Tata Mc Graw Hill |
| Engineering Mathematics-1 (Calculus)   | H. K. Dass and Dr. Rama Verma | S. Chand          |

**COURSE OUTCOME(S):**

After the completion of the course, the students will be able to:

| SOESH1020 | Linear Algebra                                                                                                                                |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| CO 1      | Evaluate linear system using matrices and the knowledge of eigenvalues and eigenvectors for matrix diagonalization                            |
| CO 2      | Determine the basis and dimension of vector spaces and subspaces.                                                                             |
| CO 3      | Discuss the matrix representation of a linear transformation given bases of the relevant vector space.                                        |
| CO 4      | Apply vectors, inner products, and linear transformations to real world situations.                                                           |
| CO 5      | Classify gamma, beta functions & their relation which is helpful to evaluate some definite integral arising in various branch of engineering. |

**MAPPING OF CO WITH PO:**

| SOESH1020 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO 1      | 3   | 3   | 1   | 1   | -   | -   | -   | -   | -   | -    | 3    |
| CO 2      | 3   | 2   | 1   | -   | -   | -   | -   | -   | -   | -    | 2    |
| CO 3      | 2   | 2   | 1   | -   | -   | -   | -   | -   | -   | -    | 3    |
| CO 4      | 2   | 2   | 1   | 1   | -   | -   | -   | -   | -   | -    | 1    |
| CO 5      | 2   | 1   | 1   | -   | -   | -   | -   | -   | -   | -    | 1    |

**MAPPING OF CO WITH PSO:**

| SOESH1020 | PSO1 | PSO2 | PSO3 |
|-----------|------|------|------|
| CO 1      | 3    | 2    | 1    |
| CO 2      | 3    | 2    | 1    |

|      |   |   |   |
|------|---|---|---|
| CO 3 | 2 | 3 | 1 |
| CO 4 | 2 | 3 | 2 |
| CO 5 | 2 | 2 | 2 |

**LEVEL OF REVISED BLOOM'S TAXONOMY IN ASSESSMENT**

|             |               |           |
|-------------|---------------|-----------|
| 1: Remember | 2: Understand | 3: Apply  |
| 4: Analyze  | 5: Evaluate   | 6: Create |

| Module No | Content                 | RBT Level |
|-----------|-------------------------|-----------|
| 1         | Matrix Algebra I        | 1,2,3     |
| 2         | Matrix Algebra II       | 1,2,3,4   |
| 3         | Vector Space            | 1,2,3,4   |
| 4         | Linear Transformation   | 1,2,3,4   |
| 5         | Inner Product Space     | 1,2,3,4,5 |
| 6         | Beta and Gamma Function | 1,2,3     |

**P P Savani University**  
**School of Engineering**  
**Offered by: Department of Civil Engineering**

**COURSE DETAILS:**

|                       |                             |
|-----------------------|-----------------------------|
| Course Code           | SOECV1010                   |
| Course Name           | Basics of Civil Engineering |
| Prerequisite Course/s | None                        |

**TEACHING SCHEME:**

| Credit | Total Learning Hours | Direct Contact Hours |           |          | Indirect Contact Hours |    |            |           |               |
|--------|----------------------|----------------------|-----------|----------|------------------------|----|------------|-----------|---------------|
|        |                      | Theory               | Practical | Tutorial | Project                | FV | Assignment | Term Work | Self-Learning |
| 4      | 120                  | 45                   | 0         | 30       | 0                      | 30 | 0          | 0         | 15            |

GD = Group Discussion | CS = Case Study | FV = Field Visit | PPT = Presentation

**EXAMINATION SCHEME:**

| Theory |     | Practical |     | Tutorial |     | Project |     | FV |     | Assignment |     | Term Work |     | Self-Learning |     | Total |
|--------|-----|-----------|-----|----------|-----|---------|-----|----|-----|------------|-----|-----------|-----|---------------|-----|-------|
| CE     | ESE | CE        | ESE | CE       | ESE | CE      | ESE | CE | ESE | CE         | ESE | CE        | ESE | CE            | ESE |       |
| 30     | 50  | 00        | 00  | 30       | 50  | 0       | 0   | 20 | 0   | 0          | 0   | 0         | 0   | 20            | 0   | 200   |

CE: Continuous Evaluation, ESE: End Semester Exam

**OBJECTIVE OF THE COURSE:**

To help learners to:

- Introduce fundamental concepts, branches, scope, and professional role of Civil Engineering in infrastructure development
- Develop basic understanding of construction materials, building components, construction practices, and principles of building planning
- Familiarize with the concepts of town planning, zoning, land use, low-cost housing, and sustainable urban development
- Provide knowledge of basic surveying and levelling techniques along with modern surveying instruments used in Civil Engineering
- Introduce recent trends and Artificial Intelligence applications in Civil Engineering for smart, sustainable, and modern infrastructure development

**COURSE CONTENT:**

| Module No. | Content                                                                                                                                                                                                                                                                                                                      | Hours | Weightage in% |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| 1          | <b>Civil engineering: an overview:</b><br>Introduction, Branches, Scope, Impact, Role of Civil Engineer, Unit of measurement, Unit conversion (Length, Area, Volume).                                                                                                                                                        | 06    | 15            |
| 2          | <b>Building materials and construction:</b><br>Introduction to construction materials, Properties and uses of: Cement, Concrete, Bricks, Steel, Timber, Glass, Basic building components: Foundation, Walls, Columns, Beams, Roofs, Types of buildings, Green building concepts, Types of brick bonds, Principle of planning | 10    | 20            |



|              |                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |             |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|
| 3            | <b>Introduction to town planning:</b><br>5 Principles of town planning, Necessity of town planning, Origin of town, Growth of town, Land use, Principles and objects of zoning, Advantages of zoning, Low-cost housing, Prevention of slum, FSI                                                                                                                                                                                       | 06        | 15          |
| 4            | <b>Introduction to surveying and levelling:</b><br>Introduction: Fundamental principles, Classification. Linear measurement: Instruments used, Chaining on plane ground, Offset, Ranging.<br>Angular measurement: Compass-Instrument used, Meridian, Bearing, Local attraction.<br>Levelling: Instrument used, Terminology, Types of levelling, Methods of levelling.<br>Modern tools: Introduction to theodolite, Total Station, GPS | 10        | 20          |
| 5            | <b>Recent trends in civil engineering:</b><br>Mass Transportation, Rapid Transportation, Smart City, Sky scarpers, Dams, Rain Water harvesting, Batch mix plant, Ready Mix Concrete plant, Earth quake resisting building                                                                                                                                                                                                             | 06        | 15          |
| 6            | <b>AI in civil engineering:</b><br>AI in construction management; AI for traffic and transportation management, Future trends in AI-driven Civil Engineering, AI for sustainable development, Drone technology and sensor applications                                                                                                                                                                                                | 07        | 15          |
| <b>TOTAL</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>45</b> | <b>100%</b> |

**LIST OF PRACTICAL / TUTORIAL:**

| Sr. No       | Practical / Tutorial                                 | Hours     |
|--------------|------------------------------------------------------|-----------|
| 1            | Unit conversation Exercise                           | 02        |
| 2            | Identification of construction materials             | 02        |
| 3            | Different types of brick bonds                       | 04        |
| 4            | Chain and compass surveying                          | 06        |
| 5            | Levelling practice                                   | 02        |
| 6            | Demonstration of concrete mixing                     | 02        |
| 7            | Site visit to construction project                   | 04        |
| 8            | Demonstration of Total Station / Drone surveying     | 02        |
| 9            | Mini project on AI applications in Civil Engineering | 06        |
| <b>TOTAL</b> |                                                      | <b>30</b> |

**SELF-LEARNING ONLINE RESOURCES:**

| Sr. No | Link / Description                                                                                              | Self-Learning Hours |
|--------|-----------------------------------------------------------------------------------------------------------------|---------------------|
| 1      | <a href="https://youtu.be/LYvDoy7MtkE?si=0f-gNu2rLy8k_ON0">https://youtu.be/LYvDoy7MtkE?si=0f-gNu2rLy8k_ON0</a> | 5                   |
| 2      | <a href="https://youtu.be/LD8MKrdAFKs?si=nzjk35lEKicLmtHQ">https://youtu.be/LD8MKrdAFKs?si=nzjk35lEKicLmtHQ</a> | 5                   |
| 3      | <a href="https://youtu.be/WZYwbyB6S6Q?si=87zQNQcLf5UD8bdy">https://youtu.be/WZYwbyB6S6Q?si=87zQNQcLf5UD8bdy</a> | 5                   |

**COURSE EVALUATION & ASSESSMENT RUBRICS:**

| Component | CE/ESE | Evaluation Methodology / Rubrics | Marks | Passing Marks |
|-----------|--------|----------------------------------|-------|---------------|
|-----------|--------|----------------------------------|-------|---------------|

|                    |     |                                                                                                                                                                                                                                                    |            |           |
|--------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|
| Theory             | CE  | Two Internal Tests of 30 marks each shall be conducted during the semester. The average of both tests will be converted to 30 marks.                                                                                                               | 30         | 00        |
|                    | ESE | Comprehensive written examination covering all modules of the course. Duration: 2 Hours                                                                                                                                                            | 50         | 20        |
| Tutorial           | CE  | Performance of Tutorial which should be evaluated out of 10 marks for each tutorial and average of the same will be converted to 30 marks                                                                                                          | 30         | 00        |
|                    | ESE | Quiz / Tutorial Performance – 25Marks<br>External Viva Voce – 25 Marks                                                                                                                                                                             | 50         | 20        |
| Field Visit        | CE  | Field Visit (FV) Evaluation Rubrics <ul style="list-style-type: none"> <li>• Attendance and Discipline – 5 Marks</li> <li>• Observation and Data Collection – 5 Marks</li> <li>• Field Visit Report – 5 Marks</li> <li>• Viva – 5 Marks</li> </ul> | 20         | 00        |
| Self Learning      | CE  | 40 MCQ questions based on self-study resources and online learning   0.5 marks per question   Total = 20 marks                                                                                                                                     | 20         | 00        |
| <b>TOTAL MARKS</b> |     |                                                                                                                                                                                                                                                    | <b>200</b> | <b>80</b> |

**TEXT BOOK(S):**

| Title                         | Author/s         | Publication          |
|-------------------------------|------------------|----------------------|
| Elements of civil engineering | Anurag A. Kandya | Charotar Publication |

**REFERENCE BOOK(S):**

| Title                         | Author/s                           | Publication                      |
|-------------------------------|------------------------------------|----------------------------------|
| Elements of civil engineering | Dr. R. K. Jain and Dr. P. P. Lodha | McGraw Hill Education            |
| Basics of civil engineering   | S.S. Bhavikatti                    | New age international Publishers |

**COURSE OUTCOME(S):**

After the completion of the course, the students will be able to:

| SOECV1010 | Basics of Civil Engineering                                                                                                                                                           |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO 1      | Explain the scope, branches, impact, and role of Civil Engineering along with unit measurement and unit conversion used in engineering applications                                   |
| CO 2      | Identify various construction materials, building components, brick bonds, and principles of planning used in building construction                                                   |
| CO 3      | Understand the principles of town planning, zoning, land use, low-cost housing, slum prevention, and FSI in urban development                                                         |
| CO 4      | Apply basic principles of surveying, linear and angular measurements, levelling techniques, and modern surveying tools in civil engineering practices                                 |
| CO 5      | Explain recent trends and AI applications in Civil Engineering including smart cities, transportation systems, sustainable development, drones, and AI-driven construction management |

**MAPPING OF CO WITH PO:**

| SOECV1010 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO 1      | 3   | 2   | 1   | -   | 2   | 2   | -   | 3   | 1   | 2    | 2    |
| CO 2      | 3   | -   | 2   | 3   | 3   | -   | 2   | -   | 2   | -    | 3    |
| CO 3      | 2   | 3   | 3   | 2   | 3   | 2   | -   | 3   | 1   | 3    | 2    |
| CO 4      | 2   | 3   | 1   | -   | 1   | 3   | 3   | 2   | 3   | -    | 1    |
| CO 5      | 2   | 2   | 3   | 2   | 3   | 2   | 1   | 2   | 2   | 2    | 3    |

**MAPPING OF CO WITH PSO:**

| SOECV1010 | PSO1 | PSO2 | PSO3 |
|-----------|------|------|------|
| CO 1      | 1    | 2    | 1    |
| CO 2      | 1    | 2    | 1    |
| CO 3      | -    | 2    | 1    |
| CO 4      | 1    | 2    | 1    |
| CO 5      | 2    | 3    | 2    |

**LEVEL OF REVISED BLOOM'S TAXONOMY IN ASSESSMENT**

|             |               |           |
|-------------|---------------|-----------|
| 1: Remember | 2: Understand | 3: Apply  |
| 4: Analyze  | 5: Evaluate   | 6: Create |

| Module No | Content                                 | RBT Level |
|-----------|-----------------------------------------|-----------|
| 1         | Civil engineering: an overview          | 1,2       |
| 2         | Building materials and construction     | 2         |
| 3         | Introduction to town planning           | 6         |
| 4         | Introduction to surveying and levelling | 3         |
| 5         | Recent trends in civil engineering      | 4,5       |
| 6         | AI in civil engineering                 | 6         |

**P P Savani University**
**School of Engineering**
**Offered by: Department of Electronics & Communication Engineering**
**COURSE DETAILS:**

|                       |                                                  |
|-----------------------|--------------------------------------------------|
| Course Code           | SOEEC1010                                        |
| Course Name           | Basics of Electrical and Electronics Engineering |
| Prerequisite Course/s | None                                             |

**TEACHING SCHEME:**

| Credit | Total Learning Hours | Direct Contact Hours |           |          | Indirect Contact Hours |    |            |           |               |
|--------|----------------------|----------------------|-----------|----------|------------------------|----|------------|-----------|---------------|
|        |                      | Theory               | Practical | Tutorial | Project                | CS | Assignment | Term Work | Self-Learning |
| 4      | 120                  | 45                   | 30        | 0        | 30                     | 0  | 0          | 0         | 15            |

GD = Group Discussion | CS = Case Study | FV = Field Visit | PPT = Presentation

**EXAMINATION SCHEME:**

| Theory |     | Practical |     | Tutorial |     | Project |     | CS |     | Assignment |     | Term Work |     | Self-Learning |     | Total |
|--------|-----|-----------|-----|----------|-----|---------|-----|----|-----|------------|-----|-----------|-----|---------------|-----|-------|
| CE     | ESE | CE        | ESE | CE       | ESE | CE      | ESE | CE | ESE | CE         | ESE | CE        | ESE | CE            | ESE |       |
| 30     | 50  | 30        | 50  | 0        | 0   | 20      | 0   | 0  | 0   | 0          | 0   | 0         | 0   | 20            | 0   | 200   |

CE: Continuous Evaluation, ESE: End Semester Exam

**OBJECTIVE OF THE COURSE:**

To help learners to:

- Understand the fundamental principles of electrical and electronic engineering
- Analyze simple DC and AC electrical circuits using basic laws and network theorems.
- Explain the working principles of electrical machines and transformers.
- Understand semiconductor devices and basic analog and digital electronic circuits.
- Develop practical skills in electrical measurements, wiring, and circuit implementation.

**COURSE CONTENT:**

| Module No. | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Hours | Weightage in% |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| 1          | <b>Fundamentals of Electrical Circuits:</b><br>Electrical quantities: Charge, Current, Voltage, Power and Energy, Passive and Active circuit elements, Ohm's Law, Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL), Series and Parallel Circuits, Voltage and Current Division Rules, Basic Network Theorems: Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Introduction to Electrical Measuring Instruments. | 8     | 18            |
| 2          | <b>AC Circuits and Electrical Power:</b><br>Generation of Alternating Voltage, Sinusoidal Waveforms, Average and RMS Values, Phasor Representation, RL, RC and RLC Series Circuits, Impedance and Admittance, Active, Reactive and Apparent Power, Power Factor and Power                                                                                                                                                                                                   | 8     | 18            |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                 |           |             |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|
|   | Factor Improvement, Single-phase and Three-phase Supply, Star and Delta Connections.                                                                                                                                                                                                                                                                                                                            |           |             |
| 3 | <b>Electrical Machines and Power Systems:</b><br>Overview of Electrical Energy Generation, Transmission and Distribution System, Transformer, Construction, Working Principle, Applications, DC Machines, Construction, Principle, DC Generator, DC Motor.                                                                                                                                                      | 8         | 18          |
| 4 | <b>Semiconductor Devices and Analog Electronics :</b><br>Semiconductor Materials, Intrinsic and Extrinsic Semiconductors, PN Junction Diode, Diode Characteristics, Rectifiers: Half-wave, Full-wave, Zener Diode and Voltage Regulation, Bipolar Junction Transistor (BJT), MOSFET (Introduction), Introduction to Operational Amplifier, Ideal Characteristics, Inverting Amplifier, Non-Inverting Amplifier. | 7         | 15          |
| 5 | <b>Digital Electronics: Concepts, Circuits, and Systems:</b><br>Number Systems, Binary Arithmetic, Logic Gates, Boolean Algebra, Karnaugh Map (K-map), Combinational Logic Circuits, Half Adder, Full Adder, Multiplexer, Demultiplexer, Sequential Logic, Latches and Flip-Flops, Introduction to Embedded Systems, IoT and Microcontrollers.                                                                  | 7         | 16          |
| 6 | <b>Electrical Wiring, Measurements and Emerging Technologies:</b><br>Domestic Electrical Wiring, Wiring Components, Protective Devices, Fuse, MCB, RCCB, Earthing Methods, Electrical Shock, Protection, Energy Efficient Appliances, Smart Grid Concepts, Electric Vehicles (Introduction), Battery Technologies, Sensors and Actuators.                                                                       | 7         | 15          |
|   | <b>TOTAL</b>                                                                                                                                                                                                                                                                                                                                                                                                    | <b>45</b> | <b>100%</b> |

**LIST OF PRACTICAL / TUTORIAL:**

| Sr. No | Practical / Tutorial                                                                                                                                                              | Hours     |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 1      | Verification of Ohm's Law and Verification of Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL).                                                                    | 4         |
| 2      | To verify Thevenin's and Norton's theorems by analyzing a linear DC network and comparing the theoretical and experimental values of voltage, current, and equivalent resistance. | 4         |
| 3      | To verify the equivalence of Star (Y) and Delta ( $\Delta$ ) resistor networks by performing theoretical calculations and experimental measurements of circuit parameters.        | 4         |
| 4      | To study the forward and reverse bias characteristics of a PN junction diode.                                                                                                     | 2         |
| 5      | To construct and analyze Half-Wave and Full-Wave Rectifier circuits and evaluate their output characteristics, including ripple factor, rectification efficiency, and waveform.   | 4         |
| 6      | To design and implement a Zener diode voltage regulator and verify its voltage regulation characteristics under varying load conditions.                                          | 4         |
| 7      | To study the operation of a Bipolar Junction Transistor (BJT) as an amplifier and as an electronic switch by observing its input-output characteristics and switching behavior.   | 4         |
| 8      | Implementation and Verification of Basic Logic Gates, Universal Gates, and Boolean Algebra using Digital ICs.                                                                     | 4         |
|        | <b>TOTAL</b>                                                                                                                                                                      | <b>30</b> |

**SELF-LEARNING ONLINE RESOURCES:**

| Sr. No | Link / Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Self-Learning Hours |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1      | NPTEL – IIT/IISc Courses: <a href="https://nptel.ac.in-https://www.youtube.com/watch?v=ikqXDWrwf4c&amp;list=PLp6ek2hDcoNCANsWM2mw3qi0387BhfLyV&amp;index=2">https://nptel.ac.in-https://www.youtube.com/watch?v=ikqXDWrwf4c&amp;list=PLp6ek2hDcoNCANsWM2mw3qi0387BhfLyV&amp;index=2</a> – Offers IIT and IISc-developed video lectures, assignments, and certification courses on Basic Electrical Engineering, Electrical Machines, Analog Electronics, and Digital Electronics. | 5                   |
| 2      | NPTEL – IIT/IISc Courses: <a href="https://nptel.ac.in-https://www.youtube.com/watch?v=LCfTE9As4KA&amp;list=PLp6ek2hDcoNCANsWM2mw3qi0387BhfLyV&amp;index=3">https://nptel.ac.in-https://www.youtube.com/watch?v=LCfTE9As4KA&amp;list=PLp6ek2hDcoNCANsWM2mw3qi0387BhfLyV&amp;index=3</a> -Offers IIT and IISc-developed video lectures, assignments, and certification courses on Basic Electrical Engineering, Electrical Machines, Analog Electronics, and Digital Electronics.  | 5                   |
| 3      | Virtual Labs: <a href="https://platform.openai.com/docs">https://platform.openai.com/docs</a> – An initiative of the Ministry of Education and IITs that provides virtual experiments and simulations for Electrical and Electronics Engineering laboratories.                                                                                                                                                                                                                    | 5                   |

**COURSE EVALUATION & ASSESSMENT RUBRICS:**

| Component          | CE/ESE | Evaluation Methodology / Rubrics                                                                                                                                                                                                                                             | Marks      | Passing Marks |
|--------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------|
| Theory             | CE     | Two Internal Tests of 30 marks each shall be conducted during the semester. The average of both tests will be converted to 30 marks.                                                                                                                                         | 30         | 00            |
|                    | ESE    | Comprehensive written examination covering all modules of the course. Duration: 2 Hours                                                                                                                                                                                      | 50         | 20            |
| Practical          | CE     | Performance of practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 30 marks.                                                                                                                                 | 30         | 00            |
|                    | ESE    | Quiz / Practical Performance – 25Marks<br>External Viva Voce – 25 Marks                                                                                                                                                                                                      | 50         | 20            |
| Project            | CE     | Project Evaluation Rubrics <ul style="list-style-type: none"> <li>• Problem Identification &amp; Understanding – 5 Marks</li> <li>• Relevance of Application – 5 Marks</li> <li>• Creativity &amp; Innovation – 5 Marks</li> <li>• Presentation Quality – 5 Marks</li> </ul> | 20         | 00            |
| Self-Learning      | CE     | 40 MCQ questions based on self-study resources and online learning   0.5 marks per question   Total = 20 marks                                                                                                                                                               | 20         | 00            |
| <b>TOTAL MARKS</b> |        |                                                                                                                                                                                                                                                                              | <b>200</b> | <b>80</b>     |

**TEXT BOOK(S):**

| Title                                 | Author/s                                | Publication         |
|---------------------------------------|-----------------------------------------|---------------------|
| Basic Electrical Engineering          | V.K. Mehta and Rohit Mehta              | S. Chand Publishing |
| Electronic Devices and Circuit Theory | Robert L. Boylestad and Louis Nashelsky | Pearson Education   |

**REFERENCE BOOK(S):**

| Title                               | Author/s                                              | Publication           |
|-------------------------------------|-------------------------------------------------------|-----------------------|
| Basic Electrical Engineering        | D.P. Kothari and I.J. Nagrath                         | McGraw Hill Education |
| Electrical Engineering Fundamentals | Vincent Del Toro                                      | Prentice Hall         |
| Digital Principles and Applications | Donald P. Leach, Albert Paul Malvino, and Goutam Saha | McGraw Hill Education |

**COURSE OUTCOME(S):**

After the completion of the course, the students will be able to:

| SOEEC1010 | Basics of Electrical and Electronics Engineering                                                                                                                                                                                                               |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO 1      | Apply fundamental electrical laws, network theorems, and circuit analysis techniques to analyze simple DC and AC electrical circuits.                                                                                                                          |
| CO 2      | Explain the operating principles and characteristics of transformers, electrical machines, power systems, and electrical safety practices.                                                                                                                     |
| CO 3      | Analyze the characteristics and applications of semiconductor devices, rectifier circuits, and operational amplifier-based analog electronic circuits.                                                                                                         |
| CO 4      | Design and implement basic digital electronic circuits using logic gates, Boolean algebra, combinational and sequential logic circuits.                                                                                                                        |
| CO 5      | Demonstrate practical knowledge of electrical wiring, measuring instruments, energy-efficient technologies, renewable energy systems, and emerging applications such as Smart Grids and Electric Vehicles while adhering to professional and safety standards. |

**MAPPING OF CO WITH PO:**

| SOEEC1010 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO 1      | 3   | 3   | 1   | -   | 2   | -   | -   | -   | -   | -    | -    |
| CO 2      | 3   | 2   | -   | -   | 1   | -   | 2   | 1   | -   | -    | -    |
| CO 3      | 3   | 3   | 2   | 1   | 2   | -   | -   | -   | -   | -    | -    |
| CO 4      | 2   | 3   | 3   | 1   | 3   | -   | -   | -   | 1   | 1    | -    |
| CO 5      | 2   | 2   | 1   | 1   | 2   | 1   | 3   | 3   | 2   | 1    | 1    |

**MAPPING OF CO WITH PSO:**

| SOEEC1010 | PSO1 | PSO2 | PSO3 |
|-----------|------|------|------|
| CO 1      | 2    | 2    | 1    |
| CO 2      | 2    | 2    | 2    |
| CO 3      | 3    | 2    | 2    |
| CO 4      | 3    | 3    | 2    |
| CO 5      | 2    | 3    | 2    |

**LEVEL OF REVISED BLOOM'S TAXONOMY IN ASSESSMENT**

|             |               |           |
|-------------|---------------|-----------|
| 1: Remember | 2: Understand | 3: Apply  |
| 4: Analyze  | 5: Evaluate   | 6: Create |

| Module No | Content                               | RBT Level |
|-----------|---------------------------------------|-----------|
| 1         | Fundamentals of Electrical Circuits   | 1, 2, 3   |
| 2         | AC Circuits and Electrical Power      | 2, 3, 4   |
| 3         | Electrical Machines and Power Systems | 1, 2, 3   |

|   |                                                           |         |
|---|-----------------------------------------------------------|---------|
| 4 | Semiconductor Devices and Analog Electronics              | 2,3, 4  |
| 5 | Digital Electronics: Concepts, Circuits, and Systems      | 2,3,4   |
| 6 | Electrical Wiring, Measurements and Emerging Technologies | 1, 2, 3 |



P P Savani University

School of Engineering

Offered by: Department of Artificial Intelligence and Machine Learning

#### COURSE DETAILS:

|                       |                 |
|-----------------------|-----------------|
| Course Code           | SOEML1010       |
| Course Name           | AI for Everyone |
| Prerequisite Course/s | None            |

#### TEACHING SCHEME:

| Credit | Total Learning Hours | Direct Contact Hours |           |          | Indirect Contact Hours |    |            |           |               |
|--------|----------------------|----------------------|-----------|----------|------------------------|----|------------|-----------|---------------|
|        |                      | Theory               | Practical | Tutorial | Project                | CS | Assignment | Term Work | Self-Learning |
| 4      | 120                  | 30                   | 30        | 0        | 0                      | 30 | 0          | 0         | 30            |

GD = Group Discussion | CS = Case Study | FV = Field Visit | PPT = Presentation

#### EXAMINATION SCHEME:

| Theory |     | Practical |     | Tutorial |     | Project |     | CS |     | Assignment |     | Term Work |     | Self-Learning |     | Total |
|--------|-----|-----------|-----|----------|-----|---------|-----|----|-----|------------|-----|-----------|-----|---------------|-----|-------|
| CE     | ESE | CE        | ESE | CE       | ESE | CE      | ESE | CE | ESE | CE         | ESE | CE        | ESE | CE            | ESE |       |
| 30     | 50  | 30        | 50  | 0        | 0   | 0       | 0   | 20 | 0   | 0          | 0   | 0         | 0   | 20            | 0   | 200   |

CE: Continuous Evaluation, ESE: End Semester Exam

#### OBJECTIVE OF THE COURSE:

To help learners to:

- Understand the fundamentals and applications of Artificial Intelligence in daily life and engineering domains.
- Develop awareness about emerging AI technologies and future industry trends.
- Explore AI tools, machine learning concepts, and generative AI platforms through hands-on learning.
- Apply AI concepts ethically and responsibly for solving real-world problems.
- Build confidence in using AI-enabled tools for academics, research, communication, and innovation.

#### COURSE CONTENT:

| Module No. | Content                                                                                                                                                                                                                                                                                                    | Hours | Weightage in% |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| 1          | <b>Introduction to Artificial Intelligence:</b><br>Definition and evolution of AI; History of AI; AI vs Human Intelligence; Types of AI (Narrow, General, Super); Applications of AI in engineering, healthcare, business, agriculture, education, and smart cities; AI in daily life; Future scope of AI. | 06    | 20            |
| 2          | <b>Generative AI &amp; AI Tools:</b><br>Introduction to Generative AI; ChatGPT, Gemini, Claude; AI image/video generation tools; AI productivity tools; Prompt Engineering basics; Responsible use of AI tools; AI for report writing, coding assistance, presentations, research, and communication.      | 06    | 20            |

|              |                                                                                                                                                                                                                                                                                                                                 |           |             |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|
| 3            | <b>AI Applications Across Engineering Disciplines:</b><br>AI in Civil Engineering, Mechanical Engineering, Electrical Engineering, Computer Engineering, Chemical Engineering, Electronics & Communication, Environmental Engineering, Healthcare & Biotechnology, Robotics and Automation, Smart Manufacturing & Industry 4.0. | 06        | 20          |
| 4            | <b>AI Ethics, Challenges &amp; Cyber Awareness:</b><br>AI ethics; Bias in AI systems; Data privacy; Cybersecurity concerns; Deepfake technology; Responsible AI practices; Legal and societal impacts of AI; Human-AI collaboration; Sustainable AI.                                                                            | 04        | 14          |
| 5            | <b>Hands-on AI Activities &amp; Mini Case Studies:</b><br>AI-based problem solving; AI chatbot usage; AI-based content generation; AI for data analysis; AI-assisted presentations; Group discussions on AI impact; Case studies on industrial AI applications.                                                                 | 04        | 14          |
| 6            | <b>Future of AI &amp; Innovation:</b><br>Future trends in AI; Artificial General Intelligence (AGI); AI startups and entrepreneurship opportunities; AI in research and innovation; AI for sustainable development goals; Career opportunities in AI domain.                                                                    | 04        | 12          |
| <b>TOTAL</b> |                                                                                                                                                                                                                                                                                                                                 | <b>30</b> | <b>100%</b> |

**LIST OF PRACTICAL / TUTORIAL:**

| Sr. No       | Practical / Tutorial                                                                  | Hours     |
|--------------|---------------------------------------------------------------------------------------|-----------|
| 1            | Introduction to AI Tools and Platforms (ChatGPT, Gemini, Claude, Copilot, Perplexity) | 04        |
| 2            | Prompt Engineering Practice using ChatGPT / Gemini                                    | 04        |
| 3            | AI-based Presentation Preparation using AI Tools                                      | 04        |
| 4            | Case Study Discussion on AI Applications in Various Engineering Disciplines           | 04        |
| 5            | AI-assisted Report Writing Activity                                                   | 02        |
| 6            | AI Image / Content Generation Activity (DALL-E, MidJourney, Adobe Firefly)            | 02        |
| 7            | Generate AI images / Content, editing and evaluation of output.                       | 02        |
| 8            | Group Discussion: 'AI – Boon or Threat?'                                              | 02        |
| 9            | Debate/Discussion on challenges, risks, and conclusion on AI impact.                  | 02        |
| 10           | Mini Project preparation using AI Tools                                               | 04        |
| <b>TOTAL</b> |                                                                                       | <b>30</b> |

**SELF-LEARNING ONLINE RESOURCES:**

| Sr. No | Link / Description                                                                                                                                        | Self-Learning Hours |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1      | <a href="https://www.youtube.com/watch?v=JOebRfKhCcg">https://www.youtube.com/watch?v=JOebRfKhCcg</a> – AI for Everyone by Andrew Ng                      | 5                   |
| 2      | <a href="https://www.youtube.com/watch?v=D1eL1EnxXXQ">https://www.youtube.com/watch?v=D1eL1EnxXXQ</a> – AI Basics Learn AI & ML Fundamentals from Scratch | 5                   |
| 3      | <a href="https://www.youtube.com/watch?v=_6R7Ym6Vy_I">https://www.youtube.com/watch?v=_6R7Ym6Vy_I</a> - What is generative AI and how does it work?       | 5                   |
| 4      | <a href="https://www.youtube.com/watch?v=-sB12gk9ESA&amp;t=19s">https://www.youtube.com/watch?v=-sB12gk9ESA&amp;t=19s</a> - A.I. Revolution               | 5                   |
| 5      | <a href="https://www.youtube.com/watch?v=SWP3k-24jT4">https://www.youtube.com/watch?v=SWP3k-24jT4</a> - How to build AI chatbot                           | 5                   |

|   |                                                                                                                                |   |
|---|--------------------------------------------------------------------------------------------------------------------------------|---|
| 6 | <a href="https://www.youtube.com/watch?v=2R-niMsB0QY">https://www.youtube.com/watch?v=2R-niMsB0QY</a> - Agentic AI Full Course | 5 |
|---|--------------------------------------------------------------------------------------------------------------------------------|---|

**COURSE EVALUATION & ASSESSMENT RUBRICS:**

| Component          | CE/ESE | Evaluation Methodology / Rubrics                                                                                                                                                                                                                                                        | Marks      | Passing Marks |
|--------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------|
| Theory             | CE     | Two Internal Tests of 30 marks each shall be conducted during the semester. The average of both tests will be converted to 30 marks.                                                                                                                                                    | 30         | 00            |
|                    | ESE    | Comprehensive written examination covering all modules of the course. Duration: 2 Hours                                                                                                                                                                                                 | 50         | 20            |
| Practical          | CE     | Performance of practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 30 marks.                                                                                                                                            | 30         | 00            |
|                    | ESE    | Quiz / Practical Performance – 25Marks<br>External Viva Voce – 25 Marks                                                                                                                                                                                                                 | 50         | 20            |
| Case Study         | CE     | Case Study (CS) Evaluation Rubrics <ul style="list-style-type: none"> <li>• Problem Identification &amp; Understanding – 5 Marks</li> <li>• Relevance of AI Application – 5 Marks</li> <li>• Creativity &amp; Innovation – 5 Marks</li> <li>• Presentation Quality – 5 Marks</li> </ul> | 20         | 00            |
| Self Learning      | CE     | 40 MCQ questions based on self-study resources and online learning   0.5 marks per question   Total = 20 marks                                                                                                                                                                          | 20         | 00            |
| <b>TOTAL MARKS</b> |        |                                                                                                                                                                                                                                                                                         | <b>200</b> | <b>80</b>     |

**TEXT BOOK(S):**

| Title                                   | Author/s   | Publication       |
|-----------------------------------------|------------|-------------------|
| AI Basics: A Non-Technical Introduction | Tom Taulli | Apress / Springer |

**REFERENCE BOOK(S):**

| Title                                       | Author/s                      | Publication       |
|---------------------------------------------|-------------------------------|-------------------|
| Artificial Intelligence – A Modern Approach | Stuart Russell & Peter Norvig | Pearson Education |
| Generative AI Fundamentals                  | Bernard Marr                  | Wiley             |

**COURSE OUTCOME(S):**

After the completion of the course, the students will be able to:

| SOEML1010 | AI for Everyone                                                                                                                                 |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| CO 1      | Explain basic AI concepts, history, types, and suitable AI tools for engineering and daily problem-solving.                                     |
| CO 2      | Use Generative AI tools like ChatGPT, Gemini, and Claude with effective prompt engineering for academic and professional tasks.                 |
| CO 3      | Apply AI-enabled tools to solve domain-specific engineering challenges, including smart manufacturing and Industry 4.0 applications.            |
| CO 4      | Evaluate ethical, legal, social, and environmental impacts of AI, including privacy, bias, and deepfakes, in professional engineering practice. |

|      |                                                                                                                            |
|------|----------------------------------------------------------------------------------------------------------------------------|
| CO 5 | Design AI-based solutions for real-world problems using data literacy, innovation, and sustainable development principles. |
|------|----------------------------------------------------------------------------------------------------------------------------|

**MAPPING OF CO WITH PO:**

| SOEML1010 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO 1      | 3   | 2   | 1   | -   | 2   | -   | -   | -   | 1   | -    | 1    |
| CO 2      | 1   | 2   | 2   | -   | 3   | -   | -   | -   | 2   | -    | 2    |
| CO 3      | 2   | 3   | 3   | 2   | 3   | 2   | -   | 1   | 1   | 1    | 2    |
| CO 4      | -   | 1   | 1   | -   | -   | 3   | 3   | -   | 2   | -    | 1    |
| CO 5      | 2   | 2   | 3   | 2   | 3   | 2   | 1   | 2   | 2   | 2    | 3    |

**MAPPING OF CO WITH PSO:**

| SOEML1010 | PSO1 | PSO2 | PSO3 |
|-----------|------|------|------|
| CO 1      | 2    | 2    | 1    |
| CO 2      | 3    | 2    | 2    |
| CO 3      | 2    | 3    | 2    |
| CO 4      | 1    | 3    | 2    |
| CO 5      | 3    | 3    | 3    |

**LEVEL OF REVISED BLOOM'S TAXONOMY IN ASSESSMENT**

|             |               |           |
|-------------|---------------|-----------|
| 1: Remember | 2: Understand | 3: Apply  |
| 4: Analyze  | 5: Evaluate   | 6: Create |

| Module No | Content                                         | RBT Level |
|-----------|-------------------------------------------------|-----------|
| 1         | Introduction to Artificial Intelligence:        | 1,2       |
| 2         | Generative AI & AI Tools:                       | 3         |
| 3         | AI Applications Across Engineering Disciplines: | 3         |
| 4         | AI Ethics, Challenges & Cyber Awareness:        | 5         |
| 5         | Hands-on AI Activities & Mini Case Studies:     | 4         |
| 6         | Future of AI & Innovation:                      | 6         |

P P Savani University

School of Engineering

Offered by: Department of Mechanical Engineering (Sustainable Energy)

#### COURSE DETAILS:

|                       |                                         |
|-----------------------|-----------------------------------------|
| Course Code           | SOEMS1010                               |
| Course Name           | Introduction to Sustainable Development |
| Prerequisite Course/s | None                                    |

#### TEACHING SCHEME:

| Credit | Total Learning Hours | Direct Contact Hours |           |          | Indirect Contact Hours |    |            |           |               |
|--------|----------------------|----------------------|-----------|----------|------------------------|----|------------|-----------|---------------|
|        |                      | Theory               | Practical | Tutorial | Project                | CS | Assignment | Term Work | Self-Learning |
| 4      | 120                  | 45                   | 0         | 30       | 0                      | 30 | 0          | 0         | 15            |

GD = Group Discussion | CS = Case Study | FV = Field Visit | PPT = Presentation

#### EXAMINATION SCHEME:

| Theory |     | Practical |     | Tutorial |     | Project |     | CS |     | Assignment |     | Term Work |     | Self-Learning |     | Total |
|--------|-----|-----------|-----|----------|-----|---------|-----|----|-----|------------|-----|-----------|-----|---------------|-----|-------|
| CE     | ESE | CE        | ESE | CE       | ESE | CE      | ESE | CE | ESE | CE         | ESE | CE        | ESE | CE            | ESE |       |
| 30     | 50  | 0         | 0   | 30       | 50  | 0       | 0   | 20 | 0   | 0          | 0   | 0         | 0   | 20            | 0   | 200   |

CE: Continuous Evaluation, ESE: End Semester Exam

#### OBJECTIVE OF THE COURSE:

To help learners to:

- Understand the fundamental principles of sustainable engineering, sustainable development, and their significance in addressing environmental, social, and economic challenges.
- Develop awareness of environmental issues, resource conservation, renewable energy technologies, and sustainable engineering practices.
- Introduce green technologies, renewable energy systems and sustainable industrial practices.
- Encourage students to analyze and propose sustainable engineering solutions while promoting ethical responsibility and lifelong learning.

#### COURSE CONTENT:

| Module No. | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Hours | Weightage in% |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| 1          | <b>Introduction to Sustainable Engineering:</b><br>Sustainability - Introduction, Need and concept of sustainability, Social- environmental and economic sustainability concepts. Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols - Clean Development Mechanism (CDM), Environmental legislations in India - Water Act, Air Act. | 9     | 20            |
| 2          | <b>Environmental issues:</b><br>Solid waste, impact of solid waste on natural resources, zero                                                                                                                                                                                                                                                                                                                                                               | 9     | 20            |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                       |           |             |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|
|   | waste concept and three R concept, waste to energy technology: thermo-chemical conversion, biochemical conversion.<br>Global Environmental Issues- Resource degradation: deterioration of water resources, land degradation, air pollution, climate change and global warming, ozone layer depletion, carbon footprint, carbon trading.                                                                               |           |             |
| 3 | <b>Tools for Sustainability :</b><br>Environmental management System (EMS), concept of ISO14000, life cycle assessment (LCA): basic components, advantages, disadvantages, case study. Environmental impact assessment (EIA), environmental auditing, bio mimicking, case studies.                                                                                                                                    | 9         | 20          |
| 4 | <b>Renewable energy resources:</b><br>Conventional and non- conventional forms of energy, solar energy, fuel cells, wind energy, small hydro plants, biogas systems, biofuels, energy from ocean, geothermal energy, conservation of energy.<br>Green technology and Green Business: Sustainable business, green technology, green energy, green construction, green transportation, green chemistry, green computing | 6         | 14          |
| 5 | <b>Sustainability Across Engineering Disciplines:</b><br>Green Computing and e-waste management (Computer); Eco-friendly materials and green infrastructure (Civil); Energy-efficient machinery and electric vehicles (Mechanical); Green chemistry and clean process technologies (Chemical); Low-power electronics and smart environmental monitoring sensors (Electronics).                                        | 6         | 14          |
| 6 | <b>Sustainable Industrialization and Urbanization:</b><br>Sustainable urbanization, industrialization, material selection, pollution prevention, industrial ecology, industrial symbiosis, poverty reduction.                                                                                                                                                                                                         | 6         | 12          |
|   | <b>TOTAL</b>                                                                                                                                                                                                                                                                                                                                                                                                          | <b>45</b> | <b>100%</b> |

**LIST OF PRACTICAL / TUTORIAL:**

| Sr. No | Practical / Tutorial                                                                                           | Hours     |
|--------|----------------------------------------------------------------------------------------------------------------|-----------|
| 1      | Explain and distinguish between the social, environmental, and economic dimensions of sustainable development. | 5         |
| 2      | Analyze the impact of technology alongside environmental regulations like the Water and Air Acts               | 5         |
| 3      | Apply the 3R concept and evaluate technologies for converting solid waste into clean energy.                   | 5         |
| 4      | Evaluate the causes of resource degradation, climate change, and mechanisms like carbon trading.               | 5         |
| 5      | Study Environmental Management Systems and apply the frameworks of the ISO 14000 series.                       | 5         |
| 6      | Study the core principles of green technologies, transport, construction, and computing.                       | 5         |
|        | <b>TOTAL</b>                                                                                                   | <b>30</b> |

**SELF-LEARNING ONLINE RESOURCES:**

| Sr. No | Link / Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Self-Learning Hours |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1      | <a href="https://www.youtube.com/watch?v=oIF9EWyJ2_w&amp;list=PLwdnzlV3ogoXD4NBvgyZJhsDUgaEB1nV3&amp;index=2">https://www.youtube.com/watch?v=oIF9EWyJ2_w&amp;list=PLwdnzlV3ogoXD4NBvgyZJhsDUgaEB1nV3&amp;index=2</a> - Introduction to Sustainable Development                                                                                                                                                                                                                                                                                                                                                             | 03                  |
| 2      | <a href="https://www.bing.com/videos/riverview/relatedvideo?q=+lecture+of+sustainability+development&amp;mid=1A40867EC43EA114A84F1A40867EC43EA114A84F&amp;churl=https%3a%2f%2fwww.youtube.com%2fchannel%2fUCoVtIBThrMPcU72F6_fADvw&amp;mcid=46D79E4C56A340ED88EF38D826E36A28&amp;FORM=VRDGA">https://www.bing.com/videos/riverview/relatedvideo?q=+lecture+of+sustainability+development&amp;mid=1A40867EC43EA114A84F1A40867EC43EA114A84F&amp;churl=https%3a%2f%2fwww.youtube.com%2fchannel%2fUCoVtIBThrMPcU72F6_fADvw&amp;mcid=46D79E4C56A340ED88EF38D826E36A28&amp;FORM=VRDGA</a> R- Global Sustainable Development Goals | 03                  |
| 3      | <a href="https://www.bing.com/videos/riverview/relatedvideo?q=%20lecture%20of%20sustainability%20development&amp;mid=D296C702DD3DB8244863D296C702DD3DB8244863&amp;ajaxhist=0">https://www.bing.com/videos/riverview/relatedvideo?q=%20lecture%20of%20sustainability%20development&amp;mid=D296C702DD3DB8244863D296C702DD3DB8244863&amp;ajaxhist=0</a> - Environment & Sustainable Development                                                                                                                                                                                                                               | 03                  |
| 4      | <a href="https://www.youtube.com/watch?v=iZyzvDj6Y3c&amp;list=PLwdnzlV3ogoXUifhvYB65lLJCZ74o_fAk&amp;index=2">https://www.youtube.com/watch?v=iZyzvDj6Y3c&amp;list=PLwdnzlV3ogoXUifhvYB65lLJCZ74o_fAk&amp;index=2</a> - Renewable Energy Sources                                                                                                                                                                                                                                                                                                                                                                            | 03                  |
| 5      | <a href="https://www.youtube.com/watch?v=vHop5VgamRc">https://www.youtube.com/watch?v=vHop5VgamRc</a> - Sustainable Industrialization and Urbanization                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 03                  |

**COURSE EVALUATION & ASSESSMENT RUBRICS:**

| Component          | CE/ESE | Evaluation Methodology / Rubrics                                                                                                                                                                       | Marks      | Passing Marks |
|--------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------|
| Theory             | CE     | Two Internal Tests of 30 marks each shall be conducted during the semester. The average of both tests will be converted to 30 marks.                                                                   | 30         | 00            |
|                    | ESE    | Comprehensive written examination covering all modules of the course. Duration: 2 Hours                                                                                                                | 50         | 20            |
| Tutorial           | CE     | Performance of tutorial which should be evaluated out of 10 marks for each practical and average of the same will be converted to 30 marks.                                                            | 30         | 00            |
|                    | ESE    | Quiz / Practical Performance – 25Marks<br>External Viva Voce – 25 Marks                                                                                                                                | 50         | 20            |
| Case Study         | CE     | Case Study (CS) Evaluation Rubrics<br>Problem Identification & Understanding – 5 Marks<br>Relevance of AI Application – 5 Marks<br>Creativity & Innovation – 5 Marks<br>Presentation Quality – 5 Marks | 20         | 00            |
| Self Learning      | CE     | 40 MCQ questions based on self-study resources and online learning   0.5 marks per question   Total = 20 marks                                                                                         | 20         | 00            |
| <b>TOTAL MARKS</b> |        |                                                                                                                                                                                                        | <b>200</b> | <b>80</b>     |

**TEXT BOOK(S):**

| Title                                                 | Author/s                                   | Publication                   |
|-------------------------------------------------------|--------------------------------------------|-------------------------------|
| Introduction to Sustainable Engineering (2nd Edition) | R. L. Rag and Lekshmi Dinachandran Remesh. | PHI Learning Pvt. Ltd., 2016. |

**REFERENCE BOOK(S):**

| Title                                        | Author/s              | Publication          |
|----------------------------------------------|-----------------------|----------------------|
| Sustainability Engineering: Concepts, Design | D. T. Allen and D. R. | Prentice Hall, 2011. |

|                                                                        |                                                        |                     |
|------------------------------------------------------------------------|--------------------------------------------------------|---------------------|
| and Case Studies (1st Edition)                                         | Shonnard.                                              |                     |
| Introduction to Environment Sustainability and Sustainable Development | Yagyavalkya Sharma, Dr. D. Thangamani, Dr. Jyoti Malik | Akinik Publications |

### COURSE OUTCOME(S):

After the completion of the course, the students will be able to:

| SOEMS1010 | Introduction to Sustainable Development                                                                            |
|-----------|--------------------------------------------------------------------------------------------------------------------|
| CO 1      | Explain sustainable development and different environmental agreements and protocols.                              |
| CO 2      | Discuss real time activities causing environmental issues and different methods to use renewable energy resources. |
| CO 3      | Apply knowledge about different tools to move industries towards sustainability.                                   |
| CO 4      | Evaluate renewable energy and green technologies.                                                                  |
| CO 5      | Develop sustainable engineering strategies.                                                                        |

### MAPPING OF CO WITH PO:

| SOEMS1010 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO 1      | 3   | 2   |     | 1   | 2   |     | 2   | 2   |     | 1    | 1    |
| CO 2      | 2   | 3   | 2   | 2   | 3   | 1   | 2   | 2   | 1   | 1    | 2    |
| CO 3      | 2   | 2   | 3   | 3   | 3   | 2   | 1   | 2   | 1   | 1    | 2    |
| CO 4      | 2   | 3   | 3   | 2   | 3   | 2   | 2   | 2   | 1   | 1    | 2    |
| CO 5      | 2   | 3   | 3   | 2   | 3   | 3   | 3   | 2   | 2   | 2    | 3    |

### MAPPING OF CO WITH PSO:

| SOEMS1010 | PSO1 | PSO2 | PSO3 |
|-----------|------|------|------|
| CO 1      | 2    | 1    | 2    |
| CO 2      | 3    | 2    | 2    |
| CO 3      | 3    | 3    | 2    |
| CO 4      | 2    | 3    | 2    |
| CO 5      | 3    | 3    | 3    |

### LEVEL OF REVISED BLOOM'S TAXONOMY IN ASSESSMENT

|             |               |           |
|-------------|---------------|-----------|
| 1: Remember | 2: Understand | 3: Apply  |
| 4: Analyze  | 5: Evaluate   | 6: Create |

| Module No | Content                                        | RBT Level |
|-----------|------------------------------------------------|-----------|
| 1         | Introduction to Sustainable Engineering        | 1,2       |
| 2         | Environmental issues                           | 3         |
| 3         | Tools for Sustainability                       | 4         |
| 4         | Renewable energy resources                     | 5         |
| 5         | Sustainability Across Engineering Disciplines  | 6         |
| 6         | Sustainable Industrialization and Urbanization | 4         |