Syllabus Book

B. Tech.
(Mechanical Engineering)

P P Savani University

School of Engineering

Effective From: 2018-19

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 B. TECH. CIVIL/ MECHANICAL ENGINEERING PROGRAMME AY: 2018-19															
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	SESH1010	Elementary Mathematics for Engineers	SH	3	0	2	5	5	40	60	0	0	50	0	150
	SECV1030	Engineering Mechanics	CV	3	2	0	5	4	40	60	20	30	0	0	150
	SEME1020	Engineering Workshop	ME	0	2	0	2	1	0	0	50	0	0	0	50
	SECE1010	Basics of Computer & Programming	CE	3	2	0	5	4	40	60	20	30	0	0	150
	SESH1210	Applied Physics	SH	3	2	0	5	4	40	60	20	30	0	0	150
	SEPD1010	Academic English & Technical Writing	SEPD	2	2	0	4	3	40	60	20	30	0	0	150
	SESH1050	Solution to Societal Problems: A Community Service Approach	SH	0	2	0	2	1	0	0	50	0	0	0	50
						Total	**28**	**22**							**850**
2	SESH1020	Linear Algebra & Vector Calculus	SH	3	0	2	5	5	40	60	0	0	50	0	150
	SEME1010	Engineering Graphics	ME	3	4	0	7	5	40	60	40	60	0	0	200
	SECV1060	Basics of Engineering Sciences	CV	3	2	0	5	4	40	60	20	30	0	0	150
	SECV1050	Global Environmental Challenges & Management	CV	2	0	0	2	2	40	60	0	0	0	0	100
	SECV1070	Solid Mechanics	CV	3	2	0	5	4	40	60	20	30	0	0	150
	SEPD1020	Communication Skills	SEPD	2	2	0	4	3	40	60	20	30	0	0	150
						Total	**28**	**23**							**900**

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV1030
Course Name: 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	
3	2	0	4	40	60	20	30	0	0	150

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 fundamental principles, concepts and techniques, both theoretical and practical, with emphasis on the application of these to the solution of mechanics based suitable problems in all engineering.
- provide a strong foundation and formwork for more advanced study at every higher semester as the subject of engineering mechanics cuts broadly across all branches of engineering profession.

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.	02	6
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 and graphical 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.	10	20

3.	**Friction** Theory of friction, Types of friction, Cone of friction, Angle of repose, Coefficient of friction, Friction on inclined plane, ladder friction, wedge friction, belt and rope friction.	06	14
4.	**Beams and Support Reaction** Types of loads, Types of supports, Types of beams, Determination of support reactions for different types of beam.	04	10
Section II			
Module No.	Content	Hours	Weightage in %
1.	**Truss** Classification of Truss, Perfect and Imperfect truss Analysis of pin-jointed perfect truss using method of joints and Method of section	06	14
2.	**Centroid And Centre of Gravity** Centroid of lines, plane areas and volumes, Examples related to centroid of composite geometry, Pappus – Guldinus theorems.	06	14
3.	**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.	11	22

List of Practical:

Sr. No	Name of Practical	Hours
1.	Equilibrium of coplanar concurrent forces	04
2.	To verify the law of parallelogram of forces	04
3.	To verify the law of polygon of forces	02
4.	To verify the lami's theorem	02
5.	To study effect of friction on flat surface	02
6.	To study effect of friction on angular surface	02
7.	Equilibrium of parallel force system – simply supported beam	02
8.	Solve tutorial on Truss, C.G & M.I	10
9.	Draw sketches for different type of trusses	02

Text Books:

Title	Author/s	Publication
Engineering Mechanics (Statics & Dynamics)	Beer and Johnston	Tata McGraw Hill Education
Mechanics of Structure Vol. I & II	S. B. Junnarkar & H. J. Shah	Charotar Publication
Applied Mechanics	S. B. Junnarkar & H. J. Shah	Charotar Publication

Reference Books:

Title	Author/s	Publication
Engineering Mechanics,	Meriam and Karaige,	Wiley-India
Engineering Mechanics: Statics & Dynamics	S Rajsekaran	Vikas Publication
Engineering Mechanics of Solids	Popov E.P	Prentice Hall of India

Engineering Mechanics Statics	J. L. Meriam, L G. Kraige.	John wiley & Son
Engineering Mechanics	S.S. Bhavikatti & K.G. Rajeshkarappa	New Age Publication
Engineering Mechanics	U.G. Jindal	Made easy Publication
Engineering Mechanics	K.L. Kumar	Tata McGraw Hill
Engineering Mechanics	R.C. Hibbeller	Pearson

Web Material Links:

- 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, 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/tutorial which should be evaluated out of 10 for each practical/tutorial 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 completion of the course, the student will be able to understand

- Fundamental principles of mechanics, equilibrium, statics reactions and internal forces in statically determinate beams.
- Application of principles of statics to determine C.G and M.I of a different geometrical shape and Understand basics of friction and its importance.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV1050
Course Name: Global Environmental Challenges & Management

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	0	0	2	40	60	0	0	0	0	100

CE: Continuous Evaluation, ESE: End Semester Exam

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

- Impart basic knowledge about environment and thereby developing an attitude of concern for environment.
- Create awareness on various environmental pollution aspects and issues.
- Give a comprehensive insight into natural resources, ecosystem and biodiversity.
- Educate the ways and means to protect the environment from various types of pollution.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to Environment and Environmental Studies** Terms related to environment, Necessity of Public awareness, Components of Environment, Relationship between the different components of Environment, Man and Environment relationship, Impact of technology on Environment, Objective, Principles, Importance, Scope of Environmental Education,	02	4
2.	**Ecology and Ecosystems** Introduction: Ecology- Objectives and Classification, Concept of an ecosystem- structure and functions of ecosystem Components of ecosystem- Producers, Consumers, Decomposers Bio-Geo- Chemical Cycles- Hydrologic Cycle, Energy Flow in Ecosystem, Food Chains, Food webs, Ecological Pyramids	04	12
3.	**Natural Resources** **Energy Recourses:** Renewable and Nonrenewable resources, exploitation and conservation, Role of individual in conservation of natural resources. **Water resources:** Water sources- Surface and Ground water sources, Indian and global scenario.	06	22

	Forest resources: Definition, Ecological and Economic importance and benefits of forest, Indian scenario, Deforestation: causes and effects, remedial measures. **Food resources:** Sources of food, Global and Indian food demand scenario, Limits of food production, Environmental effects of Agriculture.		
4.	**Global Environmental Challenges** Climate change, Global warming and Greenhouse effect, Greenhouse gases, Acid rain, Depletion of ozone layer, Nuclear accidents and holocaust.	03	12
Section II			
Module No	Content	Hours	Weightage in %
1.	**Environmental Pollution:** Environmental degradation, Pollution, Sources of pollution, Types of environmental pollution. **Water Pollution:** Water quality standards, Sources of water pollution: Industrial, Agricultural, Municipal, Classification of water pollutants, Effects of water pollutants, Eutrophication. **Air Pollution:** Ambient air quality standards, Classification of air pollutants, Sources of common air pollutants, Natural and Anthropogenic sources, Effects of common air pollutants. **Land Pollution:** Land uses, Land degradation: causes, effects and control, soil erosion. **Noise Pollution:** Sound and Noise, Causes and Effects. Role of individual in the prevention of pollution.	05	16
2.	**Effect of Human population on Environment** **Human Population and Environment**: Population Growth, World and Indian scenario, Population and Environmental Degradation, Malthusian theory, Optimum theory, Population explosion – Causes, Effects and Control. **Urbanization:** Urban population growth and Environmental Problems.	04	12
3.	**Environment Management:** Disaster management, Solid waste management, Environment Impact assessment & ISO 14001 standards**.**	06	22

Text Book:

Title	Author/s	Publication
Environmental Studies	Anindita Basak	Pearson Publications

Reference Books:

Title	Author/s	Publication
Basics of Environmental Studies	Prof. N.S. Varandani	LAP - Lambert Academic Publishing
Basics of Environmental Studies	Dr. J. P. Sharma	University Science Press
Basics of Environmental Studies	U. K .Khare	Tata McGraw Hill Publications

Environmental Studies	Anindita Basak	Pearson (India)Pvt. Ltd
Environmental Sciences	Daniel B Botkin & Edward A Keller	John Wiley & Sons Publications
Environmental Studies	Dr. Suresh K Dhameja	K Kataria & Sons Publications
Environmental Studies for Undergraduate Courses	Erach Bharucha	Universities Press (India)
Introduction to Environmental Engineering and Science	Gilbert Masters	Prentice-Hall Publication
Basics of Environmental Studies	S.G. Shah, Gopal N. Shah	Superior Publications

Web Material Links:

- http://nptel.ac.in/courses/122102006/
- http://nptel.ac.in/courses/105104099/
- http://nptel.ac.in/courses/122102006/
- http://nptel.ac.in/courses/120108004
- http://nptel.ac.in/courses/105102089/
- http://nopr.niscair.res.in
- http://www.indiaenvironmentportal.org.in

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

- multi-disciplinary nature of the environment, its components, and inter-relationship between man and environment.
- relevance and importance of the natural resources in the sustenance of life on earth and living standard.
- importance of ecosystem, biodiversity and natural bio geo chemical cycle.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV1060
Course Name: Basics of Engineering Sciences

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	2	0	4	40	60	20	30	0	0	150

CE: Continuous Evaluation, ESE: End Semester Exam

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

- study the fundamentals of mechanical systems.
- study and appreciate significance of mechanical engineering in different fields of engineering.
- carry out simple land survey and recent trends in civil engineering.
- understand components of building, building terminology and construction materials.
- understand the basic electrical component.
- understand the working principle, and applications of DC & AC machines.

Course Content:

Section I			
Module No	Content	Hours	Weightage in %
1.	**Mechanical Engineering: An Overview** Prime Movers - Meaning and Classification; Concepts of Thermodynamics: Definitions, systems and, Laws; Fuels Classification: Solid, liquid and gaseous their application.	07	09
2.	**Basics of Steam Generators** Boilers as per IBR, Classification, Functions of Mountings and Accessories.	LAB	08
3.	**Civil Engineering: An Overview** Introduction, Branches, Scope, Impact, Role of Civil Engineer. **Building Materials And Construction:** Introduction (types and properties) to construction materials like Stone, Bricks, Cement, Sand, Aggregates, Concrete, Steel. Classification of buildings, Types of loads acting on buildings, Building components and their functions, Type of foundation and importance, Symbols used in electrical layout, Symbols used for water supply, plumbing and sanitation.	07	16

4.	**Basic Understanding Of Domestic Wiring** Service mains, meter board and distribution board. Elementary discussion on Circuit protective devices: fuse and Miniature Circuit Breaker (MCB's). Electric shock, precautions against shock, Objectives of earthing, types of earthing; pipe and plate earthing, Residual current circuit breaker (RCCB) **Electromagnetic Induction:** Definition Faradays Laws, Fleming's right hand rule, Lenz's Law, Statically and dynamically induced emf. Self-inductance, mutual inductance and coefficient of coupling. Energy stored in magnetic field. Force on current carrying conductor placed in a magnetic field, Fleming's left hand rule.	08	17
Section II			
Module No	Content	Hours	Weightage in %
1.	**Motion and Power Transmission Devices** Coupling, Clutch and Brakes: Classification Applications and differences, Drives: Classification Applications and differences	08	09
2.	**Basics of I.C Engines** Construction and working of 2 stroke & 4 stroke Petrol & Diesel engine, Difference between 2-stroke -4 stroke engine & petrol-diesel engine.	LAB	08
3.	**Introduction yo Surveying And Leveling** Introduction, Fundamental principles, Classification. **Linear measurement:** Instrument used, Chaining on plane ground. **Angular measurement:** Instrument used, Bearing, and Local attraction. **Leveling:** Instrument used, Basic Terminologies, Types of leveling, and Method of leveling. **Introduction to Modern Surveying Equipment's:** Total Station, GIS, GPS	08	17
4.	**Electrical Circuits** **Three phase:** Necessity and advantages of three phase systems, generation of three phase power. Definition of Phase sequence, balanced supply and balanced load. Relationship between line and phase values of balanced star and delta connections. Power in balanced three-phase circuits, measurement of power by two-wattmeter method. Determination power factor using wattmeter readings	07	16

List of Practical:

Sr. No	Name of Practical	Hours
1.	To understand the concepts of steam generators	06
2.	To understand construction and working 2 –stroke & 4 –stroke Petrol Engines	02
3.	To understand construction and working 2 –stroke & 4 –stroke Diesel Engines	02
4.	Star Delta connections	02
5.	Electrical safety demonstrations	02
6.	Electrical wiring system	02
7.	Verifying ohms law	02
8.	Understanding three phase system	02
9.	Unit Conversation exercise	02
10.	Linear Measurement	02
11.	Angular Measurement	02
12.	Determine R.L of given point by Dumpy level without change point	02
13.	Determine R.L of given point by Dumpy level with change point	02

Text Books:

Title	Author/s	Publication
Elements of Mechanical Engineering	S. B. Mathur, S. Domkundwar	Dhanpat Rai & Sons Publications
Elements of Mechanical Engineering	Sadhu Singh	S. Chand Publications
Elements of Civil Engineering	Anurag A. Kandya	Charotar Publication
Surveying Vol. I & II	Dr. B. C. Punamia	Laxmi Publication
Basic Electrical Engineering	V. N. Mittal and A. Mittal	Tata McGraw Hill

Reference Book:

Title	Author/s	Publication
Thermal Engineering	R. K. Rajput	Laxmi Publications
Basic Mechanical Engineering	T.S. Rajan	Wiley Eastern Ltd., 1996
Surveying and Leveling	N. N. Basak	Tata McGraw Hill
Surveying Vol. I	S. K. Duggal	Tata McGraw Hill
Surveying and Leveling	R. Subramanian	Oxford University
Building Construction and Construction Material	G. S. Birdie and T. D. Ahuja	Dhanpat Rai Publishing
Engineering Material	S.C. Rangwala	Charotar Publication
Electrical Safety, Fire Safety Engineering	S. Rao	Khanna Publications
Electrical Estimating & costing	Surjit Singh	Dhanpat Rai & Co

Web Material Links:

- http://nptel.ac.in/course.php
- http://nptel.ac.in/courses/105107157/
- http://nptel.ac.in/courses/105101087/
- http://nptel.ac.in/courses/105107121/
- http://nptel.ac.in/courses/105104100/
- http://nptel.ac.in/courses/108105053/

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 should be evaluated out of 10 for each practical 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 completion of the course, the student will be able to

- know the principles and working of basic mechanical systems.
- comprehend importance of mechanical engineering in various fields of engineering.
- know about different civil engineering fields with an overview of building material, building construction and knowledge of surveying equipment in civil engineering.
- understand the importance of safety and the precaution to be taken while working with electrical equipment and accessories.
- understand concepts of three phase circuit.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV1070
Course Name: Solid Mechanics
Prerequisite Course(s): Engineering Mechanics (SECV1030)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	2	0	4	40	60	20	30	0	0	150

CE: Continuous Evaluation, ESE: End Semester Exam

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

- the stresses developed under the application of force.
- the physical and mechanical properties of materials.
- behavior of structural element under the influence of various loads.

Course Content:

Section I			
Module No	Content	Hours	Weightage in %
1.	**Introduction: Physical & Mechanical Properties of Material** 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	8
2.	**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 Constants: Modulus of elasticity, Poisson's ratio, Bulk modulus, Shear modulus (Modulus of rigidity), Modulus of rigidity.	06	12
3.	**Bending Stress and Strain** Theory of simple bending, assumptions, derivation of flexural formula, second moment of area of common cross sections(rectangular, I,T,C) with respective centroid & parallel axes, bending stress distribution diagrams, moment of resistance & section modulus calculations. Concept, derivation of shear stress distribution formula, shear stress distribution diagrams	08	20

	for common symmetrical sections, maximum and average shears stresses, shear connection between flange & web.		
4.	**Principle Stress and Strain** Two-dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr's circle of stress	04	10
	Section II		
Module No	Content	Hours	Weightage in %
1.	**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.	7	20
2.	**Column and Strut** Introduction, Failure of a column and strut, Euler's column theory, Types of end conditions of columns, Columns with both ends hinged, Columns with one end fixed and the other hinged, Euler's formula and Equivalent length of a column, Slenderness Ratio, Limitations of Euler's Formula.	10	18
3.	**Torsion** Derivation of equation of torsion, Assumptions, application of theory of torsion equation to solid & hollow circular shaft, torsional rigidity, Power Transmitted by shaft, Polar moment of Inertia.	06	12

List of Practical:

Sr. No	Name of Practical	Hours
1.	Tensile test on Ductile materials (Mild steel, Copper, Wood)	04
2.	Tensile test on Brittle Materials (Cast iron, Concrete)	04
3.	Compression test on Ductile materials (Mild steel, Copper, Wood)	04
4.	Compression test on Brittle Materials (Cast iron, Concrete)	04
5.	Determination of hardness of metals (Brinell hardness test)	02
6.	Determination of impact of metals (Izod/Charpy impact test)	02
7.	Tutorials on Principle stress & Principle strain.	04
8.	Tutorials on SFD & BMD.	04
9.	Tutorials on Column & Strut.	02

Text Book:

Title	Author/s	Publication
Strength of Materials (SI Units)	R S Khurmi, N Khurmi	S. Chand& Company Pvt. Ltd.

Reference Books:

Title	Author/s	Publication
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	Dhanpat Rai Publishing Company

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/tutorial which should be evaluated out of 10 for each practical/tutorial 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 completion of the course, the student will be able to

- Apply mathematical knowledge to calculate the deformation behavior of simple structure.
- Critically analyze problem and solve the problem related to mechanical elements and analyze the deformation behavior for different types of loads.
- Understand the different types of stresses and strains developed in the member subjected to axial, bending, shear & torsional effects.
- Understand the physical properties of materials.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME1010
Course Name: 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	
3	4	0	5	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners

- to know conventions and the methods of engineering drawing.
- how to interpret engineering drawings using fundamental technical mathematics?
- how to construct basic and intermediate geometry?
- to improve their visualization skills so that they can apply these skills in developing new products.
- to improve their technical communication skill in the form of communicative drawings.
- to comprehend the theory of projection.

Course Content:

Section I			
Module No	Content	Hours	Weightage in %
1.	**Introduction** Importance of subject; 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, Involutes and Spiral along with normal and tangent to Each.	06	15
3.	**Principles of Projections** Types of Projections; Introduction of Principle Planes of Projections. **Projection of Points & Line:** Projection of Points in all four Quadrants; Projection of Lines with its inclination to one referral plane and two referral planes.	14	30

	Projection of Plane: Projection of Planes (Circular and Polygonal) with inclination to one referral plane and two referral planes; Concept of Auxiliary Projection Method.		
Section II			
Module No	Content	Hours	Weightage in %
1.	**Projection and Section of solids** **Projection of solids:** polyhedral, prisms, pyramids, cylinder, cone, auxiliary projection method, one view, two view and three view drawings. Missing view, rules for selection of views; Sectional view, section plane perpendicular to the HP & VP and other various positions, true shape of sections.	08	20
2.	**Orthographic projection** 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.	07	18
3.	**Isometric projections and isometric drawing** Isometric Scale, Conversion of orthographic views into isometric projection, isometric view or drawing.	07	12

List of Practical:

Sr No	Name of Practical	Hours
1.	Introduction sheet (dimensioning methods, different types of line, construction of different polygon, divide the line and angle in parts, use of stencil, lettering)	08
2.	Plane scale and diagonal scale	04
3.	Engineering curves	08
4.	Projection of Points & Lines	06
5.	Projection of Planes	08
6.	Projection of solid & Section of solid	10
7.	Orthographic projection	08
8.	Isometric projection	08

Text Books:

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

Reference Books:

Title	Author/s	Publication
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

Web Material Links:

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

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 Consist of Performance of Practical/Tutorial which should be evaluated out of 10 for each practical/Tutorial and average of the same will be converted to 20 Marks.
- Internal Viva component 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 completion of the course, the student will be able to

- know and understand "Drawing is a language of Engineers."
- interpret general assembly technical drawing.
- create traditions and the strategies for Engineering Drawing.
- evaluate basic and intermediate geometry.
- apply the knowledge of principles of projections.
- develop their hallucination/imagination skills.
- enhance their technical communication skill in the form of talkative drawings.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME1020
Course Name: 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	
0	2	0	1	0	0	50	0	0	0	50

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:

Section I			
Module No	Content	Hours	Weightage in %
1.	**Introduction** Introduction to various shops / sections and workshop layouts, Safety norms to be followed in a workshop	-	-
2.	**Fitting Shop** Introduction of Fitting Shop; Safety; Making a Job As per Drawing including Marking and other Performing Operations.	-	-
3.	**Carpentry and Drilling Shop** Introduction of Carpentry Shop; Preparation of Job as per Drawing including Marking and other Performing Operations.	-	-
4.	**Sheet Metal Shop** Introduction of Sheet Metal Shop; Preparation of Job as per Drawing including Marking and other Performing Operations	-	-
5.	**Smithy Shop** Introduction of Sheet Metal Shop; Preparation of Job as per Drawing including Marking and other Performing Operations	-	-
6.	**Introduction to Machine Tools** Introduction and Demonstration of various machine tools like Lathe, Drilling, Grinding, Hack saw Cutting etc.	-	-
7.	**Introduction to Welding & Plumbing** Introduction and Demonstration of Welding process. Introduction and Demonstration of Plumbing Shop.	-	-

List of Practical:

Sr No	Name of Practical	Hours
1.	Introduction and Demonstration of Safety Norms. Different Measuring Instruments	02
2.	To Perform a Job of Fitting Shop	06
3.	To Perform a Job of Carpentry Shop	06
4.	To Perform a Job of Sheet metal Shop	06
5.	To Perform a Job of Black Smithy Shop	04
6.	Introduction and Demonstration of Grinding & Hacksaw Cutting Machine	02
7.	Introduction and Demonstration of Plumbing Shop & welding process	04

Text Books:

Title	Author/s	Publication
Elements of Workshop Technology Vol. I	Hajra Chaudhary S.K	Media promoters & Publishers
Workshop Technology Vol. I and II	Raghuvanshi B. S.	Dhanpat Rai & Sons

Reference Books:

Title	Author/s	Publication
Workshop Technology Vol. I	W.A.J. Chapman	Edward Donald Publication
Workshop Practices	H S Bawa	Tata McGraw-Hill
Basic Machine Shop Practice Vol. I, II	Tejwani V.K	Tata McGraw-Hill

Web Material Links:

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

Course Evaluation:

Practical:

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

Course Outcome(s):

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

- use various measuring instruments.
- know the importance of safety norms required in workshop.
- understand the application of various tools required for different operation.
- understand how to manufacture product from given raw material.
- come to know the use of machine tools, hand tools and power tools.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME1040
Course Name: Concepts of Engineering Drawing

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	2	0	3	40	60	20	30	0	0	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners

- to know conventions and the methods of engineering drawing.
- how to interpret engineering drawings using fundamental technical mathematics?
- how to construct basic and intermediate geometry?
- to improve their visualization skills so that they can apply these skills in developing new products.
- to improve their technical communication skill in the form of communicative drawings.
- to comprehend the theory of projection.

Course Content:

Section I			
Module No	Content	Hours	Weightage in %
1.	**Introduction** Importance of subject; 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.	07	25
2.	**Engineering Curves** Classification and Application of Engineering Curves; Construction of Conics, Cycloidal Curves, Involutes and Spiral along with normal and tangent to Each.	08	25

Section II			
Module No	Content	Hours	Weightage in %
	Orthographic Projection Types of Projections: Principle of first and third angle projection -applications & Difference; Projection from Pictorial view of Object, View from Front, Top and Sides.	08	25
1.	**Isometric Projections and Isometric Drawing** Isometric Scale, Conversion of orthographic views into isometric projection, isometric view or drawing.	07	25

List of Practical:

Sr No	Name of Practical	Hours
1.	Introduction sheet (dimensioning methods, different types of line, construction of different polygon, divide the line and angle in parts, use of stencil, lettering, Plane scale and diagonal scale)	10
2.	Engineering curves	07
3.	Orthographic projection	07
4.	Isometric projection	06

Text Books:

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

Reference Book:

Title	Author/s	Publication
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

Web Material Links:

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

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 Consist of Performance of Practical/Tutorial which should be evaluated out of 10 for each practical/Tutorial 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 completion of the course, the student will be able to

- know and understand "Drawing is a language of Engineers."
- interpret general assembly technical drawing.
- create traditions and the strategies for Engineering Drawing.
- evaluate basic and intermediate geometry.
- apply the knowledge of principles of projections.
- develop their hallucination/imagination skills.
- enhance their technical communication skill in the form of talkative drawings.

P P Savani University
School of Engineering

Department of Computer Engineering

Course Code: SECE1010
Course Name: Basics of Computer and Programming
Prerequisite Course(s): Basic Knowledge of Computer

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	2	0	4	40	60	20	30	0	0	150

CE: Continuous Evaluation, ESE: End Semester Exam

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

- understand basic components of computer system.
- identify appropriate approach to computational problems.
- develop logic building and problem-solving skill.

Course Content:

Section I			
Module No	Content	Hours	Weightage in %
1.	**Introduction to computer and its architecture** Introduction and Characteristics, Generation, Classification, Applications, Central Processing Unit and Memory, Communication between various units, processor speed, multiprocessor system	05	10%
2.	**Memory and various Input and Output devices** Introduction to Memory, Memory hierarchy, Primary memory and its type, Secondary memory, Classification of Secondary memory, Various secondary storage devices and their functioning, their merits and demerits	05	10%
3.	**Operating Systems and Computer Languages** Evolution of Operating System, types and functions of operating systems, Evolution and classification of programming language, Selection of a programming language	04	08%
4.	**Introduction to C Programming** Features of C language, structure of C Program, Development of program, Algorithm and flowchart , Types of errors, debugging, tracing/stepwise execution of program, watching variables values in memory	04	10%

5.	**Constants, Variables and data Types** Character Set, C tokens, Keyword, Constants and Variables, Data types - Declaration and initialization, User define type declarations typedef, enum, basic input and output operations, symbolic constants	04	12%
	Section II		
Module No	Content	Hours	Weightage in %
6.	**Operators and Expression and Managing I/O operations** Introduction to Operators and its types, Evaluation of expressions, Precedence of arithmetic operators, Type conversions in expressions, Operator precedence and associatively; Introduction, reading a character, writing a character, formatted input, formatted output.	05	10%
7.	**Conditional statement and branching** Decision Making & branching: Decision making with If & If ... Else statements, If - Else statements (Nested Ladder), The Switch & go-to statements, The turnery (?:) Operator Looping: The while statement, The break statement & The Do. While loop, The FOR loop, Jump within loops - Programs.	07	16%
8.	**Arrays and Strings** Introduction to array, One dimensional array, Two dimensional arrays, Declaring and initializing string variables, Arithmetic operations on Characters, Putting strings together, Comparison of two strings, Basic String Handling Functions	06	12%
9.	**User-Defined Functions, Structure and Unions** Concepts of user defined functions, prototypes, definition of function, parameters, parameter passing, calling a function, recursive function Introduction, Structure definition, declaring and initializing Structure variables, Accessing Structure members, Unions	05	12%

List of Practical/Tutorial:

Sr No	Name of Practical/Tutorial	Hours
1.	Introduction to Unix Commands	04
2.	Word Processing, Spreadsheets and Presentation Exercises	06
3.	Basic C Programs	04
4.	Implementation in C for conditional statement and branching	06
5.	Implementation in C for Array and Strings	06
6.	Implementation in C for Functions, Structures and Unions	04

Text Books:

Title	Author/s	Publication
Programming in ANSI C	E. Balagurusamy	Tata McGraw Hill
Introduction to Computer Science	ITL Education Solutions Limited	Pearson Education

Reference Books:

Title	Author/s	Publication
Programming in C	Ashok Kamthane	Pearson
Let Us C	Yashavant P. Kanetkar	Tata McGraw Hill
Introduction to C Programming	Reema Thareja	Oxford Higher Education
Programming with C	Byron Gottfried	Tata McGraw Hill

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 Consist of Performance of Practical which should be evaluated out of 10 for each practical and average of the same will be converted to 10 Marks.
- Internal Viva component of 10 Marks.
- Practical performance/quiz/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

- learn the fundamentals of programming.
- develop efficient programs with their own logic & capabilities.
- Understand the syntax and semantics of the 'C' language.

P P Savani University
School of Engineering

Department of Computer Engineering

Course Code: SECE1020
Course Name: Introduction to Computer Programming
Prerequisite Course(s): Basic Knowledge of Computer

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	4	0	5	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

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

- understand basic components of computer system.
- identify appropriate approach to computational problems.
- develop logic building and problem solving skills.

Course Content:

Section I			
Module No	Content	Hours	Weightage in %
1.	**Introduction to Computers** Introduction, Central Processing Unit, Main Memory Unit, Interconnection of units, Communication between units of a computer system; Memory representation and hierarchy, Random Access Memory, Read-only Memory, Classification of secondary storage devices, types of I/O devices; Classification of programming languages, generations of programming languages- Machine Language, Assembly Language, High-level Language, 4GL.	04	10
2.	**Introduction to C, Constants, Variables and data Types** Features of C language, structure of C Program, Flow Charts and Algorithms Types of errors, debugging, tracing/stepwise execution of program, watching variables values in memory; Character Set, C tokens, Keyword and Identifiers, Constants and Variables, Data types - Declaration and initialization, User define type declarations - typedef, enum, basic input and output operations, symbolic constants, Overflow and underflow of Data.	06	15

3.	**Operators, Expressions, and Managing I/O operations** Introduction to Operators and its types, Evaluation of expressions, Precedence of arithmetic operators, Type conversions in expressions, Operator precedence and associatively; Introduction, reading a character, writing a character, formatted input formatted output.	05	10
4.	**Conditional statements** Decision Making & branching: Decision making with If and If... Else statements, Nesting of If... Else statements, The Switch and go-to statements, The turnery (? :) Operator Looping: The while statement, The break statement & The Do. While loop, The FOR loop, Jump within loops - Programs.	07	15
Section II			
Module No	Content	Hours	Weightage in %
1.	**Arrays** Introduction, One-dimensional arrays, Two-dimensional arrays, Concept of Multidimensional arrays, Dynamic arrays	05	12
2.	**Strings** Declaring and initializing string variables, Arithmetic operations on Characters, Putting strings together, Comparison of two strings, String Handling Functions	04	10
3.	**User-Defined Functions** Concepts of user defined functions, prototypes, definition of function, parameters, parameter passing, calling a function, recursive function	04	10
4.	**Structure and Unions** Introduction, Structure definition, declaring and initializing Structure variables, Accessing Structure members, Copying & Comparison of structures, Arrays of structures, Arrays within structures, Structures within Structures, Structures and functions, Unions	04	08
5.	**Pointers and File management** Basics of pointers, chain of pointers, pointer and array, Pointer to array, array of pointers; Introduction to file management and its functions	06	10

List of Practical/Tutorial:

Sr No	Name of Practical/Tutorial	Hours
1.	Introduction to Unix Commands	08
2.	Basics C Programs	04
3.	Implementation in C for Control statements	16
4.	Implementation in C for Array and Functions	16
5.	Implementation in C for structure and pointer	10
6.	Implementation in C for file handling operations	06

 # Use of different libraries will be covered in Practical Assignments.

Text Books:

Title	Author/s	Publication
Programming in ANSI C	E. Balagurusamy	Tata McGraw Hill
Introduction to Computer Science	ITL Education Solutions Limited	Pearson Education

Reference Books:

Title	Author/s	Publication
Programming in C	Ashok Kamthane	Pearson
Let Us C	Yashavant P. Kanetkar	Tata McGraw Hill
Introduction to C Programming	Reema Thareja	Oxford Higher Education
Programming with C	Byron Gottfried	Tata McGraw Hill

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 Consist of Performance of Practical which should be evaluated out of 10 for each practical and average of the same will be converted to 30 Marks.
- Internal Viva component of 10 Marks.
- Practical performance/quiz/test of 50 Marks during End Semester Exam.
- Viva/Oral performance of 10 Marks during End Semester Exam.

Course Outcome(s):

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

- learn the fundamentals of programming.
- develop efficient programs with their own logic & capabilities.
- understand the syntax and semantics of the 'C' language.

P P Savani University
School of Engineering

Department of Computer Engineering

Course Code: SECE1030
Course Name: Programming with Python

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	4	0	5	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help leaners to
- understand basics of object-oriented programming.
- identify appropriate approach to computational problems.
- develop logic building and problem-solving skills.

Course Content:

Section I			
Module No	Content	Hours	Weightage in %
1.	**Introduction** Basic computer architecture, how a program works, including the concepts of stored instructions, and fetch-decode execute cycle, and multi-tasking, Compare and contrast machine language, assembly language, and high-level languages, Data encoding techniques: binary/decimal conversion and the ASCII table, Hello World program.	03	5
2.	**Input, Processing and Output** Designing a program, Input and output functions, Python2 v. Python3, Variable types and assignment, Using mathematical operators, Documenting a program.	06	15
3.	**Decision Structures and Boolean Logic** The Java Environment: Java Program Development, Java Source File Structure, Compilation Executions, Basic Language Elements: Lexical Tokens, Identifiers, Keywords, Literals, Comments, Primitive Data-types, Operators, Introduction to repetition structures, the while loop, The for loop, Calculating a running total, Sentinels, Nested Loops.	05	10

4.	**Functions, Lists and Tuples** Introduction to functions, designing custom functions, Local variables, scope of variables, Passing Arguments to functions, and returning values, Local variables, global variables and global constants, Libraries, Sequences, Lists and list slicing, List methods and built-in functions, Copying and processing lists, Two-dimensional Lists, Tuples.	09	20
Section II			
Module No	Content	Hours	Weightage in %
1.	**Array and Strings** Arrays, Basic strings, String slicing, Testing, searching and manipulating strings.	04	10
2.	**Dictionary and Sets** Dictionaries, Sets, Problem Solving Techniques, Top down design, Bottom Up implementation	05	15
3.	**Object -Oriented Programming Concepts** Procedural and Object -Oriented programming, Classes Working with instances, Designing classes.	06	15
4.	**Files** Introduction to file input and output, Using loops to process files, Processing records, Exceptions.	02	10

List of Practical/Tutorials:

Sr No	Name of Practical/Tutorial	Hours
1.	Introduction to Python Environment and Idles.	02
2.	Class and Functions in Python.	08
3.	Dictionaries, Sets, Tuples and Lists in python.	04
4.	Arrays and Strings in Python	04
5.	File Handling in Python.	06

 # Use of different libraries will be covered in Practical Assignments.

Text Book:

Title	Author/s	Publication
Learning to Program with Python	Richard L. Halter man	Pearson

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 Consist of Performance of Practical which should be evaluated out of 10 for each practical and average of the same will be converted to 30 Marks.
- Internal Viva component of 10 Marks.
- Practical performance/quiz/test of 50 Marks during End Semester Exam.
- Viva/Oral performance of 10 Marks during End Semester Exam.

Course Outcome(s):

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

- learn the fundamentals of object-oriented programming.
- develop efficient programs with their own logic & capabilities.
- understand the syntax and semantics of the 'Python' language.

P P Savani University
School of Engineering

Department of Information Technology

Course Code: SEIT1010
Course Name: Introduction to Web Designing

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
0	4	0	2	0	0	50	50	0	0	100

CE: Continuous Evaluation, ESE: End Semester Exam

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

- understand basic components of internet.
- learn basic web technologies such as HTML, JavaScript and CSS.
- develop basic knowledge of website designing.

Course Content:

Module	Content	Hours	Weightage
1.	Introduction to World Wide Web, Web Server, Website, Website design principles, planning the website, navigation, Introduction to HTML, CSS, Bootstrap CSS	60	100%

List of Practical/Tutorial:

Sr No	**Name of Practical/Tutorial**	**Hours**
1.	Implementation of HTML tags	20
2.	Designing Websites with basic CSS	5
3.	Designing of Responsive Website Designs using Bootstrap CSS	5
4.	Development of mini project based on HTML, CSS and Bootstrap CSS	30

Reference Book:

Title	**Author/s**	**Publication**
HTML Black Book	Steven Holzner	Dreamtech press

Web Material Links:
https://www.w3schools.com/

Course Evaluation:

Practical:

- Continuous Evaluation Consist of Performance of Practical which should be evaluated out of 10 for each practical and average of the same will be converted to 50 Marks.
- Prepared Project during practical hours will be evaluated as a part of end semester evaluation which carries 50 Marks weightages.

Course Outcome(s):

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

- learn the fundamentals of Website designing.
- apply knowledge of HTML, CSS, and JavaScript to build static and dynamic websites.

P P Savani University
School of Engineering

Department of Science & Humanities

Course Code: SESH1010
Course Name: Elementary Mathematics for Engineers
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	
3	0	2	5	40	60	-	-	50	0	150

CE: Continuous Evaluation, ESE: End Semester Exam

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

- summarize concepts of calculus to enhance ability of analyzing mathematical problems.
- acquire knowledge and ability to work with differentiation and integration for applications of mathematical techniques in engineering.
- make use of multiple integration for finding area, volume and mass of solid objects.

Course Content:

Section I			
Module No	Content	Hours	Weightage in %
1.	**Introduction to Limit, Continuity & Differentiation** Limits, Continuity, Discontinuity, Types of discontinuity, Successive Differentiation, Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem	6	15
2.	**Sequence and Infinite Series** Convergence, Divergence of sequence, Divergence of infinite series, Tests for convergence of series (Comparison, Integral, Ratio and Root), Alternating series, Absolute and Conditional convergence, Power series with applications, Taylor's and Maclaurin's series, Indeterminate forms($0/0$, ∞/∞, $\infty.0$, $\infty - \infty$, 0^{∞}, ∞^{0} & 1^{∞}).	10	20
3.	**Curve tracing** Tracing of Cartesian Curves, Polar coordinates, Polar and Parametric form of standard curves, Areas and Lengths in polar coordinates	7	15

Section II			
Module No	Content	Hours	Weightage in %
1.	**Partial Derivatives** Function of several variables, Partial differentiation, Applications, Chain rule, Tangent planes and Linear approximations, Maxima and Minima, Euler's theorem, Lagrange multiplier, Total differentiation.	8	18
2.	**Beta Gama function** Improper Integrals, Beta and Gamma function with their properties and duplications formula without proof.	4	12
3.	**Multiple Integrals** Double integral (in Cartesian and Polar coordinates), Triple integral (in Cartesian, Cylindrical and Spherical coordinates), Change order of integration, Change of variables, Applications of double and triple integrals for evaluation of Area, Volume and Mass.	10	20

List of Tutorial:

Sr No	Name of Tutorial	Hours
1.	Limit, Continuity & Differentiation	4
2.	Sequence and Infinite Series -1	3
3.	Sequence and Infinite Series-2	3
4.	Curve Tracing-1	3
5.	Curve Tracing-2	2
6.	Partial Derivatives-1	3
7.	Partial Derivatives-2	3
8.	Beta Gama Function	2
9.	Multiple Integrals-1	4
10.	Multiple Integrals-2	3

Text Book:

Title	Author/s	Publication
Thomas' Calculus	George B. Thomas, Maurice D. Weir, Joel Hass	Pearson

Reference Books:

Title	Author/s	Publication
Advanced Engineering Mathematics	Erwin Kreyszig	Wiley India Edition
Calculus with Early Transcendental Functions	James Stewart	Cengage Learning
Calculus	Robert T. Smith, Roland B. Minton	Tata McGraw Hill
Engineering Mathematics-1(Calculus)	H. K. Dass, Dr. Rama Verma	S. Chand

Web Material Links:

- http://nptel.ac.in/courses/111104085/
- http://nptel.ac.in/courses/111104095/
- http://nptel.ac.in/courses/111105069/

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 should be evaluated out of 10 Marks for each tutorial and average of the same will be converted to 30 Marks.
- MCQ based examination of 10 Marks.
- Internal Viva component of 10 Marks.

Course Outcome(s):

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

- make use of concepts of limit, continuity and differentiability for analyzing mathematical problems.
- examine series for its convergence and divergence.
- formulate differential and integral operations.
- evaluate functions like Gamma, Beta functions & their relation which is helpful to evaluate some definite integral arising in various branch of engineering.
- applications of Limit, Derivatives and Integrals.

P P Savani University
School of Engineering

Department of Science & Humanities

Course Code: SESH1020
Course Name: Linear Algebra & Vector 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	
3	0	2	5	40	60	-	-	50	0	150

CE: Continuous Evaluation, ESE: End Semester Exam

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

- analyze 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 and vector calculus for solving science and engineering problems.

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 (Homogeneous and Non-homogeneous), Characteristic equation, Eigenvalues, Eigenvector, Diagonalization, Caley-Hamilton theorem,.	9	20
2.	**Vector Space** Vector spaces, Subspaces, Linear Combination, Linear Dependence, Linear Independence, Span, Basis and Dimension, Row space, Column space and Null space, Rank and Nullity	8	18
3.	**Linear Transformation** Introduction Linear Transformation, Kernel and Range, Inverse Linear Transformation, Matrix representation of Linear Transformation	6	12

Section II			
Module No	Content	Hours	Weightage in %
1.	**Inner Product Space** Inner products, Angle and Orthogonality, Orthogonal projection, Orthonormal bases (Gram-Schmidt Process, QR-Decomposition), Least Square Approximation, Change of basis.	8	18
2.	**Vector Calculus and its Applications** Vector & Scalar functions and Fields, Curve, Arc length, Curvature & Torsion gradient of scalar field, Directional derivative divergence of a vector field, Curl of a vector field	7	16
3.	**Integral Calculus** Line integrals, Path Independence of line integrals, Green`s theorem in the plane, Surface integrals, Divergence theorem of Gauss, Stokes`s theorem	7	16

List of Tutorial:

Sr No	Name of Tutorial	Hours
1.	Matrix Algebra-1	4
2.	Matrix Algebra-2	4
3.	Vector Space-1	3
4.	Vector Space-2	2
5.	Vector Space-3	2
6.	Inner Product Space-1	4
7.	Vector Calculus-1	2
8.	Vector Calculus-2	3
9.	Integral Calculus-1	3
10.	Integral Calculus-2	3

Text Books:

Title	Author/s	Publication
Elementary Linear Algebra Applications Version	Howard Anton, Charis Rorres	Wiley India Edition
Thomas' Calculus	George B. Thomas, Maurice D. Weir, Joel Hass	Pearson

Reference Books:

Title	Author/s	Publication
Advanced Engineering Mathematics	Erwin Kreyszig	Wiley India Edition
Higher Engineering Mathematics	B. V. Ramana	Tata McGraw Hill
Linear Algebra and its Applications	David C. Lay	Pearson
Introduction to Linear Algebra with Application	Jim Defranza, Daniel Gagliardi	Tata McGraw Hill
Elementary Linear Algebra	Ron Larson	Cengage Learning

Web Material Links:

- http://nptel.ac.in/courses/111106051/
- http://nptel.ac.in/courses/111108066/
- http://nptel.ac.in/downloads/111102011/
- http://epgp.inflibnet.ac.in/view_f.php?category=1564

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 should be evaluated out of 10 Marks for each tutorial and average of the same will be converted to 30 Marks.
- MCQ based examination of 10 Marks.
- Internal Viva component of 10 Marks.

Course Outcome(s):

By the end of the course, the student will be able to

- solve linear system using matrices.
- understand the concepts of Vector Space, Linear Transformation and inner product space.
- summarize vector functions, their derivatives, integrals, arc length and curl of vector field.
- apply the fundamental concepts of calculus to understand integrals calculus.

P P Savani University
School of Engineering

Department of Applied sciences & Humanities

Course Code: SESH1030
Course Name: 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	
0	2	0	1	0	0	40	60	0	0	100

CE: Continuous Evaluation, ESE: End Semester Exam

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

- understand basic fundamental electronic circuit.
- learn to use common electronic component.
- understand components of instruments, terminology and applications.

List of Practical:

Sr No	Name of Practical	Hours
1	Understanding of electronic component with specification.	4
2	Basic Circuit Diagram.	2
3	Study of CRO & Measurement of Voltage Amplitude & Frequency	2
4	To construct logic gates AND, NOT, EX-NOR and EX-OR using NANAD gates and verify their truth tables.	4
5	Introduction to Electronic Virtual Laboratory	4
6	Analog to digital converter.	3
7	Digital to analog convertor	3
8	Operational amplifier lab	4
9	Bread board understanding.	2
10	Introduction to CRO.	2

Text Book:

Title	Author/s	Publication
Electronic Principles	Albert Malvino and David J Bates	Mc Graw Hill(7th Edition)

Reference Book:

Title	Author/s	Publication
Electronic Devices	Thomas L. Floyd	Pearson (7th Edition)
Electronic Devices and Circuits	David A. Bell	Oxford Press (5th Edition)
Integrated Electronics	Jacob Millman, Christos	Tata McGraw Hill (2nd Edition)

Course Evaluation:

Practical:

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

Course Outcome(s):

- Students will be able to design elementary combinational and sequential circuits.

P P Savani University
School of Engineering

Department of Science & Humanities

Course Code: SESH1210
Course Name: Applied Physics
Prerequisite Course(s): Concept of Physics and Mathematics up to 12th Science

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	2	0	4	40	60	20	30	0	0	150

CE: Continuous Evolution, ESE: End Semester Exam

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

- prepare students for careers in engineering where physics principles can be applied to 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.	**Quantum Mechanics** Wave-Particle duality, de-Broglie matter wave, phase and group velocity, Heisenberg uncertainty principle and its applications, wave function and its significance, Schrodinger's wave equation, particle in one dimensional box.	08	20
2	**Acousic And Ultrasonic** Introduction, classification and characterization of sound, Absorption Coefficients, Sound Absorbing materials, Sound Insulation, Ultrasonic, Properties of Ultrasonic, Generation of Ultrasonic applications of ultrasonic.	06	15
3	**Solid State Physics** Introduction, Lattice Points and space lattice, unit cells and lattice parameters, Primitive cell, Crystal systems. The Bravais space lattices. Miller indices, X-Ray properties, Diffraction and Bragg's law, Bragg's X-Ray spectrum	07	15

Section II			
Module No	Content	Hours	Weightage in %
1.	**Non-Linear Optics** LASER, Spontaneous and Stimulated emission of light, applications of LASER; Fundamental ideas about Optical fibre, Advantages of Optical fibre of optical fibre, Applications of optical fibre.	06	12
2.	**DC and AC Circuits Fundamentals** Introduction of Electrical Current, Voltage, Power and Energy; Sources of Electrical Energy Inductor and Capacitor, Fundamental laws of electric circuits – Ohm's Law and Kirchhoff's Laws; Analysis of series, parallel and series-parallel circuits. Alternating voltages and currents and their vector and time domain representations, average and RMS values, from factor, phase difference, power and power factor, purely resistive inductive and capacitive circuits, R-L, R-C, R-L-C series circuits, impedance and admittance, circuits in parallel, series and parallel resonance.	12	25
3.	**Electronics** Semiconductors, Intrinsic and Extrinsic Semiconductor Advantages of Semiconductor Devices, Diodes, Transistors, Types of Bipolar Junction Transistor, Unijunction Transistor, FET and MOSFETS.	06	13

List of Practical:

Sr. No.	Name of Practical	Hours
1	Volt-Ampere Characteristics of Light Emitting Diode	02
2	Volt-Ampere Characteristics of Zener Diode	02
3	To determine value of Planck's constant (h) using a photovoltaic cell	02
4	To determine the Hall coefficient (R) and carrier concentration of a given material (Ge) using Hall effect	04
5	To study the Capacitors in series and parallel DC circuit	04
6	To study hysteresis loop for a magnetic material on CRO	02
7	To determine velocity of sound in liquid using Ultrasonic Interferometer	04
8	To study RLC Series circuit	02
9	To determine numerical aperture of an optical fiber	02
10	Determination of Young's Modulus of given material	02
11	Analysis of errors	02

Text Books:

Title	Author / s	Publication
Concept of the Modern Physics	A. Beiser	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
Solid State Physics	S.O. Pillai	New Age International Publishers
Basic Electronics for Scientists and Engineers	Dennis L. Eggleston	Cambridge University Press

Web material Link:
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 Consist of Performance of Practical which should be evaluated out of 10 for each practical and average of the same will be converted to 10 Marks.
- Internal Viva component of 10 Marks.
- Practical performance/quiz/drawing/test of 20 Marks during End Semester Exam.
- Viva/Oral performance of 10 Marks during End Semester Exam.

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

- use appropriate mathematical techniques and concepts to obtain quantitative solutions to problems in physics & electrical.
- perform a literature search, to make use of appropriate computational of laboratory skill, and to make an effective written or oral presentation of the results of the project.

P P Savani University
School of Engineering

Department of Science & Humanities

Course Code: SESH1220
Course Name: Chemistry

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	2	0	4	40	60	25	25	-	-	150

CE: Continuous Evaluation, ESE: End Semester Exam

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

- present sound knowledge of chemistry fundamentals, enriching students to understand the role of Chemistry in the field of science and engineering.
- inculcate habit of scientific reasoning to do the task rationally.

Course Content:

Section I			
Module No	Content	Hours	Weightage in %
1.	**Chemical Bonding and Structure of Molecules** **General terms**: Chemical bond, valence, valence electrons, Bonding and Non bonding electrons, Lewis symbols, Octet rule. **Ionic bond**: Definition, Condition for formation of ionic bond, Factors governing formation of ionic bond, examples (NaCl, $MgCl_2$, CaO, Al_2O_3), Characteristics of ionic compounds. **Covalent bond:** Definition, conditions for covalent bond formation, examples [(single covalent bond: H_2, Cl_2, H_2O, NH_3, CH_4) (multiple covalent bond: O_2, N_2, CO_2)], General characteristics of covalent compounds, valence bond approach, formation of H_2 molecule, Concept of hybridization, Hybridization and shape of molecules, Shape of water, ammonia, PCL5 and SF6, Limitations of Valence bond theory, VSEPR theory, Fajan's rules. **Co-ordinate covalent bond:** Definitions, examples (NH_4^+, H_3O^+, BF_4^-, CH_3NO_2, SO_3, $AlCl_3$, SO_4^{-2}, O_3 and CO. **Hydrogen bonding:** Definition, conditions for H-bond formation, examples (HF, H_2O, NH_3, 2-nitrophenol), Types of H-bonds, Characteristics of H-bonded compounds.	09	20

	Metallic bond: Definition, The Electron sea model, explanation to the physical characteristics of metal based on the electron sea model.		
2.	**Electrochemistry** Introduction, Arrhenius ionic theory, De-bye Huckel theory of strong electrolytes, activity and activity co-efficient, Conductivity of electrolytes, Kohlrausch's law of independent migration of ions, Ostwald's dilution law, Acids and bases, Concept of pH and pOH, Buffer solutions, Solubility product, common-ion effect, hydrolysis of salts, conductometric titration, transport number.	04	09
3.	**Reaction Intermediates in organic reaction** (Definition and example only) Homolytic and Heterolytic bond fission, Nucleophiles and electrophiles, Leaving group; Stability, Generation, Reaction and applications of reaction intermediates (Carbocations, Carbanions, Free radicals, Carbenes, Nitrenes, Benzynes)	09	20
Section II			
Module No	Content	Hours	Weightage in %
1.	**Bio Chemistry** Introduction to metabolism in a cell. Overview of metabolic pathways. Regulation of Pathways at : (a) BioChemical Level and (b) Genetic Level. Chemicals from metabolic Pathways using microorganism.	07	15
2.	**Phyto Chemistry** Chemicals from Plants. Secondary Metabolites and their medicinal values. Future prospects of phytochemistry in chemical manufacturing and in the treatment of diseases; Role of Chemical Engineers in the Phytochemical industry	04	10
3.	**Water Treatment** Introduction, Characteristics imparted by impurities in water, Hardness of water, equivalents of calcium carbonate, units of hardness, disadvantages of hard water, scale and sludge formation in boilers, caustic Embrittlement, boiler corrosion, Priming and Foaming, softening methods, Drinking or Municipal water, Desalination of Brackish water.	07	15
4.	**Colloids** Lyophilic and Lyophobic colloids, Characteristics of lyophilic and lyophobic sols, preparation of sols, Dispersion methods, Aggregation methods, Purification of sols, Dialysis, optical properties of sols: Tyndall effect, kinetic properties of sols, Brownian movement, Electrical properties of sols: Electrophersis, Stability of sols, associated colloids, cleansing action of soaps and detergents, emulsions, gels, applications of	05	10

	colloids, determination of molecular weight of macromolecules.		

List of Practical/Tutorial:

Sr. No	Name of Practical	Hours
1.	Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.	2
2.	Demonstration: Preparation of solutions of different concentrations	2
3.	Determination of alkalinity in the given water sample.	2
4.	Determination of temporary and permanent hardness in water sample using EDTA as standard solution.	2
5.	Conduct metric titration of strong acid vs. strong base.	2
6.	Determination of critical micelle concentration of a surfactant using conductometry.	2
7.	Determination of concentration of unknown solution spectrophotometrically.	2
8.	Determining the strength of ferrous ammonium sulfate with the help of $K_2Cr_2O_7$.	2
9.	Determination of dissociation constant of strong acid by pH metric method.	2
10.	To determine the critical micelle concentration of a surfactant using surface tension method.	2
11.	Determination of molecular weight of a polymer by using viscometer.	2
12.	To determine λ max of the solution of (a) $KMnO_4$ (b) $K_2Cr_2O_7$.	2
13.	Determination of cloud point of a surfactant in the presence of salts.	2
14.	To determine the viscosity of given solvents using viscometer.	2
15.	Revision	2

Text Book:

Title	Author/s	Publication
Engineering Chemistry (16th Edition)	P.C. Jain and Monika Jain	Dhanpat Rai publishing company

Reference Books:

Title	Author/s	Publication
Textbook of Engineering Chemistry (4th Edition)	R. Gopalan, D. Venkappaya, S. Nagarajan	Vikas Publishing house Ltd.
A textbook of Chemical technology (Volume-1)	G. N. Pandey	Vikas Publishing house Ltd.
Essentials of Physical Chemistry	A.Bahl, B.S. Bahl and G.d. Tuli	S. Chand Publishing
Concise Inorganic Chemistry	J.D. Lee	Wiley India
Organic Reaction Mechanisms	V. K. Ahluwalia, R. K. Parashar	Norasa Publishing House
Organic Chemistry (6th edition)	Robert Thornnton Morrison Robert Neilson Boyd	Pearson Education

Web Material Link:
https://books.google.co.in/books?id=Z3033BGuMBEC&printsec=frontcover&dq=engineering+chemistry+ebook&hl=en&sa=X&ved=0ahUKEwj9xoiNv3UAhVEL48KHYg7Ak0Q6AEIITAA#v=onepage&q&f=false

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 consist of performance of practical which should be evaluated out of 10 for each practical and average of the same will be converted to 15 Marks.
- Internal Viva component of 10 Marks.
- Practical performance of 15 Marks during End Semester Exam.
- Viva performance of 10 Marks during End Semester Exam.

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

- understand the relevance of fundamental and applications of chemical sciences and chemistry in the field of engineering.
- apply the knowledge of types of hardness of water and its estimation.
- apply the knowledge of thermodynamics in studying different chemical systems.
- apply the knowledge of Colloids, metals and alloys, their types and their properties.
- have sound knowledge on Electrochemistry.

P P Savani University
School of Engineering

Centre for Skill Enhancement & Professional Development

Course Code: SEPD1010
Course Name: Academic English and Technical Writing
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	00	03	40	60	20	30	--	--	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to
- improve speaking, listening, reading and writing skills in an academic environment.
- write academic texts effectively, as well as improve grammar and vocabulary.
- express ideas clearly and accurately with accurate writing.
- form and practice strategies for reading in the academic contexts quickly and effectively.
- gain confidence in speaking English in an academic context and also analyze and improve pronunciation.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to Academic English** • General English Vs Academic English • Academic Vocabulary • Grammar for Academic Purposes	03	10
2.	**Academic Reading** • Introduction to Reading • Types of Reading • Techniques of Reading	06	20
3.	**Academic Listening** • Introduction to Listening • Types of Listening • Techniques of Listening	06	20
Section II			
Module No.	Content	Hours	Weightage in %
1.	**Academic Speaking** • Introduction to Speech and Its importance	07	25

	• Phonetics and Transcription to effective pronunciation • Speaking in various contexts		
2.	**Technical Writing** • Understanding clauses and Syntax • Cohesion and Coherence/ Building Paragraphs • Flow/ structure of Writing • Punctuations • Application/ Letter Writing • Review/ Report Writing • E-mail etiquettes	08	25

List of Practical:

Sr. No	Name of Practical	Hours
1.	Introduction to Academic English – Ice Breaker	02
2.	Introduction to Academic English – Vocabulary Games and Grammar Activity	02
3.	Reading for Summarizing and Paraphrasing	02
4.	Reading for review writing/ Skimming and Scanning Web Resources	02
5.	Comprehensive Listening: Note Taking and Note Making	02
6.	Comprehensive Listening: Summarizing and Paraphrasing	02
7.	Critical Listening: An analysis	02
8.	Speech for Pronunciation	02
9.	Speech for Presentation	02
10.	Speech for Fluency	02
11.	Conversational Skills	02
12.	Academic Writing: Paragraph Building	02
13.	Academic Writing: Critical Review Writing	02
14.	Leave Application/ Request Letter/Business Letter	02
15.	Notice/Memo/Agenda/ Minutes	02

Text Book(s):

Title	Author/s	Publication
Practical Techniques to Develop Communication Skills	Parul Popat & Kaushal Kotadia	Pothi Prakashan, 2015

Reference Book(s):

Title	Author/s	Publication
English for Academic Purposes: A Guide and Resource Book for Teachers	R. R. Jordan	Cambridge University Press, 1997
English for Academic Purposes: An Advanced Resource Book	Ken Hyland	Routledge, 2006
Engineers' Guide to Technical Writing	Kenneth G. Budinski	ASM International, 2001

Communication Skills	Parul Popat & Kaushal Kotadia	Pearson, 2015

Web Material Link(s):

- https://msu.edu/course/be/485/bewritingguideV2.0.pdf
- https://www.khanacademy.org
- http://www.kantakji.com/media/6494/t121.pdf

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 consists of 60 marks.

Practical/Tutorial:

- Continuous Evaluation consists of performance of Practical which should be evaluated out of 10 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

- effectively use LSRW skills in English in an academic environment.
- write Academic English effectively with improved grammar and vocabulary.
- practice strategies for comprehensive reading in English.
- speak English in an academic context fluently and efficiently.

P P Savani University
School of Engineering

Centre for Skill Enhancement & Professional Development

Course Code: SEPD1020
Course Name: Communication Skills
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	00	03	40	60	20	30	--	--	150

CE: Continuous Evaluation, ESE: End Semester Exam

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

- hone basic communication skills by exposing them to the key communication techniques, and thereby.
- improvise comprehension and expressional skills which are required for personal, social, academic and professional environment.
- sharpen Communication Skills with reference to Organizational Structure.
- expose to the modern modes of communication.
- show the importance of team work and give practice in Group Communication with reference to Group Dynamics.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to Communication Skills** • Concept and Process of Communication • Types of Communication • Principles of Effective Communication • Barriers to Communication	06	20
2.	**Interpersonal Organizational Communication** • Styles of Communication • Flows of Communication • Essentials of Organizational Communication • Kinesics, Proxemics and Chronemics • Cross cultural Communication	06	20
3.	**Team/ Group Dynamics and Leadership** • Introduction to Group Work and Group Dynamics	03	10

	• Types of Groups and Essentials of Group Work and networking • Concept and Types of Leadership • Traits of an Effective Leader		
Section II			
Module No.	Content	Hours	Weightage in %
1.	**Presentation Skills** • Introduction to presentation and its importance • Modes, means and purposes of presentation • Defining purpose, analyzing audience and organizing the contents • Visual aids and nuances of delivery • Body language and effective presentation	08	25
2.	**Communication and Contemporary World** • Introduction to Contemporary personal, social and professional set ups • Modern Day Communication tools and their efficacy • Effective usage of Modern-Day Communication tools for personal and professional growth	07	25

List of Practical:

Sr. No	Name of Practical	Hours
1.	Introduction to Communication: An Ice Breaker	02
2.	Verbal/ Non-Verbal Communication Pros and Cons	02
3.	Principles of Communication	02
4.	Interpersonal Communication	02
5.	Organizational Communication	02
6.	Assertive Vs Aggressive Communication	02
7.	Group Dynamics: A Decision-Making Activity	02
8.	Group Dynamics Working together to achieve organizational vision	02
9.	Leadership: Holding a diverse Group Together	02
10.	Presentation Skills; Video Session	02
11.	Presentations by the Students: Self-Peer-teacher assessment	02
12.	Presentations by the Students: Self-Peer-teacher assessment	02
13.	Discussion on Modern Day Communication	02
14.	Modern Day Communication and Contemporary Society	02
15.	Exploring Innovative Communication Tools for effective communication	02

Text Book (s):

Title	Author/s	Publication
Practical Techniques to Develop Communication Skills	Parul Popat & Kaushal Kotadia	Pothi Prakashan, 2015

Reference Book (s):

Title	Author/s	Publication
Communication Skills	Parul Popat & Kaushal Kotadia	Pearson, 2015
Communication Skills, Second Edition	Sanjay Kumar, PushpLata	Oxford University Press, 2015
Communication Skills for Engineers	Sunita Mishra	Pearson, 2011
Effective Interpersonal and Team Communication Skills for Engineers	Clifford Whitcomb, Leslie E. Whitcomb	John Wiley & Sons, 2012

Web Material Link (s):

- http://www.mindtools.com/page8.html
- http://techpreparation.com/soft-skills.htm?gclid=CJf34fyQv5wCFdMtpAodjjX_tA
- http://lorien.ncl.ac.uk/ming/Dept/Tips/present/comms.htm

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 consists of 60 marks.

Practical/Tutorial:

- 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 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

- follow the process of communication and its components in organizational context.
- express themselves and to participate in the classroom discussions and other such academic or academic support activities.
- comprehend whatever they receive from Informal Interactions with the family, teachers and friends; and from Formal Communications taking Place in Lectures, Laboratories and the like.
- communicate effectively using suitable styles and techniques.
- express themselves through the modern modes of communication and to participate in the group discussions and other such academic or academic support activities.
- use language effectively with reference to communication in groups and group behavior.
- understand and use latest and innovative communication tools to enhance their communication efficacy.

P P Savani University
School of Engineering

Department of Information Technology

Course Code: SEIT1020
Course Name: Logic Building & Problem Solving

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
1	0	1	2	50	50	0	0	50	50	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

- To understand basic components of logic building.
- To learn and analyze various logical reasoning techniques.
- To develop basic problem-solving skills.

Course Content:

Module No.	Content	Hours	Weightage in %
1	Orientation Formal Deductive Logic, Categorical Propositions Informal Logic, Basic Concepts, meaning and definition, Categorical Syllogisms, Informal fallacies Inductive Logic, Analogy and Legal and moral Reasoning, Propositional Logic Unit, Causality and Mill's Methods, Probability Unit, Natural Deduction in propositional logic, Statistical reasoning, Hypothetical/Scientific reasoning, Science and superstition, Predicate logic.	30	100

Web Material Links:
https://www.coursera.org/learn/logic-introduction#syllabus

Course Evaluation:
Practical:

- Continuous Evaluation consists of performance of tutorial, which should be evaluated out of 10 per each tutorial. At the end of the semester, average of the entire tutorial will be converted to 50 Marks.
- Prepared Problem based Case Study/Assignments during Lecture/Tutorial hours will be evaluated as a part of end semester evaluation which carries 50 Marks weightages.

Course Outcome(s):

- Students will learn the fundamentals of logical reasoning.
- Students can apply knowledge of logical reasoning in solving basic real-world issues.

P P Savani University
School of Engineering

Department of Science & Humanities

Course Code: SESH1050
Course Name: Solution to Societal Problems: A Community Service Approach
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	
0	2	0	1	0	0	50	0	0	0	50

CE: Continuous Evaluation, ESE: End Semester Exam

Objective of the Course:
To help learners to

- Identify the societal problems at ground level
- Understand the concerns and seriousness of the reality at first hand experiences
- Try to find out the solutions and apply them as much as possible
- Comprehend the concept of Community Service while being a professional

Outline of the Project:

Sr. No.	Project Guidelines
1	Identification of Societal Problem
2	Data Collection
3	Literature Review
4	Progress of Project
5	Report Writing
6	Presentation & Question-Answer

Detailed Guidelines:

Module No	Content	Hours	Weightage in %
1.	**Identification of Societal Problem** Outline of identified issue of society shall be prepared by the student/ group of students (Maximum 3).	3	10
2.	**Data Collection** Collection of data for the respective societal issue, societal impact and remedies shall be covered.	3	10
3.	**Literature Review** Mapping of the efforts carried out by the other candidates/authorities/organizations.	3	10

4.	**Progress of Project** The students must report the progress/status of their work every fortnight to their respective supervisor.	12	40
5.	**Report Writing** The report must be prepared as per suggested guidelines consisting of Preamble, Objectives, Scope, Survey Methodology, Data Collection, Data Analysis, Design (if any), Conclusions, Recommendations and Annexure.	6	10 %
6.	**Presentation & Question-Answer** At the end of the semester the student/group of students shall give presentation of their work followed by viva-voce examination.	3	10 %

Instructional Method and Pedagogy:

- The student/group of students (Maximum 3) will identify any societal issue based on their inclination/willingness/interest/experience.
- The project will include visits as per demand of the project, where student/group of students can avail an opportunity to develop understanding based on their first-hand experience of actual scenario of society and its problems.
- Work progress of the project will be assessed and evaluated regularly by the mentor as per the evaluation guidelines.
- The mentor will visit the site of the project carried out by students under him, if need be.
- At the end of the semester, students have to submit the final project report followed by the presentation and Question-Answer. The submission of the project shall be done as per the guidance of the supervisor.
- At the end of the semester, the projects (certified by the supervisor/principal only) will be evaluated as per suggested evaluation criteria.

Course Evaluation:

Sr. No.	Evaluation criteria	Marks
1	Identification of the problem related field work (Within first 30 Days of commencement of semester)	20
2	Presentation of problem & proposed solution (Within 31 to 40 Days of commencement of semester)	20
3	Actual work carried out & impact of solution (Within 41 to 60 Days of commencement of semester)	20
4	Report writing as per guidelines	20
5	Final Presentation & Question-Answer session	20
	Grand Total:	**100**

The entire evaluation will be converted equivalent to 50 Marks.

Course Outcome(s):

By the end of the course, the student will be able to:

- Learn to analyze the societal problems by the methods of survey, observation, statistics, interview and so on.
- Examine the identified issued in order to find best possible solutions

- Formulate and apply the methods to apply the solution
- Study the applications of their respective field for Community Service.

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

SECOND YEAR B. TECH.

P P SAVANI UNIVERSITY																
SCHOOL OF ENGINEERING																
TEACHING & EXAMINATION SCHEME FOR B. TECH. MECHANICAL PROGRAMME AY:2018-19																
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**	
3	SESH2011	Differential Equations	SH	3	0	2	5	5	40	60	0	0	50	0	150
	SEME2011	Engineering Thermodynamics	ME	3	0	1	4	4	40	60	0	0	20	30	150
	SEME2020	Material Science & Metallurgy	ME	3	2	0	5	4	40	60	20	30	0	0	150
	SECV2102	Advanced Solid Mechanics	CV	3	2	0	5	4	40	60	20	30	0	0	150
	SEME2030	Non-Cutting Manufacturing Processes	ME	3	2	0	5	4	40	60	20	30	0	0	150
	SEME2041	Machine Drawing	ME	0	2	0	2	1	0	0	50	0	0	0	50
	SEPD2010	Critical Thinking, Creativity & Decision Making	SEPD	2	0	0	2	2	40	60	0	0	0	0	100
	SEPD3040	Integrated Personality Development Course - I	SEPD	2	0	0	2	1	40	60	0	0	0	0	100
	SEME2910	Industrial Exposure	ME	2			0	2	0	0	100	0	0	0	100
						Total	**30**	**27**							**1100**
4	SESH2022	Numerical & Statistical Analysis	SH	3	0	2	5	5	40	60	0	0	50	0	150
	SEME2050	Forming & Machining Processes	ME	3	2	0	5	4	40	60	20	30	0	0	150
	SEME2060	Fluid Mechanics	ME	3	2	0	5	4	40	60	20	30	0	0	150
	SEME2070	Mechanical Measurement & Metrology	ME	3	2	0	5	4	40	60	20	30	0	0	150
	SEME2081	Kinematics of Machinery	ME	4	0	1	5	5	40	60	0	0	50	0	150
	SESH2211	Basics of Electrical & Electronics	SH	0	2	0	2	1	0	0	50	0	0	0	50
	SEPD3050	Integrated Personality Development Course-II	SEPD	2	0	0	2	1	40	60	0	0	0	0	100
	SEPD3030	Foreign Language (German)	SEPD	2			2	2	40	60	0	0	0	0	100
						Total	**31**	**26**							**1000**

P P Savani University
School of Engineering

Department of Science & Humanities

Course Code: SESH2011
Course Name: Differential Equations
Prerequisite Course(s): SESH1010-Elementary Mathematics for 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	00	02	05	40	60	00	00	50	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

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

- learn orientation of calculus and its applications in solving engineering problems involving differential equations.
- understand the introduction of partial differential equations with methods of its solutions.
- learn the application of Laplace transforms to solve linear differential equations.
- understand the introduction of periodic functions and Fourier series with their applications for solving ODEs.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Ordinary Differential Equation** First order ODEs, Formation of differential equations, Solution of differential equation, Solution of equations in separable form, Exact first order ODEs, Linear first order ODEs, Bernoulli Equation, ODEs of Second and Higher order, Homogeneous linear ODEs, Linear Dependence and Independence of Solutions, Homogeneous linear ODEs with constant coefficients, Differential Operators Nonhomogeneous ODEs, Undetermined Coefficients, Variation of Parameters	10	20
2.	**Partial Differential Equation** Formation of First and Second order equations, Solution of First order equations, Linear and Non-liner equations of first, Higher order equations with constant coefficients, Complementary function, Particular Integrals.	7	18
3.	**Applications of ODE and PDE** Orthogonal trajectories, Method of Separation of Variables, D'Albert's solution of wave equation, Solution of heat equation.	5	12

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Laplace Transform** Laplace Transform, Linearity, First Shifting Theorem, Existence Theorem, Transforms of Derivatives and Integrals, Unit Step Function, Second Shifting Theorem, Dirac's Delta function, Laplace Transformation of Periodic function, Inverse Laplace transform, Convolution, Integral Equations, Differentiation and Integrations of Transforms, Application to System of Differential Equation.	10	20
2.	**Fourier Series** Periodic function, Euler Formula, Arbitrary Period, Even and Odd function, Half-Range Expansions, Applications to ODEs.	7	15
3.	**Fourier Integral and Transformation** Representation by Fourier Integral, Fourier Cosine Integral, Fourier Sine Integral, Fourier Cosine Transform and Sine Transform, Linearity, Fourier Transform of Derivatives.	6	15

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	4
4.	Partial Differential Equation-1	2
5.	Partial Differential Equation-2	4
6.	Applications of ODE and PDE	2
7.	Laplace Transform-1	2
8.	Laplace Transform-2	2
9.	Laplace Transform-3	4
10.	Fourier Series-1	2
11.	Fourier Series-2	2
12.	Fourier Integral and Transformation	2

Text Book(s):

Title	Author/s	Publication
Advanced Engineering Mathematics	Erwin Kreyszig	Wiley India Pvt. Ltd.

Reference Book(s):

Title	Author/s	Publication
Higher Engineering Mathematics	B. S. Grewal	Khanna Publishers
Advanced Engineering Mathematics	R. K. Jain, S.R.K. Iyengar	Narosa Publishing House Pvt. Ltd.

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 Links:

1) http://nptel.ac.in/courses/111105035/
2) http://nptel.ac.in/courses/111106100/
3) http://nptel.ac.in/courses/111105093/
4) http://nptel.ac.in/courses/111108081/

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

Course Outcome(s):

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

- grasp the respective 1st and 2nd order ODE and PDE.
- analyze engineering problems (growth, decay, flow, spring and series/parallel electronic circuits) using 1st and 2nd order ODE.
- classify differential equations and solve linear and non-linear partial differential equations.
- apply understanding of concepts, formulas, and problem-solving procedures to thoroughly investigate relevant real-world problems.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2011
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	00	01	04	40	60	00	00	20	30	150

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	05	15

	processes, third law of thermodynamics, PPM3, Entropy change for phase changing process.		
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 %
1.	**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
2.	**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
3.	**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
4.	**Refrigeration and Liquefaction** Carnot refrigeration cycle, air refrigeration cycle, absorption refrigeration, choice of refrigeration,	04	08

List of Tutorials:

Sr. No.	Name of Tutorial	Hours
1.	To interpret comparison of heat and work and solution of basic numerical on heat and work interaction.	01
2.	To solve numerical on S.F.E.E and its application to engineering devices like boiler, heat exchanger, turbine compressor etc.	02
3.	To understand concept of heat engine, heat pump, and refrigerator based on second law of thermodynamics.	02
4.	To solve basic numerical on concept of Entropy.	02
5.	To solve numerical on vapour power cylces.	02
6.	To understand reheat cycle, regenerative cycle, reheat-regenerative cycle, feedwater heaters for rankine cycle.	02
7.	To solve numerical on gas power cycles.	02
8.	To understand effect of reheat, regeneration and intercooling on brayton cycle.	02

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 and 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.

Tutorial:

- Circuits and charts for gas & vapour power cycle consists of 10 marks.
- Internal Viva consists of 10 marks.
- Viva/Oral performance consists of 30 marks during End Semester Exam.

Course Outcome(s):

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

- interpret basics terms of thermodynamics.
- define and demonstrate laws of thermodynamics and its application.
- interpret differentiate concept of entropy, energy and exergy and their application.
- analyze different gas and vapour power cycles and its applications.
- identify behavior and properties of gases and its mixtures.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2020
Course Name: Material Science & Metallurgy
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	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

- 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, Bravise 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.	06	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, Mar-tempering, 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.	05	13
5.	**Powder Metallurgy** Application and advantages, Production of powder, Compacting, Sintering, Equipment and process capability.	Laboratory	05
Section II			
Module No.	Content	Hours	Weightage in %
1.	**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.	09	20
2.	**Non-Ferrous Alloys** Non-Ferrous Alloys of Aluminium, Magnesium, Copper, Nickel, Titanium, Microstructure and mechanical property relationships; Composite, Classification, Processing, Metal Matrix	Laboratory	05

3.	**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.	07	15
4.	**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.	07	10

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 casehardening to improve properties of steel during processes and applications with the help of muffle furnace.	04

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 solution of Practical which will be evaluated out of 10 for each and average of the same will be converted to 10 Marks.
- Internal Viva component of 10 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 completion of the course, the students will be able to

- interpret important mechanical properties and classification of engineering materials and metals.
- define different heat treatment process used in industrial applications.
- understand the solidification process of metals and alloys.
- analyze different microstructure, crystallography and defects of cast iron and steel specimen.
- identify different destructive & nondestructive testing methods used in the practical field and their applications.
- understand the use powder metallurgy and their application to industries.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV2102
Course Name: Advanced Solid Mechanics
Prerequisite Course(s): Engineering Mechanics (SECV1030), Solid Mechanics (SECV1070)/ Mechanics of Solids (SECV1080)

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 understand

- the stresses developed under the application of force.
- the effect of torsion on material.
- behavior of structural element under the influence of various stresses.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Bending Stress in Beam** Theory of simple bending, Assumptions, Derivation of flexural formula, Position of Neutral axis, Section modulus, Second moment of area of common cross sections (rectangular, I,T,C) with respective centroid & parallel axes, Bending stress distribution diagrams,	08	18
2.	**Shear Stress in Beam** Shearing stresses at a section, Derivations of shear stress distribution formula for different sections, shear stress distribution diagrams for common symmetrical sections, Maximum and average shears stresses, Shear connection between flange & web.	08	18
3.	**Direct & Bending Stress** Eccentric loading, Symmetrical column with eccentric loading about one axis, Symmetrical columns with Eccentric loading about two axis, Unsymmetrical columns with Eccentric loading.	07	14

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Dams** Introduction, Types of dams, Rectangular dam, Stress across the section of the dam, Trapezoidal dam, stability of dam.	08	18
2.	**Column & Strut** Introduction, Failure of a column, Assumptions in Eural's Theory, End conditions for long column, Expression for crippling load when both ends of the column are hinges, Expression for crippling load when both ends of the column are Fixed, Expression for crippling load when both ends of the column are Free, Expression for crippling load when one end of the column is fixed and other is hinged, Effective length of column, Limitations of Eural's formula, Rankine's formula.	07	16
3.	**Torsion** Derivation of equation of torsion, Assumptions, Application of theory of torsion equation to solid & hollow circular shaft, Torsional rigidity, Power Transmitted by shaft, Polar moment of Inertia.	07	16

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Torsion Test	02
2.	Fatigue Test	02
3.	Tutorials on Bending Stress in Beam	04
4.	Tutorials on Shear Stress in Beam	04
5.	Tutorials on Direct and Bending Stress, Torsion	04
6.	Tutorials on Dam	06
7.	Tutorials on Column & Strut	04
8.	Tutorials on Torsion	04

Text Book(s):

Title	Author/s	Publication
Strength of Materials (SI Units)	Dr. R. K. Bansal	Laxmi Prakashan

Reference Book(s):

Title	Author/s	Publication
Strength of Materials (SI Units)	R. S. Khurmi	S. Chand & Company Pvt. Ltd.
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	Dhanpat Rai Publishing Company

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 consists of 15 marks during End Semester Exam.
- Viva/ Oral performance consists of 15 marks during End Semester Exam.

Course Outcomes:

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

- apply mathematical knowledge to calculate the deformation behavior of simple structure.
- critically analyze problem and solve the problem related to mechanical elements and analyze the deformation behavior for different types of loads.
- understand the different types of stresses and strains developed in the member subjected to axial, bending, shear & torsional effects.
- understand the physical properties of materials.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2030
Course Name: Non-Cutting Manufacturing Processes
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	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

- 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	20%

Section II			
Module	Content	Hours	Weightage in %
1.	**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%
2.	**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.	08	18%
3.	**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.	07	14%

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

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 will be evaluated out of 10 for each practical 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 completion of the course, the students will be able to

- acquire basic knowledge of various casting processes and to analyze casting defects.
- conduct various experiments on manufacturing processes and to automate them.
- understand the different types of welding processes in depth.
- demonstrate an ability to use manufacturing techniques for economic production.
- choose correct manufacturing process for a particular application.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2041
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	02	00	01	00	00	50	00	00	00	50

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.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Machining Symbols and Surface Roughness** Symbols used for machining processes, Symbols used for indication of surface roughness	--	05
2.	**Limit, Fits and Tolerances** Tolerance, Limits, Allowance, Basic Size, Design Size, Actual Size, Unilateral and Bilateral Tolerance and its representation, Fits and its types(Clearance, Transition and Interference), Introduction of Hole Basic and Shaft Basic Method	--	05
3.	**Screw Threads** Forms of screw threads, Representation of external and internal thread, Unified thread, Whitworth thread, Seller thread, British Association thread, Square thread, Acme thread, Knuckle thread, Buttress thread, Right and left hand threads	--	15
4.	**Screwed Fastening** Types of Nuts (Hexagonal, Square, Flanged, Cap, Dome, Capstan, Ring and Wing), Types of Bolt (Hexagonal, Square, Cylindrical, Cup headed, Countersunk headed, Hook, Headless tapered, Eye bolt, Lifting bolt, Stud bolt)	--	15

5.	**Keys, Cotter and Pin Joint** Key and keyways, Types of Keys (Taper Key, Saddle Key, Round or Pin Key, Gib Head Key, Feather or Parallel Key, Woodruff Key), Cotter and Cotter Joint, Pin Joint or Knuckle Joint	--	10
Section II			
Module	Content	Hours	Weightage in %
1.	**Riveted Joints, Bolted Joints, Welding Joints and Welding Symbols** Riveted Joint, Forms of riveted head (Cup, Pan, Conical, Countersunk, Rounded Countersunk and Ellipsoid), Riveted Lap and Butt Joints, Welding Joints and Symbols (Lap, Butt, Tee, Corner or Edge)	--	15
2.	**Drafting Software** Introduction of Software, Part Drafting Exercise (2D as well as 3D)	--	35

List of Practical:

Sr No	Name of Practical	Hours
1.	Sheet of Machining Symbols and Surface Textures	02
2.	Sheet of Types of Screw Threads	02
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	14

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 and noted the same in manual and record book 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 30 marks.

Course Outcome(s):

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

- interpret Industrial Drawings.
- interpret Machining and Welding Symbols.
- interpret Part and Assembly Drawings.
- select Screw Threads, Screw Fasteners, Welding and Riveted Joints.

P P Savani University
School of Engineering

Centre for Skill Enhancement & Professional Development

Course Code: SEPD2010
Course Name: Critical Thinking, Creativity and Decision Making
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	00	00	02	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

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

- develop a familiarity with the mechanics of critical thinking and logic.
- understand basic concepts of critical and creative thinking.
- explore and understand critical thinking for the purpose of creativity in context of professional, social and personal spectrum.
- explore an application critical thinking and creativity in personal, social, academic, global and profession life.
- understand Decision making as a skill to be learned through critical thinking.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to Critical Thinking** • Concept and meaning of Critical Thinking • Significance of Critical Thinking in personal, social and professional life • Thinking with arguments, evidences and language	08	25
2.	**Applied Critical Thinking** • Inductive and Deductive Thinking • Questioning for Generating Ideas • Socratic Questioning and its application	07	25
Section II			
Module	Content	Hours	Weightage in %
1.	**Conceptual Thinking** • Second order thinking • Synthesizing	03	10

2.	**Creative Thinking and Decision Making** • Problem Solving • Adapting Various Structures of Decision Making	06	20
3.	**Moral Thinking** • Generating and structuring ideas • Designing and Evaluating the solutions • Case Study	06	20

Text Book (s):

Title	Author/s	Publication
Thinking Skills for Professionals	B. Greetham, Palgrave	Macmillan, 2010

Reference Book(s):

Title	Author/s	Publication
An Introduction to Critical Thinking and Creativity: Think More, Think Better	J. Y. F. Lau	John Wiley & Sons., New hercy
Critical Thinking: A Beginner's Guide to Critical Thinking, Better Decision Making and Problem Solving	Jennifer Wilson	CreateSpace Independent Publishing Platform, 2017
Creativity and Critical Thinking	edited by Steve Padget	Routledge 2013

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 completion of the course, the student will be able to

- comprehend the concept and application of critical thinking as well as its applications.
- understand the critical thinking in context of creativity, logical arguments, moral reasoning.
- understand the application of critical thinking for social, academic, global and professional spectrum.
- correlate their thinking skills for better productivity and outcome-based tasks.
- be in a better position to apply 360^{o} analysis of the situation for decision making.

P P Savani University

Integrated Personality Development Course.

Course Code: SEPD3040
Course Name: IPDC-1

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	01	40	60	00	00	--	--	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- provide students with a holistic education – focused on increasing their intelligence quotient, physical quotient, emotional quotient and spiritual quotient
- provide students with hard and soft skills, making them more marketable when entering the workforce
- educate students on their social responsibilities as citizens of India
- provide students with a value-based education which will enable them to be successful in their family, professional, and social relationships.
- teach self-analysis and self-improvement exercises to enhance the potential of the participants.

Course Content:

Lecture No.	Content	Hours	Weightage in %
1.	• Remaking Yourself - Restructuring Yourself.	02	50
2.	• Remaking Yourself - Power of Habit.	02	
3.	• Remaking Yourself -Developing Effective Habits.	02	
4.	• Learning from Legends - Tendulkar and Ratan Tata	02	
5.	• From House To Home Affectionate Relationship	02	
6.	• Facing Failures - Factors Affecting Failures.	02	50
7.	• Facing Failures - Failures are not Always Bad.	02	
8.	• Facing Failures - Insignificance of Failures.	02	
9.	• Facing Failures - Failures can be Overcome.	02	
10.	• Learning from Legends - Yogiji Maharaj and Nelson Mandela.	02	

Course Evaluation:

Theory:

- Continuous Evaluation consists of 40 marks. There will be a mid-term exam which will assess the current progress of students, it assessed out of 20 marks and will be equivalent to 20 marks of the Continuous Course Evaluation (CCE). There will be a submission consisting 10 marks as per the guidelines of course coordinator and average of the attendance consisting 10 marks (minimum 60 percentage attendance is required).
- End semester exam (ESE) part A 30 marks and part B 30 marks.

Course Outcome(s)

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

- have gained a greater sense of social responsibility
- have gained marketable hard and soft skills that would directly apply to their future careers
- have gained greater insight and ability to navigate their family, social, and professional relationships along with difficult situations which may arise in their life
- have a broader sense of self-confidence and a defined identity
- have greater value for living a moral and ethical life based on principles taught in the course

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2910
Course Name: Industrial Exposure
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 of the Course:
To help learners to

- get exposed to the industrial spectrum.
- learn the mechanisms of industry/ workplace.
- be aware about work culture and policies of industries.

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

- get acquainted with the industrial scenario.
- be aware about his future prospects in the respective field.
- gain knowledge of work culture and industrial expectations.

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 Science & Humanities

Course Code: SESH2022
Course Name: Numerical & Statistical Analysis
Prerequisite Course(s): SESH1020-Linear Algebra & Vector Calculus,
SESH2011-Differential Equations
SESH2031-Differential Methods for Chemical 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	00	02	05	40	60	00	00	50	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

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

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

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Complex Variables** Complex numbers with operators and geometric representation, Analytic function, Derivative of complex function, Cauchy-Riemann equation, Trigonometric and Hyperbolic functions, Complex Integration, Conformal Mapping, Linear functional transformations, Cauchy's Integral, Calculation of residue	10	20
2.	**Numerical Solutions of Linear and Non-linear Equations** Errors and Their computations, General error formula, Bisection Method, Iteration Method, Newton-Raphson Method, Solution of system of non-linear equation, Solution of linear system, Gauss Elimination	6	13
3.	**Numerical Differentiation and Integration** Interpolation, Finite Differences, Error in numerical differentiation, Cubic Splines Method, Differentiation Formulae, Numerical solution of ODEs, Picard's Method, Euler's Method, Runge-Kutta Method, Numerical Integration, Trapezoidal Rule, Simpson's 1/3-rule, Simpson's 3/8-rule, Euler-Maclaurin Formulae	7	17

Section II			
Module	Content	Hours	Weightage in %
1.	**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 Analysis, Regression line and regression coefficient, Karl Pearson's method.	7	15
2.	**Probability Distribution** Introduction, Conditional probability, Independent events, independent experiments, Theorem of total probability and Bayes' theorem, Probability distribution, Binomial distribution, Poisson distribution, Uniform distribution, Normal distribution.	8	18
3.	**Testing of Hypothesis** Introduction, Sampling, Tests of significance for parametric test, Null Hypothesis, Type 1 and Type 2 errors, Level of significance, Chi-square test, Student's t-test, Seducer's f-test	7	17

List of Tutorials:

Sr No	Name of Tutorial	Hours
1.	Complex Variables-1	4
2.	Complex Variables-2	2
3.	Numerical Solutions of Linear and Non-linear Equations-1	2
4.	Numerical Solutions of Linear and Non-linear Equations-2	4
5.	Numerical Differentiation and Integration-1	2
6.	Numerical Differentiation and Integration-2	2
7.	Basics of Statistics-1	2
8.	Basics of Statistics-2	4
9.	Probability-1	2
10.	Probability-2	2
11.	Testing of Hypothesis-1	2
12.	Testing of Hypothesis-2	2

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
Higher Engineering Mathematics	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

Web Material Links:

1) http://nptel.ac.in/courses/111106094/
2) http://nptel.ac.in/courses/111106084/
3) http://nptel.ac.in/courses/111105035/
4) http://nptel.ac.in/courses/111101003/
5) http://nptel.ac.in/courses/111105090/

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

Course Outcome(s):

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

- derive numerical solution of linear and non-linear system of equation.
- acquire knowledge of finite differences, interpolation, numerical differentiation and numerical integration.
- select appropriate method to collect data and construct, compare, interpret and evaluate data by different statistical methods.
- apply concept of probability in decision making, artificial intelligence, machine learning etc.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2050
Course Name: Forming and Machining Processes
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	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

- understand the basic operation involved in various machines.
- understand the machining science using conventional machines.

Course Content:

Section I			
Module	Content	Hours	Weightage in %
1.	**Mechanical working of Metals** Introduction, Classification of Forming Processes, Mechanics of Metal Working, Various Temperatures in Metal Working, Cold and Hot Working, Formability, Strain Rate Effects on metal forming, Effects of Metallurgical Structure on Metal Forming, Hydro Static Pressure, Residual Stresses.	07	16
2.	**Metal Rolling** Introduction and classification of Rolling processes, Principles of Metal Rolling, Simplified Analysis of Rolling Load, Various Rolling Parameters, Defects in rolled products and remedies of it.	03	07
3.	**Forging** Introduction and classification of Forging Processes, Various Forging operations, Forging Die Materials and Lubrication, Forge ability, Forging, Defects and remedies.	04	08
4.	**Extrusion** Introduction and classification of Extrusion Processes, Various Extrusion Operations, Metal Deformation and Forces in Extrusion. Materials and Lubrication considerations in Extrusion Process, Extrusion Defects, Extrusion of Tubing, Production of Seamless Pipe and Tubing. Drawing of Rods, Wires and Tubes, Sizing.	05	12

5.	**Press Working and Dies** Types of presses drive and feed mechanisms, press tools. Various press working operations and its parameters, Elements of press, Various Metal Forming Operations. Stock strip layout, study of sheet metal nesting software.	03	07
	Section II		
Module No.	Content	Hours	Weightage in %
1.	**Turning Machine** Engine Lathes, Construction, Arrangement and Principle, Units of engine lathes, Type and size range of engine lathes; Operations carried on engine lathe, Attachment extending the processing capacities of engine lathes; Description of other types of lathes, Plain turning lathes, Facing lathes, Multiple tool lathes; Simple purpose lathes, Turret lathes, Horizontal and Vertical lathes.	08	17
2.	**Milling Machines** Purpose and types of milling machines, general purpose milling machines. Different types of milling operations. Milling cutters, attachments extending the processing capabilities of general purpose milling machines.	06	15
3.	**Planers, Shapers and Slotters** Classification, Attachments extending the processing capacities of each.	03	06
4.	**Sawing and Broaching Machines** Metal sawing – classification; Reciprocating sawing machines, Circular sawing machines, Band sawing machines. Types of broaching machines, Advantages and Limitations of Broaching.	02	04
5.	**Drilling, Boring, Grinding Machines and Abrasives** Application of drilling and boring machines. Upright drill processes, radial drills, Horizontal and Precision Boring Machines. Classifications of grinding machines, Cylindrical grinders, Internal grinders, Surface grinders, Tool and Cutter grinders. Surface finishing, Abrasives, Manufacture of grinding wheels.	04	08

List of Practical:

Sr No	Name of Practical	Hours
1.	Rolling Operation Using Three Roller Bending Machine	02
2.	Forging Operation	02
3.	Bending Operation Using Hydraulic Pipe Bender	02
4.	Press and Press Working Operations	04
5.	Turning practices for Step turning and thread cutting	06
6.	Capstan and Turret Lathe	02
7.	Spur Gear Cutting on Milling Machine	04

8.	Planers, Shapers and Slotters Machine	04
9.	Drilling machine	02
10.	Grinding machine	02

Text Book(s):

Title	Author/s	Publication
Manufacturing Processes vol I	O.P. Khanna	Dhanpatrai Publication
Workshop Technology Vol. I, II & III	WAJ Chapman	Elseveir

Reference Book(s):

Title	Author/s	Publication
Workshop Technology Vol. II	Hajra & Choudhari	Media promoters & publishers pvt. Ltd.
Metal Cutting Principles, 2E	Shaw	Oxford
A Textbook of Production Technology	Sharma P.C.	S Chand

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 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 metal forming processes like forging, drawing, rolling, extrusion, and deep drawing.
- understand the basic concept of machining operations of different machines.
- analyze any conventional machining processes.
- identify and suggest correct manufacturing process for particular application.
- generate the sequence of machining operation to produce the end product.
- judge the limitations and scope of machines to perform variety of operations.
- understand metal forming processes like forging, drawing, rolling, extrusion, and deep drawing.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2060
Course Name: Fluid Mechanics
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	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

- 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.	07	15
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	07	15

	potential function, Flow nets, Continuity Equation for 2D and 3D flow in Cartesian co-ordinates system		
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 %
1.	**Dimensional Analysis** Dimensions, Dimensional Homogeneity, Raleigh and Buckingham π Theorem, Non-Dimensional Numbers, Similarities – Geometrical, Kinematics and Dynamic.	05	10
2.	**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, Dracy Weishbach Equation, Types of open channel flow, Specific Energy and Specific Force, Critical Flow, Hydraulic Jump, Measurement of Discharge in open Channels.	09	20
3.	**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.	05	10
4.	**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	10

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

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

Course Outcome(s):

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

- understand fundamentals of fluids.
- analyze various flow problems and flow characteristics.
- determine major and minor losses through different pipes.
- apply the concept of fluid mechanics to design various system.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2070
Course Name: Mechanical Measurement and Metrology
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	00	04	40	60	20	30	00	00	150

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, Comparison Methods and Direct Instrument Measurement, Sample Length, Numerical Evaluation of Surface	04	09

	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 %
1.	**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
2.	**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
3.	**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
4.	**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.	04	09
5.	**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,	04	09

	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		

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)	-

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 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

- describe basic concepts of Metrology.
- select linear measuring instrument for measurement of various components.
- select angular and taper measurement devices for measurement of various components.
- distinguish between various screws by measuring their dimensions.
- understand different gears through measurement of various dimensions of gears.
- measure surface finish of the component produced.
- describe basic concepts of mechanical measurement and errors in measurements.
- select appropriate temperature measuring device for various applications.
- describe methods of measurement for various quantities like force, torque, power, displacement, velocity and acceleration.
- use Coordinate Measuring Machines (CMM) in industry.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME2081
Course Name: Kinematics of Machinery
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	
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 the leaners 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.	06	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.	12	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.	12	20
Section II			
Module No.	Content	Hours	Weightage in %
1.	**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
2.	**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.	15	20
3.	**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.	08	20

List of Tutorials:

Sr No	Name of Tutorial	Hours
1.	Velocity diagram using Instantaneous center method	03
2.	Velocity and acceleration analysis of simple mechanism	02
3.	Velocity and acceleration analysis of mechanism involving coriolis component	02
4.	Layout of cam profile for reciprocating knife edge follower	02
5.	Layout of cam profile for offset reciprocating roller follower	02
6.	Layout of cam profile for flat faced reciprocating follower	02
7.	Layout of cam profile for oscillating follower	02

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 Dukkipati	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 Tutorial which should be evaluated out of 10 marks for each Tutorial and average of the same will be converted to 10 marks.
- Internal Viva consists of 20 marks.
- Model of any mechanism having weightage of 10 marks.
- Problem Solution/Quiz of 10 marks during End Semester Exam.

Course Outcome(s):

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

- demonstrate an understanding of the concepts of various mechanisms and pairs.
- do velocity and acceleration analysis of different mechanism.
- design a layout of cam and follower for specific motion.
- demonstrate an understanding of principle of gears.

P P Savani University
School of Engineering

Department of Applied Sciences & Humanities

Course Code: SESH2211
Course Name: Basics of Electrical & Electronics
Prerequisite Course(s): SESH1210-Physics

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	02	00	01	00	00	50	00	00	00	50

CE: Continuous Evaluation, ESE: End Semester Exam

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

- understand basic fundamental electronic circuit.
- learn to use common electronic instrumentation.
- explain the construction and application of standard circuit configurations and identify the component types and connections used to build functioning electronic circuits.
- understand components of instruments, terminology and applications.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to Electrical Instrument** Multimeter-Application, Sensitivity, Merits And Demerits. Cathode Ray Oscilloscope-Working, Application, Understanding Different Type Of Waveforms Formed On Cro. Understanding The Bread Board Connection. Electrical Component, Lamped Circuit Element-Classification Of Resistors, Carbon Color Coded Resistance, Capacitor, Inductor Kirchhoff's Laws	--	15
2.	**Three phase AC circuit** Advantage, generation, phase sequence, balance load, relationship between line and phase value, power measurement in balanced three phase circuit.	--	20
3.	**Electrical safety** Electrical wiring, Different type of wiring system, Safety precaution in handling electrical appliances, Cause of electric shock, Types of earthing, Circuit protection device, Earthing, Difference between Fuse and MCB.	--	15

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Logic Gates & Family** Classification of logic gates and ICs (74XX), symbols and truth table verification of basic logic gates, multiple input basic logic gates, Universal gates**,** Implementation of different Boolean functions using various gates.	--	25
2.	**PCB Designing** Drawing and printing layout on board, photo etching process, masking process, PCB manufacturing techniques, Software	--	25

List of Practical/Exercise(s):

Sr. No	List of Practical/Exercises	Hours
1.	Identify various tools used for wiring	02
2.	Identify the symbols used in electrical circuit diagrams	02
3.	Verification of truth tables of all logic gates	02
4.	Verification of De Morgan's theorem, the postulates of Boolean algebra and Realization of Sum of Product and Product of Sum expression using universal gates	04
5.	Implementation of the given Boolean function using logic gates	02
6.	Understanding Electricity lab	02
7.	Understanding the breadboard connection.	02
8.	Understanding seven segment led using bread board	02
9.	Understanding Network Theorem	02
10.	Study full wave & Half wave rectifier	02
11.	To Study and calculate Ripple factor and efficiency of various Rectifier	03
12.	PCB design of a small circuit with its layout using tapes & etching in the lab	05

Text Book(s):

Title	Author/s	Publication
Making Printed Circuit Boards	Jan Axelsen	Mc GrawHill
Fundamentals of Digital Circuits	A.Anand Kumar	Prentice-hall of India Pvt. Ltd
Electronics Instrumentation	H S Kalsi	TMH

Reference Book(s):

Title	Author/s	Publication
Digital Electronics and Circuit design	Malvino & Leach	TMN
Everyday Electronics Data Book	Mike Tooley	B P B
Electrical Technology	B.L.Theraja	S.Chand

Web Material Links:

- https://nptel.ac.in/courses/108108076/
- http://www.nptelvideos.in/2012/11/basic-electronics-prof-tsnatarajan.html
- http://vlab.co.in/

Course Evaluation:

Practical:

- Continuous Evaluation consists of performance of practical and noted the same in the manual and record book 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 30 marks.

Course Outcome(s):

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

- use the techniques, skills and modern engineering tools necessary for engineering practice
- identify and understand importance of various electrical and electronics components.
- acquire knowledge about analog and digital communication.
- develop the idea of identifying, analyzing and designing combinational circuits.

P P Savani University

Integrated Personality Development Course

Course Code: SEPD3050
Course Name: IPDC-2

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	01	40	60	00	00	--	--	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- provide students with a holistic education – focused on increasing their intelligence quotient, physical quotient, emotional quotient and spiritual quotient.
- provide students with hard and soft skills, making them more marketable when entering the workforce.
- educate students on their social responsibilities as citizens of India
- provide students with a value-based education which will enable them to be successful in their family, professional, and social relationships.
- teach self-analysis and self-improvement exercises to enhance the potential of the participants.

Course Content:

Lecture No.	Content	Hours
1.	Remaking Yourself Restructuring Yourself.	02
2.	Essentials of Profession Writing a Resume	02
3.	Financial Wisdom Basics of Financial Planning.	02
4.	Financial Wisdom Financial Planning Process.	02
5.	From House to Home Listening & Understanding.	02
6.	From House to Home Forgive & Forget.	02
7.	From House to Home Bonding the Family.	02
8.	Soft Skills Networking, Decision making & Leadership	02

9.	Soft Skills Teamwork, Harmony & Adaptability.	02
10.	Mass Management Project Management.	02
11.	My India My Pride Glorious Past (Part -1)	02
12.	My India My Pride Glorious Past (Part -2)	02
13.	My India My Pride Present Scenario.	02
14.	My India My Pride An Ideal Citizen-1	02
15.	My India My Pride An Ideal Citizen-2	02

Course Evaluation:

Theory:

- Continuous Evaluation consists of 40 marks. There will be a mid-term exam which will assess the current progress of students, it assessed out of 20 marks and will be equivalent to 20 marks of the Continuous Course Evaluation (CE). There will be a submission consisting 10 marks as per the guidelines of course coordinator and average of the attendance consisting 10 marks (minimum 60 percentage attendance is required).
- End semester exam (ESE) section I (30 marks) and section II (30 marks).

Course Outcome(s):

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

- have gained a greater sense of social responsibility.
- have gained marketable hard and soft skills that would directly apply to their future careers.
- have gained greater insight and ability to navigate their family, social, and professional relationships along with difficult situations which may arise in their life.
- have a broader sense of self-confidence and a defined identity.
- have greater value for living a moral and ethical life based on principles taught in the course.

P P Savani University
School of Engineering

Center for Skill Enhancement and Professional Development

Course Code: SEPD3030
Course Name: German Language
Prerequisite Course(s): Foreign Language

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	02	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

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

- develop and integrate the use of the four language skills i.e. listening, speaking, reading and writing.
- use the language effectively and appropriately on topics of everyday life situations.
- develop an interest in the appreciation of German.
- develop an intercultural awareness.
- enhance the ability of the candidates to express their ideas and feelings in their own words and for them to understand the use of correct language.
- appreciate the language as an effective means of communication.
- understand language when spoken at normal conversational speed in everyday life situations.
- understand the basic structural patterns of the language, vocabulary and constructions.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to German** • Alphabets • German accents • German Numbers • What are the similarities and differences between English and German? • Greetings	2	15
2.	**German Time** • Basic Introduction	2	08
3.	**Vocabulary part-1** • The days of the week • The months of the year	2	05

	• Seasons • Directions • Weather		
4.	**Vocabulary part-2** • Family • Colors and Shapes • Day/time indicators • Body parts • Clothing	2	07
5.	**Vocabulary Part-3** • Food and Meals • Fruits, Vegetables and Meats • Sports and Hobbies	2	05
6.	• Transportation • House and Furniture	2	05
7.	• School Subject • Places • Common Expressions	2	05
Section II			
Module No.	Content	Hours	Weightage in %
1.	**German grammar** • Verb Sein (to be) • Verb Haben (to have) • Introduction of Regular verbs and Irregular verb • Konjugation of Regular verb • First group verbs('EN' group)	2	10
2.	• Konjugation of Regular verbs • Second group verbs('Ten/Den' group) • Konjugation of Irregular verbs • Third group verbs (Stem change verb) • Fourth group verbs (Spell Change Verb)	2	10
3.	• Nicht trennbare und trennbare Verben • Die Modalverben • Personalpronomen-Nominativ	2	10
4.	• W-Frage • Ja/Nein-Fragen • Nomen und Artikel-Nominativ • Die Anrede	2	10
5.	• Nomen-Genusregein • Adjektiv • Nomen und Artikel-Akkusativ • Personalpronomen-Akkusativ	2	10
6.	• Practice of Writing • Practice of Speaking	2	-
7.	• Practice of Listening	2	-
8.	• Practice of Reading	2	-

Text Book(s):

Title	Author/s	Publication
Namaste German	Yoshita Dalal	Yoshita Dalal

Reference Book(s):

Title	Author/s	Publication
Fit In Deutsch	**Hueber**	**Goyal Publication**

Web Material Links:

- https://www.youtube.com/watch?v=iGovllrEsF8&list=PLRps6yTcWQbpoqIOCmqMeI1HLnLIRmO_t
- https://www.youtube.com/watch?v=GwBfUzPCiaw&list=PL5QyCnFPRx0GxaFjdAVkx7K9TfEklY4sg

Course Evaluation:

Theory:

- Continuous Evaluation consists of a Test of 30 marks and 1 hour of duration.
- German Speaking Exam consists of 10 marks.
- End Semester Examination will consist of 60 marks Exam.

Course Outcome(s):

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

- demonstrate speaking, reading, writing and listening in German.
- understand German Technology.
- communicate easily in four Language and they can get good job in German Company.
- demonstrate the level of proficiency necessary to enable them to function in an environment where German is used exclusively.

THIRD YEAR B. TECH.

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

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.	**Thermal Power Plant** General Layout of modern power plant, Site selection, Present status of power generation in India.	02	05
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.	06	20
3.	**High Pressure Steam Generators** Unique features and advantages, La-Mont; Benson; Velox, Loeffler and Schmidt-Hartmann boilers, Supercritical, Positive circulation, Fluidized bed combustion.	03	10
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 Ash disposal, Ash	04	15

	handling systems, Dust collection and its disposal, Mechanical Dust Collector, Electrostatic precipitator.		
Section II			
Module. No.	Content	Hours	Weightage in %
1.	**Draught System** Natural draught – Estimation of height of chimney, Maximum discharge condition, Forced; induced and balanced draught, Power requirement by fans	04	15
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.	04	15
3.	**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	03	10
4.	**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	04	10

List of Tutorial:

Sr. No.	Name of Tutorial	Hours
1.	To solve the numerical based on Economics of power generation.	02
2.	Study the various Feed water treatment for steam generators.	02
3.	Selection of induced and forced draft fans and height of chimney.	02
4.	A case study of Nuclear Power Plant.	02
5.	To understand India's 3-Stage Nuclear Programme and nuclear power plants in India.	02
6.	To Study various types of condenser and cooling towers.	02
7.	A Case study of thermal power plant.	02
8.	Industrial visit report on Power Plant Visit.	01

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.

FOURTH YEAR B. TECH.

P P SAVANI UNIVERSITY															
SCHOOL OF ENGINEERING															
TEACHING & EXAMINATION SCHEME FOR B. TECH. MECHANICAL PROGRAMME AY:2018-19															
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**	
7	SEME4011	Control Engineering	ME	3	2	0	5	4	40	60	20	30	0	0	150
	SEME4021	Renewable Energy Sources & Systems	ME	3	2	0	5	4	40	60	20	30	0	0	150
	SEME4031	Design of Power Transmission Elements	ME	4	0	1	5	5	40	60	0	0	20	30	150
	SEME4040	Operations Research	ME	4	0	1	5	5	40	60	0	0	50	0	150
	SEPD4010	Creativity, Problem Solving & Innovation	SEPD	3	0	0	3	3	40	60	0	0	0	0	100
	SEME4910	Industrial Training	ME	5			0	5	0	0	100	0	0	0	100
		Elective-III By Industrial Expert		2	2	0	4	3	40	60	20	30	0	0	150
						Total	**27**	**29**							**950**
8	SEME4920	Major Project	ME	16			16	16	0	0	200	300	0	0	500
						Total	**16**	**16**							**500**

TEACHING & EXAMINATION SCHEME FOR FOURTH YEAR B.TECH. MECHANICAL ENGINEERING PROGRAMME (ELECTIVE COURSES)															
7	SEME4511	Design of Heat Exchangers	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME4521	Tools Design	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3631	Automobile Engineering	ME	3	0	0	3	3	40	60	0	0	0	0	100
	SEME3602	Gas Dynamics	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: SEME4011
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	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

- 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:

Section I			
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	08	20
2.	**System Modelling** Translational and Rotational Mechanical, Electrical, Thermal, Hydraulic and Pneumatic Systems, Force Voltage and Force Current Analogy, Position Servo Mechanism. Block Diagram and Signal Flow Graph Representation of Physical Systems along with Rules, Properties, Comparison and Limitation, Mason's Gain Formula	08	15
3.	**Time Response and 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	07	15

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Frequency Response Analysis** Need of Frequency Response Analysis, Sinusoidal Response of Linear System, Methods Used in Frequency Response, Frequency Domain Specifications	08	20
2.	**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	07	15
3.	**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.	07	15

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Introduction to simulation software like MATLAB/LABVIEW	2
2	Modelling of physical system using simulation software	4
3.	Simulation of linear system to different inputs	2
4.	Given a system transfer function, plot the location of the system zeros and poles using simulation software	2
5.	Simulation of root locus plot using simulation software	4
6.	Introduction to hydraulic trainer system/software	2
7.	Development & performance of given hydraulic circuit	4
8.	Introduction to pneumatic trainer system/software	4
9.	Development & performance of given pneumatic circuit	4
10.	Introduction of programmable logic controller and ladder diagram	2

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 student will be able 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.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME4021
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	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

- 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:

Section I			
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.	19	40

	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		
Section II			
Module No.	Content	Hours	Weightage in %
1.	**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 **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	09	20
2.	**Bio Energy** Energy from Biomass, Sources of Biomass, Different Species, Conversion Process, Advantages and Disadvantages, Properties of Biomass, Biomass Energy **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	07	15
3.	**Geothermal energy** Availability, Vapor and Liquid Dominated Systems, Binary Cycle, Hot Dry Rock Resources, Magma Resources, Advantages and Disadvantages, Applications **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	15

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

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 student will be able to

- interpret national energy scenario and its possible utilization to become self-reliant in the field of renewable energy.
- define the availability of bio energy and its utilization in rural as well urban areas to use natural wastes and their conversion in biogas along with power generation.
- identify the types of renewable energies with their eco-friendly applications.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME4031
Course Name: Design of Power Transmission Elements
Prerequisite Course(s): SEME3060-Design of Basic 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	
04	00	01	05	40	60	00	00	20	30	150

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:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to Design** Terminologies, Stress, Strain, Types of Forces, Various Transmission Drives, Design	03	5
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	09	15
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.	09	15
4.	**Cams, Clutches and Brakes** Cam Design: Types, Pressure Angle and Under Cutting Base Circle Determination, Design of Plate Clutches, Axial Clutches,	09	15

	Cone Clutches, Band and Block Brakes, External Shoe Brakes, Internal Expanding Shoe Brake		
Section II			
Module No.	Content	Hours	Weightage in %
1.	**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 Parallel Axis Helical Gears – Pressure Angle in the Normal and Transverse Plane - Equivalent Number of Teeth, Forces and Stresses	12	20
2.	**Bevel, Worm and Cross Helical Gears** Straight Bevel Gear: Tooth Terminology, Tooth Forces and Stresses, Equivalent Number of Teeth, Estimating the Dimensions of Pair of Straight Bevel Gears. Worm Gear: Merits and Demerits, Terminology. Thermal Capacity, Materials, Forces and Stresses, Efficiency, Estimating the Size of the Worm Gear Pair. Cross Helical: Terminology - Helix Angles -Estimating the Size of the Pair of Cross Helical Gears	09	15
3.	**Geartrains** 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	09	15

List of Tutorials:

Sr. No.	Name of Tutorial	Hours
1.	Design of Flat belt and selection of V belt	02
2.	Standard Catalogue related to belt, Chain and Spocket	01
3.	Design of sliding and rolling contact bearing	01
4.	Design of single plate clutch	01
5.	Design of brakes and cams	01
6.	Design of spur gears	02
7.	Design of helical gears	02
8.	Design of bevel and worm wheel	02
9.	Standard catalogue for spur, helical and worm gears	01
10.	Design of Gear Trains	02

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
Machine Design	Sundararajamoorthy T. V	Anuradha Publications
Machine Design	R S Khurmi	S Chand Publication
Hand book of Mechanical Design	Gitin Maitra	McGraw Hill Eduction

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 student will be able to

- select the materials for mechanical transmission system.
- apply the design knowledge to design the various flexible drives.
- apply the design concepts to design the parallel axis mating gear.
- apply the basic design steps to design the perpendicular and oblique axis mating gear.
- apply the design procedure to design the gear box.
- apply the design principles to design the various friction drives.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME4040
Course Name: Operation Research
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	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

- 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:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**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	14	24
2.	**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	08	13
3.	**Queuing Theory** Basis of Queuing Theory, Elements of Queuing Theory, Kendall's Notation, Operating Characteristics of a Queuing	08	13

	System, Classification of Queuing Models, Preliminary Examples of M/M/1:∞/FCFA		
Section II			
Module No.	Content	Hours	Weightage in %
1.	**Inventory Control** Inventory Models, Various Costs and Concepts EOQ, Deterministic Inventory Models, Production Models, Stochastic Inventory Models, Buffer Stock	06	10
2.	**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	12	20
3.	**Sequencing and Networks** Sequencing — Problem with N jobs and 2 machines - 3 machines and 'M' machines Network Models — Basic Concepts, Construction of Networks, Project Network, CPM and PERT - Critical Path Scheduling, Crashing of Network	12	20

List of Tutorial:

Sr No	Name of Practical	Hours
1.	Exercise on definition, formulation of linear programing problems.	02
2.	Exercise on Graphical solution of linear programing 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 Transhipment 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

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 student will be able to

- describe characteristics and scope of OR.
- to define and formulate mathematical problems.
- to select optimal problems solving techniques for a given problem using LP.
- formulate and solve transportation, travelling sales man and transshipment problems.
- formulate and solve optimization problems related to job/ work assignments.
- demonstrate and solve simple models of Game theory.
- evaluate optimum solution using dynamic programming for different applications.
- choose / devise appropriate queuing model for practical application.
- solve different problems related to Network.

P P Savani University
School of Engineering

Center for Skill Enhancement and Professional Development

Course Code: SEPD4010
Course Name: Creativity, Problem Solving & Innovation

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	100	00	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

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

- achieve expertise with the technicalities of creativity and problem solving.
- advance an assertiveness for innovation.
- advance creative thinking skills using shaft of learning components leading to understanding of plans of creativity, problem solving and innovation
- discuss uses of the concepts of creativity and problem-solving skills in personal, social, academic, and profession life.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to Creativity, Problem Solving and Innovation** • Definitions of Problem Solving, Creativity and Innovation • Need for Problem Solving and Innovation & Scope of Creativity • Types and Styles of Thinking • Strategies to Develop Creativity, Problem Solving and Innovation Skills	08	17
2.	**Questioning and Learning** • Introduction to Questioning, Learning and Visualization and its Strategies • Sources and Methods of Questioning and Learning • Finding Perspective, Visualizing thinking • Mind Mapping	07	16
3.	**Creative Thinking and Problem Solving** • Need of Creative Thinking • Cracking Creativity - Reversals, Reversing Perspective, seeing all sides, Looking in other world, • Finding what you are not looking for and following up • Fishbone Diagram • SCAMPER Technique	08	17

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Logic and Reasoning** • Basic Concept of Logic • Divergent Vs Convergent Thinking, Inductive Vs Deductive Thinking • Fusion of Ideas for Problem Solving • Moral Reasoning • Improvisation	08	17
2.	**Practices of Playing** • Collaboration and Brainstorming • The Spirit of Koinonia • QFT Model • Connecting the Unconnected • Making Novel Combinations	07	16
3.	**Review Strategies for Creative problem-solving methods** • A Heuristic Technique • Problem-Solving Strategies: Why Bother? • Five Building Blocks as per Fogler & LeBlanc • Strategy for Critical Thinking for Choosing • Lateral Thinking • Six Thinking Hats by Edward De Bono • Design Thinking	07	17

Text Book(s):

Title	Author/s	Publication
Thinker Toys	Michael Michalko	Random House Publication 2006
Crackling Creativity, The Secrets of Creative Genus	Michael Michalko	Ten Speed Press 2001

Reference Book(s):

Title	Author/s	Publication
Zig Zag, The Surprising Path to Greater Creativity	R Keith Sawyer	Jossy-Bass Publication 2013
De Bono's Thinking Course	Edward De Bono	Penguin Publication 1994
Six Thinking Hats	Edward De Bono	Penguin Publication 1999
How to Mind Map	Tony Buzan	Thorsons Publication 2002
The Myths of Innovation	Scott Berkum	Berkun Publication 2010
Creative confidence: Unleashing the creative Potential within Us all	Tom Kelly and David Kelly	William Collins Publication 2013
The all Laughed	Ira Flatow	Harper Publication 1992
The Ultimate Lateral & Critical Thinking Puzzle book	Paul Sloane, Des MacHale & M.A. DiSpezio	Sterling Publication 2002

Course Evaluation:

Section	Module No.	Evaluation Criteria	Marks
1	1	Group Activity on Brainstorming	15
	2	Mind Mapping Activity	10
	3	Chart Preparation on 'Practicality of Fishbone Diagram'	15
		Group presentation on 'SCAMPER Technique & its applications'	10
2	1	Group Presentation on Critical Analysis of a Govt. scheme/ policy/ budget (merit/ demerit, pros/cons etc)	15
	2	Group Discussion/ Debate/ Elocution	10
	3	Problem Solving Activity (Individual)	10
		Presentation (Learning Outcomes)	15
		Grand Total	**100**

Course Outcome(s):

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

- establish creativity in their day to day actions and educational output.
- solve all types of problems with an optimistic and an impartial attitude.
- reflect innovatively and work towards problem solving in a tactical way.
- initiate different and advanced practices in their selected field of profession.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME4511
Course Name: Design of Heat Exchangers
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	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

- introduce and explain basics of Heat Exchanger
- calculate basis calculation applied in heat exchanger design.
- learn about analysis and design aspects in various heat exchangers.
- elaborate enhancement and performance evolution of heat exchanger.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction** Classification and Selection of Heat Exchanger, Overall Heat Transfer Co-efficient, LMTD and e – NTU Analysis Methods, Fouling and its Control, Rating and Sizing Problems, Design Methodologies	08	17
2.	**Design of Double Pipe Heat Exchanger** Thermal and Hydraulic Design of Inner Tube and Annulus, Pressure Loss Calculations, Hair Pin Heat Exchanger with Bare and Finned Inner Tube	10	23
3.	**Design of Compact Heat Exchangers** Compact Heat Exchanger, Heat Transfer Enhancement, Plate Fin Heat Exchanger, Tube Fin Heat Exchanger, Heat Transfer and Pressure Drop Calculations	05	10

Section II			
Module No.	Content	Hours	Weightage In %
1.	**Enhancement and Performance Evolution** Enhancement of Heat Transfer, Performance Evaluation of Heat Transfer Enhancement Technique. Introduction to Inch Analysis	08	20
2.	**Design of Shell & Tube Heat Exchanger** Construction and Basic Components, Basic Design procedure, TEMA standards, Conventional Design Methods, Bell Delaware Method, Application of Heat Exchanger	14	30

Text Book(s):

Title	Author/s	Publication
Heat Exchanger Selection, Rating and Thermal Design	Sadik Kakac Liu H.	CRC Press, Boston, 1998
Fundamentals of Heat Exchanger Design	Ramesh K Shah	John Wiley & Sons.

Reference Book(s):

Title	Author/s	Publication
Compact Heat Exchangers	Kays V A, London A L	McGraw Hill, New York, 1964
Process Heat Transfer	Donald Q Kern	McGraw Hill

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.

Course Outcome(s):

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

- elaborate basic concepts and construction of various heat exchangers.
- do basic calculations applied in heat exchanger design.
- do detail calculations involved in various heat exchanger design.
- apply heat transfer principles to enhance heat transfer and performance of heat exchangers.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME4521
Course Name: Tools Design
Prerequisite Course(s): SEME3060-Design of Basic 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	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 basics of various tools for different operations.
- learn the design procedure for various dies for punching, blanking etc.
- impart the ability for selection of proper jigs and fixtures for different manufacturing operations.
- understand the standard data catalogue for various tools.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to Tool Design** Introduction, Types of Tools, Various Manufacturing Operations, Jigs, Fixtures, Mechanics and Geometry of Chip Formation	02	5
2.	**Design of Single Point Cutting Tool** Various Angles Related to Cutting Tools, Tool Signature, Effect of Angles of Single Point Cutting Tool, Recommendation for Various Angle, Material Selection for Single Point Cutting Tool, Coated Carbide.	07	15
3.	**Design of Milling Cutter** Form Milling Cutter (Relieved), Types of Milling Cutter, Types of Milling, Forces in Milling, Nomenclature of Milling Cutter Elements, Selection of Cutter Geometry and Design	07	15
4.	**Design of Drills** Drilling operations, Nomenclature of Twist Drill Elements, Types of Drill, Recommendation Drill Point Geometry for Various Materials, Troubleshooting Drilling Problems Power Requirement for Drilling, Flat Drills	06	15

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Design of Drill Jigs** Introduction, Types of Drill Jigs, Chip Formation in Drilling, General Consideration in Design of Drill Jigs, Methods of Construction, Design Problems	05	10
2.	**Design of Fixtures** Milling Fixtures, Boring Fixtures, Broaching Fixtures, Lathe Fixtures, Design Problems, Universal Fixture	05	10
3.	**Design of Sheet Metal Blanking and Piercing Dies** Introduction to Die cutting operations, Blanking and Piercing Die Construction, Pilots, Strippers and Pressure Pads, Strip Layout, Die Clearance, Design Problems	07	15
4.	**Design of Sheet Metal Bending, Forming and Drawing Dies** Introduction, Bending Dies, Forming Dies, Drawing Operations, Determination of Blank Size, Design Problems	06	15

Text Book(s):

Title	Author/s	Publication
Tool Design	Donaldson	McGRAW-HILL Publication

Reference Book(s):

Title	Author/s	Publication
Fundamentals of tool design with CD	Nee, John	SME Publication

Web Material Links:

https://nptel.ac.in/courses/112105233/

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.

Course Outcome(s):

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

- select the materials for various tools.
- apply the design knowledge to design the piercing, blanking, forming, and bending dies.
- apply the design concepts to design the single point cutting tools.
- apply the basic design steps to design jigs and fixtures for drilling, milling, broaching etc.
- apply the design procedure to design milling cutter.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3631
Course Name: Automobile 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

- make students understand the basic concepts, requirements and working of various Components of automobile.
- enable students to design basic systems like brakes, steering, and suspensions.
- make students understand construction and working of different systems like Transmission, steering and suspensions.
- make students understand automotive electronics.
- aware students about recent technologies in automobile engineering and its working.
- reduce the pace between basic vehicle technology and technologies in modern vehicles.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction and Performance:** History and development of automobile, classification, layout, major components, Resistance to motion of vehicle, air rolling and gradient resistances. Power requirement for acceleration and gradability	04	10
2.	**Brakes:** Types of brakes – drum, disc, power and hydraulic; Brake efficiency and stopping distance, Weight transfer, skidding, antilock braking system.	05	10
3.	**Transmission System:** Constructional features and working of clutches, Gear Train: sliding mesh, constant mesh and synchromesh gear boxes with related components, Propeller and drive shaft, universal joints, Rear wheel drive arrangements, Rear axle	10	20

	final drive, the differential, rear axle, Simple problems in all mentioned topics, Automatic Transmission and CVT.		
4.	**Wheels and Tyres:** Types of wheels, Types of tyres, Tyre thread, Tyre selection.	03	10
Section II			
Module No.	Content	Hours	Weightage in %
1.	**Electrical and Electronics System:** Electrical and electronic components of vehicle, fundamentals of engine electricals, Lighting and Indicators: Features, Requirements and typical settings, Body electrical and electronic systems, Monitoring and Instrumentation.	05	10
2.	**Steering System:** Types of suspension systems, Functional requirements of suspension systems, Front suspension system and Steering: Types, Definitions for wheel orientation and its effect, Types and Constructional features of Front Suspension, Steering layout, types of steering gears, steering linkages, steering mechanism, definitions and significance of camber, caster and king pin inclination, toe in and toe out on turn, measurement and adjustment of various steering system layouts, steering ratio, under steering and over steering, steering geometry	12	25
3.	**Suspension System:** Principle, type of suspension system, conventional and independent front and rear axle, spring, rubber and air suspensions, automatic/hydro suspension system, shock absorbers.	06	15

Reference Book(s):

Title	**Author/s**	**Publication**
Automobile Engineering	Kirpal Singh	Standard Pub.& Dist.
Automobile Technology	N. K. Giri	Khanna Publication
Course in Automobile Engineering	R. P. Sharma	Dhanpat Rai & Sons.
Automobile Engineering	S. K. Saxena	Laxmi Publication Pvt. 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 successful completion of the course, the Students will be able to

- Understand needs and working of various systems in automobiles.
- Design various systems commonly used in automobiles.
- Develop a skill to work in multi-disciplinary streams.
- Illustrate the maintenance and repair of automobiles.
- Understand market and businesses of automobile industry.
- Outline about recent trends and research areas in Automobiles.

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: SEME3602
Course Name: Gas Dynamics
Prerequisite Course(s): -- Fluid Mechanics (SEME2060)
Power Plant Engineering(SEME3101)

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 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):** 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.	07	10
Section II			
Module No.	Content	Hours	Weightage in %
1.	**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
2.	**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

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 successful completion of the course, the Students will be able to

- understand the basic concepts of gas dynamics.
- understand the behavior of gas under different conditions.
- understand the basics of compressible flow.
- correlate fundamentals of Gas Dynamics with various mechanical systems

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