



PPSU

P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

B. TECH. (MECHANICAL ENGINEERING)

SYLLABUS BOOK

AY 2023-24

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 knowledge of engineering fundamentals, science, mathematics & engineering specialization for the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate and analyze complex engineering problems leading to substantial conclusions using basic principles of mathematics, science and engineering.
PO 3	Design/development of solutions: Develop solutions for complex engineering problems and design system

	components or processes meeting specified needs having due consideration for the safety and societal & environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge & methods like design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid & viable conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools for prediction and modeling of complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society: Apply cognitive learning by the contextual knowledge to assess societal, health, safety, legal and cultural issues and following responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge & skill needed for sustainable development.
PO 8	Values & Ethics: Apply basic moral values & ethical principles and pledge to professional ethics/norms and responsibilities of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual/as a team member or as a leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need, do necessary preparation and ability to engage in independent and

	life- long learning in the broadest context of technological change.
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PSO No	PROGRAMME SPECIFIC OUTCOMES (PSO) MECHANICAL ENGINEERING
PSO 1	Analyse, interpret and provide solutions to real life Mechanical Engineering problems.
PSO 2	Develop an attitude to accept global challenges and apply Mechanical Engineering knowledge for solving problems related to design, production, thermal and interdisciplinary fields.
PSO 3	Attain excellence in using managerial tools and techniques for effective and efficient manufacturing and in developing research & leadership skills with ethical and environmental practices.

Credit Guidelines (General)			
Component	Hour/Week	Credit	Total Hours/Semester
Theory	1	1	15
Practical	2	1	30
Tutorial	1	1	15

Note: In specific cases; extra credits can be granted for specific/important subjects.

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

B. Tech. (Mechanical Engineering)



P P Savani University

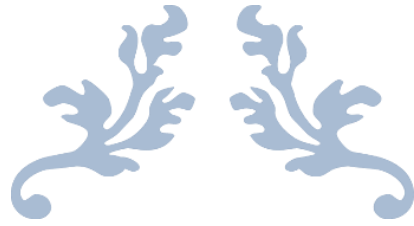
School of Engineering

Effective From: 2023-24

Authored by: P P Savani University

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FIRST YEAR B. TECH.



P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

TEACHING & EXAMINATION SCHEME FOR FIRST YEAR B.TECH. PROGRAMME AY: 2023-24

Sem	Course Code	Course Title	Offered By	Teaching Scheme					Examination Scheme						
				Contact Hours				Credit	Theory		Practical		Tutorial		Total
				Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
1 OR 2	SESH1110	Calculus	SH	3	0	2	5	5	40	60	0	0	100	0	200
	SESH1120	Linear Algebra	SH	3	0	2	5	5	40	60	0	0	100	0	200
	SEME1110	Hardware Workshop	ME	0	4	0	4	4	0	0	100	0	0	0	100
	SECE1110	Software Workshop	CE	0	4	0	4	2	0	0	100	0	0	0	100
	SEIT1110	Cyberspace Awareness	IT	2	0	0	2	2	40	60	0	0	0	0	100
	SEIT1120	Competitive Quantitative Aptitude	IT	2	0	0	2	2	40	60	0	0	0	0	100
	SECE1120	Joy of Programming	CE	3	2	0	5	4	40	60	40	60	0	0	200
	SESH1130	Conceptual Experimental Physics	SH	3	2	0	5	4	40	60	40	60	0	0	200
	SECH1110	Fundamental Chemistry & Environmental Science	CH	3	2	0	5	4	40	60	40	60	0	0	200
	SEME1120	Fundamentals of Technical Drawing	ME	0	4	0	4	4	0	0	40	60	0	0	100
	SECV1110	Core Engineering Concepts	CV	3	2	0	5	4	40	60	40	60	0	0	200
	CFLS2130	Intermediate Communicative English	CFLS	2	2	0	4	3	100	00	100	0	0	0	200
	CLSC2070	Essentials of Entrepreneurship	CFLS/SLM	2	0	0	2	2	100	0	0	0	0	0	100
						Total	52	45							2000

P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

TEACHING & EXAMINATION SCHEME FOR FIRST YEAR B.TECH. PROGRAMME AY: 2023-24

Sem	Course Code	Course Title	Offered By	Teaching Scheme					Examination Scheme						
				Contact Hours				Credit	Theory		Practical		Tutorial		Total
				Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
Group 1	SESH1110	Calculus	SH	3	0	2	5	5	40	60	0	0	100	0	200
	SEME1110	Hardware Workshop	ME	0	4	0	4	4	0	0	100	0	0	0	100
	SEIT1110	Cyberspace Awareness	IT	2	0	0	2	2	40	60	0	0	0	0	100
	SESH1130	Conceptual Experimental Physics	SH	3	2	0	5	4	40	60	40	60	0	0	200
	SEME1120	Fundamentals of Technical Drawing	ME	0	4	0	4	4	0	0	40	60	0	0	100
	SECE1120	Joy of Programming	CE	3	2	0	5	4	40	60	40	60	0	0	200
	CFLS2130	Intermediate Communicative English	CFLS	2	2	0	4	3	100	0	100	0	0	0	200
				Total	29	26							1100		
Group 2	SESH1120	Linear Algebra	SH	3	0	2	5	5	40	60	0	0	100	0	200
	SECE1110	Software Workshop	CE	0	4	0	4	2	0	0	100	0	0	0	100
	SEIT1120	Competitive Quantitative Aptitude	IT	2	0	0	2	2	40	60	0	0	0	0	100
	SECH1110	Fundamental Chemistry & Environmental Science	CH	3	2	0	5	4	40	60	40	60	0	0	200
	SECV1110	Core Engineering Concepts	CV	3	2	0	5	4	40	60	40	60	0	0	200
	CLSC2070	Essentials of Entrepreneurship	CFLS/ SLM	2	0	0	2	2	100	0	0	0	0	0	100
				Total	23	19							900		

P P Savani University
School of Engineering

Department of Science and Humanities

Course Code: SESH1110

Course Name: Calculus

Prerequisite Course/s: Algebra, Geometry, Trigonometry & Pre-Calculus till 12th Standard level

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	02	05	40	60	-	-	100	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) 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:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Calculus Limits, Continuity, Types of Discontinuity, Successive Differentiation, Rolle's Theorem, LMVT, CMVT, Maxima and Minima.	09	20
2.	Sequence and Series-I Convergence and Divergence, Comparison Test, Integral Test, Ratio Test, Root Test, Alternating Series, Absolute and Conditional Convergence.	09	20
3.	Sequence and Series-II Power series, Taylor and Maclaurin series, Indeterminate forms and L'Hospital's Rule.	05	10
Section II			
Module No.	Content	Hours	Weightage in %
1.	Partial Derivatives	11	30

	Function of several variables, Partial differentiation, Applications, Chain rule, Linear approximations, Maxima and Minima, Euler's theorem, Lagrange multiplier.		
2.	Curve tracing Tracing of Cartesian Curves, Polar Coordinates, Polar and Parametric Form of Standard Curves, Areas and Length in Polar co-ordinates	11	20
	TOTAL	45	100

List of Tutorials:

Sr. No.	Name of Tutorial	Hours
1.	Calculus-1	04
2.	Calculus-2	04
3.	Calculus-3	02
4.	Sequence and Series-1	04
5.	Sequence and Series-2	02
6.	Sequence and Series-3	02
7.	Partial Derivatives-1	04
8.	Partial Derivatives-2	02
9.	Curve tracing-1	04
10.	Curve tracing-2	02
	TOTAL	30

Text Book:

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:

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

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:

- Continuous Evaluation consists of performance of tutorial which will be evaluated out of 10 marks for each tutorial and average of the same will be converted to 50 marks
- Continuous Evaluation consists of self-performance assignment to 20 marks.
- Internal Viva consists of 30 marks.

Course Outcome(s):

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

SESH1110	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

SESH1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	3	1	1								1
CO 2	3	2	1									1
CO 3	2	2	1									
CO 4	2	2	1	1								1
CO 5	2	2	1									1

Mapping of CO with PSO

SESH1110	PSO1	PSO2	PSO3
CO 1	3		
CO 2	1	1	
CO 3	1	2	
CO 4	3	2	
CO 5	1	1	

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Calculus	1, 2, 3, 4, 5
2	Sequence and Series – I	1, 2, 3, 4, 6
3	Sequence and Series – II	1, 2, 3, 4, 6
4	Partial Derivatives	1, 2, 3, 4, 5
5	Curve tracing	1, 2, 3, 4, 5, 6

P P Savani University
School of Engineering

Department of Science and Humanities

Course Code: SESH1120

Course Name: Linear Algebra

Prerequisite Course/s: -- Algebra, Geometry, Trigonometry & Pre-Calculus till 12th Standard level

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	02	05	40	60	-	-	100	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) 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:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Matrix Algebra Elementary Row and Column operations, Inverse of matrix, Rank of matrix, System of Linear Equations, Characteristic Equation, Eigen values and Eigen vector, Diagonalization, Cayley Hamilton Theorem.	12	30
2.	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
Section II			
Module No.	Content	Hours	Weightage in %
1.	Linear Transformation Introduction of Linear Transformation, Kernel and Range, Rank and Nullity, Inverse of Linear Transformation, Rank Nullity Theorem, Composition of Linear Maps.	09	20
2.	Inner Product Space Inner Product, Angle and Orthogonality, Orthogonal projection, Gram-Schmidt process and QR Decomposition, least square decomposition.	08	20
3.	Beta and Gamma function	05	10

	Improper Integrals, Convergence, Properties of Beta and Gamma Function, Duplication Formula (without proof)		
	TOTAL	45	100

List of Tutorial:

Sr. No.	Name of 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

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 Evaluation:

Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:

- Continuous evaluation consists of performance of tutorial which will be evaluated out of 10 Marks for each tutorial and average of the same will be converted to 50 marks.
- Continuous Evaluation consists of self-performance assignment to 20 marks.
- Internal Viva consists of 30 marks.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SESH1120	LINEAR ALGEBRA & CALCULUS
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

SESH1120	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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

SESH1120	PSO1	PSO2	PSO3
CO 1	3	2	
CO 2	1	1	
CO 3	2	2	
CO 4	2	2	
CO 5			

Level of Bloom's 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	1, 2, 3, 4, 5, 6
2	Vector Space	1, 2, 3, 4, 6
3	Linear Transformation	1, 2, 3, 4, 6
4	Inner Product Space	1, 2, 3, 4, 5, 6
5	Beta and Gamma Function	1, 2, 3, 4, 5

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME1110

Course Name: Hardware Workshop

Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)			Credit	Examination Scheme (Marks)						
Theory	Practical	Tutorial		Theory		Practical		Tutorial		Total
			CE	ESE	CE	ESE	CE	ESE		
-	04	-	04	-	-	100	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- learn about the safety measures required to be taken while using working in workshop.
- learn about how to select the appropriate tools required for specific operation.
- learn about different manufacturing technique for production out of the given raw material.
- understand applications of machine tools, hand tools, power tools and welding process.

Course Content:

Sr. No.	Name of Practical	Hours
1.	Introduction and Demonstration of Safety Norms. Different Measuring Instruments. Introduction and Demonstration of Machine Shop. To Perform a Job of Fitting Shop.	12
2.	To Perform a Job of Carpentry Shop. Introduction and Demonstration of Plumbing Shop & Welding Process.	15
3.	(I)Identify computer hardware layout and components (II)Perform assembling and disassembling of PC	08
4.	Configure BIOS, disk, network and other hardware management	05
5.	Understanding the electronic components and study of Shouldering and Desoldering of electronic components on PCB Board.	04
6.	Understanding the connection on Breadboard and study of Alternate Flashing LED Lights using Breadboard.	06
7.	Verify the truth table of Logic gates and De morgan's theorem on IC trainer board.	04
8.	Study of Cathode Ray Oscilloscope.	06
	TOTAL	60

Text Book(s):

Title	Author(s)	Publication
Elements of Workshop Technology	S K Hajra Choudhury	Media Promoters & Publishers

Reference Book(s):

Title	Author(s)	Publication
Basic Electronics: A text lab manual	P.B. Zbar, A.P. Malvino, M.A. Miller	Mc-Graw Hill.
Digital Electronics	Subrata Ghoshal	Cengage Learning

Course Evaluation:**Practical:**

- Continuous Evaluation consists of Performance of Practical/Tutorial which will be evaluated out of 10 for each practical/Tutorial and average of the same will be converted to 30 Marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator
- Internal Viva consists of 30 Marks.
- Practical performance/quiz/drawing/test will consist of 30 Marks.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME1110	HARDWARE WORKSHOP
CO 1	Apply the application of mechanical workshop such as fitting, drilling and carpentry. Understand various tools of mechanical workshop and understand its applications.
CO 2	Identify and inspect hardware components and interpret latest development of the field.
CO 3	Make students capable of analysing and solving the varieties of problems coming up in the electrical measurements and also enable the students to design as well as trouble shoots the circuits and networks through hands-on mode.
CO 4	Develop skill to build, and troubleshoot digital circuits.

Mapping of CO with PO

SEME1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	2	1		3	3		3	3	1	3
CO 2	2	1	1	1	2	2			2	2	1	2
CO 3	3	2	2	2	2	2	2	3	2	2	3	3
CO 4	2	3	2	3	3		3	3	1	2	1	2

Mapping of CO with PSO

SEME1110	PSO1	PSO2	PSO3
CO 1	3	1	1
CO 2	1	1	2
CO 3	1	3	3
CO 4	2	2	2

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Practical No	Content	RBT Level
1	Introduction and Demonstration of Safety Norms. Different Measuring Instruments. Introduction and Demonstration of Machine Shop. To Perform a Job of Fitting Shop.	1,2,3,4
2	To Perform a Job of Carpentry Shop. Introduction and Demonstration of Plumbing Shop & Welding Process.	1,2,3,4
3	(I)Identify computer hardware layout and components (II)Perform assembling and disassembling of PC	1,2,3,4
4	Configure BIOS, disk, network and other hardware management	1,2,3
5	Understanding the electronic components and study of Shouldering and Desoldering of electronic components on PCB Board.	1,2,3
6	Understanding the connection on Breadboard and study of Alternate Flashing LED Lights using Breadboard.	1,2,3
7	Verify the truth table of Logic gates and De morgan's theorem on IC trainer board.	1,2,3,4
8	Study of Cathode Ray Oscilloscope.	1,2,3

P P Savani University
School of Engineering

Department of Computer Engineering

Course Code: SECE1110

Course Name: Software Workshop

Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
-	04	-	02	-	-	100	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- Provide a comprehensive knowledge of overall basic computer software tools and technology.
- Providing hands-on experience related to basic software installation, usage of Operating systems, and various essential software utilities.

Course Content:

Section I		
Module No.	Content	Weightage in %
1.	Software Fundamentals Introduction to Software, Types of software, Applications of software, Web based software, Understand Software specific requirements, Installation of Software	10
2.	Operating System Introduction of OS, Functions of Operating System, Types of OS, Installation of Windows and Linux OS, Linux architecture, Role of Device Drivers in OS, Shell scripting, Command structure, and general-purpose utility.	25
3.	DOS Commands Getting Started with DOS, Introduction to Command Prompt, System Files and Command, creating directories, traversing through directories, deleting directories, Viewing Files within a directory.	15
Section II		
Module No.	Content	Weightage in %
1.	Application Software Introduction to Application Software, Types of Application Software, Installation of Application Software, Logo Designing, Creating Flowcharts and diagrams, Introduction to Google Apps.	10

2.	Data Analysis using Application Software Introduction to Spreadsheets, Spreadsheet Functions to Organize Data, Introduction to Filtering, Pivot Tables, and Charts, VlookUp and HlookUp in Spreadsheets.	15
3.	Website Creation Creating a website using Google Sites, Creating Web Pages, Working with Images, Working with Documents on Web Pages. Introduction to WordPress, Installing Web Server and WordPress, Creating Web pages in WordPress.	25
	TOTAL	100

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Study of Different Software.	02
2.	Installation of any 2 software with required plugins and libraries.	04
3.	Study of Different Operating Systems.	02
4.	Creation of Bootable Pen drive.	02
5.	Installation of Windows OS.	02
6.	Installation of Linux OS using VMWare.	02
7.	Study of Basic commands of Linux/UNIX.	04
8.	Study of Basic commands of DOS.	04
9.	Design logo using Canva.	02
10.	Draw a Flowchart to find maximum of two numbers in either draw.io or Microsoft Visio or Lucid Chart.	02
11.	Study of different Google Apps.	04
12.	Create a Google Doc and Google sheet and share with 2 classmates.	02
13.	Demonstrate working of HlookUp and VlookUp in Excel.	02
14.	Create different types of charts in Excel.	04
15.	Demonstrate Data Analysis in Excel.	04
16.	Create a Google Website with minimum two pages showing your personal details.	04
17.	Demonstrate embedding of a YouTube video and pdf document on a web page in google site.	04
18.	Demonstrate placing Map and hyperlinks on web page in Google Site.	04
19.	Create a WordPress site and create minimum three web pages and menu to navigate between the pages.	04
20.	Demonstrate the use of Accordion in WordPress.	02
	TOTAL	60

Text Book(s):

Title	Author/s	Publication
Fundamentals Of Computers, 2nd Edition	Reema Thareja	Oxford University Press
Excel 2019 Bible	Michael Alexander, Richard Kusleika, John Walkenbach	Wiley

Reference Book(s):

Title	Author/s	Publication
UNIX: Concepts and Applications 4th Edition	Sumitabha Das	McGraw Hill Education

Web Material Link(s):

- <https://sites.google.com/site/willkimbley/google-apps-tutorials>
- <https://www.cs.upc.edu/~robert/teaching/foninf/doshelp.html>
- <https://www.javatpoint.com/software-engineering>
- <https://www.wikihow.com/Create-a-Website-Using-Google-Sites>
- <https://www.wpbeginner.com/guides/>

Course Evaluation:**Practical:**

- Continuous Evaluation consists of performance of practical, which should be evaluated out of 10 marks per each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during Internal practical Exam.
- Mini Project performance consists of 40 marks during End Semester Exam.

Course Outcome(s):

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

SECE1110	Software Workshop
CO 1	Understand the types of computer software with their requirements and how to use as per the need.
CO 2	Install different Operating Systems and learn commands used in the OS.
CO 3	Get familiar with the application software and different applications of application software
CO4	Achieve some useful information from data through analysis and represent it with different views like charts, graphs etc.
CO 5	Learn the designing and development of website to have a global communication.

Mapping of CO with PO

SECE1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2	2	2	3		1		1	2	2	1
CO 2	3	1	1	1	1		1			1		1
CO 3		1	2	2	3	2	1		2	1	2	3
CO 4	2	1		2	1		1		1	1		
CO 5	1	1	1	2	1	3	1		1	1	2	1

Mapping of CO with PSO

SECE1110	PSO1	PSO2	PSO3
CO 1	1	3	1
CO 2		3	1
CO 3	2		2
CO 4	2		1
CO 5		1	

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Software Fundamentals	1,2
2	Operating System	1,2,3,6
3	Disk Operating System	2,3
4	Application Software	2,3,4,5
5	Data Analysis using Application Software	3,4,5,6
6	Website Creation	2,3,6

P P Savani University
School of Engineering

Department of Information Technology

Course Code: SEIT1110

Course Name: Cyberspace Awareness

Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	-	-	02	40	60	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to,

- understand governance, regulatory, legal, economic, environmental, social, and ethical context of cyber security.
- equip students with the technical knowledge and skills needed to protect and defend against cyber threats.
- help students to protect the one's data, systems, and networks from malicious attacks and cyber threats.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Introduction to Cyber space Cyber space, Cyber Crime and its Types, Overview of Cyber Security, Cyber Attacks in History, Internet Governance, Hacking and its Types, Cracking, Overview of System and Web Vulnerability, OWASP	06	20
2.	Cyber Threats Various Cyber Threats, Malware, Phishing, Password Attacks, DOS attack, Man in the Middle, Drive by download, Malvertising, Rogue Software, Cyber Warfare and its conflicts, Cyber Terrorism, Case studies	09	30
Section II			
Module No.	Content	Hours	Weightage in %
1.	Cyber security Practices Cyber Security Practices and dos and don'ts, Data Privacy and Security, Security Controls, Overview of social media and its security, E-Commerce, Digital payments and its security, Tools and technology	05	15

	for cyber security, Platform to report and combat cyber-crime, Case studies		
2.	Cyberspace and the Law Cyber Security Regulations, Cyber Law, need for a Comprehensive Cyber Security Policy, Need for an International convention on Cyber space, Contemporary crime, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards, The INDIAN Cyberspace, Indian IT Act 2000, Indian IT Act 2008, Case studies	06	15
3.	Cyber Forensics Introduction to Cyber Forensics, Handling Preliminary analysis, Investigating Investigations, Controlling an Investigation, Legal Policies, Case studies	04	20
	TOTAL	30	100

Text Book(s):

Title	Author/s	Publication
Cybersecurity for Beginners	Raef Meeuwisse	Cyber Simplicity Ltd

Reference Book(s):

Title	Author/s	Publication
Cyber Security	Nina Godbole, Sunit Belapure	Wiley India, New Delhi
The Indian Cyber Law	Suresh T. Vishwanathan;	Bharat Law House New Delhi

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

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

SEIT1110	Cyberspace Awareness
CO 1	Understand Concepts of Cyber space.
CO 2	Analyze the Concepts of Cyber Threats.
CO 3	Elaborate the overview of social media and understanding cybercrimes.
CO 4	Identify cyber laws and cyber acts in India.
CO 5	Explore different case studies based on cyber-Forensics.

Mapping of CO with PO

SEIT1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2				3						2

CO 2	2	3				3						2
CO 3	3	2				3			2			3
CO 4		3				3		3		2		3
CO 5		2			2			2		3		3

Mapping of CO with PSO

SEIT1110	PSO1	PSO2	PSO3
CO 1	3	2	2
CO 2	2	3	2
CO 3	3	2	3
CO 4	2	3	2
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 Cyber space	1
2	Cyber Threats	1,2
3	Cyber security Practices	1,2,3
4	Cyberspace and the Law	1,2
5	Cyber Forensics	1,2,3

**P P Savani University
School of Engineering**

Department of Computer Engineering

Course Code: SEIT1120

Course Name: Competitive Quantitative Aptitude

Prerequisite Course(s): ---

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	-	-	02	40	60	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

- This course is designed to suit the need of the outgoing students and to acquaint them with frequently asked patterns in quantitative aptitude and logical reasoning during various examinations and campus interviews.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Quantitative Ability (Basic Mathematics) Number Systems, LCM and HCF, Decimal Fractions, Simplification, Square Roots and Cube Roots, Average, Problems on Ages, Surds & Indices, Percentages, Problems on Numbers, Quadratic Equations	05	15%
2.	Quantitative Ability (Applied & Engineering Mathematics)- Part I Logarithm, Permutation and Combinations, Probability, Profit and Loss, Simple and Compound Interest,	05	35
3.	Quantitative Ability (Applied & Engineering Mathematics) -Part II Time, Speed and Distance, Time & Work, Ratio and Proportion, Mixtures and Allegation	05	20
Section II			
Module No.	Content	Hours	Weightage in %
1.	Data Interpretation Data Interpretation, Tables, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Venn Diagrams1	06	20

2.	Logical Reasoning (Deductive Reasoning) Analogy, Blood Relation, Directional Sense, Number and Letter Series, Coding – Decoding, Calendars, Clocks, Seating Arrangement, Syllogism	06	20
3.	Mensuration & Trigonometry Two-dimensional (2D) and Three-dimensional (3D) Mensuration, Degree and Radian Measures, Trigonometric Ratios, Complementary Angles, Height and Distance, Standard Identities, Area, Inequalities	03	10
		30	

Text Book(s):

Title	Author/s	Publication
Quantitative aptitude for Competitive examination	R S Agarwal	S. Chand
A Modern Approach to Verbal & Non-Verbal Reasoning	R S Agarwal	S. Chand

Reference Book(s):

Title	Author/s	Publication
Analytical and Logical reasoning	Sijwali B S	arihant

Web Material Link(s):

- <https://prepinsta.com/>
- <https://www.indiabix.com/>
- <https://www.javatpoint.com/>

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

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

SEIT1120	Competitive Quantitative Aptitude
CO 1	Understand the basic concepts of quantitative ability
CO 2	Understand the basic concepts of logical reasoning Skills
CO 3	Acquire satisfactory competency in use of reasoning
CO4	Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning Ability
CO 5	Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc

Mapping of CO with PO

SEIT1120	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2							2			3
CO 2	2	3							2			3
CO 3	2	3							3			3
CO 4		3							3			3
CO 5									3	3		3

Mapping of CO with PSO

SEIT1120	PSO1	PSO2	PSO3
CO 1	2	2	3
CO 2	2	3	3
CO 3	2	3	3
CO 4	2	3	3
CO 5			3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Quantitative Ability (Basic Mathematics)	1, 3, 5
2	Quantitative Ability (Applied & Engineering Mathematics)	1, 2, 3, 5
3	Data Interpretation	2, 3, 6
4	Logical Reasoning (Deductive Reasoning)	2, 4, 5
5	Mensuration & Trigonometry	1, 3, 5

P P Savani University
School of Engineering

Department of Computer Engineering

Course Code: SECE1120

Course Name: Joy of Programming

Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- identify appropriate approach to computational problems.
- develop logic building and problem-solving skills.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Motivation of Programming: Use of Programming, Importance of Programming, Discussion of different Case Study	05	14
2.	Welcome to Programming: Introduction of Programming, Flow Charts and Algorithms, Debugging, Tracing the execution of the Program, Watching Variables Values in Memory, Character Set, Keyword and Identifiers, Constants and Variables, Data Types - Declaration and Initialization, Basic Input, and Output Operations, Symbolic Constants, Overflow and Underflow of Data.	09	18
3.	Conditional Statements and Looping Statements: Decision Making & Branching: Decision Making with If and If - else Statements, Nesting of If-else Statements, The Switch and go-to statements. Looping: The while Statement, The Break Statement & The Do While loop, The FOR loop, Jump within loops - Programs.	09	18
Section II			
Module No.	Content	Hours	Weightage in %
1.	Collection of Data: Introduction, One-dimensional Arrays, Two-dimensional Arrays, Concept of Multidimensional Arrays, Declaring and	10	20

	Initializing String Variables, Arithmetic Operations on Characters, Putting Strings Together, Comparison of Two Strings, String Handling Functions, Dictionary, List, Tuples and Sets.		
2.	Functions Introduction to Functions, defining a Function, Calling a Function, Types of Functions, Function Arguments, Anonymous Functions, Global and Local Variables, Recursion	06	15
3.	Building Desktop Application Exploring the Tkinter Library in Python, Creating basic Desktop application using Tkinter	06	15
	TOTAL	45	100

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Working with basic elements of C languages (different input functions, different output functions, different data types, and different operators).	2
2.	Working with control structures (if statement, if-else statement, nested if-else statement, switch statement, break statement, goto statement).	2
3.	Working with array and strings in C.	4
4.	Introduction to Python (Introduction to IDLE, different data types, Input Output in Python, Operators, Operator precedence).	2
5.	Implementation of Dictionaries, Sets, Tuples and Lists and its various methods in Python.	6
6.	Working with functions in C/Python.	2
7.	Working with recursive function in C/Python.	2
8.	Building desktop application of your own calculator in Python.	4
9.	Case Study: a. Sorting : Arrange the books b. Searching : Find in seconds c. Recursion : Tower of Hanoi	6
	TOTAL	30

Use of different libraries will be covered in Practical Assignments.

Text Book(s):

Title	Author(s)	Publication
Programming in ANSI C	E. Balagurusamy	Tata McGraw Hill
Python Programming: A modular approach	Sheetal Taneja, Naveen Kumar	Pearson

Reference Book(s):

Title	Author(s)	Publication
Programming in C	Ashok Kamthane	Pearson
Python Cookbook	David Ascher, Alex Martelli	O Reilly Media

Web Material Link(s):

- <https://www.tutorialspoint.com/cprogramming/index.htm>
- <https://www.w3schools.com/c/>
- <https://www.tutorialspoint.com/python/>
- <https://www.w3schools.com/python/>

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of the performance of practical which will be evaluated out of 10 for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva/oral performance consists of 30 marks during End Semester Exam.

Course Outcomes:

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

SECE1120	JOY OF PROGRAMMING
CO 1	Immediately analyze the syntax and semantics of the computer languages and apply it in programs.
CO 2	Implement computing solutions using logic building and problem-solving skills of a given programming language.
CO 3	Interpret the fundamental language syntax, semantics and fluent in the use of python or any computer language control flow statements.
CO 4	Determine the methods to create and manipulate programs by utilizing the data structures like lists, dictionaries, tuples and sets with emphasis on Python.

Mapping of CO with PO

SECE1120	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		2	1	1	2	2	1	1			1	
CO 2	2	1	2							2		1
CO 3	2	1		2								1
CO 4		1	1		1				1			

Mapping of CO with PSO

SECE1120	PSO1	PSO2	PSO3
CO 1	1		1
CO 2		2	
CO 3		1	1

CO 4			2
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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.	Motivation of Programming	1, 2, 4
2.	Welcome to Programming	1, 2, 3
3.	Conditional Statements and Looping Statements	1, 2, 3
4.	Collection of Data	1, 2, 3
5.	Functions	2, 3, 4, 6
6.	Building Desktop Application	2, 3, 4, 6

P P Savani University
School of Engineering

Department of Science & Humanities

Course Code: SESH1130

Course Name: Conceptual Experimental Physics

Prerequisite Course(s): -

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- Prepare students for career in engineering where physics principles can be applied for the advancement of technology.
- Think in core concept of engineering application by studying various topics involved in branch specific application.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	<p>QUANTUM PHYSICS (Prerequisites: Dual nature of radiation, Photoelectric effect Matter waves, wave nature of particles, de-Broglie relation, Davisson-Germer experiment). Introduction; De Broglie hypothesis of matter waves; Properties of matter waves; Phase velocity and group velocity and their relation; Heisenberg uncertainty principle; non-existence of electron in nucleus; Wave function; Physical interpretation of wave function; Schrodinger's time dependent wave equation; time independent wave equation; Quantum Computing (overview).</p>	07	16
2.	<p>ACOUSTIC AND ULTRASONIC (Prerequisites: Sound, propagation of sound, concept of frequency and wave length). Acoustic-Introduction, Classification and Characterization of Sound, Sabine's formula for reverberation (without derivation), Absorption Coefficients, Sound Absorbing Materials, factors affecting the acoustics of buildings and remedies, Sound Insulation. Ultrasonic - Introduction, Properties of Ultrasonic, Generation of Ultrasonic sound: Piezoelectric & Magnetostriction</p>	07	16

	effect, Applications of Ultrasonic.		
3.	<p>LASER AND FIBRE OPTICS (Prerequisites: Absorption, recombination, Valance and conduction bands, refractive index of a material, Snell's law) LASER – Introduction, Characteristics, Absorption, Spontaneous and stimulated emission; metastable state, population inversion, Pumping mechanism, components of LASER; Nd:YAG Laser, Applications of LASER. FIBRE OPTICS – Introduction, Optical Fiber construction, working principle and types, Numerical Aperture, Acceptance angle and Attenuation, Fiber optic communication system, Applications of Optical Fiber.</p>	08	18
Section II			
Module	Content	Hours	Weightage in %
1.	<p>NANOSCIENCE AND NANOTECHNOLOGY (Prerequisites: Nano scale and structures, general purpose of nano technology, method of formation of nano structure, fullerenes, carbon nanotubes). Nanomaterials: Properties (Physical, Mechanical, Optical, Electrical, Magnetic); Surface to Volume Ratio; Synthesis of Nanomaterials: Bottom up and Top down technique; Methods to synthesize nanomaterials: PVD & Sol-gel, Applications.</p>	06	14
2.	<p>SUPERCONDUCTORS AND SUPERCAPACITORS (Prerequisites: Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation with electric current, Ohm's law, electrical resistance, V-I characteristics (linear and non-linear), electrical resistivity and conductivity temperature dependence of resistance). Superconductors: Introduction, Critical temperature, Properties of superconductors, Type of superconductors: Type I and Type II and high T_c superconductors, Applications: Magnets, Josephson effect, SQUID, Maglev, other. Supercapacitors: Principle, construction, materials and Applications, comparison with capacitor and batteries: Energy density, Power density.</p>	08	18
3.	<p>SEMICONDUCTOR PHYSICS AND TECHNOLOGY (Prerequisites: Intrinsic and extrinsic semiconductors, Energy bands in conductors, semiconductors and insulators, Semiconductor diode, I-V characteristics in forward and reverse bias) Direct & indirect band gap semiconductor; Fermi level; Fermi energy level in intrinsic & extrinsic semiconductors; effect of impurity concentration and temperature on fermi level; mobility, current density; Hall Effect; Fermi Level diagram for p-n junction (unbiased, forward bias, reverse bias); Applications of semiconductors: LED, Zener diode, Photovoltaic cell.</p>	09	18

	TOTAL	45	100
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List of Practical:

Sr. No	Name of Practical	Hours
1.	Analysis of errors.	04
2.	To measure diameter of a small spherical body using Vernier calipers and hence find its volume.	04
3.	To measure the diameter of given object using micrometer screw gauge.	04
4.	Verify ohm's law using ammeter and voltmeter.	04
5.	To study the series and parallel connections of resistors.	02
6.	To study the series and parallel connections of capacitors.	02
7.	I-V characteristics of Light Emitting diode (LED).	02
8.	I-V characteristics of Zener diode.	04
9.	To determine Numerical aperture and acceptance angle of an optical fiber.	04
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
Concept of the Modern Physics	A. Beiser	Tata McGraw-Hill Education
Basic electrical engineering	Kothari and Nagrath	Tata McGraw-Hill Education
Quantum Mechanics	P.M. Mathew, K. Venkatesan	Tata McGraw-Hill Education
Waves and Acoustics	Pradipkumar Chakrabarti Satyabrata Chawdhary	New Central Book Agency
Lasers and Nonlinear Optics	G.D. Baruah	Pragati Prakashan

Reference Book(s):

Title	Author/s	Publication
Engineering Physics	G Vijayakumari	Vikas Publishing house PVT LTD
Basic Electronics for Scientists and Engineers	Dennis L. Eggleston	Cambridge University Press

Web Material Link(s):

- <http://nptel.ac.in/course.php>

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of Performance and regular manual writing,
- Internal viva or practical performance consist of 20 Marks. Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- Practical performance/test of 30 marks during End Semester Exam.
- Viva/Oral performance of 30 marks during End Semester Exam.

Course Outcome(s):

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

SESH1130	Conceptual Experimental 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 behavior 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

SESH1130	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO 1	2	2	2	2						1		
CO 2	1	3	2	3	1		1			1	2	
CO 3	1	1	1	1	1						1	
CO 4	2	2	1	2	1							
CO 5	1	1	1	1	1					1	2	

Mapping of CO with PSO

SESH1130	PSO1	PSO2	PSO3
CO 1	2	2	
CO 2		1	1
CO 3		2	2
CO 4	2	1	3

Level of Bloom's 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 and Supercapacitors	1, 2,3
6	Semiconductor Physics and Technology	1,6

P P Savani University
School of Engineering

Department of Chemical Engineering

Course Code: SECH1110

Course Name: Fundamental Chemistry & Environmental Science

Prerequisite Course(s): -

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- Understand the basic concepts of chemistry, including atoms, molecules, and chemical processes.
- Apply the scientific method to examine chemical phenomena, including the design and execution of experiments, data analysis, and evidence-based conclusion drawing.
- Evaluate the causes and consequences of environmental problems and propose solutions based on scientific evidence.
- Integrate knowledge from multiple disciplines to analyze environmental problems and propose effective solutions.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Introduction to Chemistry Overview of the scientific method and chemistry as a science, Basic concepts of matter, including atoms, molecules, and the periodic table, Introduction to chemical bonding and intermolecular forces, Basic principles of chemical reactions, including stoichiometry and reaction types	06	15
2.	Chemical Thermodynamics and Kinetics Introduction to thermodynamics and the laws of thermodynamics, Energy and enthalpy changes in chemical reactions, Introduction to chemical kinetics and reaction rates, Factors affecting reaction rates, including temperature, concentration, and catalysts	06	15
3.	Properties of Matter and Solutions Physical properties of matter, including states of matter and phase changes, Solutions and their properties, including solubility and colligative properties, Introduction to acids and bases and their properties, Chemical equilibrium and the equilibrium constant	05	10
4.	Organic Chemistry	06	10

	Introduction to organic chemistry and the basics of carbon chemistry, Functional groups and their properties, Nomenclature and isomerism in organic compounds, Introduction to organic reactions and mechanisms		
Section II			
Module No.	Content	Hours	Weightage in %
5.	Introduction to Environment Definition, principles and scope of Environmental Science, Impacts of development on Environment, Environmental Degradation, The interdisciplinary nature of environmental science, Concept of 4R's	06	10
6.	Environmental Pollution a) Water Pollution: Introduction – Water Quality Standards, Sources of Water Pollution, Classification of water pollutants, Effects of water pollutants. b) Air Pollution: Composition of air, Structure of atmosphere, Ambient Air Quality Standards, Classification of air pollutants, Sources of common air pollutants like PM, SO ₂ , NO _x , Auto exhaust, Effects of common air pollutants c) Noise Pollution: Introduction, Sound and Noise, Noise measurements, Causes and Effects. d) Solid Waste: Generation and management e) Bio-medical Waste: Generation and management f) E-waste: Generation and management	08	20
7.	Social Issues and Environment Sustainable Development, Equitable use of Resources for sustainable lifestyle and it's benefits, Water conservation, Climate Change, Global Warming and Green House Effect, Acid Rain, Depletion of Ozone layer, Carbon Footprint	08	20
	TOTAL	45	100

List of Practical:

Sr. No	Name of Practical	Hours
1.	Acid-base titration adding a base of known concentration to an acid of unknown concentration until the reaction is complete, and the concentration of the acid is determined.	02
2.	Determination of the boiling point of a liquid heating a sample of a liquid and observing the temperature at which it boils.	02
3.	Determination of the density of a liquid weighing a known volume of a liquid and calculating its density.	04
4.	Determination of the pH of a solution using a pH meter to measure the acidity or basicity of a solution.	04
5.	Flame test: burning a sample of a substance and observing the color of the flame to identify the presence of certain elements.	04
6.	Preparation of a salt reacting an acid and a base to form a salt and observing the reaction products.	02

7.	Testing of soil acidity	02
8.	Studying the effect of temperature on the solubility of a solid in water at different temperatures to see how temperature affects solubility.	02
9.	Studying the properties of acids and bases: Students can test the properties of different acids and bases (e.g., pH, conductivity) and compare their properties.	04
10.	Investigating the reaction between an acid and a metal and measure the amount of gas produced.	04
TOTAL		30

Text Book(s):

Title	Author/s	Publication
Textbook of Environmental Chemistry and Pollution Control	Dr. S. S. Dara, Dr. D.D. Mishra	S Chand & Co Ltd
Environmental Studies	Benny Joseph	Mc.Graw hill education Pvt. Ltd.
Environmental Studies	Dr. S.K. Dhameja	S.K. Kataria & Sons

Reference Book(s):

Title	Author/s	Publication
Engineering Chemistry	Jain & Jain	Dhanpat Rai Publishing company
Environmental Studies (From crisis to cure)	R. Rajagopalan	OXFORD university press

Web Material Link(s):

https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_ENS_LECTURE_NOTES_2.pdf

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of Practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal Viva consists of 20 marks.
- Practical performance/quiz/drawing/test of 30 marks during End Semester Exam.
- Viva/Oral presentation consists of 30 marks during End Semester Exam.

Course Outcome(s):

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

SECH1110	Fundamental Chemistry & Environmental Science
CO 1	Develop a fundamental understanding of the principles and concepts of chemistry, including atomic structure, chemical reactions, and chemical bonding.

CO 2	Demonstrate an ability to apply chemical knowledge to real-world problems, such as calculating reaction yields and predicting chemical properties.
CO 3	Identify the types of pollution in society along with their sources.
CO 4	Realize the global environmental issues.

Mapping of CO with PO

SECH1110	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO 1	2	2	1	1			2			2		1
CO 2	1	1	2	3		1	2			1		1
CO 3	1	2	2	3	3	3		2	1	1	3	
CO 4	3	3	2	2	1	1				3		1

Mapping of CO with PSO

SECH1110	PSO1	PSO2	PSO3
CO 1	1	2	3
CO 2	3	1	1
CO 3	2		2
CO 4	1		

Level of Bloom's 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 Chemistry	2,1
2	Chemical Thermodynamics and Kinetics	4, 5
3	Properties of Matter and Solutions	1,2
4	Organic Chemistry	4,5
5	Introduction to Environment	1,2
6	Environmental Pollution	1,2,3
7	Social Issues and Environment	1,2,3

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME1120

Course Name: Fundamentals of Technical Drawing

Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)			Credit	Examination Scheme (Marks)						
Theory	Practical	Tutorial		Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
-	04	-	04	-	-	40	60	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- Know conventions and the methods of engineering drawing.
- Interpret engineering drawings using fundamental technical mathematics.
- Construct basic and intermediate geometry.
- Improve their visualization skills so that they can apply these skills in developing new products.
- Improve their technical communication skill in the form of communicative drawings.
- Comprehend the theory of projection.
- Basic knowledge of computer-aided drawing using AutoCAD.

Course Content:

Section I			
Module No.	Contents	Lab Hours	Weightage in %
1.	Introduction: Importance of the Course; Use of Drawing Instruments and accessories; BIS – SP – 46; Lettering, Dimensioning, and Lines; Representative Fraction; Types of Scales (Plain and Diagonal Scales); Construction of Polygons.	03	05
2.	Engineering Curves: Classification and Application of Engineering Curves; Construction of Conics, Cycloidal Curves, Involute, Spiral, and Normal & Tangent to each curve.	12	15
3.	Projections of points, lines & planes: Types of Projections; Introduction of Principle Planes of Projections; Projection of Points in all four Quadrants; Projection of Lines inclined to one Referral Plane & two Referral Planes. True length and inclination with reference plane; Projection of Planes (Circular and Polygonal) with inclination to one Referral Plane and	15	30

	two Referral Planes; Concept of Auxiliary Projection Method.		
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Section II			
Module No.	Content	Hours	Weightage in %
1.	Orthographic Projection and Isometric Projections Types of Projections: Principle of First and Third Angle Projection Applications & Difference; Projection from Pictorial view of Object, View from Front, Top, and Sides; Full Section View. Isometric Scale, Conversion of Orthographic views into Isometric Projection, Isometric View, or Drawing of simple objects.	18	30
2.	Residential Building Planning: Introduction to buildings, Classification of buildings, Principles of building planning, Principles of architecture composition, Detail drawing, Line Plan, plan, elevation, section, Preparing working drawing of residential building.	06	10
3.	Computer-Aided Drawing: Introduction to AutoCAD, Basic commands for 2D drawing (Line, Circle, Polyline, Rectangle, Hatch, Fillet, Chamfer, Trim, Extend, Offset, Dim style, etc.)	06	10
	TOTAL	60	100

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Introduction sheet (dimensioning methods, different types of lines, construction of various polygons, dividing the line and angle into parts, use of stencil, lettering), plane scale and diagonal scale	03
2.	Engineering curves	12
3.	Projection of points, lines & planes	15
4.	Orthographic projection	10
5.	Isometric projection	10
6.	Residential building drawing (Line plan, Plan, Elevation, Section, Schedule opening)	04
7.	Computer-Aided Drawing	06
	TOTAL	60

Text Book(s):

Title	Author(s)	Publication
A Text Book of Engineering Graphics	P J Shah	S. Chand & Company Ltd., New Delhi
Engineering Drawing	N D Bhatt	Charotar Publishing House, Anand
Building Planning, Designing and Scheduling	Gurucharan Singh	Standard Book

Reference Book(s):

Title	Author(s)	Publication
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Engineering Drawing	P.S.Gill	S. K. Kataria & sons, Delhi
Engineering Drawing	B. Agrawal & C M Agrawal	Tata McGraw Hill, New Delhi
Engineering drawing made Easy	K. Venugopal	Wiley Eastern Ltd
Building Drawing	M. G. Shah, C.M. Kale, S.Y. Patki	Tata McGraw Hill

Web Material Link(s):

- <http://nptel.ac.in/courses/105104148/>

Course Evaluation:

Practical:

- Continuous evaluation consists of performance of practical/tutorial which will be evaluated out of 20 marks for each practical/tutorial and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical test will consist of 30 marks and viva will consist of 30 marks during end semester exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME1120	FUNDAMENTALS OF TECHNICAL DRAWING
CO 1	Apply BIS standards of building planning and conventions while drawing Lines, printing Letters, and showing dimensions.
CO 2	Explore the various methods to draw various engineering curves and their applications.
CO 3	Classify the orthographic projection systems concerning the observer, object, and reference planes.
CO 4	Develop 3D Isometric views in relation to 2D orthographic views.
CO 5	Software application in engineering drawing.

Mapping of CO with PO

SEME1120	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	1	1				1			1	
CO 2	2		1	1	1			1			1	
CO 3	2		1	1				1			1	1
CO 4	2		1	2	1			1			1	1
CO 5	2	1	1	2	1			1			1	1

Mapping of CO with PSO

SEME1120	PSO1	PSO2	PSO3
CO 1	1	2	2
CO 2	2	2	3
CO 3	2	3	1
CO 4	3	3	3
CO 5	3	3	3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
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4: Analyze	5: Evaluate	6: Create
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Module No	Content	RBT Level
1	Introduction	1, 2, 6
2	Engineering Curves	2, 6
3	Projection of Points, Line & Plane	1, 2, 3, 4
4	Orthographic Projection	2, 5, 4
5	Isometric Projections and Isometric Drawing	2, 5, 4
6	Computer-Aided Drawing	2,3,6

Course Code: SECV1110

Course Name: Core Engineering Concepts.

Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)			Credit	Examination Scheme (Marks)						
Theory	Practical	Tutorial		Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- Study the basic fundamentals of construction planning and material.
- Study significance of mechanical engineering systems in different fields of engineering.
- Study the basic concepts of electrical and electronics engineering.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Basics of Construction material and techniques Common materials used in construction, Aggregate, Sand, Cement, Bricks, Timber, Steel, Paints. Bonds in brick masonry techniques, Foam works, Curing, Compaction of concrete, Water proofing, Fire safety norms and requirement.	08	18
2.	Building planning and Bye laws Building by laws as per national building code, building by laws as per local authority, standards for residential, public, commercial, industrial and institutional buildings planning, planning of earth quake resistance building, overview of RERA and ODPS, Green building and LEED certification, general layout, maps and plan used at construction site.	08	18
3.	Basic Electricity Principles Concept of Charge, Potential Difference and Current, Resistor, capacitor, Inductor, Ohm's law, effect of Temperature on resistance, temperature coefficient, Series and parallel combinations of Resistors and capacitors, Lenz and Faraday's laws for electromagnetic induction, AC Electricity and DC Electricity. Electrical Wiring: Different types of conductors and cables. Basics of wiring-Star and delta connection. Voltage drop and losses across cables and conductors.	07	14
Section II			

Module No.	Content	Hours	Weightage in %
1.	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.	08	18
2.	Power Transmission Elements: Construction and Applications of Couplings, Clutches and Brakes, Difference Between Clutch and Coupling, Types of Belt Drive and Gear Drive	08	18
3.	DC Circuits and AC Circuits DC Circuits: Introduction of Electrical circuit elements (prerequisites), voltage and current sources, Kirchoff's current and voltage laws, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits. AC Circuits: Representation of sinusoidal waveforms, peak and RMS values, Phasor representation of AC quantities, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), Series and parallel resonance. Three phase balanced circuits, voltage and current relations in star and delta connections, Power measurement in three phase circuits.	06	14
	TOTAL	45	100

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Preparation of drawing sheet showing various bonds.	04
2.	Preparation of Basic plan of Construction site.	04
3.	Preparation sketch of various building component.	04
4.	Verify the series and parallel connections of resistors and capacitors.	04
5.	To understand construction and working of various types of boilers.	04
6.	To understand construction and working of mountings and accessories.	04
7.	To verify the Kirchoff's current and voltage laws and Network theorems.	02
8.	To understand construction and working 2 -stroke & 4 -stroke Petrol engines.	02
9.	To understand construction and working 2 -stroke & 4 -stroke Diesel engines.	02
	TOTAL	30

Text Book(s):

Title	Author(s)	Publication
Elements of Mechanical Engineering	Sadhu Singh	S. Chand Publications
Building construction	Dr. B C Punamia	Laxmi Publication
A text book in Electrical Technology	B L Theraja -	S Chand & Co.
Basic Electrical Engineering	D. C. Kulshreshtha	McGraw Hill, 2009

Reference Book(s):

Title	Author(s)	Publication
Basic Mechanical Engineering	T.S. Rajan	Wiley Eastern Ltd., 1996.

Town Planning	G. K. Hiraskar	Dhanpatrai Publications
Basic Electrical Engineering	Nagsarkar and Sukhija,	Oxford University Press

Web Material Link(s):

- <http://nptel.ac.in/course.php>

Course Evaluation:

Theory:

- Continuous evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination will consist of 60 marks.

Practical:

- Continuous Evaluation consists of performance of practical which will be evaluated out of 20 marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test of 30 marks during End Semester Exam.
- Viva/Oral performance of 30 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SECV1110	CORE ENGINEERING CONCEPTS
CO 1	Understand basic properties of various construction materials.
CO 2	Understand the general rules and regulation of building planning.
CO3	Apply the principles of basic mechanical engineering.
CO4	Comprehend the importance of mechanical engineering equipment like IC engine and power transmission elements.
CO5	Understand working of various instruments and equipments used for the measurement of various electrical engineering parameters like voltage, current, power, phase etc in industry as well as in power generation, transmission and distribution sectors.

Mapping of CO with PO

SECV1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	1	1			2		1	1	2	1
CO 2	2		1	1	2		2		1	2	3	
CO 3	1		2	1	1	2	1		1	2	3	
CO 4	2		1	1						1		1
CO 5			1	2	1		1			1		

Mapping of CO with PSO

SECV1110	PSO1	PSO2	PSO3
CO 1	3		2
CO 2	3	1	1
CO 3	1	1	
CO 4		1	1
CO 5			1

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Basics of Construction material and techniques	1, 2, 3
2	Building planning and Bye laws	1, 2
3	Basic Electricity Principles	1,2,3
4	Power Transmission Elements	1, 2
5	Basics of I.C Engines	2
6	DC Circuits and AC Circuits	2,3,4
7	Basics of Steam Generators	1, 2

Centre for Language studies

Course Code: CFLS2130

Course Name: Intermediate Communicative English

Prerequisite Course/s: N/A

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)				
Theory	Practical	Tutorial	Credit	Theory	Practical	Tutorial		Total
				CE	CE	CE	ESE	
2	0	0	2	100	0	0	0	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective (s) of the course:

To help learners to

- Describe the idea of LSRW English communication abilities, for dealing with people in typical social and/or professional circumstances.
- Infer and react to instructions, paragraphs, articles, official and informal communication, and reading and listening.
- Select and demonstrate the appropriate language, grammar, and pronunciation for typical social or professional contexts.
- Analyse and present instances of effective business-related spoken English.
- Organise your thoughts to create a paragraph that flows smoothly and develop a speech script.
- Make an effort to communicate, take part in a discussion in a small group, and write.

Course Content:

S.No.	Content	Hours	Weightage in %
Section 1			
1.	Listening Listening to the recording on various topics and responding. The topics may be: Personal information, Travel Information, Listening to radio interviews and summarizing. Students will be expected to demonstrate a level of listening competence as outlined in listening outcomes.	15	25
Section 2			
2.	Reading and Language Reading various online articles, short stories to develop content to present and discuss. Using collocations, Using a Dictionary. Guessing the context and summarising. Students will be expected to demonstrate a level of reading competence as outlined in reading outcomes.	15	25

Section 3			
3.	Speaking Skills, Non-Verbal Aspects Role-plays, Real-life speaking, Presentation by a Company Director, Listening to statistical information, Interview techniques. Students will be expected to demonstrate a level of speaking competence as outlined in learning outcomes.	15	25
Section 4			
4.	Writing Noting and changing appointments. Writing e-mails, Applying for a Job, Writing a Business Report, Summarising, Linking ideas and arguments. Students will be expected to demonstrate a level of Speaking competence as outlined in writing outcomes.	15	25
Total		60	100

Text Book:

Title	Author(s)	Publication
Business Benchmark Pre-Intermediate to Intermediate	Norman Whitby	Cambridge

Reference Book:

Title	Author(s)	Publication
Business Benchmark Pre-Intermediate to Intermediate Student's Book	Norman Whitby	Cambridge
Business Benchmark Pre-Intermediate to Intermediate Teacher's Book	Norman Whitby	Cambridge

Online References:

https://www.academia.edu/34869668/Business_Benchmark_Pre_Intermediate-To_Intermediate_Workbook_With_Key

Course Evaluation:

Theory:

- Continuous Evaluation consists of four tests (LSRW), each of 25 marks and 1 hour of duration.

Course Outcome(s):

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

CFLS2130	Intermediate Communicative English
CO 1	Recognise the importance of the LSRW method for learning English.
CO 2	Read, hear, and decipher communications, letters, etc., and then react properly.
CO 3	Create a basic vocabulary and utilise his/her language abilities to find the information you need from a variety of sources.

CO 4	Identify various social and professional contexts
CO 5	Write and speak at a basic understanding level.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Listening	1, 2, 3, 4, 5, 6
2	Reading and Language	1, 2, 3, 4, 5, 6
3	Speaking Skills, Non-Verbal Aspects	1, 2, 3, 4, 5, 6
4	Writing	1, 2, 3, 4, 5, 6

P P Savani University
School of Engineering

Centre for Life Skills Courses (CLSC)

Course Code: CLSC2070

Course Name: Essentials of Entrepreneurship

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	00	00	2	100	00	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- To understand the basics of entrepreneurship and its traits
- To analyze the theory and models of entrepreneurships
- To evaluate different types and dimensions of entrepreneurship

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Introduction to Entrepreneurship Definition of Entrepreneurship, Entrepreneurship as a career choice, Benefits and Myths of Entrepreneurship, Characteristics, Qualities and Skills of an Entrepreneur, Model Traits of Entrepreneurs	07	30
2.	Dimensions of Entrepreneurship Entrepreneurship Theories, Intrapreneurship, Benefits of intrapreneurship, Difference between Entrepreneurs and Intrapreneurs Institutes for Entrepreneurship Development, startup Failures, Startup Success Stories	08	20
Section II			
Module No.	Content	Hours	Weightage in %
1.	Women Entrepreneurship Women Entrepreneurship Meaning, Factors that influence women Entrepreneurship, Barriers to Women Entrepreneurship, Qualities of Women Entrepreneurs, Success stories of Women Entrepreneurs Lijjat Papad Case study, Jassuben Pizza Case study	08	30
2.	Social Entrepreneurship and emerging trends Social Entrepreneurship, Functions of Social Entrepreneurship, Difference between Entrepreneurship and Social Entrepreneurship How does an NGO run?, Case Study on Social Entrepreneurship, Emerging trends in Entrepreneurship	07	20

	Total	30	100
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Text Book(s):

Title	Author/s	Publication
Entrepreneurship Business and Management	Dr. R C Bhatia	Sultan Chand and Sons

Reference Book(s):

Title	Author/s	Publication
Entrepreneurship	Trehan A	Dremtech

Web Material Link(s):

- <https://www.startupindia.gov.in>
- <https://ediindia.ac.in>
- <https://www.ediindia.org>

Theory:

- Continuous Evaluation consists of one test of 20 marks, 10 marks assignment, 10 marks presentation, 10 marks class participation and behavior.
- One live project of 50 marks

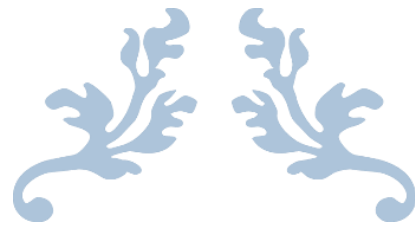
Course Outcome(s):

CLSC2070	Essentials of Entrepreneurship
CO 1	Students will be able to think of startup ideas
CO 2	Students will be able to apply the model of entrepreneurship practically
CO 3	Students will be able to further analyze other dimensions of Entrepreneurship

Level of Bloom's 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 Entrepreneurship	1, 2, 3, 4, 5
2	Dimensions of Entrepreneurship	1, 2, 3, 4, 5
3	Women Entrepreneurship	1, 2, 3, 4, 6
4	Emerging Trends and Social Entrepreneurship	1, 2, 3, 4, 6



SECOND YEAR B. TECH.



P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

TEACHING & EXAMINATION SCHEME FOR B. TECH. MECHANICAL PROGRAMME AY:2023-24

Sem	Course Code	Course Title	Offered By	Teaching Scheme					Examination Scheme						
				Contact Hours				Credit	Theory		Practical		Tutorial		Total
				Theory	Practical	Tutorial	Total		CE	ES E	CE	ESE	CE	ESE	
3	SESH2110	Differential Methods & Complex Variable	SH	3	0	2	5	5	40	60	0	0	100	0	200
	SEME2210	Engineering Thermodynamics	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME2220	Material Science & Metallurgy	ME	3	2	0	5	4	40	60	40	60	0	0	200
	SEME2231	Manufacturing Technology-I	ME	3	2	0	5	4	40	60	40	60	0	0	200
	SECV2210	Mechanics of Solids	CV	3	2	0	5	4	40	60	40	60	0	0	200
	CFLS2140	Upper Intermediate Communicative English	CFLS	2	0	0	2	2	100	0	0	0	0	0	100
	CLSC2020	IPDC-I	CLSC	2	0	0	2	2	100	0	0	0	0	0	100
				Total	27	24								1100	
4	SESH2120	Numerical Methods & Statistics	SH	3	0	2	5	5	40	60	0	0	100	0	200
	SEME2241	Machine Drawing	ME	0	4	0	4	2	0	0	100	0	0	0	100
	SEME2250	Fluid Mechanics	ME	3	2	0	5	4	40	60	40	60	0	0	200
	SEME2260	Mechanical Measurement & Metrology	ME	3	2	0	5	4	40	60	40	60	0	0	200
	SEME2270	Theory of Machines	ME	3	2	0	5	4	40	60	40	60	0	0	200
	CLSC2030	IPDC-II	CLSC	2	0	0	2	2	100	0	0	0	0	0	100
					Total	26	21								1000

P P Savani University
School of Engineering

Department of Science & Humanities

Course Code: SESH2110

Course Name: Differential Methods & Complex Variable

Prerequisite Course(s): SESH1110- Calculus

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	02	05	40	60	-	-	100	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learner to

- learn orientation of calculus and its applications in solving engineering problems including differential equations.
- learn introduction of Partial Differential Equations with methods of its solutions.
- learn applications of Laplace Transforms for solving ODEs.
- learn introduction of Periodic functions and Fourier series with their applications for solving ODEs.
- Represent complex numbers algebraically and geometrically.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Ordinary Differential Equation First order ODEs, Formation of differential equations, Exact, linear and Bernoulli's equations, Ordinary differential equations of higher orders, Homogeneous Linear ODEs of Higher Order, Homogeneous Linear ODEs with Constant Coefficients, Euler-Cauchy Equations Differential Operators Nonhomogeneous ODEs, Variation of Parameters.	10	20
2.	Partial Differential Equation Formation of First and Second order equations, Solution of First order Linear and Non-linear equations, Higher order equations with constant coefficients, Complementary function, Particular Integrals, Initial and boundary conditions, Modeling and solution of the Heat, Wave and Laplace equations.	08	17
3.	Laplace Transform Laplace Transform, Linearity, First Shifting Theorem, Existence Theorem, Transforms of Derivatives and Integrals, Unit Step Function,	07	13

	Second Shifting Theorem, Laplace Transformation of Periodic function, Inverse Laplace transform, Convolution, Systems of ODEs		
Section II			
Module No.	Content	Hours	Weightage in %
4.	Fourier Series Fourier Series of $2n$ periodic functions, Euler Formula, Arbitrary Period, Even and Odd function, Half-Range Expansions.	07	14
5.	Complex Variables Complex Variable – Differentiation, Complex number, polar form of complex number, Cauchy-Riemann equations, analytic functions, harmonic functions, Mobius transformations and their properties.	08	21
6.	Complex Variable - Integration Representation by Fourier Integral, Cauchy's integral theorem and formula, Taylor and Laurent series.	05	15
	Total	30	100

List of Tutorials:

Sr. No.	Name of Tutorial	Hours
1.	Ordinary Differential Equation-1	2
2.	Ordinary Differential Equation-2	2
3.	Ordinary Differential Equation-3	2
4.	Partial Differential Equation-1	2
5.	Partial Differential Equation-2	4
6.	Laplace Transform-1	4
7.	Laplace Transform-2	2
8.	Fourier Series-1	2
9.	Fourier Series-2	2
10.	Complex Variables -1	2
11.	Complex Variables -2	2
12.	Complex Variables -3	4
	Total	30

Text Book(s):

Title	Author/s	Publication
Advanced Engineering Mathematics	Erwin Kreyszig	Wiley India Pvt. Ltd.
Complex Variables and Applications,	J. W. Brown and R. V. Churchill	McGraw Hill.

Reference Book(s):

Title	Author/s	Publication
Higher Engineering Mathematics	B. S. Grewal	Khanna Publishers
A first course in complex analysis with applications	Dennis G. Zill, Patrick D. Shanahan	Jones and Bartlett Publishers Inc.

Differential Equations for Dummies	Steven Holzner	Wiley India Pvt. Ltd.
Higher Engineering Mathematics	H.K. Dass, Er. Rajnish Verma	S. Chand & Company Pvt. Ltd.

Web Material Link(s):

- <http://nptel.ac.in/courses/111105035/>
- <http://nptel.ac.in/courses/111106100/>
- <http://nptel.ac.in/courses/111105093/>
- <http://nptel.ac.in/courses/111108081/>
- <http://nptel.ac.in/courses/111/103/111103070/>

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:

- Continuous Evaluation consists of performance of tutorial which will be evaluated out of 10 marks for each tutorial and average of the same will be converted to 50 marks.
- MCQ based examination consists of 20 marks.
- Internal Viva consists of 30 marks.

Course Outcome(s):

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

SESH2110	DIFFERENTIAL METHODS & COMPLEX VARIABLE
C01	Describe 1st and 2nd order odes and pde's.
C02	Classify differential equations and evaluate linear and nonlinear partial differential equations.
C03	Apply Laplace transform as a tool which are used to evaluate differential equation.
C04	Examine the various tests of power series and Fourier series for learning engineering.
C05	Demonstrate understanding of the basic concepts underlying complex analysis to evaluate definite integrals and infinite series.

Mapping of CO with PO

SESH2110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	1	1								1
CO 2	1	1	1									1
CO 3	2	1	1	1								1
CO 4	2	1	1									1
CO 5	2	2	1	1								1

Mapping of CO with PSO

SESH2110	PSO1	PSO2	PSO3
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CO 1	2	1	
CO 2	1	1	
CO 3	1	1	
CO 4	2		

CO 5	2	1	
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Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Ordinary Differential Equation	1, 2, 3, 5
2	Partial Differential Equation	1, 2, 4, 5
3	Laplace Transform	1, 2, 4, 5
4	Fourier Series	1, 2, 3, 5
5	Complex Variables	1, 2, 3, 4, 5
6	Complex Integration	1, 2, 3, 4, 5

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2210

Course Name: Engineering Thermodynamics

Prerequisite Course(s): SEME1030-Elements of Mechanical Engineering

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	-	03	40	60	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- identify different aspects of thermodynamics and their application.
- interpret different laws of thermodynamics and their application to field and daily life.
- understand various gas laws and equations of state and their application.
- understand the role of entropy, exergy to the universe.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Basic Concepts of Thermodynamic Classical and statistical thermodynamic approach, Thermodynamic: system, properties, states, processes, cycle & equilibrium, Concepts of: control volume and control surface, Specific heat capacity, Internal Energy, Enthalpy, Specific Volume, heat and work.	05	07
2.	First and Second law of Thermodynamics First law for a closed system undergoing a cycle and change of state, energy, PMM1, First law of thermodynamics for a non- flow and flow process. Limitations of first law of thermodynamics, Statements of second law of thermodynamics and their equivalence, PMM2, Carnot's theorem, Corollary of Carnot's theorem, Causes of irreversibility.	08	20

3.	Entropy Clausius theorem, property of entropy, Clausius inequality, entropy change in an irreversible process, principle of increase of entropy, entropy change for non-flow and flow processes, third law of thermodynamics, PPM3, Entropy change for phase changing process.	05	15
4.	Exergy Energy of a heat input in a cycle, exergy destruction in heat transfer process, exergy of finite heat capacity body, exergy of closed and steady flow system, irreversibility and Gouy-Stodola theorem and its applications, second law efficiency.	05	08
Section II			
Module No.	Content	Hours	Weightage in %
5.	Vapour Power Cycles Carnot vapor cycle, Rankine cycle, comparison of Carnot and Rankine cycle, Carnot cycle efficiency, variables affecting efficiency of Rankine cycle.	06	15
6.	Gas Power Cycles Carnot, Otto and Diesel cycle, Dual cycle, Comparison of Otto, Diesel and Dual cycles, air standard efficiency, mean effective pressure, brake thermal efficiency, relative efficiency, Brayton cycle.	06	15
7.	Properties of gases and gas mixtures Avogadro's law, equation of state, ideal gas equation, Vander Waal's equation, reduced properties, law of corresponding states, compressibility chart, Gibbs-Dalton law, internal energy; enthalpy and specific heat of a gas mixtures.	06	12
8.	Cryogenic Refrigeration System: Ideal isothermal and reversible isobaric source refrigeration cycles, Joule Thomson system, cascade or pre-cooled Joule-Thomson refrigeration systems, expansion engine and cold gas effectiveness for the Philips refrigerators, Gifford single volume refrigerators analysis, COP, FOM, refrigerators, pulse tube refrigerators, various types of pulse tube refrigerator. Refrigerators using solids as working media Magnetic cooling, magnetic refrigeration systems, thermal, valves, nuclear demagnetization.	04	08
TOTAL		45	100

Text Book (s):

Title	Author/s	Publication
Engineering Thermodynamics	P.K. Nag	McGraw-Hill Education

Reference Book(s):

Title	Author/s	Publication
Fundamentals of Thermodynamics	Borgnakke & Sonntag	Wiley India (P) Ltd.
Thermodynamics - An Engineering Approach	Yunus Cengel & Boles	McGraw-Hill Education
Engineering Thermodynamics	Gordon Rogers & Yon Mayhew	Pearson Education Ltd.
Engineering Thermodynamics	Jones and Dugan,	PHI Learning Pvt. Ltd

Web Material Links:

- <http://nptel.ac.in/courses/112105123/1>

Course Evaluation:**Theory:**

- Continuous evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination will consist of 60 marks.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME2210	ENGINEERING THERMODYNAMICS
CO 1	Interpret basic terminologies of thermodynamics.
CO 2	Define and demonstrate the laws of thermodynamics and its application in routine life.
CO 3	Interpret the concept of entropy and exergy.
CO 4	Analyze different gas and vapour power cycles and its applications to the diff. power plants.
CO 5	Identify different laws and its application related to gases and its mixtures.

Mapping of CO with PO

SEME2210	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	1	1		1				1		1
CO 2	2	1	2			1				1		1
CO 3	1		2	1	1	2	1			1	1	
CO 4	2	2	1	2	2				1	2	1	2
CO 5	1	2		1		2						2

Mapping of CO with PSO

SEME2210	PSO1	PSO2	PSO3
CO 1	2	1	1

CO 2	2	1	2
CO 3	3	3	2
CO 4	3	3	2
CO 5	3	3	

Level of Bloom's 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 Concepts of Thermodynamic	1, 2
2	First and Second law of Thermodynamics	1, 2, 3
3	Entropy	1, 2, 3
4	Exergy	1, 2, 3
5	Vapour Power Cycles	2, 5
6	Gas Power Cycles	2, 5
7	Properties of gases and gas mixture	1, 2, 3
8	Refrigeration and Liquefaction	2, 3, 5

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2220

Course Name: Material Science & Metallurgy

Prerequisite Course(s): -- None

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- identify the different materials and their properties described.
- understand the microstructures, crystallography, defects, and phase diagrams of different materials.
- understand the process involved in mechanical testing of materials and their deformation under certain conditions.
- understand the role of heat treatment to achieve desired variation in properties of materials.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Introduction to Materials Classification of Engineering Materials, Engineering requirements of materials, Methods/Tools to reveal the different levels of structure. Defects-Point, Line, Planar; Crystal geometry and Crystal Imperfections: Unit Cell, Crystal structure, Bravais lattice, atomic packing, coordination number, crystal structures of metallic elements, crystal directions and planes, Miller indices, Polymorphism or Allotropy. Crystal structure and correlated properties. Diffusion processes, Mechanism of crystallization - nucleation and growth, factors influencing nucleation and growth, Imperfections in crystals and their effect on properties, Solute strengthening, Corrosion.	06	12

2.	Phase Diagrams and Phase Transformation Phase, Gibbs's Phase rule, Solubility and Solid Solutions, Iso-morphous alloy system, Eutectoid and Peritectic system, Evolution of Microstructure, Phase Transformation-Temperature-Time-Transformation (TTT) and Continuous Cooling Transformation (CCT) Diagrams, Electro Microscopy.	05	10
3.	Solidification of Metals Solidification of metals and an alloy, Nucleation and Growth during freezing of pure metal and alloy ingot/a casting Resultant macrostructures; Effects of Structure on Mechanical Properties, Methods to control the grain structure resulting from solidification, Solidification defects like porosity and shrinkage and remedies. Cooling curve of pure metal and alloy.	05	10
4.	Heat Treatment Annealing and its types, Normalizing, Aus-tempering, Martempering, Quenching and Temper heat treatment, Hardenability, Applications of above processes for the industrial practices. Surface hardening processes Flame and induction hardening, Carburizing, Nitriding and Carbonitriding, Applications of above processes for the industrial practices.	04	13
5.	Powder Metallurgy Application and advantages, Production of powder, Compacting, Sintering, Equipment and process capability.	02	05
Section II			
Module No.	Content	Hours	Weightage in %
6.	Cast Iron and Alloy steel Iron-Iron Carbide and Iron-carbon diagrams, Transformations resulting into White Cast Iron, Grey Cast Iron, Malleable Cast Iron, S. G. Iron, Alloy Cast Iron. Their microstructures and correlated properties and applications, IS Codification, Purpose of alloying, General effect of alloying elements on ferrite, carbide, transformation temperature, hardenability and tempering. Types of steel: Chromium, Manganese, Molybdenum and Manganese steels, IS Codification, Tool Steels Classification, properties, applications and IS and ISO Codification.	08	18
	Non-Ferrous Alloys Non-Ferrous Alloys of Aluminium, Magnesium, Copper, Nickel,		

7.	Titanium, Microstructure and mechanical property relationships; Composite, Classification, Processing, Metal Matrix	03	05
8.	Mechanical Behavior of Metals Properties of metals, Deformation of metals, Mechanisms of deformation, Deformation in polycrystalline materials, Mechanical testing of materials (destructive & nondestructive) testing methods.	03	12
9.	Polymers, Ceramics and Composites Definition, Classification & characteristics of polymers, Types of polymerization, Polymer processing, polymer matrix, properties and applications Elastomers, Properties of ceramic materials, Cermets, Ceramic Matrix, Ceramics, Alumina, Zirconia, Silicon Carbide, Sialons, Reaction Bonded Silicon Nitride, Processing Composite materials, Fiber reinforced plastic (FRP), Glasses properties and applications.	05	08
10.	Energy Materials Issues and challenges of functional nanostructured materials for electrochemical energy storage systems, Primary and Secondary batteries, Lithium ion batteries, Current status and future trends. Capacitor, Electrochemical supercapacitors, Current status and future trends, electro chromic energy storage device, Porous materials to store clear energy gases, Metal organic frame works(MOFs), hydrogen storage, Storage of carbon dioxide, CO2 capture and conversion.	04	07
TOTAL		45	100

List of Practical:

Sr. No.	Name of Practical	Hours
1.	To understand construction and working of metallographic microscope.	02
2.	To study procedure of specimen preparation for microscopic examination and to carry out a specimen preparation.	04
3.	To understand what is micro examination, importance of micro examination and to study various ferrous, non-ferrous microstructures.	04
4.	To show the effect of different quenching media like Oil, Water and Brine on the hardness of medium carbon steel.	04
5.	To find out the effect of varying section size on hardenability of steel and obtain hardness distribution curves of hardened steel cross-section.	04
6.	To determine machine defects by dye -penetrant test and magnetic particle test.	04
7.	To determine the hardenability by Jominy end quench test.	04
8.	Study of different heat treatment processes- annealing, normalizing, hardening and tempering, surface and case hardening to improve properties of steel during	04

	processes and applications with the help of muffle furnace.	
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
Callister's Material Science and Engineering	R. Balasubramaniam	Wiley India

Reference Book(s):

Title	Author/s	Publication
Materials Science and Metallurgy	O. P. khanna	Dhanpatrai Publication
Principles of Materials Science and Engineering	W F Smith	McGraw Hill
Elements of Material Science and Engineering	Lawrence H. Van Vlack,	Pearson Education

Web Material Links:

- <http://nptel.ac.in/downloads/113106032/>

Course Evaluation:

Theory:

- Continuous evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination will consist of 60 marks.

Practical:

- Continuous Evaluation consists of performance of practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test consists of 30 marks during End Semester Exam.
- Viva/Oral performance consists of 30 marks during the End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME2220	MATERIAL SCIENCE & METALLURGY
C01	Understand the basic concept of material science and metallurgy.
C02	Know about the ferrous and non ferrous metals and alloys and their applications.
C03	Understand and apply various heat treatment process to get desired material properties.
C04	Examine the mechanical properties of metals through various destructive and non destructive methods.
C05	Understand the importance of powder metallurgy & judge the scope and limitations of different materials.

Mapping of CO with PO

SEME2220	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	3	2			3	3	1				3
CO 2	2	3	2			3	3	3	2	1	1	3
CO 3	2	3	2			3	3	3	2		2	3
CO 4	2	3	3	3	3	3	3	3	1	2	2	3
CO 5	2	3	2			3	3		2		1	3

Mapping of CO with PSO

SEME2220	PSO1	PSO2	PSO3
CO 1	1	3	2
CO 2	1	3	1
CO 3	3	3	3
CO 4	3	3	3
CO 5	3	3	3

Level of Bloom's 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 Materials	1
2	Phase diagrams and phase transformation	1, 2, 4
3	Solidification of Metals	2, 4
4	Heat Treatment, Surface hardening process	3, 5
5	Powder Metallurgy	2, 5
6	Cast Iron and Alloy Steel	1, 2
7	Non Ferrous Alloys	1, 2
8	Mechanical Behaviour of Metals	2, 3, 5
9	Polymers, Ceramics and Composites	2, 4
10	Energy Materials	1,2

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2231

Course Name: Manufacturing Technology - I

Prerequisite Course(s): -- SEME1020 – Engineering Workshop

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- understand various manufacturing techniques.
- learn the background for higher level subjects in engineering like Production Technology.
- understand the relevance and importance of the Different manufacturing techniques and real-life application in industry.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Manufacturing Processes Basic Introduction, Economics and Technological Definition, Importance of Manufacturing, Classification and Selection of Manufacturing Processes.	02	05
2.	Patternmaking and Foundry Patterns, Allowances, Types of patterns, Moulding materials, Moulding sands; properties and sand testing: Grain fineness, moisture content, clay content and permeability test. Core materials and core making, Gating & Riser systems, Spure, Gating, Ration, Cupola, Inspection and Cleaning of casting, Casting defects.	12	25
3.	Miscellaneous Casting Process Shell moulding, Die casting, investment Casting, Carbon dioxide molding process, Centrifugal casting, Slush casting, Continuous casting process, Advanced technologies in casting.	08	18
Section II			

Module	Content	Hours	Weightage in %
4.	Gas Welding Principles of gas welding, Types of gases used, Types of flames, Welding techniques, Edge preparation, Equipment used, Torch, Regulators, Welding filler rods, Gas cutting, Principles of gas cutting, Position of torch, Soldering, Brazing, Adhesive bonding.	08	18
5.	Electric Arc Welding Principles of electric arc welding, A.C. / D.C. welding, Edge preparation, Equipment used, ISI electrode classification: Designation and selection, Manual metal arc welding, Carbon arc welding, Inert gas shielded arc welding, TIG & MIG, Submerged arc welding, Atomic hydrogen arc welding, Plasma arc welding, Stud arc welding, Arc cutting.	05	10
6.	Resistance Welding Principles of resistance welding, Heat balance, Electrodes, Spot welding, Seam welding, Projection welding, Upset welding, Flash welding, Fusion welding processes: Thermit welding, electro-slag welding, Electron beam and laser beam welding.	04	12
7.	Green Manufacturing Why Green Manufacturing, Motivations and Barriers to Green Manufacturing, Environmental Impact of Manufacturing, Strategies for Green Manufacturing. The Social, Business, and Policy Environment for Green Manufacturing: Introduction, The Social Environment—Present Atmosphere and Challenges for Green Manufacturing, The Business Environment: Present Atmosphere and Challenges, The Policy Environment—Present Atmosphere and Challenges for Green Manufacturing.	06	12
	TOTAL	45	100

List of Practical:

Sr No	Name of Practical	Hours
1.	Study of different types of patterns & types of molding methods	02
2.	Design of Gating system & Design of Riser	02
3.	To Find out the Moisture Content, Permeability and Hardness of Moulding Sand	04
4.	Casting Defects, their Causes and Remedies	02
5.	Tutorial on Casting Simulation	04
6.	Study different Welding Processes, Weld Joint Design as per I.S. code and Weld Symbols	04
7.	Gas Welding and Gas Cutting Processes	04
8.	MIG & TIG Welding Process	04

9.	Resistance Welding Process	04
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
Manufacturing Technology Vol. II	P.N. Rao	Tata McGraw Hill
A Textbook of Production Technology	Sharma P. C.	S. Chand

Reference Book(s):

Title	Author/s	Publication
Manufacturing Technology – I	Rao	Tata McGraw Hill
A Textbook of Production Engineering	Sharma P.C.	S. Chand
Manufacturing Processes and Systems	Phillip F., Ostwald, Jairo Munoz	Wiley India
Elements of Workshop Technology V. II	Chaudhary	MPP
Manufacturing technology	Rao	Atul
Work shop Technology -1	Hajra	MPP

Web Material Links:

- <https://nptel.ac.in/courses/112107145>

Course Evaluation:

Theory:

- Continuous evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination will consist of 60 marks.

Practical:

- Continuous Evaluation consists of performance of practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test consists of 30 marks during End Semester Exam.
- Viva/Oral performance consists of 30 marks during the End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME2231	MANUFACTURING TECHNOLOGY – I
CO1	Articulate basic knowledge of manufacturing processes to implement in professional skills.
CO2	Describe patternmaking process and casting defects
CO3	Differentiate various casting processes for good manufacturing practices.

CO4	Demonstrate gas welding and cutting process for different application
CO 5	Identify, classify and apply arc & resistance welding processes used for various applications in industrial practice.

Mapping of CO with PO

SEME2231	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		2	3	2		3	3	1		3		
CO 2		1	3	3			3	1	3	3		3
CO 3		2	3	2		3		1	3	3		3
CO 4		2	3	3	3	3	3	1	3			3
CO 5		2	3	2	3	3	3	1	3	3		

Mapping of CO with PSO

SEME2231	PSO1	PSO2	PSO3
CO 1	3	3	3
CO 2	3	3	3
CO 3	3	3	3
CO 4	3	3	3
CO 5	3	3	3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Manufacturing Processes	1, 2, 4, 6
2	Patternmaking and Foundry	1, 2, 5, 6
3	Miscellaneous Casting Process	1, 2, 6
4	Gas Welding	1, 2, 5
5	Electric Arc Welding	2, 5, 6
6	Resistance Welding	2, 5, 6
7	Green Manufacturing	1, 2, 3

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV2210

Course Name: Mechanics of Solids

Prerequisite Course/s: -

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- understand different types of forces, systematic evaluation of effect of these forces, behavior of rigid and deformable bodies subjected to various types of forces at the state of rest or motion of the particles.
- understand the stresses developed under the application of force.
- understand the physical and mechanical properties of materials.
- understand the behavior of structural elements under the influence of various loads.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Introduction: Definition of Rigid Body, Deformable Body, Scalar and Vector Quantities, Fundamental Principles of Mechanics: Principle of Transmissibility, Principle of Superposition, Law of Parallelogram of Forces.	05	11
2.	Fundamental of Static: Force, Types of Forces, Characteristics of a Force, System of Forces, Composition and Resolution of Forces. Concurrent Forces: Resultant of Coplanar Concurrent Force System by Analytical Method, Law of Triangle of Forces, Law of Polygon of Forces, Equilibrium Conditions for Coplanar Concurrent Forces. Non-Concurrent Forces: Moments & Couples, Characteristics of Moment And Couple, Varignon's Theorem, Resultant of Non-Concurrent Forces by Analytical Method, Equilibrium Conditions of Coplanar Non-Concurrent Force System.	06	14
3.	Centroid and Centre of Gravity:	05	11

	Centroid of Lines, Plane Areas and Volumes, Examples Related to Centroid of Composite Geometry, Pappus –Guldinus Theorems.		
4.	Moment of Inertia: Parallel and Perpendicular Axis Theorems, Polar Moment of Inertia, Radius of Gyration of Areas, Examples related to moment of Inertia of Composite geometry.	06	14
Section II			
Module No.	Content	Hours	Weightage in %
5.	Mechanical Properties of Materials: Introduction, Classification of Materials, Properties Related to Axial, Bending, and Torsional & Shear Loading, Toughness, Hardness, Ductility, Brittleness. Proof stress, Factor of Safety, Working Stress, Load Factor.	04	12
6.	Simple Stress and Strain: Definition of Stress and Strain, Tensile & Compressive Stresses: Shear and Complementary Shear Strains, Linear, Shear, Lateral, Thermal and Volumetric. Hooke's Law, Stresses and Strain in bars of Varying, Tapering & Composite Section, Principle of Superposition. Elastic Constant, Relation between Elastic Constants.	07	15
7.	Shear Force and Bending Moment: Introduction, Types of Loads, Supports and Beams, Shear Force, Bending Moment, Sign Conventions for Shear Force & Bending Moment. Statically Determinate Beam, Support Reactions, SFD and BMD for Concentrated Load and Uniformly Distributed Load, Uniformly Varying Load, Point of Contra-flexure.	12	23
	TOTAL	45	100

List of Practical (Any Ten):

Sr. No	Name of Practical	Hours
1.	Equilibrium of coplanar concurrent forces	02
2.	To verify the law of parallelogram of forces	02
3.	To verify the law of polygon of forces	02
4.	To verify the Lami's theorem	02
5.	Equilibrium of parallel force system – simply supported beam	02
6.	Tensile test on Ductile materials.	02
7.	Compression test on Ductile materials	02
8.	Compression test on Brittle Materials	02
9.	Determination of hardness of metals (Brinell/ Rockwell hardness test)	02
10.	Determination of impact of metals (Izod/ Charpy impact test)	02
11.	Tutorial on concurrent & Non-concurrent forces	04
12.	Tutorials on C. G & MI	02
13.	Tutorials on SFD & BMD	04
	TOTAL	30

Text Book(s):

Title	Author(s)	Publication
Applied Mechanics	S. B. Junnarkar & H. J. Shah	Charotar Publication
Strength of Materials (SI Units)	R S Khurmi, N Khurmi	S. Chand & Company Pvt. Ltd.

Reference Book(s):

Title	Author(s)	Publication
Engineering Mechanics,	Meriam and Karaige,	Wiley-India
Engineering Mechanics: Statics and Dynamics	S Rajsekaran	Vikas Publication
Engineering Mechanics of Solids	Popov E.P	Prentice Hall of India
Strength of Materials (SI Units)	Er. R . K. Rajput	S. Chand & Company Pvt. Ltd.
Mechanics of Structure-Vol.I	Dr. H.J. Shah & S. B. Junarkar	Charotar Publishing House Pvt. Ltd.
Strength of materials	R. Subramanian	Oxford Publications
Strength of materials	S. Ramamrutham	DhanpatRai Publishing Company
Strength of Materials (SI Units)	Er. R . K. Rajput	S. Chand & Company Pvt. Ltd.

Web Material Link(s):

- <http://nptel.ac.in/courses/122104014/>
- <http://nptel.ac.in/courses/112103108/>

Course Evaluation:**Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination will consist of 60 marks.

Practical:

- Continuous Evaluation consists of performance of practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test consists of 30 marks during End Semester Exam.
- Viva/Oral performance consists of 30 marks during the End Semester Exam.

Course Outcome(s):

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

SECV2210	MECHANICS OF SOLIDS
CO 1	Identify fundamental principles of mechanics, equilibrium, statics reactions and internal forces in statically determinate beams.
CO 2	Understand, the basics of friction and its importance.
CO 3	Apply principles of statics to determine c.g and m.i of a different geometrical shape.

CO 4	Analyse problems and solve the problem related to mechanical elements and analyse the deformation behaviour for different types of loads.
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Mapping of CO with PO

SECV2210	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1										
CO 2	2	1	1									
CO 3	2	1										
CO 4	2	1		1	1							

Mapping of CO with PSO

SECV2210	PSO1	PSO2	PSO3
CO 1	2	2	1
CO 2	2	3	2
CO 3	2	3	2
CO 4	2	3	3

Level of Bloom's 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	1, 2,
2	Fundamental of Static	2, 3, 4
3	Centroid and Centre of Gravity	2, 4, 5
4	Moment of Inertia	3, 4, 5
5	Mechanical Properties of Materials	1, 2, 5
6	Simple Stress and Strain	2, 4, 5
7	Shear Force and Bending Moment	3, 4, 5

P P Savani University
School of Engineering

Department of Science & Humanities

Course Code: SESH2120

Course Name: Numerical Method & Statistics

Prerequisite Course(s): SESH2110- Differential Methods and Complex Variable

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	02	05	40	60	-	-	100	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learner to

- provide the knowledge of numerical analysis & statistical methods to the students.
- mentally prepare the students to identify and formulate the engineering problem and obtain their solution.
- inculcate the analytical skill of the students to apply the Numerical & Statistical techniques to the problems of respective field.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Approximations and Errors: Errors and Their computations, General error formula. Solution of Algebraic and Transcendental Equations: Bracketing Methods (Bisection, Secant, Method of False Position), Convergence of Iterative Methods, Newton-Raphson Method, Newton-Raphson Method	7	17
2.	Numerical Solutions of Linear Equations Gauss-Seidel Method Iteration Method, Jacobi's Method, Gauss-Seidel Method, Eigen Value Problem.	6	13
3.	Numerical Differentiation and Integration Finite Differences: Forward, Backward and Divided Differences Table, Newton's Forward, Backward and Divided Differences Interpolation Formula, Interpolation Polynomials, Lagrange Interpolation Formula Interpolation, Numerical Integration, Trapezoidal Rule, Simpson's 1/3-rule, Simpson's 3/8-rule.	10	20
Section II			
Module	Content	Hours	Weightage in %

4.	Numerical Methods for ODEs: Taylor's Series and Euler's Method, Modifications and Improvements in Euler's Method, Runge-Kutta 2nd Order & 4th Order Methods, Milne's Predictor-Corrector Methods, Boundary Value Problems.	7	16
5.	Basics of Statistics Elements, Variables, Observations, Quantitative and Qualitative data, Cross-sectional and Time series data, Frequency distribution, Dot plot, Histogram, Cumulative distribution, Measure of location, Mean, Median, Mode, Percentile, Quartile, Measure of variability, Range, Interquartile Range, Variance, Standard Deviation, Coefficient of Variation, Regression line and regression coefficient, Karl Pearson's method	7	16
6.	Probability Distribution Introduction, Conditional probability, Independent events, independent experiments, Bayes' theorem, Probability distribution, Binomial distribution, Poisson distribution, Normal distribution.	8	18
	Total	45	100

List of Tutorials:

Sr. No.	Name of Tutorial	Hours
1.	Approximations and Errors	2
2.	Solution of Algebraic and Transcendental Equations	4
3.	Numerical Solutions of Linear Equations	2
4.	Numerical Differentiation and Integration-1	2
5.	Numerical Differentiation and Integration-2	2
6.	Ordinary Differential Equations-1	2
7.	Ordinary Differential Equations-2	4
8.	Basics of Statistics-1	4
9.	Basics of Statistics-2	2
10.	Probability-1	4
11.	Probability-2	2
	Total	30

Text Book(s):

Title	Author/s	Publication
Advanced Engineering Mathematics	Erwin Kreyszig	Wiley India Pvt. Ltd. New Delhi.
Probability and Statistics for Engineers	Richard A. Johnson Irwin Miller, John Freund	Pearson India Education Services Pvt. Ltd., Noida.

Reference Book(s):

Title	Author/s	Publication
Numerical Methods in Engineering & Science	B. S. Grewal	Khanna Publishers, New Delhi

Advanced Engineering Mathematics	R. K. Jain, S. R. K. Iyengar	Narosa Publishing House, New Delhi.
Introductory Methods of Numerical Analysis.	S. S. Sastry	PHI Learning Pvt. Ltd., New Delhi.
Statistics for Business and Economics	David R. Anderson, Dennis J. Sweeney, Thomas A. Williams	Cengage Learning

Web Material Link(s):

- <http://nptel.ac.in/courses/111106094/>
- <http://nptel.ac.in/courses/111105035/>
- <http://nptel.ac.in/courses/111101003/>
- <http://nptel.ac.in/courses/111105090/>
- <http://nptel.ac.in/courses/111107105/>
- <http://nptel.ac.in/courses/110107114/>

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:

- Continuous Evaluation consists of performance of tutorial which will be evaluated out of 10 marks for each tutorial and average of the same will be converted to 50 marks.
- MCQ based examination consists of 20 marks.
- Internal Viva consists of 30 marks.

Course Outcome(s):

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

SESH2120	NUMERICAL METHODS & STATISTICS
CO 1	Derive numerical solution of linear and nonlinear system of equation.
CO 2	Acquire knowledge of finite differences, interpolation, numerical differentiation and numerical integration.
CO 3	Compare variety of numerical methods for solving ordinary differential Equation.
CO 4	Construct different statistical methods to collect, compare, interpret & evaluate data.
CO 5	Apply probability in decision making, artificial intelligence, machine learning etc.

Mapping of CO with PO

SESH2120	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	1	1	1								1
CO 2	2	1	1	2								1
CO 3	2	2	1	1								1
CO 4	2	1	1	1								1

CO 5												
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Mapping of CO with PSO

SESH2120	PSO1	PSO2	PSO3
CO 1		2	
CO 2		2	
CO 3		2	
CO 4		2	
CO 5			

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Solution of Algebraic and Transcendental Equations	1, 2, 3, 4, 6
2	Numerical Solutions of Linear Equations	1, 2, 3, 5
3	Numerical Differentiation and Integration	1, 2, 3, 5
4	Numerical Methods for ODEs	1, 2, 3, 5, 6
5	Basics of Statistics	1, 2, 3, 4, 5
6	Probability Distribution	1, 2, 3, 4, 5

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2241

Course Name: Machine Drawing

Prerequisite Course(s): SEME1010 - Engineering Graphics

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
00	04	00	02	00	00	100	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- understand the industrial drawing.
- learn a machining and welding symbols.
- know the part and assembly drawings.
- know an application of screw threads, screw fasteners, welding and riveted joints.

List of Practical:

Sr No	Name of Practical	Hours
1.	Sheet of Machining Symbols and Surface Textures	03
2.	Sheet of Types of Screw Threads	03
3.	Drafting Exercise of Types of Nuts and Bolts	04
4.	Sheet of Types of Keys, Cotter and Knuckle Joint	04
5.	Sheet of Types of Riveted Joints, Welding Joints and Welding Symbols	02
6.	Sheet of Plummer Block or Pedestal Bearing	02
7.	Drafting Exercise of Part in Drafting software	12
8.	Parts designing using software tools	10
9.	Study of force analysis using software	13
10.	Assembly and disassembly of parts	07
	TOTAL	60

Text Book(s):

Title	Author/s	Publication
Machine Drawing	N. D. Bhatt, V. M. Panchal	Charotar Publishing House Pvt. Ltd.
Machine Drawing	N. Sidheshwar, P. Kannaiah, V. V. S. Sastry	Tata McGraw Hill Publication

Web Material Links:

- <http://nptel.ac.in/syllabus/112106075/>

Course Evaluation:**Practical:**

- Continuous Evaluation consists of performance of practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test consists of 30 marks during End Semester Exam.
- Viva/Oral performance consists of 30 marks during the End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME2241	MACHINE DRAWING
CO1	Illuminate machining and welding symbols and its representation in the industrial drawings.
CO2	Interpret and differentiate part and assembly drawing.
CO3	Explore various types of screw threads, screw fasteners, welding, riveted and pin joints and its applications.
CO4	Understand limit, fits and tolerance systems and its representation in drawings.
CO5	Discover the drafting software to create 2D and 3D geometry.

Mapping of CO with PO

SEME2241	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	3	3	2		3				3		3
CO 2	2	3	3	3		3				3		3
CO 3	2	3	3	3		3						3
CO 4	2	3	3	3		3		3		3		3
CO 5	2	3	3	3	3	3	1			3		3

Mapping of CO with PSO

SEME2241	PSO1	PSO2	PSO3
CO 1	3	2	1
CO 2	3	2	
CO 3	2	2	
CO 4	2	2	
CO 5	3	2	3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Sheet of Machining Symbols and Surface Textures	1, 2,3
2	Sheet of Types of Screw Threads	1, 2, 3
3	Drafting Exercise of Types of Nuts and Bolts	1, 2, 3,4
4	Sheet of Types of Keys, Cotter and Knuckle Joint	1, 2,3,4
5	Sheet of Types of Riveted Joints, Welding Joints and Welding Symbols	1,2,3,4
6	Sheet of Plummer Block or Pedestal Bearing	1,2,3,4
7	Drafting Exercise of Part in Drafting software	1,2,3,4,5
8	Parts designing using software tools	1,2,3,4,5,6
9	Study of force analysis using software	1,2,3,4,5
10	Assembly and disassembly of parts	1,2,3,4

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2250

Course Name: Fluid Mechanics

Prerequisite Course(s): -- None

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- understand basic fundamentals of Fluid Mechanics, which is used in the applications of Aerodynamics, Hydraulics, Marine Engineering, Gas dynamics etc.
- learn Fluid Properties.
- understand the importance of flow measurement and its applications in Industries and to obtain the loss of flow in a flow system.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Properties of Fluids Density, Viscosity, Surface Tension, Compressibility, Capillary, Vapour Pressure, Bulk Modulus, Cavitation, Classification of Fluids	02	5
2.	Fluid Statics Force and Pressure, Pascal's law of Pressure at a point, Pressure measurement by Manometers – U tube, Inclined U tube and Differential, Centre of Pressure, Hydrostatic forces on surface – Vertical, Horizontal and Inclined, Forces on curved Surfaces, Buoyancy and Buoyant Force, Centre of Buoyancy and Meta Centre, Determination of Metacentric Height, Stability of Floating and Submerged Body, Position of metacenter relative to Centre of buoyancy.	06	14
3.	Fluid Kinematics Steady and Unsteady Flow, One – two and three Dimensional Flow,		

	Uniform and Non Uniform Flow, Rotational and Irrotational Flow, Stream Lines and Stream Function, Velocity Potential Function, Relation between stream and velocity potential function, Flow nets, Continuity Equation for 2D and 3D flow in Cartesian co-ordinates system	07	16
4.	Fluid Dynamics Newton's law of motion, Euler's Equation and its applications, Bernoulli's Equation and its applications, Momentum Equation, Pitot Tube, Determination of volumetric flow with pitot tube, Principle of Venturimeter, Pipe Orifice and Rotameter.	06	15
Section II			
Module No.	Content	Hours	Weightage in %
5.	Dimensional Analysis Dimensions, Dimensional Homogeneity, Raleigh and Buckingham π Theorem, Non-Dimensional Numbers, Similarities - Geometrical, Kinematics and Dynamic.	05	10
6.	Flow Through Pipes & Open Channels Major and Minor Losses in Pipes, Losses in Pipe Fittings, Hydraulic Gradient line and Total energy line, Equivalent Pipes, Pipes in series and parallel, Siphon, Power transmission through pipe, Moody's Diagram, Darcy Weishbach Equation, Types of open channel flow, Specific Energy and Specific Force, Critical Flow, Hydraulic Jump, Measurement of Discharge in open Channels.	07	16
7.	Viscous Flow Reynolds number and Reynolds experiment, flow of viscous fluid through circular pipe- Hagen Poiseuille formula, Flow of viscous fluid between two parallel fixed plates, power absorbed in viscous flow through - journal, foot step and collar bearing, measurement of viscosity.	04	08
8.	Boundary Layer Theory Concept of Boundary Layer, Boundary layer Thickness, Momentum Thickness, Displacement Thickness, Drag and Lift, Separation of Boundary layer, Streamlined and Bluffed Bodies.	04	08
9.	Nano Fluids Introduction to nanofluids, nanostructure materials, base fluids, dispersion, sonication and stable suspension. Various types of nanofluids-volumetric concentration. Thermophysical properties: Density; principles of measurement and apparatus. Theoretical equations to determine the density of different nanofluids. Viscosity: principles of measurement and apparatus. Andrade's and other theoretical equations. Effect of volumetric concentration and	04	08

	temperature. Effect of subzero temperature on nanofluid viscosity.		
	TOTAL	45	100

List of Practical:

Sr No	Name of Practical	Hours
1.	Determine metacentric height of floating body.	02
2.	Measurement of pressure using different types of manometers.	02
3.	Determine Co-efficient of Discharge by venturimeter, Orificemeter and Rotameter.	06
4.	Verification of Bernoulli's apparatus.	02
5.	Measurement of velocity of flow using Pitot tube.	02
6.	Measurement of Friction factor for Different pipes.	04
7.	Measurement of viscosity using Redwood Viscometer.	02
8.	Determine discharge through triangular notch.	02
9.	Determine discharge through trapezoidal notch.	02
10.	Determine discharge through rectangular notch.	02
11.	Determine different flow patterns by Reynolds's apparatus.	02
12.	Determine friction loss for different pipes fittings	02
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
Textbook of Fluid Mechanics and Hydraulic Machines	R. K. Bansal	Laxmi Publications
Introduction to Fluid Mechanics and Fluid Machines	S.K.Som & Biswas.G	Tata McGraw Hill Publication

Reference Book(s):

Title	Author/s	Publication
Fluid Mechanics	Frank M. White	Tata McGraw Hill Publication
Fluid Mechanics	R.K.Rajput	Schand Publication

Web Material Links:

- <http://nptel.ac.in/courses/112105171/1>

Course Evaluation:

Theory:

- Continuous evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination will consist of 60 marks.

Practical:

- Continuous Evaluation consists of performance of practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test consists of 30 marks during End Semester Exam.
- Viva/Oral performance consists of 30 marks during the End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME2250	FLUID MECHANICS
CO 1	Differentiate fluid properties and its behavior in static and dynamic mode.
CO 2	Apply dimensional analysis to design the system and interpret types of fluid flow.
CO 3	Determine major and minor losses through different pipes.
CO 4	Diagnose the viscosity of fluids.
CO 5	Diagnose pressure exerted by the fluids and rate of flow of fluids.

Mapping of CO with PO

SEME2250	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2			2	1				3			1
CO 2	3	2	2	3	2				3			
CO 3	3	2		3	2	1			3		2	1
CO 4	3	3		3	2				3		1	1
CO 5	3	1		3	3	1			3		2	

Mapping of CO with PSO

SEME2250	PSO1	PSO2	PSO3
CO 1		2	
CO 2	3	3	
CO 3	3	3	
CO 4	3	3	
CO 5		2	

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Properties of Fluids	1, 2
2	Fluid Statics	1, 2, 5
3	Fluid Kinematics	1, 2, 5
4	Fluid Dynamics	2, 3, 4, 5
5	Dimensional Analysis	2, 3, 5

6	Flow Through Pipes & Open Channels	2, 3, 4, 5
7	Viscous Flow	2, 3, 4, 5
8	Boundary Layer Theory	2, 3, 4, 5
9	Nano Fluids	1, 2, 3, 4

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2260

Course Name: Mechanical Measurement & Metrology

Prerequisite Course(s): -- None

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help the learners to

- know various types and methods of measurement.
- assess the suitability of measuring instruments.
- describe the basic concepts of metrology.
- know how to operate different types of mechanical measuring instruments.
- explain the different instruments used in industry.
- evaluate quality of surface produced using various methods of measurements.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Principles of Metrology Concept of Metrology, Need for inspection, Linearity, Repeatability, Sensitivity and readability, Precision & Accuracy, Standards of measurements.	02	05
2.	Screw threads and gear Metrology Measurement of Screw thread: Screw terminology, Errors in threads, measuring elements of the internal and external threads. Measurement of Gear: Introduction and Classification of gears, Forms of gear teeth, Gear tooth terminology, Measurement and testing of spur gear: Various methods of measuring tooth thickness, tooth profile and pitch, Gear Errors.	08	15
3.	Surface Roughness Metrology Introduction, Surface Texture, Methods of Measuring Surface finish,	04	09

	Comparison Methods and Direct Instrument Measurement, Sample Length, Numerical Evaluation of Surface Texture, Indication of Surface roughness Symbols used, Adverse effects of poor surface finish		
4.	Straightness, Flatness, Squareness, Parallelism and Machine Tool Tests Introduction, Measurement of Straightness, Flatness, Squareness and Parallelism, run out and concentricity, Tool makers microscope, Interferometry and its use in checking flatness, surface contour, parallelism etc., Interferometers and optical flats, Introduction to Machine tool testing; Various Alignment test on lathe, Milling Machine, Drilling Machine etc.	05	12
5.	Miscellaneous Metrology Measurement of Force, Torque, Power, Measurement of displacement, Velocity and Acceleration, Measurement of Speed and Frequency	04	09
Section II			
Module No.	Content	Hours	Weightage in %
6.	Measurement Concept Economics of measurement, Need of mechanical measurement, Basic definitions: Hysteresis, Linearity, Resolution of measuring instruments, Threshold, Drift, Zero stability, loading effect and system response. Source of Errors and their classification. Methods of measurement and performance characteristics	04	09
7.	Linear Measurements Precision and Non-precision linear Measurements, Vernier caliper, Micrometer, Use of End standard – Slip Gauge, Indian standard on Slip gauge, Care and use of slip gauge for workshop and inspection purpose, Telescopic gauge, Comparators.	06	14
8.	Angular and Taper Measurements Introduction; Working principle and construction of Angular Measuring instruments like Protractors, Sine bars, Sine Centre, Angle gauges, Spirit level, Clinometers, Angle dekkor, Taper Measuring Instruments: Measurement of taper shafts and Holes	04	09
9.	Temperature measurement Temperature scales, Temperature measuring devices, Methods of Temperature Measurement, Expansion Thermometers; Filled System thermometers; Electrical Temperature Measuring Instrument, Pyrometers; Calibration of Temperature Measuring Instruments, Reliability and calibration.	04	09

10.	Inspection Technologies History of Coordinate Measuring Machines, Important feature of CMM, CMM construction, CMM Operation and Programming, Performance of CMM, Possible causes of errors in CMM, Trigger type and Measuring type probes in computer controlled CMM, Accuracy Specification for CMM, Calibration of CMM, CMM Applications and Benefits, Role of computer in field of Metrology, Advances in Metrology.	04	09
TOTAL		45	100

List of Practical:

Sr No	Name of Practical	Hours
1.	Study of various instrument characteristics	02
2.	Study, Use and calibration of Linear Measuring Instruments	08
3.	Study and use of slip gauge	02
4.	Study of angle measurement using (a) Bevel Protractor (b) Combination Set and (c) Sine Bar	08
5.	Study of Temperature Measurement	02
6.	Study of Surface Roughness Tester	02
7.	Study of Gear Tooth Measurement	02
8.	Study Strain gauge Transducer	04
9.	Study of Coordinate Measuring Machines (CMM) (Industrial Visit)	-
TOTAL		30

Text Book(s):

Title	Author/s	Publication
Textbook Of Metrology	M. Mahajan	Dhanpat rai & Co.
Mechanical Measurements & Control	D. S. Kumar	Metropolitan books co pvt ltd

Reference Book(s):

Title	Author/s	Publication
Mechanical Measurement and Metrology	R K Jain	Khanna Publisher
Mechanical Measurements and Instrumentations	R K Rajput	Kataria Publication
Mechanical Measurements	Beckwith & Buck	Narosa publishing House
Metrology and Measurement	Anand Bewoor & Vinay Kulkarni	McGraw-Hill

Web Material Links:

- <http://nptel.ac.in/courses/112106179>

Course Evaluation:

Theory:

- Continuous evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination will consist of 60 marks.

Practical:

- Continuous Evaluation consists of performance of practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test consists of 30 marks during End Semester Exam.
- Viva/Oral performance consists of 30 marks during the End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME2260	MECHANICAL MEASUREMENT & METROLOGY
CO 1	Select linear and angular measuring instrument for measurement of various components
CO 2	Distinguish between various gears and screws by measuring their dimensions
CO 3	Measure surface finish of the component produced
CO 4	Compare appropriate temperature measuring device for various applications
CO 5	Describe methods of measurement for various quantities like force, torque, power, displacement.

Mapping of CO with PO

SEME2260	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2		1	1						2	
CO 2	2	1	1	1	3		3					2
CO 3	2		1	2	2	1	3		2		2	2
CO 4	2				3		3	1	2			2
CO 5	2	3	1	2	3	1	3	1	2		2	2

Mapping of CO with PSO

SEME2260	PSO1	PSO2	PSO3
CO 1	1	1	1
CO 2	3	2	2
CO 3	3	2	2
CO 4	3	2	2
CO 5	3	2	2

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Principles of Metrology	1,2, 3
2	Screw threads and gear Metrology	2, 4, 5
3	Surface Roughness Metrology	2, 4 , 5
4	Straightness, Flatness, Squareness, Parallelism and Machine Tool Tests	2, 4, 5
5	Miscellaneous Metrology	2, 3, 4, 5
6	Measurement Concept	2, 4, 5
7	Linear Measurements	2, 5
8	Angular and Taper Measurements	2, 5
9	Temperature Measurement	2, 5
10	Inspection Technologies	2, 3, 4, 5

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2270

Course Name: Theory of Machines

Prerequisite Course(s): SECV1030-Engineering Mechanics

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help the learners to learn:

- basics types of mechanism, degree of freedom, joints.
- about velocity and acceleration analysis for different mechanism.
- about kinematic analysis of cam and follower motion.
- about types of belts, ropes, chain and gears drives and its applications.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Basics of Mechanisms Introduction, Mechanism and machine, Rigid and resistant body, Link, Kinematic pair, Types of motion, Degrees of freedom (mobility), Classification of kinematic pairs, Kinematic chain, Linkage, Mechanisms, Kinematic inversion, Inversions of slider crank chain, Synthesis of Mechanism, Double slider- crank chain, Quick return mechanism, Limiting Positions and Mechanical Advantage.	08	10
2.	Velocity Analysis Vectors, Displacement of a rigid body, Relative displacement, Definition of velocity, Angular velocity, Rotation of a rigid body, Translation and rotation of a rigid body, Relative velocity method (graphical and analytical), Instantaneous axes of motion, Properties of instantaneous centers, The Aronhold - Kennedy theorem of three centers, Velocity analysis by instantaneous centers. The line-of-centers method, Velocity analysis by components, Velocity images, Velocity diagrams.	10	20

3.	Acceleration Analysis Definition of acceleration, Angular acceleration, A general case of acceleration, Radial and transverse components of acceleration, The coriolis component of acceleration, Examples of acceleration analysis, Acceleration diagrams.	8	20
Section II			
Module No.	Content	Hours	Weightage in %
4.	Kinematics of Belts, Ropes and Chain Drives Introduction, Belt and rope drives, Open and crossed belt drives, Velocity ratio, Slip, Materials for belt and ropes, Law of belting, Length of belt, Ratio of friction tensions, Power transmitted, Centrifugal effect on belts, Maximum power transmitted by a belt, Initial tension, Creep, Chains, Chain length, Angular speed ratio, Classification of chains.	07	10
5.	Kinematics of Gears Introduction, Classification of gears, Gear terminology, Law of gearing, Velocity of sliding, Forms of teeth, Cycloidal profile teeth, Involute profile Teeth, Comparison of Cycloidal and involute tooth forms, Path of contact, Arc of contact, number of pairs of teeth in contact, Interference in involute gears, Minimum number of teeth, Interference between rack and pinion, Undercutting, Introduction to helical, Spiral, Worm, Worm gear and bevel gears.	08	20
6.	Kinematics of Cams Introduction, Types of cams, Types of followers, Cam terminology, Displacement diagrams, Motions of the follower, Graphical construction of cam profile, High Speed CAM.	04	20
	TOTAL	45	100

List of Practical:

Sr No	Name of Practical	Hours
1.	To measure the ratio of time of cutting stroke to the return stroke in shaping machine by varying the stroke length.	02
2.	To understand the ratio of time of cutting stroke to the return stroke in shaper machine by varying the stroke length.	08
3.	To estimate kinematic data related to bicycle free wheel sprocket mechanism and Geneva mechanism.	02
4.	To prepare different kinematic links and to determine velocity and acceleration by relative velocity method for analysis of motion links.	08
5.	To draw a radial cam profile for given follower type to obtain desired follower motion.	02
6.	To estimate the slip, length of belt, angle of contact in open and cross belt drive.	02

7.	To assemble and dismantle different clutches.	02
8.	To measure radius and height of all types of governors for different rotational speeds and mass of balls.	04
9.	To perform balancing of rotating unbalanced system.	02
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
Theory of Machines	S. S. Rattan	Tata McGraw Hill Education
Theory of Machines and Mechanisms	John J. Uicker, Gordon R. Pennock, Joseph E. Shigley	Oxford University Press

Reference Book(s):

Title	Author/s	Publication
Mechanism and Machine Theory	J.S Rao, R.V Dukkupati	Wiley Eastern Ltd.
Theory of Mechanism and Machine	Ghosh A., Malick A.K	East-West Pvt. Ltd.

Web Material Links:

- <http://nptel.ac.in/courses/112104121/1>

Course Evaluation:

Theory:

- Continuous evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination will consist of 60 marks.

Tutorial:

- Continuous Evaluation consists of performance of practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test consists of 30 marks during End Semester Exam.
- Viva/Oral performance consists of 30 marks during the End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME2270	THEORY OF MACHINES
CO 1	Understand the essential components of linkage and mechanism in the assembly of machines.
CO 2	Analyze the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism.
CO 3	Apply the concept of the belt, rope, chains, and gear drives in machines operations.

CO 4	Understand a power transmission machine's element and its mechanism to solve the problems associated with it.
CO 5	Design a layout of cam and follower for specific motion.

Mapping of CO with PO

SEME2270	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	1	2						2	1		
CO 2	1	1	1	1	1					1		1
CO 3	1	1	2		1				2	1	2	1
CO 4	1	1	2	1			1		2	1		
CO 5	1	1	3	1	1		2		2	1	2	1

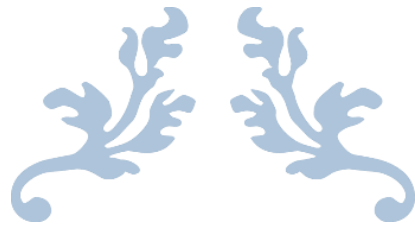
Mapping of CO with PSO

SEME2270	PSO1	PSO2	PSO3
CO 1	3	2	
CO 2	3	3	1
CO 3	3	3	2
CO 4	3	2	1
CO 5	3	3	1

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Basics of Mechanisms	1, 2
2	Velocity Analysis	1, 2, 3, 5
3	Acceleration Analysis	1, 2, 3, 5
4	Kinematics of Belts, Ropes and Chain Drives	2, 5
5	Kinematics of Gears	2, 5
6	Kinematics of Cams	2, 5



THIRD YEAR B. TECH.



P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

TEACHING & EXAMINATION SCHEME FOR B. TECH. MECHANICAL PROGRAMME AY:2023-24

Sem	Course Code	Course Title	Offered By	Teaching Scheme					Examination Scheme						
				Contact Hours				Credit	Theory		Practical		Tutorial		Total
				Theory	Practical	Tutorial	Total		CE	ES E	CE	ESE	CE	ESE	
5	SEME3211	Heat & Mass Transfer	ME	3	2	0	5	4	40	60	40	60	0	0	200
	SEME3221	Fluid Machines	ME	3	2	0	5	4	40	60	40	60	0	0	200
	SEME3230	Manufacturing Technology - II	ME	3	2	0	5	4	40	60	40	60	0	0	200
	SEME3241	Industrial Engineering	ME	3	0	0	3	3	40	60	0	0	0	0	100
		Language Training Elective Course	CFLS	3	0	0	3	3	100	0	0	0	0	0	100
		Life Skill Elective Course-I	CLSC	2	0	0	2	2	100	0	0	0	0	0	100
	SEME3920	Summer Training	ME	0			4	0	0	4	0	0	100	0	0
		Elective-I	ME	3	0	0	3	3	40	60	0	0	0	0	100
				Total			26	27							1100
6	SEME3252	Design of Machine Elements	ME	3	0	1	4	4	40	60	0	0	100	0	200
	SEME3261	Internal Combustion Engines	ME	2	2	0	4	3	40	60	40	60	0	0	200
	SEME3272	Computer Aided Design & Manufacturing	ME	3	2	0	5	4	40	60	40	60	0	0	200
	SEME3282	HVAC Systems	ME	3	2	0	5	4	40	60	40	60	0	0	200
	SEME3292	Power Plant Engineering	ME	3	0	0	3	3	40	60	0	0	0	0	100
	TNPC3010	Corporate Grooming & Etiquette	TNPC	3	0	0	3	3	100	0	0	0	0	0	100
	SEME3490	MOOC Course / University Elective		3	0	0	3	3	100	0	0	0	0	0	100
		Life Skill Elective Course-II	VAC	CLSC	2	0	0	2	2	100	0	0	0	0	0
				Total			29	26							1200

ELECTIVE-I COURSES

Sem	Course Code	Course Title	Offered By	Teaching Scheme					Examination Scheme						
				Contact Hours				Credit	Theory		Practical		Tutorial		Total
				Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
5	SEME3660	Fuels & Combustion	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3660	Production Management	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3670	Cost Estimation for Engineers	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3680	Product Development & Value Engineering	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3690	Gas Dynamics	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3700	Industrial Maintenance & Safety	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3710	Mechatronics	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3720	Plastics, Ceramics & Composites	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3730	Design of Pressure Vessel & Piping	ME	3	0	0	3	3	40	60	0	0	0	0	100

**P P Savani University
School of Engineering**

Department of Mechanical Engineering

Course Code: SEME3211

Course Name: Heat & Mass Transfer

Prerequisite Course(s): SEME2011-Engineering Thermodynamics

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- introduce and explain basic concept, principles and modes of heat transfer.
- calculate basis calculation based on heat transfer in various applications.
- calculate basis calculation applied in heat exchanger design.
- learn about analysis and design aspects in various engineering systems related to conduction, convection and radiation heat transfer.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Introduction Modes of Heat Transfer – Conduction; Convection and Radiation, Thermal Conductivity, Effect of temperature on thermal conductivity, derivation of generalized equation in Cartesian, cylindrical and spherical coordinates and its reduction to specific cases, General Laws of Heat Transfer.	04	09
2.	Steady State Heat Conduction Fourier's Law, One Dimensional Steady State Conduction through Plane and Composite Wall; Plane and Composite Cylinder; Plane and Composite Sphere, Critical Radius of Insulation for Cylinder and Sphere, Overall Heat Transfer Co-efficient.	06	13
3.	Unsteady State Heat Conduction (Transient) Lumped Parameter Analysis, Transient Heat Conduction in solids with finite conduction and convection resistances.	06	14

4.	Heat Transfer from Extended Surfaces (Fins) Types of Fins, Heat Transfer through Rectangular Fins, Infinitely Long Fins, Fins Insulated at tip and fins losing the heat from the tip, Efficiency and Effectiveness of Rectangular Fins, Biot Number	06	14
Section II			
Module No.	Content	Hours	Weightage in %
5.	Forced and Free Convection Newton's Law of Cooling, Dimensional Analysis applied for free and forced convection, Dimensionless Numbers and their physical significance, Energy integral equation of the boundary layer on a flat plate for forced convection, Empirical Correlations and their uses for free and forced convection, Thermal and Hydro Dynamic Boundary layer, Free Convection from vertical flat plate, Blasius Solution, General Solution for Von-Karman integral momentum equation.	08	17
6.	Radiation Absorptivity, Reflectivity and Transmissivity; Black, Grey and White Body; Emissivity and Emissive Power; Laws of Radiation – Planck's, Kirchoff's, Stefan Boltzmann, Wein's Displacement Law; Lambert Cosine Law; Radiation Shape Factor; Heat radiate between black bodies; Heat radiate between non black bodies, parallel plates and infinite long cylinders.	06	13
7.	Heat Exchangers Classification, Heat Exchanger Analysis, LMTD and e-NTU for parallel and counter flow heat exchanger, Fouling Factor, Correction Factor for Multi passes arrangements, Introduction of Heat Pipe and Compact Heat Exchanger.	06	13
8.	Two Phase Heat Transfer Fundamentals of Boiling and Condensation, Pool Boiling and its types, Condensation of vapour, Film wise and Drop wise condensation.	03	07
TOTAL		45	100

List of Practical:

Sr No	Name of Practical	Hours
1.	Thermal Conductivity of Composite Wall	02
2.	Thermal Conductivity of Insulating Powder	02
3.	Heat Transfer from a Pin Fin	02
4.	Heat Transfer by Unsteady state conduction	04
5.	Heat Transfer by Free Convection	04
6.	Heat Transfer by Forced Convection	04
7.	Measurement of Emissivity	02
8.	Measurement of Stefan Boltzmann Constant	02
9.	Heat Transfer in Tubular (Parallel and Counter Flow) Heat Exchanger	04

10.	Heat Transfer in Plate Heat Exchanger	02
11.	Critical radius of insulation.	02
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
Heat and Mass Transfer	Yunus A Cengen, Afshin J Ghajar	McGraw Hill Education
Heat Transfer	P K Nag	McGraw Hill Publication

Reference Book(s):

Title	Author/s	Publication
Heat and Mass Transfer	R K Rajput	S Chand Publication
Heat and Mass Transfer	D S Kumar	KATSON Books

Web Material Link(s):

- <https://nptel.ac.in/downloads/112108149/>

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of Performance of Practical which will be evaluated out of 10 marks for each practical and average of the same will be considered.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral performance of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3211	HEAT & MASS TRANSFER
CO1	Describe classify the heat transfer problems and to apply the principles of steady state one dimensional heat transfer, extended surface and unsteady state conduction for commonly encountered mechanical engineering problems.
CO2	Identify the type of convection problems and to apply concepts of natural and forced convection for related problems.
CO3	Adapt LMTD and effectiveness NTU method for simple heat exchange devices.
CO4	Integrate heat transfer principles to analyse various engineering applications.
CO5	Explain various laws of radiation heat transfer and to compute the radiation heat transfer between black and grey surfaces of simple mechanical systems.

Mapping of CO with PO

SEME3211	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2	2	3	2	1	1		3	3	1	2
CO 2	3	2	3	3	2	1			3	3		
CO 3	2	2	2	3	1						1	
CO 4	3	2	3	3			1		3	3		
CO 5	3	2		3			1		3	3	2	1

Mapping of CO with PSO

SEME3211	PSO1	PSO2	PSO3
CO 1	3	3	
CO 2	3	3	
CO 3	3	3	2
CO 4	3	3	1
CO 5	3	3	

Level of Bloom's 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	1, 2
2	Steady State Heat Conduction	2, 3, 4, 5
3	Unsteady state Heat Conduction (Transient)	2, 3, 4, 5
4	Heat Transfer from Extended Surfaces (Fins)	2, 3, 4, 5
5	Forced and Free Convection	2, 4, 5
6	Radiation	2, 4, 5
7	Heat Exchangers	2, 4, 5
8	Two Phase Heat Transfer	2, 4, 5

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3221

Course Name: Fluid Machines

Prerequisite Course(s): SEME2060-Fluid Mechanics

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- learn about applications of Fluid Mechanics.
- understand fluid power and different major equipment which can produce power from fluid.
- learn about operation and use of different hydraulic machines like Hydraulic Crane, Hydraulic Ram, Hydraulic Lift, Hydraulic Jack, Accumulator, Intensifier etc.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Hydro Power Plant Principles of Hydro Power Generation, Components and Layout of Hydro Power Plants, Classification; Advantages and Disadvantages of Hydro Power Plant.	02	04
2.	Flow Over Immersed Bodies Introduction, Concept of Lift and Drag, Concept of Streamline and Bluff Bodies, Flow over Cylinder and Aerofoil	02	04
3.	Fans And Blowers Construction details, governing equations, losses and performance curves	03	08
4.	Impulse Turbines Classification of Turbines, Impulse and Reaction, Radial and Axial, Tangential and Mixed flow turbines, Working Principle, Construction of Pelton Wheel, Expression for Work done and Efficiency for Pelton Turbine, Velocity Triangle, Performance characteristic curve, Unit and Specific Quantities, Governing of Impulse Turbines.	07	16
5.	Reaction Turbines Working Principle, Construction of Francis and Kaplan Turbines, Draft Tube Theory, Cavitation, Velocity Triangle,	08	18

	Performance characteristic curve, Unit and Specific Quantities, Governing of Reaction Turbines.		
Section II			
Module No.	Content	Hours	Weightage in %
6.	Hydraulic Pumps Classification, Principle of Dynamic and Positive Displacement Pumps, Centrifugal Pump and its Velocity Diagrams, Work Done by Impeller, Various Efficiencies of Pumps, Pump Losses, NPSH, Specific Speed, Characteristic Curves, Priming, Operation of Single and Double acting reciprocating Pump, Volumetric Efficiency; Work done and Slip, Special Purpose Pumps, Cavitation, Effect of Air Vessels	12	26
7.	Impact of Jet Impact of jet on different types of flat and curved plates, Force exerted on Fixed and Moving Plates, Expression of Efficiency, Condition for Maximum Efficiency and Value for maximum efficiency.	06	13
8.	Hydraulic Actuators and control valves Classification of hydraulic and pneumatic actuators, Construction and working of linear and rotary actuators (motors). Classification of control valves, pressure control valves-relief, flow control valves – non-compensated, pressure and temperature compensated.	05	11
TOTAL		45	100

List of Practical:

Sr No	Name of Practical	Hours
1.	To Study about Hydro Power Plant	02
2.	Performance test on Pelton Turbine	04
3.	Performance test on Francis Turbine	04
4.	Performance test on Kaplan Turbine	04
5.	Performance test on Centrifugal Pump	02
6.	Performance test on Reciprocating Pump	02
7.	Performance test on Gear Pump	02
8.	Performance Test on Hydraulic Ram	04
9.	Impact of Jet on Vanes	02
10.	Performance test on Pumps in Series and Parallel	04
TOTAL		30

Text Book(s):

Title	Author/s	Publication
Textbook of Fluid Mechanics and Hydraulic Machines	R. K. Bansal	Laxmi Publications
Introduction to Fluid Mechanics and Fluid Machines	S. K. Som & Biswas. G	Tata McGraw Hill Publication

Reference Book(s):

Title	Author/s	Publication
Fluid Mechanics and Fluid Power Engineering	D. S, Kumar	S K Kataria & Sons.
Turbines, Compressors and Fans	S. M. Yahya	Tata McGraw Hill Publication

Web Material Link(s):

- <https://nptel.ac.in/courses/112104117/>

Course Evaluation:**Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of Performance of Practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral performance of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3221	FLUID MACHINES
CO1	Understand the fundamentals of hydro power plant and its operation and construction.
CO2	Understand and apply the effect and importance of forces on immersed bodies.
CO3	Apply the knowledge of different types of fans and blowers, turbines and pumps.
CO4	Evaluate the turbine and pump performance and understand various hydraulic systems and their purpose in hydraulic machines.
CO5	Understand the concept of impact of jets on different positions of blades.

Mapping of CO with PO

SEME3221	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		1	1				1	1		2	1	
CO 2	3	2	2	3	2		2	1		1	1	1
CO 3	3	1	1	1	1					1	1	
CO 4	3	3	2	3	3	2	3			2	2	1
CO 5	3	3	2	3	3		1			1	2	

Mapping of CO with PSO

SEME3221	PSO1	PSO2	PSO3
CO 1	1		

CO 2	2	3	1
CO 3			
CO 4	3	3	2
CO 5	1	3	3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Hydro Power Plant	1, 2
2	Flow Over Immersed Bodies	1, 2, 5
3	Fans and Blowers	1, 2, 5
4	Impulse Turbines	1, 2, 5
5	Reaction Turbines	1, 2, 5
6	Hydraulic Pumps	1, 2, 5
7	Impact of Jet	1, 2, 5
8	Miscellaneous Hydraulic Systems	1, 2

**P P Savani University
School of Engineering**

Department of Mechanical Engineering

Course Code: SEME3230

Course Name: Manufacturing Technology - II

Prerequisite Course(s): SEME2050 - Forming & Machining Processes,
SEME2110 – Casting & Joining Processes

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- introduce the students to the theory and mechanism of various cutting processes.
- grasp distinctive knowledge of gear forming and its generating method
- understand the usefulness of Jig & Fixtures, Presses and Press work.
- introduce students with nontraditional manufacturing techniques for shaping newer materials.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Theory of Metal Cutting Cutting Tool Material, Types of cutting tools, Tool geometry and Force analysis. Theory of metal cutting: Orthogonal and oblique cutting, Mechanics of chip formation and types of chips produced, Chip thickness ratio, Shear plane angle and its effect, Forces, Coefficient of friction, Shear strain, Power in machining. Merchant circle diagram and its assumptions and use. Chip breakers, Tool Dynamometers, Tool wears and methods of tool failure, Tool life. Cutting fluids and their properties, Economics of machining, Machinability and its evaluation.	14	30
2.	Thermal Aspects in Machining Sources of heat generation in machining and its effects, Temperature Measurement techniques in machining, types of cutting fluids, Functions of cutting fluid, Characteristics of cutting fluid, Application of cutting fluids, Economics of Metal Cutting Operations.	05	12

3.	Gear and Thread Manufacturing Different types of Threads manufacturing methods, and tools involved, Different gear forming and generating methods with their special features, Gears finishing processes.	04	08
Section II			
Module No.	Content	Hours	Weightage in %
4.	Press Tool Classification of presses, Classification of dies, cutting actions in dies, clearance, cutting forces, Methods of reducing cutting forces, Minimum Diameter of Piercing Center of Pressure, Blanking, Piercing, Drawing, Bending and Progressive Die design, scrap reduction, strip layout.	08	18
5.	Jigs and Fixtures Definition, Differences between Jigs and Fixtures, Its usefulness in mass production, design principles, 3-2-1 location principle and its application to short and long cylinders, types of locators, concept of work piece control, geometric control, dimensional control and mechanical control, Clamps, jig bushes, Jigs and fixtures for various machining operations.	06	14
6.	Modern Machining Processes Purpose, Need and Classification, Aspects considered in selection of a process. Principle, construction, working of the following processes: Ultrasonic machining, Abrasive jet machining, Water jet machining, Chemical Machining, Electro Chemical Machining and Grinding, Electro discharge Machining, Plasma arc machining, Laser beam machining, Electron beam machining.	08	18
TOTAL		45	100

List of Practical:

Sr No	Name of Practical	Hours
1.	Study of various types of cutting tools and measurement of tool geometry	04
2.	To Understand the Effect of Chosen Parameters on the type of chip produced	04
3.	Determination of chip-thickness ratio and shear plane Angle During Machining	04
4.	Measurement of cutting forces in turning using Lathe Tool Dynamometer under various cutting conditions	04
5.	To study the Temperature Measurement on chip tool interface	04
6.	To study and understand the effect of a suitable cutting lubricant	04
7.	Design a Jig and Fixture for given component	04
8.	To study different press and design of punch and die, also exercise on strip layout and center of pressure	02

	TOTAL	30
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Text Book(s):

Title	Author/s	Publication
A Text Book of Production Engineering	Sharma P C	S. Chand Publishers
Production Technology	R K Jain	Khanna Publication

Reference Book(s):

Title	Author/s	Publication
Production Technology	HMT	Tata McGraw Hill Pub
Metal Cutting principles	M C Shaw	Oxford University press
Fundamentals of machining and machine tools	Boothroyd	CRC publication
Workshop Technology Vol. II	Raghuvanshi	Dhanpat rai Pub

Web Material Link(s):

- http://nptel.iitm.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Manuf%20Proc%20II/New_index1.html

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 Marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical/Tutorial:

- Continuous Evaluation consists of Performance of Practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral performance of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3230	MANUFACTURING TECHNOLOGY - II
CO1	Understand the theory of metal cutting process, dynamometer tools, tool wear and economics of machining.
CO2	Explain the thermal behaviour of metal during metal cutting operation.
CO3	Apply and develop gears and threads through basic knowledge of gear and thread manufacturing process.
CO4	Interpret the function of the press tool and jigs and fixtures.
CO5	Interpret modern machining processes for material removal application.

Mapping of CO with PO

SEME3230	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	3	3	3	2	3	3	1	3	3	3
CO 2	3	3	3	3	3	2	3	3	2	3	3	3
CO 3	3	3	3	3	3	3	3	3	2	3	3	3
CO 4	2	1	2	2	3	3	3	1	3	3	3	3
CO 5												

Mapping of CO with PSO

SESH1070	PSO1	PSO2	PSO3
CO 1	3		
CO 2	1	1	
CO 3	1	2	
CO 4	2	1	
CO 5	2	2	

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Theory of Metal Cutting	1, 2, 5
2	Thermal Aspects in Machining	1, 2, 5
3	Gear and Thread Manufacturing	1, 2, 3
4	Press Tool	1, 2
5	Jigs and Fixtures	1, 2
6	Modern Machining Processes	1, 2

**P P Savani University
School of Engineering**

Department of Mechanical Engineering

Course Code: SEME3241

Course Name: Industrial Engineering

Prerequisite Course(s): -- None

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	-	03	40	60	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- provide students insight into the concept of industrial engineering.
- familiarize the students with principles of work study and motion study.
- realize the importance of plant design and production planning in industries.
- enable the students to understand cost analysis and inventory management.
- understand about various Industrial Acts.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Industrial Engineering Introduction, History; Activities and Techniques of Industrial Engineering, Concepts of Management and Organization, Departmentalization and Decentralization, Types of Organizations	03	05
2.	Work Study & Productivity Production and Productivity, Factors influencing productivity, Measurement of Productivity (Productivity Index), Work Content, Excess work and Ineffective Time, Method Study – Objective, Steps, Selection of job, Process Charts, Micro and Memo motion study, Work Measurement – Objectives, Steps, Techniques, Performance Rating, Allowance of Standard time, Techniques of work measurement, Work Sampling – Confidence level, Methods of work sampling, Computation of machine utilization and standard time, Predetermined Motion and Time Study (PMTS), Method Time Measurement (MTM)	14	30

3.	Introduction to Lean Management Historical perspective: Origin of Toyota Production System – Toyota’s engineering innovation, Overview of lean management. Definition – objectives – difference between mass and lean manufacturing – benefit of lean; key concepts of lean management, Just-in-time- Jidoka; Overview of various Lean tools & supportive strategies; Lean system & Lean tools interlink: The “TPS House” diagram, 14 principles of Toyota Way.	05	15
Section II			
Module No.	Content	Hours	Weightage in %
4.	Cost And Break Even Analysis Cost of Production, Classification of Cost, Analysis of Production Cost, Break Even Analysis – Graphical and Mathematical and Break Even Point, Applications of Break Even Chart and Break Even Analysis, Determination of Material Cost, Labour Cost, Expenses, Over Head Expenses, Methods and procedure of job evaluation, merit rating and wage incentive plans - Problems	08	20
5.	Production Planning And Control (PPC) Types of Production, Production Cycle – Process Planning, Forecasting, Loading, Scheduling, Dispatching, Routine. Material Planning, ABC Analysis, Incoming Material Control, Kanban System, MRP System, Master Production Schedule, Bill of Materials, MRP Calculations	11	25
6.	Industrial Acts Need for Industrial acts, Factories act 1948, Industrial dispute act 1947, The Indian trade unions act 1926, Industrial employment act 1946, Payment of wage act 1936, Workmen compensation act 1923, Payment of bonus act 1965, Employees provident fund scheme 1952	04	05
Total		45	100

Text Book(s):

Title	Author/s	Publication
Industrial Engineering and Production Management	M. Mahajan	Dhanpat Rai & Sons.
Industrial Engineering and Production Management	M. Telsung	S. Chand & Co.

Reference Book(s):

Title	Author/s	Publication
Industrial Engineering and Operational Management	S. K. Sharma Savita Sharma	S. K. Kataria & Sons

Web Material Link(s):

- <https://nptel.ac.in/courses/112107142/>

Course Evaluation:**Theory:**

- Continuous Evaluation consists of two tests each of 30 Marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3241	INDUSTRIAL ENGINEERING
CO 1	Express concepts of industrial engineering & apply work and motion management techniques in industries.
CO 2	Describe location decision, site selection and plant layout
CO 3	Analyse cost of production & demonstrate wage and incentive plans.
CO 4	Solve forecasting problem by applying different techniques.
CO 5	Understand industrial legislation.

Mapping of CO with PO

SEME3241	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2		1		3	1		3	3	1	3
CO 2	1	2	1	1	2	3			3	3	1	3
CO 3	2	2	1	1		3			1	3	3	3
CO 4	3	2	1	2	2	3			1	3	3	3
CO 5	1	1		1		3	1	2		3		3

Mapping of CO with PSO

SEME3241	PSO1	PSO2	PSO3
CO 1		3	2
CO 2	3	3	1
CO 3	3	2	2
CO 4	3	3	2
CO 5	1	2	1

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Industrial Engineering	1, 2
2	Work Study & Productivity	1, 2
3	Economics of Plant Layout and Location	1, 2
4	Cost and Break Even Analysis	1, 2, 5

5	Production Planning and Control (CPC)	1, 2, 5
6	Industrial Acts	1, 2

**P P Savani University
School of Engineering**

Department of Mechanical Engineering

Course Code: SEME3920

Course Name: Summer Training

Prerequisite Course(s): -- None

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
-	04	-	04	-	-	100	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- have first-hand experience the real time situations in industrial scenario.
- get familiar with engineering applications in industrial spectrum
- learn to adapt themselves in professional scenario

Outline of the Course:

Sr. No	Content
1.	Selection of Companies
2.	Company Information collection
3.	Report Writing
4.	Presentation & Question-Answer

Course Evaluation:

Sr. No.	Evaluation criteria	Marks
1	Actual work carried & Report Submission	50
2	Final Presentation & Question-Answer session	50
Grand Total:		100

Report Writing Guidelines

A. Report Format:

1. Title Page (to be provided by the respective supervisor)

The title page of the project shall give the following information in the order listed:

- Full title of the project as approved by the Mentor;
- The full name of the student/Group of students with enrollment number;
- The qualification for which the project is submitted;
- The name of the institution to which the project is submitted;
- The month and year of submission.

2. Project Certification Form

[The form should be duly filled signed by the supervisors.]

3. Acknowledgements

[All persons (e.g. supervisor, technician, friends, and relatives) and organization/authorities who/which have helped in the preparation of the report shall be acknowledged.]

4. Table of Contents/Index with page numbering
5. List of Tables, Figures, Schemes
6. Summary/abstract of the report.
7. Introduction/Objectives of the identified problem
8. Data Analysis and Finding of Solution
9. Application of the identified solution
10. Future Scope of enhancement of the Project and Conclusion
11. “Learning during Project Work”, i.e. “Experience of Journey during Project Duration”
12. References(must)
13. Bibliography
14. Annexures (if any)

B. Guideline for Report Formatting:

- Use A4 size page with 1" margin all sides
- Header should include Project title and footer should contain page number and enrollment numbers
- Chapter Name should be of Cambria font, 20 points, Bold
- Main Heading should be of Cambria font, 14 points, Bold
- Sub Heading should be of Cambria font, 12 points, Bold
- Sub Heading of sub heading should be of Cambria font, 12 points, Bold, Italic
- Paragraph should be of Cambria font, 12 points, no margin at the start of the paragraph
- Line spacing for all content – 1.15, before - 0, after - 0
- No chapter number for references
- Before chapter 1, give page numbers in roman letter

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3920	SUMMER TRAINING
C01	Construct company profile by compiling brief history, management structure, products/services offered, key achievements and market performance for the company visited during internship.
C02	Determine the challenges and future potential for his/her internship organization in particular and the sector in general.
C03	Test the theoretical learning in practical situations by accomplishing the tasks assigned during the internship period.
C04	Apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization.
C05	Analyze the functioning of internship organization and recommend changes for improvement in processes.

Mapping of CO with PO

SEME3920	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		2	3	3	3	3	3	3	3	3	3	3
CO 2	3	2	3	3	3	3	3	3	3	3	3	3
CO 3	3	2	3	3	3	3	3	3	3	3	3	3
CO 4	3	2	3	3	3	3	3	3	3	3	3	3
CO 5		2	3	3	3	3	3	3	3	3	3	3

Mapping of CO with PSO

SEME3920	PSO1	PSO2	PSO3
CO 1	2	3	3
CO 2	2	3	3
CO 3	2	3	3
CO 4	2	3	3
CO 5	2	3	3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Selection of Companies	1, 2, 5
2	Company Information collection	1, 2, 5
3	Report Writing	1, 2, 3
4	Presentation & Question-Answer	1, 2

**P P Savani University
School of Engineering**

Department of Mechanical Engineering

Course Code: SEME3252

Course Name: Design of Machine Elements

Pre requisite Course: -- SEME3031 – Dynamics of Machinery, SEME2081 – Kinematics of Machinery

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	01	04	40	60	-	-	100	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- understand design consideration and material selection for particular applications.
- learn design methodology/procedure for machine elements.
- Understand standards of materials designation and machine elements.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Introduction and Design Analysis Types of Loads, Types of Stresses, Types of Failures, Factor of Safety, Theory of failure, Fatigue failure analysis, Soderberg, Gerber and Goodman Criteria, Estimation of life of components, Introduction to creep and wear failure	04	09
2.	ASME Definition, Introduction to ASME Codes for pipeline, pressure vessel and material selection. Introduction to ASME PCC-2 Repair of pressure equipment, ASME Section VIII Division 1 & 2 – Pressure vessel, ASME B31.3 – Process piping code design requirements.	07	16
3.	Material Selection Selection of material, Factors affecting material selection, Ferrous and Non Ferrous metals and alloys, Plastics, BIS designation system for steels	05	12
4.	Design of Springs Types, Terminologies and Types of ends in helical springs, Stress and Deflection Equations, Correction Factors, Design of helical spring against static and fluctuating loads,	06	14

	Multileaf spring : Terminologies, Nipping and Design		
Section II			
Module No.	Content	Hours	Weightage In %
5.	Design of Shafts and Keys Types of Shafts, ASME code for shaft design, Design of shaft, Types of Keys, Design of Keys	07	16
6.	Design of Screw And Threaded Fastness Types of threads, Terminologies and Design of Power Screw, Design of Screw and Nut, Design of Screw Jack, Types of Screw Fastening, Bolt of uniform strength, ISO Metric screw threads	06	13
7.	Design of Joints Design of Cotter and Knuckle Joints, Strength of welded joints, Strength of riveted joints, Efficiency of Joints.	06	13
8.	Belt Drives and Brakes Brakes, Energy Equations, Block Brake with Short and Long Shoe, Band and Disc Brake, Selection of Flat belts from manufacturer 's catalogue, Selection of V-Belts	04	08
	TOTAL	45	100

List of Tutorial:

Sr No	Name of Tutorial	Hours
1.	Design consideration and Material selection	01
2.	Design Analysis against static and fluctuating loads.	01
3.	Design of Cotter Joints	01
4.	Design of Knuckle Joints	01
5.	Design of Helical Springs	02
6.	Design of Multileaf Springs	02
7.	Design of Power Screw	01
8.	Design of Screw Jack	02
9.	Design of Shafts	02
10.	Design of Keys	01
11.	Design of Belt Drives	01
	TOTAL	15

Text Book(s):

Title	Author/s	Publication
Design of Machine Elements	V B Bhandari	McGraw Hill Education
Mechanical Engineering Design	Joseph Shigley	McGraw Hill Education

Reference Book(s):

Title	Author/s	Publication
Design Data Book		PSG College of Technology
Fundamental of Machine Components Design	R C Junival	John Wiley Publication

Course Evaluation:**Theory:**

- Continuous Evaluation consists of two tests each of 30 Marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of Performance of Tutorial which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral performance of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3252	DESIGN OF MACHINE ELEMENTS
CO 1	Describe the design process, designing methods and selection of proper material for design of machine element.
CO 2	Analyze forces acting on machine elements under static and cyclic loading conditions.
CO 3	Determine forces and stresses acting on machine elements like springs, shaft, screw, threaded fasteners, belt drives and brakes.
CO 4	Design the temporary and permanent joints required to assemble the machine elements.
CO 5	Design and dissect mechanisms for strength and improve their life.

Mapping of CO with PO

SEME3252	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	2	1	1	2		1		1	2	2	
CO 2	2	3	1	1	2		1		1	2		
CO 3	2	3	1	1	2		1		1	2		
CO 4	2	1	2	1	2		2	1	1	1	2	
CO 5	2	1	2	1	2		2	1	1	1	2	

Mapping of CO with PSO

SEME3252	PSO1	PSO2	PSO3
CO 1	1	2	1
CO 2	2	1	2
CO 3	3	1	2
CO 4			1
CO 5	1	2	

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
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4: Analyze	5: Evaluate	6: Create
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Module No	Content	RBT Level
1	Introduction	1, 2
2	Design Analysis	1, 2, 4
3	Material Selection	1, 2, 4
4	Design of Springs	1, 2, 3, 4, 5
5	Design of Shafts and Keys	1, 2, 3, 4, 5
6	Design of Screw and Threaded Fasteners	1, 2, 3, 4, 5
7	Design of Joints	1, 2, 3, 4, 5
8	Belt Drives and Brakes	1, 2, 5

**P P Savani University
School of Engineering**

Department of Mechanical Engineering

Course Code: SEME3261

Course Name: Internal Combustion Engines

Pre requisite Course: -- SEME2011 – Engineering Thermodynamics

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- understand basics of IC engine and emission control.
- Examine the performance parameters of IC engines.
- Inspect the rating and testing performance of IC engines.
- Justify the alternative fuels for IC engine.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
5.	Introduction Comparison of SI and CI Engines, Difference in thermodynamic and operating variables, comparison of performance characteristics, comparison of initial and maintenance costs application of SI and CI engine.	05	13
6.	Fuel and its Supply System for SI and CI Engine Important qualities of IC engine fuels, rating of fuels, Carburetion, mixture requirement for different loads and speeds, simple carburetor and its working, types of carburetors, MPFI, types of injection systems in CI engine, fuel pumps and injectors, types of nozzles, spray formation.	05	16
7.	Combustion in SI and CI Engines Combustion equations, calculations of air requirement in I C Engine, stoichiometric air fuel ratio, proximate and ultimate analysis, enthalpy of formation, adiabatic flame temperature. Stages of combustion in SI engines, abnormal combustion and knocking in SI engines, factors affecting knocking, effects of knocking, control of knocking, combustion chambers for SI engines, Stages of combustion in CI engines, detonation in C.I. engines, factors affecting	08	15

	detonation, controlling detonation, combustion chamber for SI and CI engine.		
8.	<p>Engine Lubrication Types of lubricants and their properties, SAE rating of lubricants, Types of lubrication systems.</p> <p>Engine Cooling Necessity of engine cooling, disadvantages of overcooling, Cooling systems and their comparison: Air cooling, Liquid cooling.</p> <p>Supercharging/ Turbo-Charging Objectives, Limitations, Methods and Types, Different arrangements of turbochargers and superchargers.</p>	07	14
Section II			
Module No.	Content	Hours	Weightage In %
5.	<p>Rating, Testing and Performance Measurements of speed, air flow, fuel consumption, indicated power brake power, frictional horse power, and smoke, testing of engines as per Indian Standard 10001, performance test for variable speed I C Engines, heat balance sheet, governing test for constant speed IC engines, effect of fuel injection parameters in CI engines and ignition advance of SI engines on performance of engine. Rating of internal combustion engine based on (I) continuous operation of engine (II) Maximum power an engine can develop (III) Power calculated from empirical formula, Trouble Shooting and Overhauling of Engines.</p>	10	16
6.	<p>Emission of IC Engine Emission from SI engine, effect of engine maintenance on exhaust emission control of SI engine, diesel emission, diesel smoke and control, diesel and control comparison of gasoline and diesel emission. Measurement and calculation for of emission constituents.</p>	05	13
7.	<p>Unconventional Engines & Alternative Fuels for IC Engine Working principle of stratified charge engines sterling engine, Wankel engine Methanol, Ethanol, vegetable oils, bio gas, bio-fuels, hydrogen and comparison of their properties with Diesel and petrol.</p>	05	13
	TOTAL	45	100

List of Tutorial:

Sr No	Name of Tutorial	Hours
1	To demonstrate various engines and their components.	02
2	Demonstration of valve timing diagram.	04
3	To demonstrate about the fuel injection system for C.I. Engine.	04

4	To demonstrate about carburetor and its types.	04
5	To carry out the performance analysis of single cylinder two stroke petrol engine.	04
6	To carry out the performance analysis of multi cylinder four stroke petrol engine.	04
7	To carry out the performance analysis of multi cylinder four stroke diesel engine.	04
8	To carry out various Performance tests: Morse Test and William Line Plot.	04
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
IC Engine	Heywood	-
IC Engines	Marthur & Sharma	Dhanpatrai Publication

Reference Book(s):

Title	Author/s	Publication
IC Engines	V.Ganeshan	Tata McGraw Hill
IC Engine	Domkundwar & Domkundwar	Dhanpatrai Publication
IC Engine	R.K. Rajput	Laxmipublication

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 Marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of Performance of Tutorial which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral performance of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3261	INTERNAL COMBUSTION ENGINES
CO 1	Describe and explain the major phenomena going on in an internal combustion engine such as gas exchange, combustion and emissions formation/reduction.
CO 2	Explain the performance and evaluation of internal combustion engine and to discuss how this is affected.
CO 3	Reflect on the role of internal combustion engines for transports in society as

	well as the emissions issue from both a sustainable and ethical perspective.
CO 4	Understand and explain about the alternative fuels and their properties
CO 5	Explain the latest development of unconventional engines.

Mapping of CO with PO

SEME3261	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	1			1		2				2	
CO 2	3	1			2	2		2				
CO 3	3	1	2	1	3					2	1	
CO 4	1	1	1	1	3						1	
CO 5	1	1		2	2	2					2	

Mapping of CO with PSO

SEME3261	PSO1	PSO2	PSO3
CO 1	2	1	
CO 2	1	1	
CO 3	2	3	
CO 4	1	1	
CO 5	1	1	1

Level of Bloom's 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	1, 2
2	Fuels and its supply system for SI and CI engine	1, 2
3	Combustion in SI and CI engines	1, 2, 4, 5
4	Engine lubrication, Engine cooling, and Supercharging/ Turbo-Charging	1, 2, 3
5	Rating, Testing and Performance	1, 2, 3, 4, 5
6	Emission of IC Engine	1, 2, 3, 4, 5
7	Unconventional Engines & Alternative Fuels for IC Engine	1, 2, 3

**P P Savani University
School of Engineering**

Department of Mechanical Engineering

Course Code: SEME3272

Course Name: Computer Aided Design and Manufacturing

Prerequisite Course(s): -- SEME2090 – Software Tools for Mechanical Engineers

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- understand the basic aspects of CAD/CAM.
- gain exposure over the concepts of computer graphics.
- learn geometric modelling and issues in manufacturing.
- develop strong skill of writing CNC programs.
- educate students to understand different advances in manufacturing system like: GT, FMS and RP.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Fundamental of CAD Application of computer for design, Product Cycle and CAD-CAM, Graphics input-output devices, Concept of Coordinate Systems: Working Coordinate System, Model Coordinate System, Screen Coordinate System, Graphics exchange standards - Neutral file formats – IGES, STEP	03	05
2.	Principles of computer Graphics Introduction to Computer graphics, Scan conversions and Algorithm for generation - DDA, Bresenham's algorithms, 2D and 3D Transformation - Translation, Scaling, Reflection, Rotation, Shearing	07	15
3.	Geometric Modeling Representation of curves and surfaces, Geometric modeling techniques, Wireframe modeling, Surface Modeling and Solid Modeling, Feature based Parametric and Variation modeling.	07	15
4.	Finite Element Analysis Design and analysis and Historical background, Stresses and equilibrium, Boundary conditions, Strain-Displacement	07	15

	relations, Plane stress and plane strain cases, Concept of Raleigh-Ritz and Galerkin's methods, Review of matrix algebra, Generalized procedure for Finite element analysis, Types of elements and Finite element modeling, Coordinates and shape functions, Design problems of structural analysis, Applications and capabilities of various software for FEA.		
Section II			
Module No.	Content	Hours	Weightage in %
5.	CNC Machine Tools Introduction to NC, CNC, DNC, Manual Part programming, Computer assisted part programming, Components of NC/CNC system, Specification of CNC system, Classification of NC/CNC Machine tools, Nomenclature of NC machine axes, CNC Control System, CNC Programming, Automatic tool changer, Automatic Pallet Changer, Machine tool structure, Guideways, Transmission system, Drives and Feedback Devices, NC/CNC tooling, Canned cycles and subroutines, APT language, Machining from 3D models.	11	30
6.	Introduction to Group Technology, FMS and Rapid Prototyping Objectives, part families, similarities, design and Manufacturing attributes, Classification methods- visual inspection, product flow analysis and coding, G.T. machine cells and types, concept of composite part, benefits and limitations, Flexible Manufacturing system (FMS) – Concept, objectives, applications, classification, FMS layouts, specifications, benefits, limitations, FMS planning and implementation issues, Fundamentals of Rapid Prototyping, Advantages and Applications of RP Types of Rapid Prototyping Systems	07	15
7.	Computer Integrated Manufacturing Basic information of CIMS, hardware and software requirement for CIMS, benefits, scope and Needs, CIMS wheel, elements of CIMS and their role, Fundamentals of communication, data base management	03	05
	TOTAL	45	100

List of Practical:

Sr No	Name of Practical	Hours
1.	Prepare a programme for plotting lines and curves using algorithms learned	02
2.	Demonstration of 3D modeling using CAD Packages	04
3.	Demonstration of stress analysis using FEA package	06
4.	Part Programming using G and M code: Lathe and Milling jobs	04
5.	Simulation of part programme	06

6.	CNC code generation using any CAM software	04
7.	Problems on Group Technology and Industrial case problems on coding	02
8.	Study of Expert System in Manufacturing and MIS	02
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
CAD, CAM and CIM	Radhakrishnan P. and Subramaniyam S.	New Age International
Numerical control and computer aided manufacturing	Kundra T. K., Rao P. N. and Tewari N. K.	Tata McGraw Hill Publishing company Ltd.

Reference Book(s):

Title	Author/s	Publication
CAD / CAM: Theory and Practice	Ibrahim Zied,	Tata McGraw Hill Publishing company Ltd.
CAD/CAM	Rao P. N.	Tata McGraw Hill Publishing company Ltd.
Computer numerical control machines	Radhakrishnan P	New Central Book Agency
CAD/CAM Computer Aided Design and Manufacturing	M. P. Groover, E. W. Zimmers	Prentice Hall of India, New Delhi.
CNC Programming handbook	Peter Smid	Industrial Press Inc, New York
Mathematical Elements for Computer Graphics	David Rogers, J. Alan Adams	Tata McGraw Hill Publishing company Ltd.

Web Material Link(s):

- <http://help.autodesk.com/view/fusion360/ENU/>
- <https://academy.autodesk.com/course/83871/essentials-cam>
- <https://www.autodesk.com/products/fusion-360/blog/getting-started-introduction-to-cam-and-toolpaths/>
- <https://knowledge.autodesk.com/support/fusion360/learnexplore/caas/CloudHelp/cloudhelp/ENU/Fusion-GetStarted/files/GUID-A93F8BAB-1B3B-457F9265-AFD16D8B732A-htm.html>

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 Marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of Performance of Practical which will be evaluated out of 10

marks for each practical and average of the same will be converted to 10 marks.

- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral performance of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEM3272	COMPUTER AIDED DESIGN & MANUFACTURING
CO 1	Apply algorithms of graphical entity generation.
CO 2	Construct a mathematical model of geometrical modelling and transformation
CO 3	Formulate finite element model for analysis of simple components.
CO 4	Develop programs related to manufacturing using cnc codes
CO 5	Classify different components using different techniques of group technology.

Mapping of CO with PO

SEM3272	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	1	3	1	1				3	2		1
CO 2	3	1	2	2	2			1	3	2		1
CO 3	3	1	2	1	3			2		2	1	
CO 4	1	1	1	1	3	1	2		3	2	1	2
CO 5	1	1	1	2	2						2	

Mapping of CO with PSO

SEM3272	PSO1	PSO2	PSO3
CO 1	1	2	3
CO 2	2	2	2
CO 3	2	2	2
CO 4	2	2	1
CO 5	2	2	2

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Fundamental of CAD	1, 2, 3
2	Principles of Computer Graphics	1, 2, 3
3	Geometric Modeling	1, 2, 3, 6
4	Finite Element Analysis	1, 2, 3, 4, 6
5	CNC Machine Tools	1, 2
6	Introduction to Group Technology, FMS and Rapid Prototyping	1, 2, 3
7	Computer Integrated Manufacturing	1, 2

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3282

Course Name: HVAC Systems

Prerequisite Course(s): - SEME2011 – Engineering Thermodynamics, SEME3111 – Heat & Mass Transfer

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- Clarify the concepts of refrigeration and air-conditioning .
- Explore the different types of refrigeration and air conditioning systems.
- Selection of refrigerant under different condition with application and properties.
- Elaborate the various Psychrometric Processes and its applications.
- Estimate load calculation for air conditioning for buildings.

Course Content:

Section I			
Module No.	Contents	Hours	Weightage in %
1.	Fundamentals of Refrigeration: Methods of producing cooling, ton of refrigeration, coefficient of performance, types and application of refrigeration, Classification of refrigerant, nomenclature, desirable properties of refrigerant, secondary refrigerants, future industrial refrigerants, VCR System, P – h and T – s Diagrams, analysis of simple cycle, actual cycle.	08	20
2.	Psychrometry: Dalton’s law of partial pressure, Properties of moist air, temperature and humidity measuring instruments, psychrometric chart, psychrometric processes such as sensible heating and cooling, heating and humidification cooling and dehumidification, chemical dehumidification, adiabatic saturation	07	20
3.	Air Conditioning Systems: Classification, system components, all air; all water; and air-water systems, room air conditioners, packaged air conditioning plant, central air conditioning systems, split air	05	10

	conditioning systems		
Section II			
Module No.	Contents	Hours	Weightage in %
4.	Duct Design and Air Distribution: Function; classification and economic factors influencing duct layout, equal friction, velocity reduction and static regain methods of duct design, use of friction chart, dynamic losses and its determination, Requirements of air distribution system, air distribution, grills, outlets, application, location	10	20
5.	Load Analysis: Site survey, outdoor and indoor design conditions, classification of loads, flywheel effect of building material and its use in design, effect of wall construction on cooling load, instantaneous heat gain (IHG) and instantaneous cooling load (ICL) heat transmission through sunlit and shaded glass using tables, method of reduction of solar heat gain through glass, calculations of cooling load TETD due to sunlit and shaded roof and walls using tables, ventilation and air infiltration, load due to outside air, heat gain from occupants; electric lights; product; electric motor and appliances, load calculations for automobiles, use of load estimation sheet.	11	20
6.	Vapour Absorption Refrigeration Cycle: Desirable characteristics of refrigerant, selection of pair, practical H ₂ O -NH ₃ cycle, LiBr – H ₂ O system and its working, Electrolux refrigeration system	04	10
	TOTAL	45	100

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Performance Test of VCR System	04
2.	Performance Test of VAR System	04
3.	Performance test on Recirculating Type Air Conditioning Dust to learn various Psychrometric Processes.	04
4.	To understand various tools used for refrigeration tubing and to perform various operations like flaring, swaging, bending, brazing etc.	02
5.	To calculate cooling load of a confined space using table and compare the same with load estimation sheet.	04
6.	To design duct layout of the confined space selected for above.	04
7.	Performance Test of Sling Psychrometer to determine DBT & WBT.	04
8.	Performance test on heat pump test rig.	04
	TOTAL	30

Text Book(s):

Title	Author(s)	Publication
Refrigeration & Air Conditioning	C P Arora	McGraw Hill India Publishing House
Refrigeration & Air Conditioning	R K Rajput	S Chand and Co

Reference Book(s):

Title	Author(s)	Publication
Refrigeration & Air Conditioning	Ramesh Arora	Prentice Hall of India

Course Evaluation:

- Continuous Evaluation consists of two tests each of 30 Marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of Performance of Practical/Tutorial which will be evaluated out of 10 for each practical/Tutorial and average of the same will be converted to 10 Marks.
- Internal Viva consists of 10 Marks.
- Practical performance/quiz/drawing/test will consist of 15 Marks during End Semester Exam.
- Viva/Oral performance will consist of 15 Marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3282	HVAC Systems
CO 1	Select proper refrigerant for various applications and make basic calculations of VCR System.
CO 2	Explore construction and working of different Air Conditioning systems.
CO 3	Estimate Air Conditioning Load Calculation for buildings.
CO 4	Select proper air-conditioning system for various applications and construct duct layout for the systems.
CO 5	Understand various Psychrometric Processes and Its applications.

Mapping of CO with PO

SEME3282	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	1					1					
CO 2	3	1	3	2	2	1	1					
CO 3	3	3	2	2	3		1					
CO 4	2	2	3	1	3		1					
CO 5	3	2	1	2	2							

Mapping of CO with PSO

SEME3282	PSO1	PSO2	PSO3
CO 1	2	3	
CO 2	2	1	

CO 3	3	2	
CO 4	2	2	
CO 5	1	1	1

Level of Bloom's 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 Refrigeration	1,2,3,4
2	Psychrometry	1,2,3
3	Air Conditioning Systems	1,2,3
4	Duct Design and Air Distribution	1,2,3,4,5
5	Load Analysis	1,2,3,4,5,6
6	Vapour Absorption Systems	1,2

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3292

Course Name: Thermal Engineering

Prerequisite Course(s): SEME2011-Engineering Thermodynamics, SEME3111 – Heat & Mass Transfer

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	00	04	40	60	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- identify which are the different power plants in operation with fundamentals various power generation units.
- interpret economics of power generation and country's energy hunger and potential.
- understand different power plant units like Steam based, gas-based power plants, Hydro and Nuclear power plants.
- explore power plants based on renewable resources like Solar, Wind, Geothermal, Tidal.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	Thermal Power Plant General Layout of modern power plant, Site selection, Present status of power generation in India.	03	07
2.	Economics of Power Generation Load duration curves, Connected load, Maximum load, Peak load, Base load and peak load power plants, Load factor, Plant capacity factor, Plant use factor, Demand factor, Diversity factor, Cost of power plant, Performance and operating characteristics of power plant, Tariff for electric energy.	08	18
3.	High Pressure Steam Generators Unique features and advantages, La-Mont; Benson; Velox, Loeffler and Schmidt-Hartmann boilers, Supercritical, Positive circulation, Fluidized bed combustion.	05	12
4.	Coal and Ash handling Systems Coal handling and preparation, Combustion equipment and firing methods, Pulverized mills, Mechanical Stokers, Pulverized coal firing systems, Cyclone Furnace, Necessity of	06	13

	Ash disposal, Ash handling systems, Dust collection and its disposal, Mechanical Dust Collector, Electrostatic precipitator, Carbon capture and utilization, Transporting CO ₂ from capture to storage or use.		
Section II			
Module No.	Content	Hours	Weightage in %
5.	Draught System Natural draught – Estimation of height of chimney, Maximum discharge condition, Forced; induced and balanced draught, Power requirement by fans	04	08
6.	Nuclear and Hydro Power Plant Principal of Nuclear energy, Nuclear fission and chain reaction, types of reactors, Boiling water reactor, Pressurised water reactor, Pressurised Heavy water reactor, CANDU reactor Gas cooled reactor, fast breeder reactor, Classification of Hydro-electric power plants and their applications.	08	17
7.	Feed Water Treatments Internal & external water treatment systems – Hot lime soda process, Zeolite ion exchange process, Demineralization plants, Reverse osmosis process, Sea water treatment using reverse osmosis, De-aeration	05	12
8.	Condensers and Cooling Tower Types of Condensers, Condenser Efficiency, Mass of cooling water required, Terminology of Cooling tower, Types of cooling tower and cooling ponds	06	13
	TOTAL	45	100

Text Book (s):

Title	Author/s	Publication
Power Plant Engineering 4e	P.K. Nag	McGraw-Hill Education

Reference Book(s):

Title	Author/s	Publication
A Course in Power Plant Engineering	S. C Arora and S. Domkundwar	Dhanpat Rai & Co.
A Text Book of Power Plant Engineering	R. K. Rajput	Laxmi Publications (P) Ltd.
Power Plant Technology	M.M. El-Wakil	McGraw-Hill Education

Web Material Link(s):

- <https://nptel.ac.in/courses/112107216/> (Review of Thermodynamics)
- <https://nptel.ac.in/courses/108105058/8> (Thermal Power Plants)
- <https://nptel.ac.in/courses/112106133/15> (Capacity of Steam Power Plant)

Course Evaluation:**Theory:**

- Continuous Evaluation consists of two tests each of 30 Marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:

- Model Preparation task consists of 10 marks.
- Internal Viva consists of 10 marks.
- Viva/Oral Performance of 30 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3292	THERMAL ENGINEERING
CO 1	Interpret different parameters associated with power generation and supply.
CO 2	Define the role of various power plants for fulfilment of energy requirement of country.
CO 3	Identify the india's 3 stage nuclear programme and current power generation by nuclear plants.
CO 4	Understand various components and requirements of different power plants.
CO 5	Explore various coal & ash handling systems and feed water treatments.

Mapping of CO with PO

SEME3292	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	1	2						3	3	1
CO 2	2	2	2			2	3			3		3
CO 3	2	3	3	3	1	2	3	3	3	3	3	3
CO 4	2	2	3		1					3		1
CO 5	2	1					3	3		3		

Mapping of CO with PSO

SEME3292	PSO1	PSO2	PSO3
CO 1	1	2	3
CO 2	2	3	1
CO 3	3	3	3
CO 4	1	2	1
CO 5	1	1	1

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Thermal Power Plant	1, 2
2	Economics of Power Generation	1, 2, 3
3	High Pressure Steam Generators	1, 2, 3
4	Coal and Ash Handling Systems	1, 2
5	Draught System	1, 2, 3
6	Nuclear and Hydro Power Plant	1, 2
7	Feed Water Treatments	1, 2
8	Condenser and Cooling Tower	1, 2, 3

**P P Savani University
School of Engineering**

Department of Mechanical Engineering

Course Code: SEME3660

Course Name: Production Management

Prerequisite Course(s): -- SEME4040 – Operations Research, SEME3241 – Industrial Engineering

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	-	03	40	60	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

- To acquaint the students with decision making in Planning, Scheduling and control of Production functions in both manufacturing and services.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Production function – an Introduction Definitions and types of production systems. Strategic Management – corporate strategies, production strategies, World class manufacturing, demand forecasting for Operations	08	20
2.	New product development Product Design, New product development, process planning and design, value analysis, capacity planning.	10	20
3.	Plant location and layout Plant location, factors influencing plant location, Plant layout- classification of layout with advantages, layout design procedures, Production planning and control – aggregate planning-nature, Strategies, methods, Master production Plan.	07	10
Section II			
Module No.	Content	Hours	Weightage in %
4.	Quality control Quality control-Definition, need, Quality control techniques, control charts, acceptance sampling, six sigma, and quality circles. TQM-scope, benefits, JIT	10	25
5.	Flexible manufacturing system Flexible Manufacturing Systems. Pokayoke-Characteristics,	10	25

	levels, classification, principles, device. Kaizen-Elements, classification, steps in implementing kaizen.		
	TOTAL	45	100

Text Book(s):

Title	Author/s	Publication
Production and Operations Management	R. Panneerselvam	PHI learning.
Production and operations Management	Martin K. Staff	Cengage learning.
Production & operation & Management	V.K. Khurana	ANE books

Reference Book(s):

Title	Author/s	Publication
Production and Operations management with solution manual	Kanishka bedi	Oxford University press, Chennai
Production and operations management	R.B. Khanna	PHI learning private ltd

Course Evaluation:

Theory:

- Continuous Evaluation consists of Two Test Each of 30 Marks and 1 Hour of duration.
- Submission of assignment which consists of 5 Questions to be answered under each module and it carried of 10 Marks of Evaluation Banner or Presentation on modern measuring Instruments.
- End Semester Examination will consist of 60 Marks Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3660	PRODUCTION MANAGEMENT
CO 1	Understand various production systems and management principles, corporate and production strategies.
CO 2	Become familiar with the planning and designing of production processes
CO 3	Understand the critical factors in plant location and layout design, apply production planning and control techniques
CO 4	Develop understanding of various quality control
CO 5	Become familiar with Flexible Manufacturing Systems and delve into the principles of Pokayoke as well as Kaizen elements

Mapping of CO with PO

SEME3660	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2		1			3	1	2	2	3	3	2
CO 2	1	1	1	1		2	2	3	1	3	3	2
CO 3	2	2	2	1		3	1	2	2	2	3	2
CO 4	2	1	1	1		2	1	2	2	2	3	2
CO 5	1	3	2	2		2	1	2	1	2	3	2

Mapping of CO with PSO

SEME3660	PSO1	PSO2	PSO3
CO 1	2	2	1
CO 2	3	2	2
CO 3	2	2	2
CO 4	1	2	2
CO 5	2	2	1

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Management and its evaluation	1, 2, 3, 5
2	Apparel production planning and control	1, 2, 3, 4
3	Terminology for apparel production planning	1, 2, 3,
4	Kinds of manufacturing system	1, 2, 3
5	Planning, Production planning and work allocation	1, 2, 3
6	Production Activities	1, 2, 3

**P P Savani University
School of Engineering**

Department of Mechanical Engineering

Course Code: SEME3670

Course Name: Cost Estimation for Engineers

Prerequisite Course(s): -- SEME4040 – Operations Research

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	-	03	40	60	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- provide deep study of the costing principles, techniques and cost component.
- address the underlying concepts, methods and application of Engineering Costing & Estimating.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Costing & Estimation Definition, Scope, Objectives & Significance, Cost Objects, Cost Centers & Cost Units, Classification of Cost, Types of Estimate, Standard Data, Methods of Estimates	04	05
2.	Cost Ascertainment – Element of Cost Material Cost – EOQ, Safety Stock, Minimum level, Maximum Level, Re-order Quantity, Types of inventory control systems, Valuation by FIFO, LIFO etc., Illustrative Example Labour Cost - Methods of wage payments for direct and indirect labour, Piece rate system, Wage incentives: different plans, Illustrative Example Overheads – Collection, Classification, Apportionment, Absorption treatment of overhead, Illustrative Example	07	15
3.	Marginal Costing Depreciation – Purpose & Method - straight line method, Diminishing balance method, Break-even analysis, Margin of safety, Application of marginal costing for decision making, Illustrative Example	07	20
4.	Budget and Budgetary Control	04	10

	Concepts, Types of Budgets, Budgetary Control, Preparation of Budgets, Illustrative Example		
Section II			
Module No.	Content	Hours	Weightage in %
5.	Cost Estimation of Forging Shop Losses in forging, Forging Cost, Illustrative Example Cost Estimation of Foundry Shop Estimation of pattern cost, Foundry losses, Steps for Finding Costing cost, Illustrative Example	09	20
6.	Cost Estimation of Fabrication Shop Weldments & Welded joints, Welding Cost, Illustrative Example	05	10
7.	Time & Cost Estimation of Machine Shop Estimation of machining time for lathe operations, Estimation of machining time for drilling, boring, shaping, planning, milling and grinding operations, Illustrative Example	09	20
	TOTAL	45	100

Text Book(s):

Title	Author/s	Publication
Mechanical Estimating and Costing	B.P. Sinha	Tata McGraw Hill Publishing Co. Ltd. N. Delhi
Mechanical Estimating and Costing	T.R. Banga and S. C. Sharma	Khanna Publishers, Delhi-6

Reference Book(s):

Title	Author/s	Publication
Industrial Engineering & Operations management	S. K. Sharma & Savita Sharma	Kataria publishers
Process Planning & Cost Estimation	R. Kesoram, C. Elanchezhian & B. Vijaya Ramnath	New age international publication
Process Planning & Cost Estimation	M. Adithan	New age international publication

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3670	COST ESTIMATION FOR ENGINEERS
CO 1	Identify different areas of Engineering Costing & Estimating.
CO 2	Analyze the applications of all the areas in day to day life.
CO 3	Apply cost estimating in decision making.
CO 4	Develop the concept of budgetary control.

Mapping of CO with PO

SEME3670	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		1	1	2		2			3	1	3	1
CO 2	3	3	3	3	3	3	3	3	3	3	3	3
CO 3	3	3	3	3	3	3	3	3	3	3	3	3
CO 4	2	3	2	3	3	3	3	3	3	1	3	3

Mapping of CO with PSO

SEME3670	PSO1	PSO2	PSO3
CO 1	2	3	
CO 2	3	3	
CO 3	3	3	3
CO 4	3	3	3
CO 5			

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Costing & Estimation	1, 2, 3, 4
2	Cost Ascertainment-Element of Cost	1, 2, 3, 4
3	Marginal Costing	1, 2, 3, 4
4	Budget and Budgetary Control	1, 2, 3, 4, 5
5	Cost Estimation of Forging and Foundry Shop	1, 2, 3, 4, 5
6	Cost Estimation of Fabrication Shop	1, 2, 3, 4, 5
7	Time & Cos Estimation of Machine Shop	1, 2, 3, 4, 5

**P P Savani University
School of Engineering**

Department of Mechanical Engineering

Course Code: SEME3680

Course Name: Product Development & Value Engineering

Prerequisite Course(s): -- SEME4040 – Operations Research, SEME3241 – Industrial Engineering

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	-	03	40	60	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- learn about product design.
- learn about manufacturing and assembly and able to select materials for product design.
- learn about the customer needs for product for value engineering services.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Product Design Introduction, Product life cycles, characteristics of successful product development, design and development of products, types of design and redesigns, engineering designs, duration and cost of product development, the challenges of product development.	08	20
2.	Product Design for Manufacturing and Assembly Methods for designing for manufacturing and assembly, design for maintainability, design for environment, legal factors and social issues, engineering ethics and issues of society related to design of products, design for safety, vision and illumination design, climate, noise, motion, sound and vibration, product costing.	10	20
3.	Product Analysis and Material Selection Tools and charts used for product analysis like bill of materials, gozinto chart, performance characteristics of materials, material selection process, sources of information on material properties, economics of materials, evaluation methods for material selection.	07	10
Section II			

Module No.	Content	Hours	Weightage in %
4.	Identifying Customer Needs Customer satisfaction, voice of customer, customer populations, types of customer needs, customer need models, gathering customer needs: Need gathering methods, conducting interviews, like dislike method, articulated-used method, product feel and industrial design, organizing and prioritizing needs, grouping interpreted needs, affinity diagram, determining need importance, customer use patterns, customers need documentation.	10	25
5.	Value Engineering Definition, value engineering function, approach of function, evaluation of function, determining function, classifying function, evaluation of costs, evaluation of worth, determining worth, evaluation of value, FAST diagramming. Case studies on product design development and value engineering.	10	25
	TOTAL	45	100

Text Book(s):

Title	Author/s	Publication
Product Design	Kevin Otto, Kristin Wood	Pearson Education Inc.
Product design and development	K.T. Ulrich and S.D. Eppinger	Tata McGraw Hill

Reference Book(s):

Title	Author/s	Publication
Product development	Chitale & Gupta	Tata McGraw Hill
The mechanical process design	David Ullman	McGraw Hill Inc.
Engineering Design Process	Yousef Haik	T M M Shahin, Cengage Learning
Product design & Process Engineering	Niebel and Deeper	McGraw Hill
Value Management	Heller	Addison Wasley
Value Engineering: A systematic approach	Arthur E. Mudge	McGraw Hill
New Product Development	Timjones, Butterworth Heinmann	Oxford
Assembly automation and product design	Geoffrey Boothroyd	CRC Taylor & Francis

Course Evaluation:

Theory:

- Continuous Evaluation consists of Two Test Each of 30 Marks and 1 Hour of duration.

- Submission of assignment which consists of 5 Questions to be answered under each module and it carried of 10 Marks of Evaluation Banner or Presentation on modern measuring Instruments.
- End Semester Examination will consist of 60 Marks Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3680	PRODUCT DEVELOPMENT VALUE ENGINEERING
CO 1	Interpret product design and development process.
CO 2	Contrast and frame customer specification to configure product with function.
CO 3	Choose product architecture and virtual prototyping.
CO 4	Understand contemporary issues and their impact on provided solution.
CO 5	Solve open ended problem belongs to design engineering that meet the requirements.

Mapping of CO with PO

SEME3680	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	1	1	1			1	1	1	1	
CO 2	2	3	2	2	1		2	1		1	1	1
CO 3	2	1	1	2	2	2	2	1	1	2	1	1
CO 4	2	2	3	2	2		2	3	1	2	2	2
CO 5	1	3	2	2	3	2	3	1		3	2	2

Mapping of CO with PSO

SEME3680	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	1	1	1
CO 3	3	1	1
CO 4	2	3	3
CO 5	3	3	3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Product Design	1, 2, 3, 5, 6
2	Product Design for Manufacturing and Assembly	1, 2, 3, 4, 5, 6
3	Product Analysis and Material Selection	1, 2, 3, 4, 5, 6
4	Identifying Customer Needs	1, 2, 3, 4
5	Value Engineering	1, 2, 3, 4

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3690

Course Name: Gas Dynamics

Prerequisite Course(s): -- SEME2060 - Fluid Mechanics, SEME3292 - Power Plant Engineering

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	-	03	40	60	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- learn about basic concepts of gas dynamics
- learn about how the gas behaves in different operating conditions
- learn about basics of compressible flow
- learn about application of gas dynamics in various mechanical systems

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Fundamentals of compressible flow: Ideal gas relationship, The adiabatic energy equation, Mach number and its significance, Mach waves, Mach cone and Mach angle, static and stagnation states, relationship between stagnation temperature, pressure, density and enthalpy in terms of Mach number, stagnation velocity of sound, reference speeds, various regions of flow, Effect of Mach number on compressibility, Area velocity relationship.	08	20
2.	One Dimensional Isentropic flow: General features of isentropic flow, performance curve, Comparison of adiabatic and isentropic process, One dimensional isentropic flow in ducts of varying cross-section- nozzles and diffusers, operation of nozzles under varying pressure ratio, mass flow rate in nozzles, critical properties and choking, area ratio as function of Mach number, Impulse function, non-dimensional mass flow rate in terms of pressure ratio, area ratio and Mach number, Working charts and gas tables, Application of Isentropic flow	10	20
3.	Flow in constant area duct with heat transfer (Rayleigh flow):	07	10

	Simple heating relation of a perfect gas, Rayleigh curve and Rayleigh flow equations, variations of flow properties, maximum heat transfer, tables and charts for Rayleigh flow.		
Section II			
Module No.	Content	Hours	Weightage in %
4.	Normal shock Waves: Development of shock wave, Thickness of shock wave, governing equations, Strength of shock waves, Prandtl-Mayer relation, Rankine-Hugoniot relation, Mach number in the downstream of normal shock, variation of flow parameters across the normal shock, normal shock in Fanno and Rayleigh flows, impossibility of a rarefaction shock, supersonic diffusers, supersonic pitot tube.	10	25
5.	Flow in constant area duct with friction (Fanno flow): Fanno curve and Fanno flow equations, solution of Fanno flow equations, variation of flow properties, variation of Mach no. with duct length, isothermal flow in constant area duct with friction, tables and charts for Fanno flow, Experimental friction coefficients.	10	25
	TOTAL	45	100

Text Book(s):

Title	Author/s	Publication
Fundamental of Compressible flow	S. M. Yahya	New Age International Publication
Fundamentals of compressible fluid dynamics	P. Balachandran	PHI Learning, New Delhi

Reference Book(s):

Title	Author/s	Publication
Gas Dynamics	E. Rathakrishnan	PHI Learning, New Delhi
Gas Dynamics and Jet Propulsion	P. Murugaperumal	Scitech Publication, Chennai.

Course Evaluation:

Theory:

- Continuous Evaluation consists of Two Test Each of 30 Marks and 1 Hour of duration.
- Submission of assignment which consists of 5 Questions to be answered under each module and it carried of 10 Marks of Evaluation Banner or Presentation on modern measuring Instruments.
- End Semester Examination will consist of 60 Marks Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3690	GAS DYNAMICS
CO 1	Understand the fundamentals of compressible flow
CO 2	Formulate and develop the flow parameters for isentropic flow.

CO 3	Analyze the effect of normal shock in compressible flow.
CO 4	Study the effect of friction on compressible flow in constant area duct.
CO 5	Study the flow through constant area duct with heat transfer

Mapping of CO with PO

SEME3690	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	1	3	1					2	1	1
CO 2	2	2	1	2	1		1		2	2		1
CO 3	2	1	1	2	1	2	1		2	2		1
CO 4	2	1	1	3	1					2	1	1
CO 5	2	1	1	3	1					2	1	1

Mapping of CO with PSO

SEME3690	PSO1	PSO2	PSO3
CO 1	2	3	
CO 2	2	3	2
CO 3	3	3	2
CO 4	2	3	1
CO 5	2	3	1

Level of Bloom's 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 compressible flow	1, 2, 3, 5
2	One Dimensional Isentropic flow	1, 2, 3, 4, 5
3	Flow in constant area duct with heat transfer (Rayleigh flow)	1, 2, 3, 3, 5
4	Normal shock Waves	1, 2, 3, 5
5	Flow in constant area duct with friction (Fanno flow)	1, 2, 3, 5

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3710

Course Name: Mechatronics

Prerequisite Course(s): - SEME4011 – Control Engineering,
SESH1240 – Electrical & Electronics Workshop

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	-	03	40	60	-	-	-	-	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- Understand applications signal processing, sensors, actuators.
- Apply the importance of mechatronics systems.
- Understand the importance of maintenance and safety in Robotics systems.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Introduction Control devices-Meaning, need and application. Open loop control. Closed loop control Sinking and sourcing concept.	04	08
2.	Signal Processing Signal processing- Need and meaning. Data acquisition Sampling. Digitized signal. Sampling rate. Nyquist frequency. Aliasing. Analog to digital signal conversion. Digital to analog signal conversion	06	14
3.	Sensors Sensors- Need and classification. Important parameters (such as sensitivity, linearity, range, response time, accuracy, repeatability, Resolution, threshold value etc.) Its definitions and Importance in sensor Selection. Working and application of sensing technique for following parameter. i. Position and speed. ii. Stress, strain. iii. Temperature. iv. Pressure. v. Flow and level. vi. Vibration vii. Acoustic viii. Optical ix. Object detection. Selection criteria for sensors. Common troubles and remedies in sensor operations.	08	18
4.	Actuators Definition, need, working, applications. Electrical actuator	04	08

	(working and application). i. DC motors – series, shunt and compound. ii. Ac Single-phase motor. AC poly phase motor. iv. Servo Motor v. Stepper motors. Hydraulic & Pneumatic actuators (working and application) i. Types of Cylinder. ii. Direction control valve. Precautions in handling / operating actuators. Selection criteria. Common troubles and remedies.		
Section II			
Module No.	Content	Hours	Weightage in %
5.	Mechatronic Systems Introduction. Design steps and considerations. Various mechatronics systems. i. Being used in day-to-day life. ii. Expected use in future. Working elements ,its functions and applications of following system. i. Hydraulic robot arm. ii. DC motor based bottle filling. iii. Temperature sensing system. Mechatronics systems, which are in recent trend.	11	25
6.	Robotics Applications, Maintenance and Safety Applications of robots (including special types). Robot maintenance: Need and types. Common troubles and remedies in robot operation. General safety norms, aspects and precautions in robot handling	12	27
	TOTAL	45	100

Text Book (s):

Title	Author/s	Publication
Mechatronics-Electronics Control Systems in Mechanical and Electrical Engineering	W.Boltong Pearson	Tata McGraw Hill Education
Mechatronics	Ganesh Hedge	Jones & Bartlett

Reference Book(s):

Title	Author/s	Publication
Robotics-Control, Sensing, Vision and Intelligence	Ralph Gonzalez, C.S.G. Lee, K.S. Fu	Tata McGraw Hill Education
Industrial Robotics	Roger N Nagel, M.P. Groover, N.G. Odrey, Michell Weiss	Tata McGraw Hill Education

Course Evaluation:

Theory:

- Continuous Evaluation consists of Two Test Each of 30 Marks and 1 Hour of duration.
- Submission of assignment which consists of 5 Questions to be answered under each module and it carried of 10 Marks of Evaluation Banner or Presentation on modern measuring Instruments.
- End Semester Examination will consist of 60 Marks Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3710	MECHATRONICS
CO 1	Understand the basic concept of signal processing.
CO 2	Understand the working principle of sensors and actuators.
CO 3	Define and identify various mechatronics systems.
CO 4	Understand the importance of maintenance and safety of Robotics.

Mapping of CO with PO

SEME3710	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2	2	3	1	2	1		1	2		3
CO 2	3	2	2	2	2		2		1	2		2
CO 3	2	2	2	3	1	2	3	3		3	2	2
CO 4	2	2	3	3	3	2	3	1	1	3	2	2

Mapping of CO with PSO

SEME3710	PSO1	PSO2	PSO3
CO 1	3	2	3
CO 2	2	2	2
CO 3	3	2	2
CO 4	3	3	3

Level of Bloom's 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	1, 2, 3
2	Signal Processing	1, 2, 3, 5
3	Sensor	1, 2, 3
4	Actuators	1, 2, 3
5	Mechatronics Systems	1, 2, 3, 4
6	Robotics Applications, Maintenance and Safety	1, 2, 3, 4

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3720

Course Name: Plastics, Ceramics and Composites

Prerequisite Course(s): SEME2020 - Material Science and Metallurgy,
SEME2050 – Forming & Machining Processes,
SEME3230 – Production Technology,

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	-	03	40	60	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- understand the concept of plastic, ceramic and composite material.
- know processing of plastics and ceramics materials.
- identify different manufacturing process for composite material.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Introduction Polymeric materials and comparison with other engineering materials. Plastic, Thermoplastic and Thermosets, Elastomers and polymers.	04	10
2.	Processing of plastics and rubbers Introduction to injection moulding, rotational moulding, extrusion, blow moulding, plastic film blowing, compound moulding, resin transfer moulding, resin injection moulding, designing with plastics and rubbers.	09	20
3.	Fabrication and decorating of plastics Machining of plastics, turning, drilling, sawing, threading, post -moulding techniques, hot stamping, metallic coatings, electroplating, printing, vacuum metalizing and some case studies.	09	20
Section II			
Module No.	Content	Hours	Weightage in %
4.	Ceramic materials Atomic bonding and crystal structure in ceramics,	08	15

	conventional ceramics and glass structure, refractory and insulating materials, physical, thermal, electrical, magnetic, optical and piezoelectric properties, Differentiation from other engineering materials, Time temperature and environmental effect on properties of ceramics.		
5.	Processing of ceramics Phase Equilibrium Diagram, Gibbs phase rule, advanced structural ceramics, synthesis and processing of ceramics, sintering process, powder pressing and sintering fabrication processes, Sintering defects, slip casting, ceramic injection moulding, tape casting, properties & applications of ceramics and material selection.	07	15
6.	Composite materials Merits & demerits of composites, application of composite, manufacturing processes of composites, Property evaluation of composites.	08	20
	TOTAL	45	100

Reference Book(s):

Title	Author/s	Publication
Plastic Process Engineer	Throne James L.	Marcel Dekker, New York, 1979.
Engineering Design of Plastics and Rubber	Crawford R.J	Woodhead Publication, U.K, 1985
Modern Ceramic Engineering, Properties, Processing and Use in Design	Richerson David	Marcel Dekker, 1987
Engineering Materials and their Applications	Flinn R.A. and Trojan P.K.	Jaico Publishing House, 1999.
Introduction to Ceramics	Kingery W.D, Bowen H. K and Uhlman D.R.	John Wiley & Sons, 1975.

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3720	PLASTICS, CERAMICS & COMPOSITES
CO 1	Know the different processes and bedecking of plastics and rubbers.
CO 2	Apply the knowledge and applications of ceramics in material selection.
CO 3	Understand application of composite materials.

CO 4	Identify materials for different applications.
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Mapping of CO with PO

SEME3720	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2	1	2			1		1	2		
CO 2	3	3		2	1							1
CO 3	2	2		3	3	3			1	3	1	1
CO 4	2	2	1	2			3		1	2		

Mapping of CO with PSO

SEME3720	PSO1	PSO2	PSO3
CO 1	2	1	
CO 2	2	3	
CO 3	3	3	2
CO 4	2	2	

Level of Bloom's 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	1, 2, 3
2	Processing of Plastic and Rubbers	1, 2, 3, 5
3	Fabrication and decorating of plastics	1, 2, 3
4	Ceramic materials	1, 2, 3
5	Processing of ceramics	1, 2, 3, 4
6	Composite materials	1, 2, 3, 4

**P P Savani University
School of Engineering**

Department of Mechanical Engineering

Course Code: SEME3730

Course Name: Design of Pressure Vessel & Piping

Prerequisite Course(s): -- SECV2102 – Advanced Solid Mechanics,
SEME3060 – Design of Basic Machine Elements,
SEME4061 – Design of Power Transmission Elements

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	-	03	40	60	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- learn about design of pressure vessels and piping systems.
- learn to use of various standards used for the pressure vessel design.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Stresses in Pressure Vessel Introduction to stresses in pressure vessel and its application to shells and end closures, stresses in circular plate, Thermal stresses, stresses in plate having the circular hole due to bi-axial loading, excessive elastic deformation, plastic instability, brittle, rupture and creep.	08	20
2.	Pressure vessel design code Introduction to ASME code for pressure vessel design, pressure vessel and related components design using ASME codes, design of nozzle.	10	20
3.	Supports design for Pressure vessel Design of base plate and support lugs, allowable stresses, design of saddle supports.	07	10
Section II			
Module No.	Content	Hours	Weightage in %
4.	Other design consideration in pressure vessel Buckling phenomenon, Elastic buckling of circular ring and cylinders under external pressure, collapse of thick walled cylinders or tubes under external pressure, effect of	10	25

	supports on elastic buckling of cylinders, design of circumferential stiffness, buckling under combine external pressure and axial loading, fatigue, shock high pressure high temperature irradiation corrosion and other hostile environments, high strength, light weight pressure vessels resistant to external high pressures found in undersea exploration.		
5.	Piping design for pressure vessel Flow diagram, piping layout and piping stress analysis, flexibility factor and stress intensification factor, design of piping as per B31.1 piping code, piping components: bends, tees bellows and valve. Types of piping supports and the behaviour, Introduction to piping codes and standards.	10	25
	TOTAL	45	100

Text Book(s):

Title	Author/s	Publication
Pressure vessel design	J F Harvey	CBS publication
Process equipment design	L E Brownell	Wiley Eastern Ltd., India

Reference Book(s):

Title	Author/s	Publication
ASME Pressure Vessel and Boiler Code, Section VIII Div 1,2 and 3	-	-
Pressure vessel design handbook	Henry H Bednar	CBS publishers and distributors
Chemical Process equipment, selection and design, Butterworths, Series in Chemical Engineering, 1988	Stanley M Wales	-
Pressure Vessels: ASME Code Simplified	J Philip Ellenberger	-
Fundamentals of piping design	P Smith	Elsevier

Course Evaluation:

Theory:

- Continuous Evaluation consists of Two Test Each of 30 Marks and 1 Hour of duration.
- Submission of assignment which consists of 5 Questions to be answered under each module and it carried of 10 Marks of Evaluation Banner or Presentation on modern measuring Instruments.
- End Semester Examination will consist of 60 Marks Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME3730	DESIGN OF PRESSURE VESSEL & PIPING
CO 1	Analyse thin plates and shells for various types of stresses.

CO 2	Understand and evaluate the terms involved for the design of pressure vessel and piping.
CO 3	Develop shells, end closures and nozzles of pressure vessels using asme codes.
CO 4	Analyse and examine piping systems.

Mapping of CO with PO

SEME3730	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	3	3	3	3	2	1	1	2		
CO 2	3	3	3	3	3	3	2	1		2	1	
CO 3	3	3	3	3	2		2	1	2	2	2	1
CO 4	2	3	2	2	1			1		1	1	

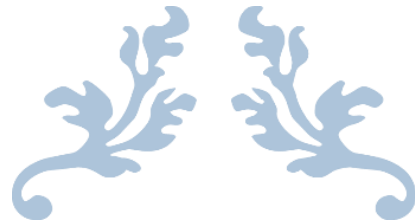
Mapping of CO with PSO

SEME3730	PSO1	PSO2	PSO3
CO 1	3	3	3
CO 2		3	3
CO 3	3	3	3
CO 4	1	2	2

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1.	Stresses in Pressure Vessel	1, 2, 3, 4, 5, 6
2.	Pressure vessel design code	1, 2, 3, 4
3.	Supports design for Pressure Vessel	1, 2, 3, 4, 5
4.	Other design consideration in pressure vessel	1, 2, 4, 5
5.	Piping design for Pressure vessel	1, 2, 3, 4, 5, 6



FOURTH YEAR B. TECH.



P P SAVANI UNIVERSITY															
SCHOOL OF ENGINEERING															
TEACHING & EXAMINATION SCHEME FOR B. TECH. MECHANICAL PROGRAMME AY:2023-24															
Sem	Course Code	Course Title	Offered By	Teaching Scheme					Examination Scheme						
				Contact Hours				Credit	Theory		Practical		Tutorial		Total
				Theory	Practical	Tutorial	Total		CE	ES E	CE	ESE	CE	ESE	
7	SEME4211	Control Engineering	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME4220	Renewable Energy Sources & Systems	ME	3	2	0	5	4	40	60	40	60	0	0	200
	SEME4232	Design of Power Transmission Elements	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME4241	Operations Research	ME	3	0	1	4	4	40	60	0	0	100	0	200
		Elective-II	ME	2	2	0	4	3	40	60	40	60	0	0	200
	TNPC3020	Creativity, Problem Solving & Innovation	SEPD	2	0	0	2	2	100	0	0	0	0	0	100
	SEME4950	Project/Summer Internship	ME	0	5	0	0	5	40	60	0	0	100	0	100
						Total	21	24							1000
8	SEME4960	Project/Training	ME	0	23	0	23	23	0	0	200	300	0	0	500
						Total	23	23							500

ELECTIVE-II COURSES															
Sem	Course Code	Course Title	Offered By	Teaching Scheme					Examination Scheme						
				Contact Hours				Credit	Theory		Practical		Tutorial		Total
				Theory	Practical	Tutorial	Total		CE	ES E	CE	ESE	CE	ESE	
7	SEME4650	Advanced Manufacturing Technology	ME	2	2	0	4	3	40	60	40	60	0	0	200
	SEME4660	Electrical Technology	ME	2	2	0	4	3	40	60	40	60	0	0	200
	SEME4670	Applied Thermodynamics	ME	2	2	0	4	3	40	60	40	60	0	0	200
	SEME4680	Automobile Engineering	ME	2	2	0	4	3	40	60	40	60	0	0	200
	SEME4690	Quality Engineering & Reliability	ME	2	2	0	4	3	40	60	40	60	0	0	200
	SEME4700	Tools Design	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME4710	Design of Heat Exchangers	ME	2	2	0	4	3	40	60	40	60	0	0	200
	SEME4720	AI in Manufacturing	ME	2	2	0	4	3	40	60	40	60	0	0	200
	SEME4730	Industry 4.0 & IoT	ME	3	0	0	3	3	40	60	0	0	0	0	100
SEME4660	Electrical Technology	ME	2	2	0	4	3	40	60	40	60	0	0	200	

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME4211

Course Name: Control Engineering

Prerequisite Course(s): SESH2211- Basics of Electrical & Electronics

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	-	03	40	60	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- develop the mathematical model of the physical systems.
- analyze the response of the closed and open loop systems.
- analyze the stability of the closed and open loop systems.
- design the various kinds of compensator.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	Fundamentals of Control System Basic Concepts of Control System, Classification, System Modeling, Transfer Function, Block Diagram Representation, Signal Flow Graph, Concept of Superposition for Linear Systems with Examples	03	15
2.	System Modelling Translational and Rotational Mechanical, Electrical, Thermal, Hydraulic and Pneumatic Systems, Force Voltage and Force Current Analogy, Position Servo Mechanism.	08	15
3.	Block Diagram and Signal Flow Analysis Block diagram and signal flow graph representation of physical systems along with rules, properties, comparison and limitation, Mason's gain formula		15
4.	Stability Analysis Concept of stability, types of stability, Routh's stability criterion, special cases with numerical examples, stability of closed loop system, concept of root locus, open loop and closed loop transfer poles, step by step procedure for root loci, numerical examples	08	15
5.	Time response analysis: Standard test signals along with examples of their usage, steady state errors for step, ramp and parabolic inputs, analysis of first and second order systems, Transient response specifications with numerical examples, Basic control actions and two position, proportional, PI, PID and rate feedback controllers, Limitations of time domain analysis.	06	10
6.	Frequency Response Analysis Need of Frequency Response Analysis, Sinusoidal Response of Linear System, Methods Used in Frequency Response, Frequency	08	10

	Domain Specifications		
7.	Hydraulic Control System Basic Elements of Hydraulic Circuit, Principle Used in Hydraulic Circuit, Sources of Hydraulic Power, Integral, Derivative, PD & PID Controller With its Transfer Function, Comparison Between Hydraulic and Electrical Control System	06	10
8.	Pneumatic Control System Basic Elements of Pneumatic Circuit, Difference Between Pneumatic and Hydraulic Control Systems, Force Balance and Force Distance Type Controllers, Nozzle-Flapper Amplifier, PD, PI and PID Control System along with its Transfer Function.	06	10
	TOTAL	45	100

Text Book(s):

Title	Author/s	Publication
Control System Engineering	J.Nagrath and M.Gopal	New Age International Publishers, 5th Edition, 2007
Automatic Control Systems	Farid Golnaraghi, Benjamin C Kuo,	John Wiley & Sons, Inc., 9th Edition

Reference Book(s):

Title	Author/s	Publication
Modern Control Engineering	Ogata K.	Prentice Hall India, 2003
Modern Control Systems	Richard C. Dorf, Robert H Bishop	Pearson Education International, 12th Edition.
Control System Engineering	Norman S Nise	John Wiley & Sons, Inc., 6th Edition

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination will consist of 60 marks.

Practical:

- Continuous Evaluation consists of Performance of Practical which should be evaluated out of 10 for each practical in the next turn and average of the same will be converted to 10 Marks.
- Internal Viva component of 10 Marks.
- Practical performance/quiz/drawing/test of 15 Marks during End Semester Exam.
- Viva/Oral performance of 15 Marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME4211	CONTROL ENGINEERING
C01	Summarized fundamentals of control systems and components of control systems
C02	Demonstrate the methodology for modelling mechanical, hydraulic and pneumatic systems for control.
C03	Summarize various techniques related to stability analysis of a control system.
C04	Analyze time domain and frequency domain responses of mechanical systems.
C05	Utilization PD, PI, PID controllers for control of physical systems.

Mapping of CO with PO

SEME4211	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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CO 1	1	1		1								
CO 2	3	2	1	1	1							
CO 3	2	2	1	1								
CO 4	2	2	1	1								
CO 5		2		1								

Mapping of CO with PSO

SEME4211	PSO1	PSO2	PSO3
CO 1	1	3	
CO 2	1	3	1
CO 3	1	3	
CO 4	2	3	1
CO 5		3	

Level of Bloom's 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 Control System	1, 2
2	System Modeling	1, 2, 5, 6
3	Time Response and Stability Analysis	1, 2, 4, 5
4	Frequency Response Analysis	1, 2, 3, 4, 5
5	Hydraulic Control System	1, 2, 3, 4, 5
6	Pneumatic Control System	1, 2, 3, 4, 5

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME4220

Course Name: Renewable Energy Sources & Systems

Prerequisite Course(s): SEME3011-Heat Transfer

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- identify which are the different renewable energy sources available and their national scenario.
- interpret Solar energy and related terminology along with their possible applications and conversions.
- Understand wind energy and related terminology along with their conversion to produce electricity.
- explore the geothermal and ocean energy with their possible conversions.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	Renewable Energy Scenario Scope for Renewable Energy, Advantages and Limitations of Renewable Resources, Present Energy Scenario of Conventional and Non- Conventional Resources, Government Policies, National Missions	04	10
2.	Solar Energy Energy Available from the Sun, Spectral Distribution, Sun-Earth Angles and their Relations, Measuring Techniques and Estimation of Solar Radiation Outside and the Earth's Atmosphere, Radiation on Tilted Surface Solar Power Generation Photovoltaic System for Power Generation, Types of Solar Cell Modules and Arrays, Solar Cell Types, Grid Connection, Payback Period Calculation, Advantages and Disadvantages, Site Selection and other Parameters.	10	15
3	Solar Applications Conversion of Solar Energy In to Heat, Solar Thermal Collectors, Solar Concentrators Analysis and Performance Evaluation, Solar Energy Thermal Storage, Solar Based Devices like: Solar Pumping, Solar Cooker, Solar Still, Solar Drier, Solar Refrigeration and Air Conditioning, Solar Pond, Heliostat, Solar Furnace	6	15
4.	Wind Energy Principle and Basics of Wind Energy Conversion, Energy Available from Wind, Basics of Lift and Drag, Effect of Density, Angle of Attack and Wind Speed	07	15

	Wind Power Conversion Wind Turbine Rotors, Horizontal and Vertical Axes Rotors, Drag, Lift, Torque and Power Coefficients, Tip Speed Ratio, Solidity of Turbine, Site Selection and Basics of Wind Farm, Solar-Wind Hybrid System		
5.	Bio Energy Energy from Biomass, Sources of Biomass, Different Species, Conversion Process, Advantages and Disadvantages, Properties of Biomass, Biomass Energy	04	10
6	Biogas Generation Conversion of Biomass into Fuels, Gasification and Combustion, Aerobic and Anaerobic Bio-Conversion, Types of Biogas Plants, Design and Operation, Factors Affecting Biogas Generation, Gasification, Types and Applications of Gasifiers	06	10
7.	Geothermal energy Availability, Vapor and Liquid Dominated Systems, Binary Cycle, Hot Dry Rock Resources, Magma Resources, Advantages and Disadvantages, Applications	05	15
8.	Ocean Energy Ocean Thermal Energy Conversion, Availability, Advantages and Limitations; Open, Closed and Hybrid Cycle Otec System, Wave and Tidal Energy, Estimation of Tidal Power, Tidal Power Plants, Single and Double Basin Plants, Site Requirements	06	10
	TOTAL	45	100

List of Practical:

Sr. No.	Name of Practical	Hours
1.	To Prepare one mathematical model using the Sun angles relations for particular any one solar application.	06
2.	Demonstration of Solar air heater, solar cooker, Solar pyranometer, Solar collector, biogas plant, gasifier.	06
3.	To estimate the solar day time with the help of sunshine recorder.	02
4.	To perform efficiency test of solar water heater with its different parameters.	04
5.	To evaluate distilled water output under solar desalination system considering different water depth and day-night performance and calculation of payback period.	04
6.	To estimate the solar power generation using PV panel and estimation of Payback period.	04
7.	To calculate the wind power generation using the small wind mill.	04
	TOTAL	30

Text Book (s):

Title	Author/s	Publication
Solar Energy-Fundamentals, Design, Modelling and Applications.	G.N. Tiwari	Narosa Publishers
Non-conventional energy resources.	Shobh Nath Singh	Pearson India
Solar Energy	S P Sukhatme, J K Nayak	McGraw Hill

Reference Book(s):

Title	Author/s	Publication
Principles of Solar Engineering	F. Kreith and J.F. Kreider	McGraw Hill

Solar Energy thermal processes	J.A. Duffie and W.A. Beckman	J. Wiley
Wind energy Theory and Practice	Ahmed	PHI, Eastern Economy Edition
Renewable Energy Sources and Emerging Technologies	Kothari	PHI, Eastern Economy Edition

Web Material Links:

- <https://nptel.ac.in/courses/112107216/> (Review of Thermodynamics)
- <https://nptel.ac.in/courses/108105058/8> (Thermal Power Plants)
- <https://nptel.ac.in/courses/112106133/15> (Capacity of Steam Power Plant)

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination will consist of 60 marks.

Practical:

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test consists of 15 marks during End Semester Exam.
- Viva/ Oral performance consists of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME4220	RENEWABLE ENERGY SOURCES & SYSTEMS
CO1	Analyze the present scenario of conventional and non-conventional energy in india.
CO2	Estimate the application of solar energy to develop different solar based devices in use.
CO3	Understand basics of wind energy and its use for power generation.
CO4	Relate the generation of biogas through different biogas plant and gasifier.
CO5	Recognize the basics of ocean, geothermal, tidal & wave energy based power plants.

Mapping of CO with PO

SEME4220	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		2	2	2	3	3	3	1	3	3		3
CO 2	2	2	3	3	3	3	3	1	3	3		3
CO 3	1	3	3	3	3	3	3	1	3	3		3
CO 4		3	3	2	3	3	3	1	3	3		3
CO 5		3	1	2	3	3	3	1	3	3		3

Mapping of CO with PSO

SEME4220	PSO1	PSO2	PSO3
CO 1	3	3	1
CO 2	3	3	3
CO 3	3	3	3
CO 4	3	3	3
CO 5	3	3	3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Renewable Energy Scenario	1, 2
2	Solar Energy, Solar Power Generation, Solar Applications	1, 2, 3
3	Wind Energy and Wind Power Generation	1, 2, 3
4	Bio Energy and Biogas Generation	1, 2, 4
5	Geothermal energy and Ocean Energy	1, 2

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME4232

Course Name: Design of Power Transmission Elements

Prerequisite Course(s): SEME32270-Theory of Machine ;SEME3252-Design of Machine Elements

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	0	0	04	40	60	0	0	0	0	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- learn the basics of various transmission elements involved in mechanical power transmission.
- identify various forces and its effect on power transmission.
- impart the ability for selection of proper power transmission system as per requirement.
- understand the standard data catalogue for various power transmission drives.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	Introduction to Design Terminologies, Stress, Strain, Types of Forces, Various Transmission Drives, Design	02	05
2.	Design of Flexible Elements Design of Flat Belts and Pulleys, Selection of V Belts and Pulleys, Selection of Hoisting Wire Ropes, Design of Transmission Chains and Sprockets	06	13
3.	Bearings Sliding Contact Bearings- Types of Journal Bearing, Load Carrying Capacity, Methods of Lubrication, Hydrodynamic Bearing, Performance of Bearing, Mckee's Equation, Heat Dissipation and Power Loss, Summerfield Number. Rolling Contact Bearing- Types, Bearing Designation (SKF and BIS), Static Load carrying Capacity, Life of Bearing, Basic Load Rating.	07	16
4.	Cams, Clutches and Brakes Cam Design: Types, Pressure Angle and Under Cutting Base Circle Determination, Design of Plate Clutches, Axial Clutches, Cone Clutches, Band and Block Brakes, External Shoe Brakes, Internal Expanding Shoe Brake	07	16
5.	Spur Gears and Parallel Axis Helical Gears Gear Terminology, Speed Ratios and Number of Teeth, Force Analysis Tooth Stresses, Dynamic Effects, Fatigue Strength, Factor of Safety, Gear Materials, Module and Face Width, Power Rating Calculations Based on Strength and Wear Considerations	06	10
6.	Bevel, and Worm Gear Straight Bevel Gear: Tooth Terminology, Tooth Forces and Stresses, Equivalent Number of Teeth, Estimating the Dimensions of Pair of Straight Bevel Gears.	05	15

	Worm Gear: Merits and Demerits, Terminology. Thermal Capacity, Materials, Forces and Stresses, Efficiency, Estimating the Size of the Worm Gear Pair.		
7.	Helical Gears Parallel Axis Helical Gears – Pressure Angle in the Normal and Transverse Plane - Equivalent Number of Teeth, Forces and Stresses; Cross Helical: Terminology - Helix Angles -Estimating the Size of the Pair of Cross Helical Gears	06	12
8.	Gear trains Geometric Progression, Standard Step Ratio, Design of Sliding Mesh Gear Box, Design of Multi Speed Gear Box, Types of Gear Trains, Simple Gear Trains, Compound Gear Train, Reverted Gear Train, Epicyclic Gear Train	06	13
	TOTAL	45	100

Text Book(s):

Title	Author/s	Publication
Design of Machine Elements	V B Bhandari	McGraw Hill Education
Mechanical Engineering Design	Joseph Shigley	McGraw Hill Education

Reference Book(s):

Title	Author/s	Publication
Machine Design	Sundararajamoorthy T. V	Anuradha Publications
Machine Design	R S Khurmi	S Chand Publication
Hand book of Mechanical Design	Gitin Maitra	McGraw Hill Education

Web Material Links:

- <https://nptel.ac.in/courses/112/106/112106137/>

Course Evaluation:

Theory:

- Continuous Evaluation consists of Two Tests Each of 30 Marks and 1 Hour of duration.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination will consist of 60 marks.

Tutorial:

- Continuous Evaluation consists of solution of Practical which should be evaluated out of 10 for each Tutorial and average of the same will be converted to 20 Marks.
- Performance/Problem solution/quiz/test of 15 Marks during End Semester Exam.
- Viva/Oral performance of 15 Marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME4232	DESIGN OF POWER TRANSMISSION ELEMENTS
CO1	Select the materials for the mechanical transmission system.
CO2	Apply the design principle in designing of flexible elements, bearings, cams, clutches, brakes, gears and gear trains.
CO3	Estimate life of rolling element bearings and determine performance parameters of sliding contact bearings.
CO4	Describe the terminology of different gears and cams.
CO 5	Evaluate speed variation on gear box shafts and optimize fluctuation of shaft speeds in gear box.

Mapping of CO with PO

SEME4232	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	2	1	1								1
CO 2	1	2	1	1	1							
CO 3	1	1		1								
CO 4	1	1	1	1								
CO 5	1	2		1	1							

Mapping of CO with PSO

SEME4232	PSO1	PSO2	PSO3
CO 1	1	3	2
CO 2	3	3	2
CO 3	3	3	2
CO 4	1	3	2
CO 5	3	3	2

Level of Bloom's 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 Design	1, 2
2	Design of Flexible Elements	1, 2, 3, 4, 5
3	Bearings	1, 2, 3, 4, 5
4	Cams, Clutches and Brakes	1, 2, 4, 5
5	Spur Gears and Parallel Axis Helical Gears	1, 2, 5
6	Bevel, Worm and Cross Helical Gears	1, 2, 5
7	Geartrains	1, 2, 5

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME4241

Course Name: Operations Research

Prerequisite Course(s): -- SEME3241- Industrial Engineering

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	01	04	40	60	-	-	100	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- provide students the knowledge of optimization techniques and approaches.
- enable the students apply mathematical, computational and communication skills needed for the practical utility of Operations Research.
- teach students about networking, inventory, queuing, decision and replacement models.
- introduce students to research methods and current trends in Operations Research.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	Introduction Origin of Operation Research, Historical Standpoint, Methodology, Different Phases, Characteristics, Scope and Application of Operations Research.	04	10
2.	Linear Models Introduction to Operations Research - Linear Programming - Mathematical Formulation, Solution Techniques of LP: Graphical Methods, Analytical Methods: Simplex, Big M and Two Phase, Sensitivity Analysis, Primal and Dual Problems, Economic Interpretation	06	12
3.	Transportation and Assignment Transportation Problems Definition, Linear Form, Solution Methods: North West Corner Method, Least Cost Method, Vogel's Approximation Method, Degeneracy in Transportation, Modified Distribution Method, Unbalanced Problems and Profit Maximization Problems, Transshipment Problems, Assignment Problems and Travelling Sales Man Problem	06	14
4.	Queuing Theory Basis of Queuing Theory, Elements of Queuing Theory, Kendall's Notation, Operating Characteristics of a Queuing System, Classification of Queuing Models, Preliminary Examples of M/M/1:∞/FCFA	06	14
5.	Inventory Control Inventory Models, Various Costs and Concepts EOQ, Deterministic Inventory Models, Production Models, Stochastic Inventory Models, Buffer Stock	05	10

6.	Decision Models Game theory – Two-person Zero Sum Game, Graphic Solution - Property of Dominance, Algebraic solution Replacement Models - Items that deteriorate with Time, when Money Value Changes, Items that failed completely — Individual Replacement and Group Replacement	09	20
7.	Sequencing Sequencing — Problem with N jobs and 2 machines - 3 machines and 'M' machines	04	10
8.	Network Models Basic Concepts, Construction of Networks, Project Network, CPM and PERT - Critical Path Scheduling, Crashing of Network	05	10
	TOTAL	45	100

List of Tutorial:

Sr No	Name of Tutorial	Hours
1.	Exercise on definition, formulation of linear programming problems.	02
2.	Exercise on Graphical solution of linear programming problems	02
3.	Exercise and case problems on Simplex, Big M and Two-phase LP Problems	01
4.	Exercise and case problems on Dual and Primal LP Problems	01
5.	Exercise and case problems on Sensitivity Analysis	01
6.	Exercise and case problems on Transportation and Transshipment Problems.	01
7.	Exercise and case problems on Assignment and Travelling sales man Problems	02
8.	Exercise and case problems on Queuing theory	01
9.	Exercise and case problems on Game theory	01
10.	Exercise on Inventory model	01
11.	Exercise on Replacement theory	01
12.	Exercise and case problems on PERT/CPM	01
	TOTAL	15

Text Book(s):

Title	Author/s	Publication
Operations Research	Kanti Swarup, Gupta PK, and Manmohan	S. Chand & Sons
Operations Research: An Introduction	Hamdy Taha	Pearson

Reference Book(s):

Title	Author/s	Publication
Operations Research	P Mariappan	Pearson
Operations Research	H N wagner	Prentice hall
Optimization in Operations Research	Ronald Rardin	Pearson Education Inc
Quantitative Techniques in Management	N D Vohra	Tata McGraw-Hill

Web Material Links:

- www.nptel.ac.in/

Course Evaluation:

Theory:

- Continuous Evaluation consists of Two Test Each of 30 Marks and 1 Hour of duration.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.

- End Semester Examination will consist of 60 Marks.

Tutorial:

- Continuous Evaluation consists of Performance of Tutorial which should be evaluated out of 10 for each Tutorial and average of the same will be converted to 20 Marks.
- Internal Viva component of 30 Marks.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

SEME4241	OPERATIONS RESEARCH
CO1	Formulate and solve the linear programming problems.
CO2	Compile optimal solutions by using various transportation and assignment methods.
CO3	Apply various methods to select and execute various optimal strategies to win the game.
CO4	Compute the eq for minimizing total inventory cost, discount model, and replacement time of assets.
CO5	Construct a network for case problems of CPM/PERT.

Mapping of CO with PO

SEME4241	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	3	2	2	1							3
CO 2	2	3	2	2	1							2
CO 3	2	3	2	2	1							1
CO 4	2	3	2	2	1							3
CO 5	2	3	2	2	1						3	3

Mapping of CO with PSO

SEME4241	PSO1	PSO2	PSO3
CO 1	3	2	3
CO 2	3	2	3
CO 3	3	2	3
CO 4	3	2	3
CO 5	3	2	3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Linear Models	1, 2, 4, 5
2	Transportation and Assignment	1, 2, 4, 5
3	Queuing Theory	1, 2, 4, 5
4	Inventory Control	1, 2, 4, 5
5	Decision Models	1, 2, 4, 5
6	Sequencing and Networks	1, 2, 4, 5

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME4950

Course Name: Project/Summer Internship

Prerequisite Course(s): -- None

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
-	05	-	05	-	-	100	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Outline of the Course:

Project

- The project will be aligned with the aims of the engineering programme and its areas of specialization and shall be based on the recent trends in technology.
- The student shall carry out a comprehensive project at relevant academic / R&D / industrial organization.
- The student is required to submit a project report based on the work carried out.

Training

- The aim of this course is to use the internship experience to enable students to develop their engineering skills and practices.
- The student will be placed in industry/organization for 12 to 18 weeks and assessed for academic credit.
- The students may select industry on their own or one which is offered by institute.
- Students are expected to experience a real-life engineering workplace and understand how their engineering and professional skills can be utilized in industry.
- The student is required to submit a project report based on the work carried out.

Course Outcome(s):

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

SEME4950	PROJECT / SUMMER INTERNSHIP
CO 1	Support the theoretical learning with practice and integrate knowledge for engineering applications
CO 2	Adapt to real time industry exposure and experience
CO 3	Solve challenging projects for commercial, societal and environment benefit.
CO 4	Explain the importance of planning, documentation, punctuality and work ethics.
CO 5	Document the work which is carried out in proper format with industry standards.

Mapping of CO with PO

SEME4950	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	3	3	3	3	3	3	1	3	3	3	3
CO 2	2	3	3	3	3	3	3	1	3	3	3	3
CO 3	2	3	3	3	3	3	3	1	3	3	3	3
CO 4	2	3	3	3	3	3	3	1	3	3	3	3
CO 5	2	3	3	3	3	3	3	1	3	3	3	3

Mapping of CO with PSO

SEME4950	PSO1	PSO2	PSO3
CO 1	2	3	3
CO 2	2	3	3
CO 3	2	3	3
CO 4	2	3	3
CO 5	2	3	3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Identify suitable project area/internship company	1,2, 3
2	Understand the current level of technology/operations	1,2, 3, 4, 5
3	Identify bottlenecks in technology/operations	1, 2, 3, 4, 5
4	Propose solutions	1, 2, 3, 4, 5, 6
5	Validate solutions	1, 2, 3, 4, 5, 6

Mapping of CO with PSO

SEME4920	PSO1	PSO2	PSO3
CO 1	3	3	3
CO 2	3	3	3
CO 3	3	3	3
CO 4	3	3	3
CO 5	3	3	3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

Module No	Content	RBT Level
1	Identify suitable project area/training company based on sub-field of choice	1,2, 3
2	Understand the current level of technology/operations	1,2, 3, 4, 5
3	Identify bottlenecks in technology/operations	1, 2, 3, 4, 5
4	Propose & validate solutions	1, 2, 3, 4, 5, 6
5	Proper documentation of solutions.	1, 2, 3, 4, 5, 6



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