PPSU

P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

MECHANICAL ENGINEERING

(SUSTAINABLE ENERGY)

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	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem Analysis:** 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	**Design/development of solutions:** 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	**Conduct Investigations of Complex Problems:** 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	**Engineering Tool Usage:** 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	**The Engineer and The World:** 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	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO 8	**Individual and Collaborative Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 9	**Communication:** 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.
PO 10	**Project Management and Finance:** 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.
PO 11	**Life-Long Learning:** 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.

PSO No	PROGRAMME SPECIFIC OUTCOMES (PSO)
PSO 1	Graduates will apply advanced knowledge of mechanical engineering, thermodynamics, heat transfer, fluid mechanics, and renewable energy technologies to design, analyze, and operate efficient and sustainable energy systems.
PSO 2	Graduates will investigate real-world and socially relevant energy challenges by developing effective, energy-efficient solutions through the integration of modern tools, computational methods, and multidisciplinary engineering approaches.
PSO 3	Graduates will evolve as technically proficient professionals, researchers, and entrepreneurs in the sustainable energy domain, well-equipped to excel in competitive examinations and advance through higher academic and research pursuits.

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

Mapping Level	%age Mapping	Indicator
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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PPSU
P P SAVANI UNIVERSITY
NAAC ACCREDITED A+ GRADE

School of
Engineering

FIRST YEAR B.TECH (2026-27)

P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

TEACHING & EXAMINATION SCHEME FOR FIRST YEAR B.TECH. MECHANICAL ENGINEERING(SUSTAINABLE ENERGY) 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
G1	SOESH1010	Calculus	S & H	45	0	30	0	0	30	0	15	120	4	30 50	0	30 50	0	0	20 00	0	20 00	100 100
	SOESH1030	Engineering Physics	S & H	45	30	0	0	15	0	0	30	120	4	30 50	30 50	0	0	20 00	0	0	20 00	100 100
	SOEME1010	Basics of Mechanical Engineering	ME	45	0	30	0	0	30	0	15	120	4	30 50	0	30 50	0	0	20 00	0	20 00	100 100
	SOECE1010	Programming for Problem Solving with C	CE	45	30	0	30	0	0	0	15	120	4	30 50	30 50	0	20 00	0	0	0	20 00	100 100
	CFLS2130	Intermediate Communicative English	CFLS	45	0	0	0	0	45	0	0	90	3	100 00	0	0	0	0	0	0	0	100 00
	SOESH1040	Project Studio	S & H	0	0	0	60	30	0	30	0	120	4	0	0	0	50 00	25 00	0	25 00	0	100 0
											Total	**690**	**23**									**900**
G2	SOESH1020	Linear Algebra	S & H	45	0	30	0	0	30	0	15	120	4	30 50	0	30 50	0	0	20 00	0	20 00	100 100
	SOECV1010	Basics of Civil Engineering	CV	45	0	30	0	30	0	0	15	120	4	30 50	0	30 50	0	20 00	0	0	20 00	100 100
	SOEEC1010	Basics of Electrical and Electronics Engineering	E&C	45	30	0	30	0	0	0	15	120	4	30 50	30 50	0	20 00	0	0	0	20 00	100 100
	SOEML1010	AI for Everyone	ML	30	30	0	0	30	0	0	30	120	4	30 50	30 50	0	0	20 00	0	0	20 00	100 100
	SOEMS1010	Introduction to Sustainable Development	MT	45	0	30	0	30	0	0	15	120	4	30 50	0	30 50	0	20 00	0	0	20 00	100 100
	CLSC2090	Constitutional Empowerment	CLSC	30	0	0	0	0	30	0	0	60	2	100 00	0	0	0	0	0	0	0	100 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	**Foundations of Differential Calculus:** Limits, Continuity, Types of Discontinuity, Successive Differentiation.	06	10
2	**Mean Value Theorems and Applications:** Rolle's Theorem, LMVT, CMVT, Maxima and Minima.	06	10
3	**Sequence and Series-I:** Convergence and Divergence, Comparison Test, Integral Test, Ratio Test, Root Test, Alternating Series, Absolute and Conditional Convergence.	10	20

4	**Sequence and Series-II:** Power series, Taylor and Maclaurin series, Indeterminate forms and L'Hôpital's Rule.	06	10
5	**Partial Derivatives:** Function of several variables, Partial differentiation, Applications, Chain rule, Maxima and Minima, Euler's theorem, Lagrange multiplier.	12	30
6	**Curve Tracing:** 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
	TOTAL	**45**	**100%**

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
	TOTAL	**30**

SELF-LEARNING ONLINE RESOURCES:

Sr. No	Link / Description	Self-Learning Hours
1	https://www.youtube.com/watch?v=54_XRjHhZzI&list=PLF797E961509B4EB5&index=7 – An introduction to limits	05
2	https://www.youtube.com/watch?v=qr1WXiq3S3k&list=PLF797E961509B4EB5&index=15 – Applications of the Derivative	05
3	https://www.youtube.com/watch?v=8u6woY05aL0 - 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 External Viva Voce – 25 Marks	50	20
Assignment	CE	Assignment Rubrics Conceptual Understanding – 5 Marks Problem Solving Methodology – 5 Marks Application of Theorems and Techniques – 5 Marks 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
		TOTAL MARKS	**200**	**80**

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	**QUANTUM PHYSICS:** 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	**ACOUSTIC AND ULTRASONIC:** 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	**LASER AND FIBRE OPTICS:** 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	**NANOSCIENCE AND NANOTECHNOLOGY:** 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	**SUPERCONDUCTORS:** Introduction; Critical temperature; Properties of superconductors; Type of superconductors: Type I and Type II; High Tc 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	**SEMICONDUCTOR PHYSICS:** 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
	TOTAL	**45**	**100%**

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
	TOTAL	**30**

SELF-LEARNING ONLINE RESOURCES:

Sr. No	Link / Description	Self-Learning Hours
1	https://youtu.be/HQdy2Z-GmdY?si=KBzbZBJDei-HDvrC – Unit of Measurements, System of Units, Fundamental and derived Units	5
2	https://www.youtube.com/watch?v=DqYl42JtaQg – Electricity & Magnetism	5
3	https://youtu.be/l-Xo6Xv3amc?si=Y7frdohG_b_nRQE_ – Physical World	5
4	https://www.youtube.com/watch?v=t06aTX9jM34&t=227s - Quantum Physics	5
5	https://www.youtube.com/watch?v=i8fp0MQ-3zE&t=1293s - Quantum effects	5
6	https://www.youtube.com/watch?v=9LU1pE07yTk&t=355s- 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 External Viva Voce – 25 Marks	50	20
Group Discussion	CE	Group Discussion (GD) Evaluation Rubrics • Understanding of Physics Concepts and Principles – 5 Marks • Scientific Reasoning and Analytical Ability – 5 Marks • Participation and Communication Skills – 5 Marks • Teamwork and Response to Questions – 5 Marks	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
		TOTAL MARKS	**200**	**80**

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	**Basic concept of thermodynamics:** 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	**Basics of I.C Engines:** 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	**Basic of Boilers & Steam:**	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	**Engineering Materials:** 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	**Basic Manufacturing Process:** 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	**Basic of Fluids & Power Transmission Elements: :** 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
	TOTAL	**45**	**100%**

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
	TOTAL	**30**

SELF-LEARNING ONLINE RESOURCES:

Sr. No	Link / Description	Self-Learning Hours
1	https://www.youtube.com/watch?v=H_RgFXjg5s&list=PLyqSpQzTE6M9G2SNxKfsVEjcM9MlJau4F - Basics of I.C Engines	02

2	https://youtu.be/9GMBpZZtjXM?si=xub19V-rE5_bUgEp - Basic concept of thermodynamics	02
3	https://www.youtube.com/watch?v=w8tQ9FSYzm0&list=PLdoIhVhbPQV6nmSlVMi7rk2za0y1jFjeL - Basic of Boilers & Steam	02
4	#1 Introduction | Basics of Materials Engineering- Engineering Materials	03
5	https://www.youtube.com/watch?v=jdFrBtHeJbs&list=PLSGws_74K01g9nnTMBssGURHawYYQfMQ - 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 External Viva Voce – 25 Marks	50	20
Assignment	CE	Assignment Evaluation Rubrics Problem Formulations & Assumptions – 5 Marks Description/methodology/calculations – 5 Marks Analysis & Interpretations – 5 Marks 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
		TOTAL MARKS	**200**	**80**

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:

SOEME1010	Basics of Mechanical Engineering
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:

SOEME1010	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
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:

SOEME1010	PSO1	PSO2	PSO3
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

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

	Structures, unions, typedef, file operations, command line arguments.		
6	**Problem Solving Applications:** Case studies, mini-projects, debugging, testing, real-world programming applications.	06	13
	TOTAL	**45**	**100%**

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
	TOTAL	**30**

SELF-LEARNING ONLINE RESOURCES:

Sr. No	Link / Description	Self-Learning Hours
1	Algorithm and Flowchart: https://www.youtube.com/watch?v=MUkvVLGz89k	05
2	Pillars of Computational Thinking: https://www.coursera.org/learn/computational-thinking-problem-solving/home/module/1	05
3	Fundamentals Operations of a Modern Computer: https://www.coursera.org/learn/computational-thinking-problem-solving/home/module/3	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 External Viva Voce – 25 Marks	50	20
Project	CE	Project Evaluation Rubrics • Problem Identification & Understanding – 5 Marks • Relevance of Application – 5 Marks	20	00

		• Creativity & Innovation – 5 Marks • 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
		TOTAL MARKS	**200**	**80**

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	**Project Identification, Problem Formulation & Literature Review:** 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	**Feasibility Study & Project Planning:** Technical, economic, and operational feasibility study; work breakdown structure; project scheduling using Gantt	0	17

	chart/PERT-CPM; resource and role allocation within the team; risk identification and mitigation planning.		
3	**Design & Methodology Development:** 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	**Implementation / Prototype Development:** Development of working prototype/model/software solution; fabrication, coding, or experimentation as applicable; iterative development with mentor feedback; troubleshooting and refinement.	0	23
5	**Testing, Validation & Result Analysis:** 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	**Documentation, Reporting & Final Presentation:** 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
	TOTAL	**0**	**100%**

COURSE EVALUATION & ASSESSMENT RUBRICS:

Component	CE/ESE	Evaluation Methodology / Rubrics	Marks	Passing Marks
Project	CE	Problem Identification & Objective Clarity – 10 Marks Design/Methodology & Technical Content – 15 Marks Implementation, Functionality & Innovation – 15 Marks 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 Prototype/model submission - 10 Marks Final report compilation - 10 Marks	25	00
		TOTAL MARKS	**100**	**40**

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	**Matrix Algebra I:** Elementary Row and Column operations, Inverse of matrix, Rank of matrix, System of Linear Equations.	06	15
2	**Matrix Algebra II:** Characteristic Equation, Eigen values and Eigen vector, Diagonalization, Cayley Hamilton Theorem.	06	15
3	**Vector Space:** 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	**Linear Transformation:** Introduction of Linear Transformation, Kernal and Range, Rank and Nullity, Inverse of Linear Transformation, Rank Nullity Theorem, Composition of Linear Maps.	09	20
5	**Inner Product Space:**	08	20

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

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
	TOTAL	**30**

SELF-LEARNING ONLINE RESOURCES:

Sr. No	Link / Description	L
1	https://youtu.be/5hGjimutBEo?si=KMmcyV3DLZildfIF -Inner product space	
2	https://youtu.be/Li4PfR7v7n8?si=5uIu-CbfrKuIk8-C – Linear Transformation	
3	https://youtu.be/cdZnhQjJu4I?si=3RwZuBApR9-gJUFE -Eigen Values & Eigen Vectors	
4	https://www.youtube.com/watch?v=fNk_zzaMoSs&list=PLZHQObOWTQDPD3MizzM2xVFitgF8hE_ab -Linear Algebra	

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 External Viva Voce – 25 Marks	50	20
Assignment	CE	Assignment Evaluation Rubrics Understanding of Concepts– 5 Marks Problem Solving & Accuracy – 5 Marks Presentation & Organization – 5 Marks Timeliness & Originality – 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
		TOTAL MARKS	**200**	**80**

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 Chrish 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	**Civil engineering: an overview:** Introduction, Branches, Scope, Impact, Role of Civil Engineer, Unit of measurement, Unit conversion (Length, Area, Volume).	06	15
2	**Building materials and construction:** 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	**Introduction to town planning:** 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	**Introduction to surveying and levelling:** Introduction: Fundamental principles, Classification. Linear measurement: Instruments used, Chaining on plane ground, Offset, Ranging. Angular measurement: Compass-Instrument used, Meridian, Bearing, Local attraction. Levelling: Instrument used, Terminology, Types of levelling, Methods of levelling. Modern tools: Introduction to theodolite, Total Station, GPS	10	20
5	**Recent trends in civil engineering:** Mass Transportation, Rapid Transportation, Smart City, Sky scarper, Dams, Rain Water harvesting, Batch mix plant, Ready Mix Concrete plant, Earth quake resisting building	06	15
6	**AI in civil engineering:** 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
	TOTAL	**45**	**100%**

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
	TOTAL	**30**

SELF-LEARNING ONLINE RESOURCES:

Sr. No	Link / Description	Self-Learning Hours
1	https://youtu.be/LYvDoy7MtkE?si=0f-gNu2rLy8k_ON0	5
2	https://youtu.be/LD8MKrdAFKs?si=nzjk35lEKicLmtHQ	5
3	https://youtu.be/WZYwbyB6S6Q?si=87zQNQcLf5UD8bdy	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 External Viva Voce – 25 Marks	50	20
Field Visit	CE	Field Visit (FV) Evaluation Rubrics • Attendance and Discipline – 5 Marks • Observation and Data Collection – 5 Marks • Field Visit Report – 5 Marks • Viva – 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
		TOTAL MARKS	**200**	**80**

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	**Fundamentals of Electrical Circuits:** 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	**AC Circuits and Electrical Power:** 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 Factor	8	18

	Improvement, Single-phase and Three-phase Supply, Star and Delta Connections.		
3	**Electrical Machines and Power Systems:** 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	**Semiconductor Devices and Analog Electronics :** 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	**Digital Electronics: Concepts, Circuits, and Systems:** 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	**Electrical Wiring, Measurements and Emerging Technologies:** 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
	TOTAL	**45**	**100%**

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 (Δ) 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
	TOTAL	**30**

SELF-LEARNING ONLINE RESOURCES:

Sr. No	Link / Description	Self-Learning Hours
1	NPTEL – IIT/IISc Courses: https://nptel.ac.in-https://www.youtube.com/watch?v=ikqXDWrwf4c&list=PLp6ek2hDcoNCANsWM2mw3qi0387BhfLyV&index=2– 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: https://nptel.ac.in-https://www.youtube.com/watch?v=LCfTE9As4KA&list=PLp6ek2hDcoNCANsWM2mw3qi0387BhfLyV&index=3-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: https://platform.openai.com/docs – 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 External Viva Voce – 25 Marks	50	20
Project	CE	Project Evaluation Rubrics • Problem Identification & Understanding – 5 Marks • Relevance of Application – 5 Marks • Creativity & Innovation – 5 Marks • 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
		TOTAL MARKS	**200**	**80**

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	**Introduction to Artificial Intelligence:** 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	**Generative AI & AI Tools:** 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	**AI Applications Across Engineering Disciplines:**	06	20

	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.		
4	**AI Ethics, Challenges & Cyber Awareness:** 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	**Hands-on AI Activities & Mini Case Studies:** 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	**Future of AI & Innovation:** 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
	TOTAL	**30**	**100%**

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
	TOTAL	**30**

SELF-LEARNING ONLINE RESOURCES:

Sr. No	Link / Description	Self-Learning Hours
1	https://www.youtube.com/watch?v=JOebRfKhCcg – AI for Everyone by Andrew Ng	5
2	https://www.youtube.com/watch?v=D1eL1EnxXXQ – AI Basics Learn AI & ML Fundamentals from Scratch	5
3	https://www.youtube.com/watch?v=_6R7Ym6Vy_I - What is generative AI and how does it work?	5
4	https://www.youtube.com/watch?v=-sB12gk9ESA&t=19s - A.I. Revolution	5
5	https://www.youtube.com/watch?v=SWP3k-24jT4 - How to build AI chatbot	5
6	https://www.youtube.com/watch?v=2R-niMsB0QY - 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 External Viva Voce – 25 Marks	50	20
Case Study	CE	Case Study (CS) Evaluation Rubrics • Problem Identification & Understanding – 5 Marks • Relevance of AI Application – 5 Marks • Creativity & Innovation – 5 Marks • 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
		TOTAL MARKS	**200**	**80**

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	**Introduction to Sustainable Engineering:** 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	**Environmental issues:** Solid waste, impact of solid waste on natural resources, zero waste concept and three R concept, waste to energy	9	20

	technology: thermo-chemical conversion, biochemical conversion. 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	**Tools for Sustainability :** 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	**Renewable energy resources:** 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. Green technology and Green Business: Sustainable business, green technology, green energy, green construction, green transportation, green chemistry, green computing	6	14
5	**Sustainability Across Engineering Disciplines:** 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	**Sustainable Industrialization and Urbanization:** Sustainable urbanization, industrialization, material selection, pollution prevention, industrial ecology, industrial symbiosis, poverty reduction.	6	12
	TOTAL	**45**	**100%**

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
	TOTAL	**30**

SELF-LEARNING ONLINE RESOURCES:

Sr. No	Link / Description	Self-Learning Hours
1	https://www.youtube.com/watch?v=oIF9EWyJ2_w&list=PLwdnzlV3ogoXD4NBvgyZJhsDUgaEB1nV3&index=2 - Introduction to Sustainable Development	03
2	https://www.bing.com/videos/riverview/relatedvideo?q=+lecture+of+sustainability+development&&mid=1A40867EC43EA114A84F1A40867EC43EA114A84F&churl=https%3a%2f%2fwww.youtube.com%2fchannel%2fUCoVtIBThrMPcU72F6_fADvw&mcid=46D79E4C56A340ED88EF38D826E36A28&FORM=VRDGAR- Global Sustainable Development Goals	03
3	https://www.bing.com/videos/riverview/relatedvideo?q=%20lecture%20of%20sustainability%20development&mid=D296C702DD3DB8244863D296C702DD3DB8244863&ajaxhist=0 - Environment & Sustainable Development	03
4	https://www.youtube.com/watch?v=iZyzvDj6Y3c&list=PLwdnzlV3ogoXUifhvYB65lLJCZ74o_fAk&index=2- Renewable Energy Sources	03
5	https://www.youtube.com/watch?v=vHop5VgamRc - 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 External Viva Voce – 25 Marks	50	20
Case Study	CE	Case Study (CS) Evaluation Rubrics Problem Identification & Understanding – 5 Marks Relevance of AI Application – 5 Marks Creativity & Innovation – 5 Marks 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
		TOTAL MARKS	**200**	**80**

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 and Case Studies (1st Edition)	D. T. Allen and D. R. Shonnard.	Prentice Hall, 2011.
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