Syllabus Book

3rd Year B. Tech.
Mechanical Engineering

P P Savani University
School of Engineering
Department of Mechanical Engineering

Effective From: 2019-20
Authored by: P P Savani University

P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

TEACHING & EXAMINATION SCHEME FOR B. TECH. THIRD YEAR MECHANICAL PROGRAMME

Sem	Course Code	Course Title	Teaching Scheme					Examination Scheme						
			Contact Hours				Credit	Theory		Practical		Tutorial		Total
			Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
5	SEME3011	Heat Transfer	4	2	0	6	5	40	60	20	30	0	0	150
	SEME3021	Fluid Machines	4	2	0	6	5	40	60	20	30	0	0	150
	SEME3031	Dynamics of Machinery	3	2	0	5	4	40	60	20	30	0	0	150
	SEME3041	Thermal Engineering	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3051	Production Technology	3	2	0	5	4	40	60	20	30	0	0	150
	SEPD3010	Professional Communication & Soft Skills	1	2	0	3	2	0	0	50	50	0	0	100
	Elective-I						3							100
	SEME3910	Summer Training	4			0	4	0	0	100	0	0	0	100
					Total	**31**	**30**							**1000**
6	SEME3060	Design of Basic Machine Elements	4	0	1	5	5	40	60	0	0	50	0	150
	SEME3071	Internal Combustion Engine & Refrigeration & Air Conditioning	4	2	0	6	5	40	60	20	30	0	0	150
	SEME3080	Computer Aided Design and Manufacturing	4	2	0	6	5	40	60	20	30	0	0	150
	SEME3090	Industrial Engineering	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3101	Power Plant Engineering	3	0	1	4	4	40	60	0	0	20	30	150
	SEPD3020	Corporate Grooming & Etiquette	1	2	0	3	2	0	0	50	50	0	0	100
	Elective-II						3							100
					Total	**30**	**27**							**900**

Elective Courses														
Offered from Sem.	Course Code	Department Elective Course Title	Teaching Scheme					Examination Scheme						
			Contact Hours				Credit	Theory		Practical		Tutorial		Total
			Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
5	SEME3512	Advanced Manufacturing Technology	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3521	Applied Thermodynamics	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3530	Estimation & Costing	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3551	Electrical Technology	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3560	Industrial Maintenance & Safety	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3570	Mechatronics	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3581	Plastics, Ceramics & Composites	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3590	Course by Industrial Expert	3	0	0	3	3	40	60	0	0	0	0	100
6	SEME3541	Design of Pressure Vessel & Piping	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3591	Fuels & Combustion	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3602	Gas Dynamics & Jet Propulsion	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3610	Product Development & Value Engineering	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3620	Production Management	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3631	Automobile Engineering	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3640	Quality Engineering	3	0	0	3	3	40	60	0	0	0	0	100

CONTENT

Semester 5

Semester 6

Electives

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3011
Course Name: Heat 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	
04	02	00	05	40	60	20	30	00	00	150

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	10
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.	10	15
3.	**Unsteady State Heat Conduction (Trasient)** Lumped Parameter Analysis, Transient Heat Conduction in solids with finite conduction and convection resistances.	08	10
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	08	15

Section II			
Module No.	Content	Hours	Weightage in %
1.	**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.	12	15
2.	**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.	07	15
3.	**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.	07	15
4.	**Two Phase Heat Transfer** Fundamentals of Boiling and Condensation, Pool Boiling and its types, Condensation of vapour, Film wise and Drop wise condensation.	04	05

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

Text Book(s):

Title	Author/s	Publication
Heat and Mass Transfer	Yunus A Cengen, Afshin J Ghajar	McGraw Hill Eduction
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 completion of the course, the student will be able to

- elaborate basic concepts and modes of heat transfer.
- do basic calculation involved in heat transfer in various applications.
- do basic calculations applied in heat exchanger design.
- apply heat transfer principles to analyze and design various engineering applications.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3021
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	
04	02	00	05	40	60	20	30	00	00	150

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.	03	05
2.	**Flow Over Immerged Bodies** Introduction, Concept of Lift and Drag, Concept of Streamline and Bluff Bodies, Flow over Cylinder and Aerofoil	03	05
3.	**Fans And Blowers** Construction details, governing equations, losses and performance curves	04	10
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.	10	15
5.	**Reaction Turbines** Working Principle, Construction of Francis and Kaplan Turbines, Draft Tube Theory, Cavitation, Velocity Triangle, Performance characteristic curve, Unit and Specific Quantities, Governing of Reaction Turbines.	10	15

Section II			
Module No.	Content	Hours	Weightage in %
1.	**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	15	30
2.	**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.	10	15
3.	**Miscellaneous Hydraulic Systems** Construction and Working of Hydraulic Intensifier, Hydraulic Accumulator, Hydraulic Jack, Hydraulic Ram, Hydraulic Crane, Hydraulic Fluid Couplings and Torque Convertor	5	05

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

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 Completion of the course, the student will be able to

- understand fundamentals of hydro power plant and its operation and construction.
- analyze complete performance of Hydraulic Turbines Experimentally and Theoretically.
- understand working and construction of different Fluid Machines.
- apply the principles of Fluid Statics and Fluid Kinematics to various Fluid Machines.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3031
Course Name: Dynamics of Machinery
Prerequisite Course(s): 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	02	00	04	40	60	20	30	00	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- learn about turning moment diagrams and the dynamics of reciprocating engines.
- understand balancing procedure of rotating and reciprocating masses.
- learn about forced and free vibrations.
- learn about governors and gyroscope and their applications.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction** Force and Couple, Condition of Static Equilibrium, Free body diagrams, Analysis of Mechanism	02	05
2.	**Dynamic Force Analysis** D'Alembert Principal, Inertia Force, Dynamic analysis of Four bar Mechanism, Analysis of floating link, Method of virtual work, Turning Moment diagrams, Fluctuation of energy, Flywheel	12	30
3.	**Balancing** Need of balancing, Static balancing, Balancing of static masses in same and different planes, Dynamic Balancing, Balancing of reciprocating masses, Balancing of Inline, Radial and V- Engines	09	15
Section II			
Module No.	Content	Hours	Weightage in%
1.	**Vibrations – Single Degree Of Freedom** Introduction, Terminologies, Classification, Undamped and damped vibration, Viscous damping, Introduction of Coulomb Damping, Forced vibrations, Magnification Factor, Vibration Isolation and Transmissibility	08	20

2.	**Transverse And Torsional Vibrations** Longitudinal and transverse vibrations, Whirling of shaft with and without damping, Dunkerley 's method for simply supported beams Torsional Vibrations, Single; Two and Three rotor systems, Free vibration of gears systems	08	20
3.	**Mechanism For Controls** Introduction, Types of Governors, Sensitivity, Hunting, Isochronisms, Stability, Effort and Power of Governors, Controlling Force, Angular velocity and Acceleration, Gyroscopic couple, Gyroscopic effect on naval ships, stability of an automobile	06	10

List of Practical:

Sr No	Name of Practical	Hours
1.	Whirling of Shaft Apparatus	02
2.	Balancing of Rotors	04
3.	Governors	04
4.	Gyroscopes	02
5.	Natural frequency of longitudinal vibration of spring mass system.	04
6.	Analysis of Cam and plotting the Cam profile	04
7.	Undamped free vibration of equivalent spring mass system	02
8.	Damped vibration of equivalent spring mass system	02
9.	BI –FILAR System	02
10.	TRI-FILAR System	02
11.	Viscous Vibration	02

Text Book(s):

Title	Author/s	Publication
Theory of Machines	S S Rattan	Tata McGraw Hill
Theory of Machines	P L Ballaney	Khanna Publishers

Reference Book(s):

Title	Author/s	Publication
Theory of Machines and Mechanisms	J E Shigley	Tata McGraw Hill
Theory of Machines	V P Singh	Dhanpatrai Publications

Web Material Link(s):

- https://nptel.ac.in/courses/112101096/

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 completion of the course, the student will be able to

- apply the understanding of turning moment diagrams in various applications.
- perform static and dynamic balancing of rotary and reciprocating machines.
- analysis of free and forced vibrations of various machines.
- apply the methods of controls to various machines.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3041
Course Name: Thermal Engineering
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	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learner to

- understand about construction and operation of various compressors.
- learn about various jet propulsion engines.
- recognizing different gas turbine arrangements and differences of a real cycle.
- learn about different types of steam turbines.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Compressors** Centrifugal Compressor – Construction and Operation, Static and Total Head Properties, Velocity Diagram, Degree of Reaction, Surging and Chocking, Various Losses Reciprocating Compressor – Construction and Working, Condition for minimum work for Multistage, Inter cooling, Volumetric and Isentropic Efficiency Rotary Compressor – Introduction and Classification, Root Blower, Vane Type, Scroll Type, Screw type Compressors	10	25
2.	**Steam Nozzles** Introduction and Classification, Steam Velocity, Discharge through Nozzles and Condition for Maximum Discharge, Critical Pressure Ratio and its physical significance, Effect of Friction, Nozzle Efficiency, General Relationship between area, velocity and pressure, Supersaturated Flow	08	20
3.	**Jet Propulsion** Turbojet Engine and its Thrust, Thrust Power, Propulsive and Thermal Efficiency, Turboprop, Ramjet and Pulsejet Engines, Rocket Engine	05	05

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Steam Turbines** Principal and Operation, Classification, Compounding Impulse Turbines – Velocity Diagram, Determination of Work, Power and Efficiency, Condition for Maximum Efficiency Reaction Turbines – Velocity Diagram, Degree of Reaction, Parson Turbine, Work, Power and Efficiency, Blade Height, Condition for Maximum Efficiency for Parson Turbine, Reheat Factor Governing of Steam Turbines – Throttle, Nozzle and Bypass Governing, Regenerative feed heating, Reheating of steam and Binary vapour power cycle.	11	25
2.	**Gas Turbine** Introduction, Merits and Demerits, Classification, Open and Closed Cycle, Actual Brayton Cycle, Compressor and Turbine Efficiency, Optimum Pressure ratio for Maximum Efficiency, Work Ratio, Methods to Improve Efficiency of Gas Turbine – Reheating, Regeneration and Inter cooling, Combine Steam and Gas Turbine Power Plant, Requirements of combustion chamber and Types of Combustion Chamber	11	25

Text Book(s):

Title	Author/s	Publication
Thermal Engineering	P L Ballaney	Khanna Publishers
Thermal Engineering	S Domkundwar	Dhanpatrai & Co.

Reference Book(s):

Title	Author/s	Publication
Thermal Engineering	R K Rajput	Laxmi Publication
Thermodynamics & Thermal Engineering	J Selwin Rajadurai	New Age Publishers
Turbines, Compressors and Fans	S M Yahya	Tata McGraw Hill Publications

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 student will be able to

- elaborate basic concepts, construction and operation of various compressors.
- do basic calculation involved in gas turbines.
- do basic calculations applied steam nozzles.
- do analysis and basic calculation involve in steam turbines.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3051
Course Name: Production Technology
Prerequisite Course(s): SEME2050 - Forming & Machining 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	00	04	40	60	20	30	00	00	150

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 %
1.	**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
2.	**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, geo metric control, dimensional control and mechanical control, Clamps, jig bushes, Jigs and fixtures for various machining operations.	06	14
3.	**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

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

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 completion of the course, the student will be able to

- Understand the theory behind cutting of materials for shaping them into desired forms.
- Analyze forces involved during machining process.
- Understand motions in machine tools and analyze various elements of machine tools.
- Interpret modern machining processes for material removal application
- Understand gear and thread manufacturing methods
- Understand work holding method for production activities

P P Savani University
School of Engineering

Centre for Skill Enhancement & Professional Development

Course Code: SEPD3010
Course Name: Professional Communication & Soft Skills
Prerequisite Course(s): SEPD1020: Communication Skills

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
01	02	00	02	00	00	50	50	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- understand multifaceted Professional Speaking Process.
- learn the writing etiquettes for professional purposes.
- gain basic knowledge, skills and the right attitude to succeed in future professional working environment.
- develop confidence, enhance their professional communication ability in civilized, harmonized manner.
- sharpen communication skills with reference to organizational structure.
- expose themselves to the modern modes of communication.

Course Content:

Section I			
Module	Content	Hours	Weightage in %
1.	**Self-Management & Career Building** • Self-Evaluation, discipline and criticism • SWOT analysis to identify personal strength/ weakness • Planning & Goal setting • MBTI test for self-analysis • Profiling on Online Platforms	01	7
2.	**Interpersonal Organizational Communication** • Interpersonal Behavioral Skills • Understanding empathy and comprehend other's opinions/ points of views, Managing Positive and negative emotions • Healthy and Unhealthy expression of emotions. • Mutuality, Trust, Emotional Bonding and handling situation in interpersonal relationship	04	25
3.	**Professional Communication (Speaking) - I** • Professional Communication and Rhetorics • Art of Telephonic Conversation • Public Speaking	03	18

Section II			
Module	Content	Hours	Weightage in %
1.	**Professional Communication (Speaking) – II** • Group Discussion (Concept, importance, Methods, Dos and Don'ts, Paralinguistic and Nonverbal Etiquettes) • Personal Interview (Concept, Importance, Methods, Dos and Don'ts, Type, Paralinguistic and Nonverbal Etiquettes)	03	20
2.	**Professional Communication (Writing)** • Cover Letter and Resume Building • E mail writing • Report Building • Technical/ Academic Writing (Reference/ citation/ plagiarism)	04	30

List of Practical:

Sr. No	Name of Practical	Hours
1.	SWOT analysis & Profiling	04
2.	MBTI Test	02
3.	Interpersonal Organizational Communication	02
4.	Group Discussion	04
5.	Personal Interview	04
6.	Cover Letter and Resume	06
7.	E mail and Report Writing	04
8.	Technical Academic Writing	04

Reference Book(s):

Title	Author/s	Publication
Professional Communication	Sheekha Shukla	2010, WordPress
Professional Communication Skills	Rajesh Kariya	Paradise Publication, Jaipur
Soft Skills and Professional Communication	Petes S. J., Francis.	Tata McGraw-Hill Education, 2011
Effective Communication and Soft Skills	Nitin Bhatnagar	Pearson Education India
Behavioural Science: Achieving Behavioural Excellence for Success	Dr. Abha Singh	John Wiley & Sons, 2012
The Hard Truth about Soft Skills	Klaus, Peggy, Jane Rohman & Molly Hamaker	London: Harper Collins

Course Evaluation:

Practical

- Continuous Evaluation consists of performance of Practical to be evaluated out of 10 marks for each practical and average of the same will be converted to 30 marks.
- Internal Viva consists of 20 marks.
- Practical performance/quiz/drawing/test/submission of 25 marks during End Semester Exam.
- Viva/Oral performance of 25 marks during End Semester Exam.

Course Outcome(s):

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

- understand the importance self-analysis for career building.
- learn tactics of communication in professional/ organizational ambience.
- master the art of conversation and public speaking.
- expose themselves for placement processes.
- develop writing etiquettes pertaining to placement and organizational context.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3910
Course Name: Summer Training
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	
00	00	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

- 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**

Course Outcome(s):
After completion of the course, the student will be able to

- apply their theoretical knowledge into reality.
- learn to adapt the workplace situations when they will be recruited.
- be prepared for the real-world situations in their future.

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

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3060
Course Name: Design of Basic Machine Elements
Pre requisite Course: --

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	00	01	05	40	60	00	00	50	00	150

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** Process of Design, Framework of Design, Designing Methods, Concurrent Engineering	06	10
2.	**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	10	15
3.	**Material Selection** Selection of material, Factors affecting material selection, Ferrous and Non Ferrous metals and alloys, Plastics, BIS designation system for steels	06	10
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, Multileaf spring : Terminologies, Nipping and Design	08	15

Section II			
Module No.	Content	Hours	Weightage In %
1.	**Design of Shafts and Keys** Types of Shafts, ASME code for shaft design, Design of shaft, Types of Keys, Design of Keys	10	15
2.	**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	08	15
3.	**Design of Joints** Design of Cotter and Knuckle Joints, Strength of welded joints, Strength of riveted joints, Efficiency of Joints	08	10
4.	**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	10

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

Text Book(s):

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

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 completion of the course, the student will be able to

- carry out preliminary material selection for particular applications.
- able to design various machine parts like joints, screw and threaded fasteners, shaft, keys, power screw and screw joints and springs.
- apply design considerations in design of various machine elements.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3071
Course Name: Internal Combustion Engine & Refrigeration Air Conditioning
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	
04	02	00	05	40	60	20	30	00	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- identify functions of various components of Internal Combustion Engine and related performance parameters.
- interpret the differences between Air standard, Fuel air and Actual cycle.
- understand the rating of fuels, Calorific value and their findings.
- explore combustion processes of S.I and C.I engine in detail.
- clarify the concepts of refrigeration and air-conditioning
- explore the different types of refrigeration and air conditioning methods
- understand the difference between VAR and VCR System.
- Selection of refrigerant under different condition with application and properties.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Analysis of Fuel Air Cycles and Actual Air Cycles** Air standard cycles with assumptions, Fuel air cycles with assumptions, Characteristics of fuel-air mixtures, Variation of specific heat, Dissociation, Comparison of Air Standard and Fuel air cycles, Comparison of air standard and actual cycles, Valve Timing diagram	04	08
2.	**Combustion in I.C Engine** Combustion equations, stoichiometric air fuel ratio, rich and lean mixture and its application, adiabatic flame temperature Calorific value and its findings, Combustion in S.I. Engine and C.I. Engines Stages of combustion in S.I. Engine and C.I engine, Detonation and its Control of detonation, Delay period, Factor s influencing delay period, Diesel knock, Control of diesel knock.	06	15

3.	**Engine Emissions it's Control & Recent Development in engine** Pollutants and their ill effects, Sources and types, formation of NOx, Particulate emissions, Catalytic converters. Alternate fuels like Alcohol, Hydrogen, Natural Gas, LPG, CNG Properties, Suitability and LPG&CNG based engines, Engine Modifications, Merits and Demerits as fuels, Electric/Hybrid Vehicles, fuel cell	05	10
4.	**Ignition, Fuel Supply, Lubrication and Cooling System** Battery and Magneto ignition system and its comparison, firing order, Lubrication of engine components, Lubrication system, wet sump and dry sump, Types of cooling systems, liquid and air cooled, comparison of liquid and air-cooled systems, Simple carburetor, MPFI in S.I. Engine, Requirements of Diesel Injection System, Types of injection systems, Fuel pumps, types of nozzles, spray formation.	05	08
5.	**Supercharging** supercharging, Effect of supercharging, methods of supercharging, limitations of supercharging, turbocharging.	03	09
	Section II		
Module. No.	Content	Hours	Weightage in %
1.	**Basics of refrigeration** Methods of producing cooling, ton of refrigeration, coefficient of performance, types and application of refrigeration and air condensing systems. Classification of refrigerant, nomenclature, desirable properties of refrigerant, secondary refrigerants, future industrial refrigerants	04	07
2.	**Vapour Compression system** Simple system on P-h and T-s diagrams, analysis of the simple cycle, factors affecting the performance of the cycle, actual cycle **Compound Compression System** Compound compression with intercooler, flash gas removal and flash intercooler, multiple evaporators with back pressure valves and with multiple expansion valves without flash inter cooling, analysis of two evaporators with flash intercooler and individual expansion valve and multiple expansion valve, cascade refrigeration system **Absorption refrigeration system** Desirable characteristics of refrigerant, selection of pair, practical H2O -NH3 cycle, LiBr – H2O system and its working, Electrolux refrigeration system	08	20
3.	**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	06	15

	dehumidification, chemical dehumidification, adiabatic saturation **Human comfort** Selection of inside design conditions, thermal comfort, heat balance equation for a human being, factors affecting thermal comfort, Effective temperature, comfort chart and factors governing effective temperature, selection of outside design conditions		
4.	**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 conditioning systems	04	08

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Identification of Calorific value of different liquid fuels using Bomb calorimeter and gases fuels using Junkers gas calorimeter.	04
2.	Performance of Morse Test with 4 cylinder 4-stroke Petrol Engine.	02
3.	Performance of 4-stroke diesel engine and Heat balance sheet.	04
4.	Identification of Exhaust gases using 5 gas analyzer.	02
5.	Study of different measurement and testing methods of I.C engines	04
6.	To understand different components of VCR system and to determine its COP	02
7.	To determine COP and apparatus dew point of an air conditioning test rig	04
8.	Study of domestic refrigerator and to determine % running time at different thermostat settings.	02
9.	To understand working of Electrolux refrigerator and to determine its COP.	04
10.	To determine COP and apparatus dew point of an air conditioning test rig.	02

Text Book (s):

Title	Author/s	Publication
Internal Combustion Engines	V. Ganeshan	McGraw Hill
Refrigeration and Air Conditioning	R.S. Khurmi	S. Chand

Reference Book(s):

Title	Author/s	Publication
Internal Combustion Engines	R. B. Mathur and R. P. Sharma	Dhanpat Rai & Sons
Internal Combustion Engine Fundamentals	Heywood J. B	McGraw Hill
Internal Combustion Engines	Shyam K. Agrawal	New Age International Ltd.
Alternative Fuels Guide Book	Richard. L. Bechfold	SAE International Warrendale
Refrigeration and Air conditioning	C.P. Arora	McGraw Hill
Refrigeration and Air conditioning	P.S. Desai	Khanna Publishers

Web Material Link(s):

- https://nptel.ac.in/courses/112104033/ (Introduction to I.C Engines and Air Pollution)
- https://nptel.ac.in/courses/112103262/ (I.C engine and Gas Turbines)
- https://www.nptel.ac.in/courses/112105128/ (Refrigeration and air conditioning)

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:

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

Course Outcome(s):

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

- measure and test the different performance parameters of I. C engine.
- define the role and importance of fuel supply system for various engine.
- understand the concepts & types of ignition and governing systems used for I.C Engine.
- clarity of concepts of air-condition and idea about different conditioning systems.
- use of refrigeration in industrial application with types.
- knowledge of properties of different refrigerants and selection of refrigerant.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3080
Course Name: Computer Aided Design and Manufacturing
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	00	05	40	60	20	30	00	00	150

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	04	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	08	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.	08	15

4.	**Finite Element Analysis** Design and analysis and Historical background, Stresses and equilibrium, Boundary conditions, Strain-Displacement 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.	10	15
Section II			
Module No.	Content	Hours	Weightage in %
1.	**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.	18	30
2.	**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	08	15
3.	**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	04	05

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

Text Book(s):

Title	Author/s	Publication
CAD, CAM and CIM	Radhakrishan 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

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 completion of the course, the student will be able to

- apply algorithms of graphical entity generation.
- understand mathematical aspects of geometrical modelling.
- understand and use finite element methods for analysis of simple components.
- develop programs related to manufacturing using codes.
- describe basic concepts of CAM application and understand CAM wheel.
- classify different components using different techniques of group technology.
- analyze the manufacturing network in industry.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3090
Course Name: Industrial Engineering
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	00	00	03	40	60	00	00	00	00	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.	**Economics of Plant Layout And Location** Plant Location, Factors affecting Plant Layout, Importance and Principles of Plant Layouts, Types of Layout – Product or Line Layout, Process or Functional Layout, Fixed Position Layout, Travel Chart.	05	15

Section II			
Module No.	Content	Hours	Weightage in %
1.	**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
2.	**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
3.	**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

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 completion of the course, the student will be able to

- apply work and motion management techniques in industries.
- demonstrate the knowledge of designing plants and controlling production.
- optimize the resources of organization and improve the productivity.
- conduct market research, demand forecasting and cost analysis.
- aware about various Industrial Acts.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3101
Course Name: Power Plant Engineering
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	
02	00	01	03	40	60	00	00	20	30	150

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.	**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.	04	15
2.	**Steam Generators** Steam generators like high pressure, Supercritical, Positive circulation, Fluidized bed boilers, Waste heat recovery, study of Feed water heaters, Super heaters, air preheaters, Economiser, Condenser and Cooling tower.	06	20
3.	**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 Ash disposal, Ash handling systems, Dust collection and its disposal, Mechanical Dust Collector, Electrostatic precipitator.	05	15

Section II			
Module. No.	Content	Hours	Weightage in %
1.	**Introduction to Power Plants** Components and layouts, Working principle of Steam, Hydro, Nuclear, Gas Turbine, Diesel Solar, Wind, Tidal, Geothermal power plants.	07	25
2.	**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.	05	15
3.	**Diesel and Gas Turbine Power Plant** Diesel power plant Subsystems, Starting and stopping, Open and closed cycle Gas turbine power plant, Intercooling, Reheating and Regenerating, Combined Steam and Gas power plant.	03	10

List of Tutorial:

Sr. No.	Name of Tutorial	Hours
1.	To solve the numerical based on Economics of power generation.	03
2.	Study the Feed water treatment for steam generators.	02
3.	Selection of induced and forced draft fans and height of chimney.	02
4.	Selection of Sites for Steam, Hydro, Nuclear, Gas Turbine, Diesel, Solar, Wind, Tidal, Geothermal power plants.	02
5.	To understand India's 3-Stage Nuclear Programme and nuclear power plants in India.	02
6.	To Study about Selection of prime movers and governing of hydraulic turbines.	02
7.	Supercharging of Diesel engines and heat balance for diesel power plant using one case study.	02

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 completion of the course, the student will be able to

- interpret different parameters associated with power generation and supply.
- define the role of different power plants for fulfilment of energy requirement of country.
- identify the India's 3 Stage Nuclear Programme and current Power generation by Nuclear plants.
- understand different components and requirements of different power plant considering convention and non-conventional category.

P P Savani University
School of Engineering

Centre for Skill Enhancement & Professional Development

Course Code: SEPD3020
Course Name: Corporate Grooming & Etiquette
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	
01	02	00	02	00	00	50	50	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- learn corporate and professional structure and mannerisms.
- acquire self-development skills to balance casual and formal situation.
- polish their personal skills for apt behavior in the context of corporate structure.
- develop adequate Skill set required for the workplace.
- become aware about the professional etiquettes and tactics to follow them.

Course Content:

Section – I			
Module	Content	Hours	Weightage in %
1.	**Corporate Grooming** • Introduction to corporate culture • Corporate Expectations • Need of Self-Grooming to the Corporate Expectations • Understanding and importance of Professionalism	03	25
2.	**Personal Skills** • Behavioral skills • Language Skills • Knowledge Skills • Problem Solving Skills • Developing professional attitude	04	25
Section – II			
Module	Content	Hours	Weightage in %
1.	**Management Skills** • Self-management • Time management • Work life balance	04	25

2.	**Organizational Etiquettes** • General Workplace Etiquettes • Presentation Etiquettes • Meeting Etiquettes	04	25

List of Practical:

Sr. No	Name of Practical	Hours
1.	Corporate Grooming (Video session/ Role Play/ Skit)	04
2.	Personal Skills (Games/ Quiz/ Activities)	08
3.	Management Skills (Management Activities/ Video Sessions)	06
4.	Organizational Etiquettes (Case Study/ Activities/ Video Sessions)	06
5.	Computer Assisted Activities of Corporate Grooming	06

Reference Book(s):

Title	Author/s	Publication
Grooming and Etiquette for Corporate Men and Women	John Chibaya Mbuya	2009
Effective Communication Skills for Public Relations	Andy Green	Kogan Page, 2006
Personality Development and Soft Skills	Barun Mitra	Oxford University Press, 2016
The EQ Edge: Emotional Intelligence and Your Success	Stein, Steven J. & Howard E. Book	Wiley & Sons, 2006.
Cross Cultural Management: Concepts and Cases	Madhavan	Oxford University Press, 2016
Corporate Grooming and Etiquette	Sarvesh Gulati	Rupa Publications India Pvt. Ltd., 2012
Behavioural Science: Achieving Behavioural Excellence for Success	Dr. Abha Singh	John Wiley & Sons, 2012

Course Evaluation:

Practical

- Continuous Evaluation consists of Performance of Practical to be evaluated out of 10 marks for each practical and average of the same will be converted to 30 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test/submission of 25 marks during End Semester Exam.
- Viva/Oral performance of 25 marks during End Semester Exam.

Course Outcome(s):

Students will be able to

- understand the importance of professional etiquettes and ways to improve the same.
- gain the knowledge and practice of skill sets required in corporate set up.
- learn personal management skills in the organizational context.
- develop an awareness about the corporate etiquettes.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3512
Course Name: Advance Manufacturing Technology
Prerequisite Course(s): SEME2030 - Non-Cutting Manufacturing Processes
SEME2050 - Forming & Machining 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	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- learn the principles of material removal mechanism of nontraditional processes.
- provide depth knowledge in selection of advanced machining process to fabricate intricate and complex shapes in difficult to machine material.
- provide awareness of advanced Nano and additive manufacturing techniques.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction** Trends in modern manufacturing; characteristics and classification of modern manufacturing methods, considerations in the process selection.	02	05
2.	**Mechanical Advanced Machining Processes** Introduction, principle, process description, process capabilities, material removal mechanism, parametric analysis, tool design, limitations, and applications of Ultrasonic Machining (USM), Abrasive Jet Machining (AJM), Water Jet Machining (WJM) and Abrasive Water Jet Machining (AWJM) processes.	12	25
3.	**Electro-Chemical Processes** Fundamental principle of ECM process, Chemistry of the ECM processes, process capabilities, determination of material removal rate, surface finish and accuracy, limitations, and applications of Electrochemical Machining (ECM), Electrochemical Grinding (ECG), Electrochemical deburring, Electrochemical honing and Chemical Machining (CM) processes.	08	20

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Thermal Metal Removal Processes** Electrical Discharge Machining (EDM): Working principle, process description, process capabilities, power circuits, mechanism of material removal, selection of tool electrode and dielectric fluid, limitations, and applications. Wirecut electro discharge machining, powder mixed electro discharge machining process. Laser Beam Machining (LBM): Working principle, type of lasers, machining applications of lasers, mechanism of material removal, shape and material, applications and limitation. Electron Beam Machining (EBM): Generation and control of electron beam, EBM systems, process analysis & characteristics, mechanism of material removal, shape and material, applications and limitations. Plasma Arc Machining (PAM) and Ion Beam Machining (IBM): Process principle, analysis and characteristics of process, mechanism of material removal, shape and material, applications and limitations.	10	30
2.	**Hybrid Machining** Concept, classification, process capabilities, and applications of various hybrid machining methods based on USM, EDM, ECM, etc.	04	7
3.	**Micromachining Processes** Introduction to micro machining methods; material removal mechanism and process capability of micro machining methods like micro -turning, micro-milling, micro-drilling, micro EDM, micro- WEDM, micro ECM, etc. ultra-precision machining, electrolytic in-process dressing and grinding.	05	7
4.	**Additive Processes:** Introduction to additive manufacturing processes, classification, laminated object manufacturing process, adhesive manufacturing process, and digital manufacturing process.	04	6

Text Book(s):

Title	Author/s	Publication
Introduction to micro machining	V. K. Jain	Narosa publishing house, New Delhi
Nonconventional machining	P. K. Mishra	Narosa publishing house, New Delhi
Modern Machining Processes	P. C. Pandey	Tata McGraw Hill, New Delhi

Reference Book(s):

Title	Author/s	Publication
Advanced Machining processes	V. K. Jain	Allied publishers, New Delhi
Nontraditional manufacturing processes	G. Benedict	Marcel Dekker, New York
Advanced methods of machining	J. A. McGeough	Chapman & Hall, London
Manufacturing Scienc	A. Ghosh and A. K. Malli	East-West Press, 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 student will be able to

- identify suitable manufacturing process for advanced materials and manufacturing complication.
- deal with sophisticated and advanced equipment such as IBM, EBM, PAM, Waterjet machine etc.
- understand the micro machining processes.
- use the additive manufacturing concept in ear of industry 4.0.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3521
Course Name: Applied Thermodynamics
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	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- extend various concepts of Engineering thermodynamics and their applications.
- interpret the concepts of thermodynamics associated with combustion processes.
- understand the concepts of Exergy balance and its application to various devices.
- apply different thermodynamic relations between different thermodynamic properties.
- extend the knowledge of various gas and power cycles and its applications to field.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Combustion thermodynamics** Stoichiometric air and excess air for combustion of fuels, Mass Balance, Exhaust gas analysis. A/F ratio, Rich Mixture, Lean Mixture and their requirements. enthalpy of formation, Dissociation and equilibrium, emissions, Combustion efficiency, Fuel Cell.	06	15
2.	**Basic applications of Thermodynamics** Application of S.F.E.E for various Mechanical Devices, discharging and charging of a tank, Application of Entropy Principals, Entropy transfer with heat flow, P-V, P-T and T-V diagram of Pure Substance, P-V-T Surface.	08	15
3.	**Exergy** Dead state, Law of Degradation of Energy, Exergy of Steady flow system, Application of Gouy-Stodola Equation, Exergy Balance for Closed system, Exergy principal, Exergy balance for Steady flow system, second law efficiencies for turbine, Compressor and pump, Heat exchanger and Mixing of two fluids.	09	20

Section II			
Module. No.	Content	Hours	Weightage in %
1.	**Thermodynamic Relations** Mathematical theorems used for relations, The Maxwell relations, TdS Equation, Relationships involving specific heats, Joule-Thomson or Joule-Kelvin coefficient, Clausis–clapeyron equation, enthalpy, entropy, Gibbs Function and Gibbs Phase rules.	10	25
2.	**Gas and Vapour Power cycles** Binary vapour cycle, Combined cycles, Cogeneration, Stirling Cycle, Ericsson Cycle, Lenoir Cycle, Atkinson Cycle with applications, ideal regenerative gas turbine cycle with intercooling and reheat.	06	15
3.	**Jet propulsion** Introduction to the principles of jet propulsion, Turbojet and turboprop engines and their processes, Principle of rocket propulsion, Introduction to Rocket Engine.	06	10

Text Book (s):

Title	Author/s	Publication
Basic and Applied Thermodynamics	P.K. Nag	Tata Mcgraw-Hill

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 and Yon Mayhew	Pearson Education Ltd.

Web Material Link(s):

- https://nptel.ac.in/courses/112106133/ (Applied thermodynamics)
- https://nptel.ac.in/courses/112105123/ (Fundamentals of Basic Thermodynamics)
- https://nptel.ac.in/courses/112103243/ (Laws of Thermodynamics)
- https://nptel.ac.in/courses/112103016/ (Advance Engineering Thermodynamics)

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 student will be able to

- understand the basic laws of thermodynamics to the various engineering devices.
- learn the concept of pure substance and applications of Entropy.
- understand the importance of Second law efficiency and its applications for various mechanical devices.
- develop the knowledge of different aircraft engines and their applications.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3530
Course Name: Estimation & Costing
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	00	00	03	40	60	00	00	00	00	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	07	20

	• Margin of safety • Application of marginal costing for decision making. • Illustrative Example		
4.	**Budget and Budgetary Control** • Concepts, Types of Budgets • Budgetary Control • Preparation of Budgets • Illustrative Example	04	10
Section II			
Module No.	Content	Hours	Weightage in %
1.	**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
2.	**Cost Estimation of Fabrication Shop** • Weldments & Welded joints • Welding Cost • Illustrative Example	05	10
3.	**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

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 completion of the course, the student will be able to

- identify different areas of Engineering Costing & Estimating.
- find the applications of all the areas in day to day life.
- apply cost estimating in decision making.

P P Savani University
School of Engineering

Department of Science & Humanities

Course Code: SESH3551
Course Name: Electrical Technology
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	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- demonstrate the basic steps involved in design of electrical machines.
- prepare students to perform the analysis of any electromechanical system.
- empower students to understand the working of electrical equipment used in everyday life.
- make the student be able to complete design of transformers, induction machines, dc machines and synchronous machines.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Single phase transformer** Types, KVA rating, approximate equivalent circuit, voltage regulation and efficiency of transformer, condition for maximum efficiency. **Three phase transformers** Types of transformer connection (star/star, star/delta, delta/star, and delta/delta) and applications based on connections. (Theoretical Treatment only) Introduction of power transformer, distribution transformer.	12	25
2.	**Three phase Induction Motor** Constructional feature, working principle of three phase induction motors, types; torque equation, torque slip characteristics; power stages; efficiency; types of starters; methods of speed control & Industrial applications. **Single phase induction motors** Types, construction, working principle of split phase and shaded pole type induction motors, applications. Specifications of induction motors (KW rating, rated voltage, current rating, frequency, speed, class of insulation)	10	25

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Synchronous Generator** Constructional features (Salient and non- salient),working principle, emf equation, synchronous speed of an alternator, concept of synchronous reactance and impedance, phasor diagram of loaded alternator, voltage regulation of alternator by direct loading method and synchronous impedance method. Specifications of synchronous generator.	13	25
2.	**D.C. Motor** Construction, working principle of D.C. generator, emf equation of D C generator. (Theoretical concept only). Working principle of D.C. motor. Types of D. C. motor, back emf , torque equation for D.C. motor, characteristics of D. C. motor (series, shunt and compound), starters of D.C. shunt and series motor, methods for speed control of D.C shunt and series motors, Industrial applications.	10	25

Text Book(s):

Title	Author/s	Publication
Electrical Technology	B. L.Theraja	S Chand Publication Co Ltd.
Fundamentals of Electrical Engineering	Ashfaq Husain	Dhanpat Rai& Co.
Electrical machines	D P Kothari and I J Nagrath	Tata McGraw Hill

Reference Book(s):

Title	Author/s	Publication
Electrical Machinery	S.K. Bhattacharya	TTTI Chandigad
Electrical Technology	Edward Hughes	Pearson Education
Art and Science of Utilization of Electrical Energy	H Pratap	Dhanpat Rai and Co ,Third Edition
Power Electronics	Dr. P.S. Bhimbra	Khanna 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 completion of the course, the student will be able to

- formulate and then analyze the working of any electrical machine using mathematical model under loaded and unloaded conditions.
- analyze the response of any electrical machine.
- select a suitable measuring instrument for a given application.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3560
Course Name: Industrial Maintenance and safety
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	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- understand the concepts of maintenance planning and performance of the machines.
- learn the theory of industrial safety and management.
- know the safety act.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Principles and practices of Maintenance planning** Basic Principles of maintenance planning – Objectives and principles of planned maintenance activity – Importance and benefits of sound Maintenance systems – Reliability and machine availability, Equipment Life cycle, Measures for Maintenance. Performance: Equipments breakdowns, Mean Time Between Failures, Mean Time To Repair, Factors of availability, Maintenance organization, Maintenance economics.	08	20
2.	**Maintenance policies and preventive maintenance** Maintenance categories – Comparative merits of each category – Preventive maintenance, Maintenance schedules: Repair cycle, Principles and methods of lubrication, Fault Tree Analysis, Total Productive Maintenance: Methodology and Implementation.	08	15
3.	**Condition Monitoring** Condition Monitoring: Cost comparison with and without Condition Monitoring, On-load testing and off load. Methods and instruments for Condition Monitoring, Temperature sensitive tapes, Pistol thermometers, wear-debris analysis, noise vibration and harshness analysis of machines	07	15

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to the development of industrial safety and management:** History and development of Industrial safety: Implementation of factories act, Formation of various councils, Safety and productivity, Safety organizations. Safety committees, safety committee structure, Roll of management and roll of Govt. in industrial safety, Safety analysis.	08	20
2.	**Accident preventions, protective equipment and the Acts** Personal protective equipment, Survey the plant for locations and hazards, Part of body to be protected, Education and training in safety, Prevention causes and cost of accident, Housekeeping, First aid, Firefighting equipment, Accident reporting, Investigations, Industrial psychology in accident prevention, Safety trials.	07	15
3.	**Safety Acts** Features of Factory Act, Introduction of Explosive Act, Boiler Act, ESI Act, Workman's compensation Act, Industrial Hygiene, Occupational safety, Diseases prevention, Ergonomics, Occupational diseases, stress, fatigue, health, safety and the physical environment, Engineering methods of controlling chemical hazards, safety and the physical environment, Control of industrial noise and protection against it, Code and regulations for worker safety and health.	07	15

Text Book(s):

Title	Author/s	Publication
Industrial Maintenance Management	Srivastava, S.K.	S. Chand and Co.
Installation, Servicing and Maintenance	Bhattacharya, S.N.	S. Chand and Co.
Occupational Safety Management and Engineering	Willie Hammer	Prentice Hall

Reference Book(s):

Title	Author/s	Publication
Industrial Maintenance	Garg, M.R.	
Maintenance Engineering Hand book	Higgins, L.R.	5th Edition, McGraw Hill
Condition Monitoring	Armstrong	BSIRSA
Handbook of Condition Monitoring	Davies	Chapman and Hall
Industrial Safety and Health Management	Ray Asfahl C.	5th Edition, Prentice Hall
Reliability and Maintenance Engineering	S. C. Mishra	New Age Publishing house

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 student will be able to

- understand the maintenance policies and planning
- incorporate different maintenance schedule for machines.
- execute condition monitoring of machines.
- know accidents reporting procedure.
- get the code and regulations for worker safety and health.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME4550
Course Name: Mechatronics
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	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- discover the fundamentals of mechatronics as well as their design and control.
- develop an ability to design a system, component, or process to meet desired needs within realistic constraints.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Introduction to Mechatronics** Mechatronic system elements, Measurement system, Control system, Microprocessor based controllers & its applications, Other applications with mechatronic approach, Building blocks of mechatronic system.	06	10
2.	**Sensors & Transducers** Classification, Performance terminologies, Displacement, Position & proximity sensors, Photo detectors, Optical encoders, Pneumatic sensor, Hall effect sensor, Velocity & motion sensors: Incremental encoder, Tacho-generator, Piezoelectric sensors, Tactile sensors, Flow & temperature sensors: Ultrasonic sensors, Light sensors.	08	20
3.	**Actuation Systems** Pneumatic & hydraulic actuation systems: System configuration, Control System & its elements, Linear actuators, Rotary actuators. Mechanical actuation: System types & its configuration, Fixed ratio type, Invariant motion profile type, variator etc. Electrical actuation system types & configurations, Mechanical switches, Solid state switches, Solenoids.	08	20

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Digital Circuits** Boolean algebra combinational circuits. (adders, subtractors, encoders, decoders, multiplexers, de-multiplexers, memory units: RAM, ROM, EPROM etc.), Sequential circuits (elementary).	08	20
2.	**Analog Signal Processing** Amplifiers, Operational amplifiers, Ideal model for operational amplification, Inverting amplifier, Non-inverting amplifier, Summer, Difference amplifier, Instrumentation amplifier, Integrator, Differentiator, Comparator, ADC, DAC.	08	20
3.	**Electronic System Design** Introduction to MPU & MCU, Assembly programming, Interfacing, Introduction to PLC & basics of PLC programming, Basics of filters, Types of filters, Basics of LPS & SMPS, Clipper & clamper circuits.	07	10

Text Book(s):

Title	Author/s	Publication
Mechatronics	Necsulescu D.	Pearson Education (Singapore), 2002
Digital Logic & Computer Design	Morris Mano	Prentice Hall, 2001
Mechatronics	HMT Ltd.	Tata McGraw Hill Publication, 2002

Reference Book(s):

Title	Author/s	Publication
Mechatronics	W. Bolton	Pearson Education (India) 2003
Mechatronic System Design	Shetty D., Kolk R. A.	PWS Publicity Boston, 2002

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 student will be able to

- integrate mechanical, electronics, control and computer engineering in the design of mechatronics systems.
- do the complete design, building, interfacing and actuation of a mechatronic system for a set of specifications.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3581
Course Name: Plastics, Ceramics and Composites
Prerequisite Course(s): SEME2020 - Material Science and Metallurgy

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	00	03	40	60	00	00	00	00	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 %
1.	**Ceramic materials** Atomic bonding and crystal structure in ceramics, conventional ceramics and glass structure, refractory and insulating	08	15

	materials, physical, thermal, electrical, magnetic, optical and piezoelectric properties, Differentiation from other engineering materials, Time temperature and environmental effect on properties of ceramics.		
2.	**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
3.	**Composite materials** Merits & demerits of composites, application of composite, manufacturing processes of composites, Property evaluation of composites.	08	20

Reference Book(s):

Title	Author/s	Publication
Plastic Process Engineer	Throne James L.	Marcel Dekker, New York, 1979.
Engineering Design of Plastics and Rubber	Crawfard 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 completion of the course, the student will be able to

- know the different processes and bedecking of plastics and rubbers.
- apply the knowledge and applications of ceramics in material selection.
- understand application of composite materials.