PPSU

P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

DIPLOMA (MECHANICAL ENGINEERING)

SYLLABUS BOOK

AY 2023-24

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

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

Graduates will demonstrate ability to:

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

PO No	PROGRAMME OUTCOMES
PO 1	Engineering knowledge: Apply knowledge of engineering fundamentals, science, mathematics & engineering specialization for the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate and analyze complex engineering problems leading to substantial conclusions using basic principles of mathematics, science and engineering.
PO 3	Design/development of solutions: Develop solutions for complex engineering problems and design system components or processes meeting specified needs having due consideration for the safety and societal & environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge & methods like design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid & viable conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools for prediction and modeling of complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society: Apply cognitive learning by the contextual knowledge to assess societal, health, safety, legal and cultural issues and following responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge & skill needed for sustainable development.
PO 8	Values & Ethics: Apply basic moral values & ethical principles and pledge to professional ethics/norms and responsibilities of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual/as a team member or as a leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need, do necessary preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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

Credit Guidelines (General)			
Component	**Hour/Week**	**Credit**	**Total Hours/Semester**
Theory	1	1	15
Practical	2	1	30
Tutorial	1	1	15
Note: In specific cases; extra credits can be granted for specific/important subjects.			

CO-PO Mapping Guidelines		
Mapping Level	**% age Mapping**	**Indicator**
0 / -	0	No Mapping
1	0-33	Low Level (Slightly Mapped)
2	33-66	Medium Level (Moderately Mapped)
3	>66	High Level (Strongly Mapped)

Syllabus Book

Diploma Engineering (Mechanical Engineering)

P P Savani University

Institute of Diploma Studies

Effective From: 2023-24

Authored by: P P Savani University

CONTENT

FIRST YEAR DIPLOMA

P P SAVANI UNIVERSITY															
INSTITUTE OF DIPLOMA STUDIES															
TEACHING & EXAMINATION SCHEME FOR DIPLOMA ENGINEERING PROGRAMME AY:2023-24															
Sem.	**Course Code**	**Course Title**	**Offered By**	**Teaching Scheme**					**Examination Scheme**						
				Contact Hours				**Credit**	**Theory**		**Practical**		**Tutorial**		**Total**
				Theory	**Practical**	**Tutorial**	**Total**		**CE**	**ESE**	**CE**	**ESE**	**CE**	**ESE**	
1	IDSH1010	Fundamentals of Mathematics	SH	3	0	2	**5**	5	40	60	0	0	50	0	**150**
	IDSH1020	Engineering Physics	SH	3	2	0	**5**	4	40	60	20	30	0	0	**150**
	IDME1010	Basics of Mechanical & Civil Engineering	ME	2	4	0	**6**	4	40	60	40	60	0	0	**200**
	IDCE1010	Computer Applications	CE	3	4	0	**7**	5	40	60	40	60	0	0	**200**
	IDME1020	Engineering Workshop	ME	0	2	0	**2**	1	0	0	50	0	0	0	**50**
	CFLS1030	Functional English-I	CFLS	2	0	0	**2**	2	40	60	0	0	0	0	**100**
						Total	**27**	**21**							**850**
2	IDSH1040	Engineering Mathematics	SH	3	0	2	**5**	5	40	60	0	0	50	0	**150**
	IDSH1050	Fundamentals of Chemistry	SH	3	2	0	**5**	4	40	60	20	30	0	0	**150**
	IDCV1010	Engineering Mechanics	CV	3	2	0	**5**	4	40	60	20	30	0	0	**150**
	IDIT1010	Introduction to Computer Programming	IT	3	4	0	**7**	5	40	60	40	60	0	0	**200**
	IDSH1060	Electrical & Electronics Workshop	SH	0	2	0	**2**	1	0	0	50	0	0	0	**50**
	CFLS1040	Functional English-II	CFLS	2	0	0	**2**	2	40	60	0	0	0	0	**100**
						Total	**26**	**21**							**800**

P P Savani University
Institute of Diploma Studies

Department of Applied Science & Humanities

Course Code: IDSH1010
Course Name: Fundamentals of Mathematics
Prerequisite Course(s): Algebra, Geometry, Trigonometry till 9th 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

- outlining logarithm properties.
- implementing concepts of Determinants and Matrices for solving science and engineering problems.
- presenting usefulness of trigonometry.
- acquire knowledge of co-ordinate geometry and ability to work with applications to Engineering Mathematics.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Logarithm** Basic concept of logarithm, Rules and related examples, Applications of logarithm.	5	14
2.	**Determinants and Matrices** Basic concept of determinants and matrices, Addition and subtraction, Product, Inverse up to 3X3 matrix, Solution of simultaneous equations up to three variables, Applications of determinants and matrices.	9	18
3.	**Trigonometry** Basic concept of trigonometry, Units of angles (degree and radian), Allied & compound angles, Multiple–submultiples angles, Graph of sine and cosine, Periodic function, Sum and factor formulae, Inverse trigonometric function, Applications of trigonometry.	9	18
Section II			
4.	**Co-ordinate geometry** Introduction, Point, Distance formula, Mid-point, Locus of a point, Straight lines, Slope of a line, Equation of a straight line, The general equation, Angle between two lines, Circle, Tangent and normal, Equation of tangent and normal.	6	15

5.	**Vectors** Basic concept of vector and scalar, Addition and subtraction, Product of vectors, Geometric meaning of scalar and vector product, Angle between two vectors, Applications of dot and cross product, Work done and moment of force.	8	15
6.	**Mensuration** Basic concept of Mensuration, Area of Triangle, Square, Rectangle, Trapezium, Parallelogram, Rhombus and Circle surface, Volume of Cuboids, Cone, Cylinder and Sphere.	8	20

List of Tutorials:

Sr. No.	List of Tutorial	Hours
1.	Logarithm-1	2
2.	Logarithm-2	2
3.	Determinants and Matrices-1	2
4.	Determinants and Matrices-2	2
5.	Determinants and Matrices-3	2
6.	Trigonometry-1	2
7.	Trigonometry-2	2
8.	Trigonometry-3	2
9.	Co-ordinate geometry-1	2
10.	Co-ordinate geometry-2	2
11.	Vectors-1	2
12.	Vectors-2	2
13.	Mensuration-1	2
14.	Mensuration-2	2
15.	Mensuration-3	2

Text Book:

Title	Author(s)	Publication
Advanced Mathematics for Polytechnic	Dr. N. R. Pandya	Macmillan Publication
Engineering Mathematics - 3rd Edition	Anthony croft & others	Pearson Education Publication

Reference Book:

Title	Author(s)	Publication
Basic Mathematics	G.C. Patel and Ami C. Shah	Atul Prakashan
Applied Mathematics for Polytechnics - 10th Edition	H. K. Dass	H. K. Dass
Applied Mathematics	W. R.Neelkanth	Sapna Publication

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.

- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:

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

Course Outcome(s):

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

IDSH1010	**FUNDAMENTALS OF MATHEMATICS**
CO1	Outlining logarithmic properties
CO2	Implement the concept of determent and matrices to solve science and engineering problems.
CO3	Presenting application of geometry
CO4	Establish the knowledge of coordinate geometry, and ability to solve engineering problems.

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

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

Module No	**Content**	**RBT Level**
1	Logarithm	1,2,3,5
2	Determination and Matrices	2,3,4,5
3	Trignometry	2,3,4,5,6
4	Co-ordinate geometry	2,3,5
5	Vectors	2,3,5
6	Mensuration	1,2,3,5

P P Savani University
Institute of Diploma Studies

Department of Applied Science & Humanities

Course Code: IDSH1020
Course Name: Engineering Physics
Prerequisite Course(s): Concept of Science up to 9th Standard

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:

- The student will demonstrate the ability to think in core concept of their engineering application by studying various topics involved in branch specific applications.
- The student will demonstrate the ability to use appropriate mathematical techniques and concepts to obtain quantitative solutions to problems in physics.
- In courses involving laboratory, the student will demonstrate the ability to collect and analyze data and to prepare coherent reports of his or her findings.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introductory concepts:** Need of measurement and unit in engineering and science, definition of unit, requirements of standard unit, systems of units-CGS, MKS and SI, fundamental and derived quantities and their units Definition of accuracy, precision and error, estimation of errors -absolute error, relative error and percentage error, rules and identification of significant figures. (Numerical on above topics)	08	18
2.	**Mechanics:** The concept of Force, Newton's 1st law of motion, Newton's 2nd law of motion, Newton's 3rd law of motion, Conservation of momentum, Applications of Conservation of linear momentum, Impulse. (Numerical on above topics)	07	15
3.	**Work, Energy and Power:** Work done by a constant force and a variable force, Kinetic energy, Work-energy theorem, Power, Notion of potential energy, Potential energy of a spring, Conservative forces, Conservation of mechanical energy (kinetic and potential energies), Non-conservative forces.	07	15

	(Numerical on above topics)		
Section II			
4.	**Mechanical properties of solids:** Deforming force, Restoring force, Elastic and plastic body, Stress and Strain with their types, Elastic limit, Hooke's law, Young's modulus, Bulk modulus, Modulus of rigidity and Relation between them (no derivation), Stress- Strain diagram, Yield point, Ultimate stress, Breaking stress, Factor of safety. (Numerical on above topics)	08	18
5.	**Properties of fluids:** Pascal's law and its applications (hydraulic lift and hydraulic brakes), Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow, critical velocity, Bernoulli's theorem and its applications, Surface energy and surface tension, angle of contact. (Numerical on above topics)	08	18
6.	**Heat transfer:** Introduction to thermodynamics, Temperature and Heat, Transmission of heat - Conduction, Convection and Radiation, Law of thermal conductivity, Coefficient of thermal conductivity and its S.I. unit, Heat capacity and Specific heat of materials, Celsius, Fahrenheit and Kelvin temperature scales and their conversion formula. (Numerical on above topics)	07	16

List of Practical:

Sr. No.	List of Practical	Hours
1.	To study about basic unit conversion and dimension analysis.	4
2.	To measure length and diameter of the given object using Vernier callipers.	2
3.	To measure the thickness of slit and diameter of wire with help of micrometer Screw Gauge.	2
4.	To determine the surface tension of water by capillary rise method.	4
5.	To Verify Ohm's Law by using an Ammeter & Voltmeter	2
6.	To determine the wavelength of sound produced (i) in an air column and the velocity of sound in air at room temperature using a resonance column and a tuning fork.	4
7.	To determine Young's modulus of a material of a beam by the method of bending of a beam.	4
8.	To determine the modulus of rigidity of the material of wire by dynamical method.	2
9.	To determine the value of 'g' by using a Simple Pendulum.	2
10.	Measurement of g: Use of a Kater's Pendulum.	2
11.	To measure the temperature of given material by any temperature measuring instrument.	2

Text Book:

Title	Author(s)	Publication
Basic physics for Diploma group -1	-	Atul Prakashan

Reference Books:

Title	Author(s)	Publication
Physics Part-I and II	Resnick and Haliday	Wiley Eastern Publication
Concept of Modern Physics	Arthur Beiser	Tata McGraw Hill
Concept of Physics	H C Verma	-
Fundamental of physics	Gomber & Gogia	Pradeep publications Jalandhar
NCERT Physics part 1 & 2	-	NCERT

Course Evaluation:

Theory:

- Continuous Evaluation Consist 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 Exam.

Practical:

- Continuous Evaluation Consist 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 20 Marks during End Semester Exam.
- Viva/Oral performance of 10 Marks during End Semester Exam.

Course Outcome(s):

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

IDSH1020	ENGINEERING PHYSICS
CO 1	Identify physical quantities, different systems of units and make measurements with accuracy by minimizing different types of errors to solve real life relevant problems.
CO 2	Analyze type of motions and apply the knowledge to solve equation of motion and conservation of momentum principle to describe motion of rocket, recoil of gun etc.
CO 3	Define scientific work, energy and power and their units. Derive relationships for work, energy and power and solve related problems.
CO 4	Learn about the concept of elasticity, it's types and applications from engineering perspectives.
CO 5	Describe the properties of fluids, understand the concepts of viscosity and surface tension and their respective applications.
CO 6	Apply the knowledge of heat and thermodynamics needed for different engineering tasks.

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

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

Module No	Content	RBT Level
1	Introductory Concepts	3, 5
2	Mechanics	2, 4
3	Work, Energy and Power	1, 3
4	Mechanical properties of solids	2, 6
5	Properties of fluids	1, 5
6	Heat transfer	3, 4

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME1010
Course Name: Basics of Mechanical and Civil 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	
02	04	00	04	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

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

- acquire an inclusive knowledge of fundamental concept of Mechanical Engineering.
- understand working of simple mechanical devices.
- study and gain significance of Mechanical Engineering in various fields.
- read and interpret the building drawing
- select different types of construction materials as per requirements

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction of Mechanical Engineering:** Introduction, Scope, Importance, Basic terminologies in mechanical engineering, Basic mechanical components used in routine, Pipe and pipe fittings, Hand tools, Power tools	02	7
2.	**Heat interactive equipment:** Heat transfer and its Modes, Boilers, Classification and Working, Concept of Accessories and Mountings – Types, Applications, Prime movers, Meaning, Classification, Steam turbine working, Layout of thermal power plant, Working and applications, Internal combustion engines – Definition, Classification, Components, Working of two-stroke and four-stroke engines, S.I. and C.I. engines	05	13
3.	**Power Transmission and Safety:** Power transmission: Importance, Modes, Types, Applications, Couplings in power transmission, Safety norms to be followed for preventing accidents.	06	11
4.	**Hydraulic and pneumatic devices:**	05	11

	Concept of theory of fluid flow, general properties of fluid flow, Pumps, Water turbines, and Air compressors – working principle, types, parts, performance, troubles and remedies, applications.		
5.	**Manufacturing processes:** Overview of manufacturing processes, Welding concept and overview, Types, Arc and Gas welding, Accessories and Consumables, Precautions and Safety during arc and gas welding, Casting - Introduction, Applications.	04	10
Section II			
6.	**Civil Engineering: An Overview** Introduction, Branches, Scope, Impact, Role of Civil Engineer, Unit of measurement, Unit conversion (Length, Area, Volume).	04	7
7.	**Civil Engineering Surveying:** Surveying & leveling (its importance and types), Necessity for leveling, Principals of surveying, Instrument/tools used for survey and level, Various methods of finding the field survey measurements, Chain and Compass Survey	07	16
8.	**Civil Engineering Drawing**: Types of building drawings, Abbreviation, conventions & symbols in civil drawing, building byelaws for planning of residential building and industrial building, Planning of simple residential and industrial building	06	13
9.	**Construction Materials**: Common construction materials such as cement, Brick, Stone, Timber, Steel and Concrete, Properties of each materials & their acceptable standards, Quality parameters of materials, Estimations and costing for simple structure (only the material cost)	06	12

List of Practical:

Sr. No.	Details of Practical	Hours
1.	Study of few selected boilers, accessories and mountings	02
2.	Numerical based on heat interactive equipment	02
3.	Study of power and motion transmission systems	04
4.	Numerical based on power transmission and safety	02
5.	Study of various pumps	04
6.	Numerical based on hydraulic and pneumatic devices	02
7.	Study and demonstration of basic machine tools	04
8.	Numerical based on manufacturing processes	02
9.	Machine parameters of wheel and differential axel apparatus	04
10.	Study and demonstration of basic mechanical equipment	04
11.	Unit Conversation Exercise	02
12.	Linear Measurement.	04
13.	Angular Measurement (Prismatic Compass)	04
14.	Angular Measurement (Surveyor Compass)	04
15.	Determine R.L of given point by Dumpy level without change point.	04

16.	Determine R.L of given point by Dumpy level with change point.	04
17.	Brick masonry bonds	04
18.	Aggregate experiments	02
19.	Brick masonry tests	02

Reference Book(s):

Title	Author/s	Publication
Elements of Mechanical engineering	P. S. Desai and S. B. Soni	Atul Prakashan
Theory of Machines	R. S. Khurmi and J. K. Gupta	S. Chand
Heat engine	Shah and Pandya	Charotar Publishing House
Hydraulic machines	Jagdish Lal	Metropolitan Book Company
Elements of Workshop	Hazara Chaudhary	Asia Publishing House
Text book on Surveying & Levelling	S. B. Junnarkar and H. J. Shah	Laxmi Publication

Course Evaluation:

Theory:

- Continuous Evaluation Consist 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 Exam.

Practical:

- Continuous Evaluation Consist 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 20 Marks during End Semester Exam.
- Viva/Oral performance of 10 Marks during End Semester Exam.

Course Outcome(s):

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

IDME1010	**BASICS OF MECHANICAL & CIVIL ENGINEERING**
CO 1	Know the principles and working of basic mechanical systems
CO 2	Comprehend importance of mechanical engineering in various fields of engineering
CO 3	Interpret about different civil engineering fields with an overview of building material
CO 4	Identify the scope of Civil engineering in the practical field of engineering

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

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

Module No	**Content**	**RBT Level**
1	Introduction to Mechanical Engineering	1, 2
2	Heat Interactive equipment	1, 2, 4
3	Power Transmission and Safety	1, 2, 4
4	Hydraulic and pneumatic devices	1, 2, 4
5	Manufacturing Processes	1, 2

6	Civil Engineering: An Overview	1, 2, 3
7	Civil Engineering Drawing	2, 3, 6
8	Construction Materials	1, 2, 3

P P Savani University
Institute of Diploma Studies

Department of Computer Engineering

Course Code: IDCE1010
Course Name: Computer Applications
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	04	00	05	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

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

- Familiarize with components of computer and basic operations of it.
- Provide practical and hands-on experience of application used to create documents.
- Introduce internet and its usage.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Basics of Computer System** Introduction and Characteristics, Generation, Classification, Applications, describe computer hardware and software, Identify I/O, Devices, describe functioning of CU, ALU and memory unit, differentiate various types of printers, Demonstrate various file handling operations, Introduction to Memory, Memory hierarchy, Primary memory and its type, Secondary memory, Classification of Secondary memory, Cache Memory and Virtual Memory.	08	20
2.	**Computer Software** Software concept Classification of Software, System software and Application Software, Overview of Operating System, Objectives and Functions of O.S, Types of Operating System, Batch Processing, Multiprogramming, Time Sharing OS, Features of DOS, Windows and UNIX, Programming Languages, Compiler, Interpreter, Computer Virus Different Types of computer virus, Detection and prevention of Virus Application of computers in different Domain. Installation of device drivers and other required software, need and method of backup.	08	15

3.	**Using MS-Word** Use basics text formatting features, manipulate text, use page Setup features, use spell and grammar utility, Work with graphics/ clipart, Create and manipulate table, use auto shapes and its formatting with text, Use Image and table formatting.	06	14
Section II			
4.	**Using MS-Excel** Use basic formatting and data entry features, use formula and functions, Work with graphics, Create and manipulate charts, Use header and footer options, Setup page layout and print worksheet	07	20
5.	**Using MS - PowerPoint** Create new presentation and apply basic formatting features, use master slide, Create and manipulate table, Work with objects and clips, Work with video, Work with audio, use special effects, Use navigation and hyper linking, Custom Animation and Transitions	07	15
6.	**Multi Media, Internet usage and Google Applications** Introduction of Multimedia, Types of Multimedia, and Use of Multimedia in various platforms, Describe Internet, WWW and Web Browsers: Web Browsing software, Surfing the Internet, Chatting on Internet, Basic of electronic mail, Using Emails, Document handling, Network definition, Common terminologies: LAN, WAN, Node, Host, Workstation, bandwidth, Network Components: Severs, Clients, Communication Media. Introduction of Google Applications, Gmail, Google Drive, Docs, Spreadsheet	08	16

List of Practical(s):

Sr. No	List of Practical	Hours
1.	Introduction to different hardware components of PC and Assembling of PC.	02
2.	Installation of OS and other Software. Partitions of Drive, Compression Utilities: WinZip, Defragmenting Hard, Formatting Hard disk, etc.	04
3.	Use accessories utilities of windows OS the User Interface, Using Mouse and Moving Icons on the screen, The My Computer Icon, The Recycle Bin, Status Bar, Start and Menu & Menu-selection, Running an Application, Windows Explorer Viewing of File, Folders and Directories, Creating and Renaming of files and folders, Opening and closing of different Windows, Control Panels, Setting the date and Sound, Create Users and password.	02
4.	Entering and editing text in document file. Apply formatting features on Text like Bold, Italics, Underline, font type, color and size, Apply features like bullet, numbering in Microsoft word.	04
5.	Create and manipulate tables, create documents, insert images, format tables, Smart art, Chart in Microsoft word, Insert Hyperlink, Page number and textbox in word.	04
6.	Create Event Registration Form and Resume in Microsoft word.	04
7.	Entering and editing data in worksheet, Fill Series, fill with formatting and without	02

	formatting Using Microsoft Excel.	
8.	Create and manipulate Charts, Shape, Sparkline Charts, Clipart, and table.	04
9.	Filter Data Using Filter and advanced filter function with more than 2 conditions, Freeze row & Column in Microsoft Excel.	02
10.	Create Mark sheet, and Pay slips using Excel, Apply various formula and functions in the sheet.	06
11.	Print sheet using print area, Page setting, print titles, Adjusting margins, Page break, headers and footers.	02
12.	Basic operations of Power point, Create PPT and inset and delete slides in power point, Use of Master Slide in Presentation, Create Project presentations, Lecture presentations, Apply Custom animation & Transition. Apply basic formatting features in presentation like font, font size, font color, text fill, spacing and line spacing Formatting text boxes, word arts, styles bullet and numbering in Microsoft power point. Working with drawing tools, applying shape or picture styles, Applying object borders, object fill, object effects in Microsoft Power point.	16
13.	Working with video, Link to video and sound files using power point.	02
14.	Internet Searching, Browsers, Various functions of Browsers (Eg. Bookmark, Customize Settings), Study of components like switches, bridges, routers, Wi-Fi router,	02
15.	Introduction of Google application, Compose Gmail, File attachment, add signature.	02
16.	Demonstration of Google drive, Sharing File Using Google drive, Spreadsheet, Docs and Google slides	02

Reference Book(s):

Title	Author/s	Publication
Computer Course	R.Taxali	Tata McGraw Hills. New Delhi.
MS-Office for Dummies	Wallace Wang	Wiley India, New Delhi
Basic Computer Engineering	Petes S. J., Francis.	Tata McGraw-Hill Education, 2011

Web Material Link(s):

- http://www.digimat.in/nptel/courses/video/106104128/L01.html
- https://www.youtube.com/watch?v=3QiItmIWmOM

Course Evaluation:

Theory

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

Practical

- Continuous Evaluation Consist 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 20 Marks.
- Internal Viva component of 20 Marks.
- Practical performance/quiz/test of 30 Marks during End Semester Exam.

- Viva/Oral performance of 30 Marks during End Semester Exam.

Course Outcome(s):

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

IDCE1010	**COMPUTER APPLICATIONS**
CO 1	Learn and acquire basic knowledge about history of computer, functional role of different components of computer and memory architecture.
CO 2	Acquire the basic knowledge of computer hardware, software, role of operating system and other peripheral devices and their installation.
CO 3	Learn the concepts of Microsoft Office – Word, Excel, and PowerPoint and be able to work on them for better documentation and presentation.
CO 4	Recognize the role of network & related terminologies and internet.
CO 5	Identify the significance of multimedia and its utilization in various platforms.

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

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

Module No	**Content**	**RBT Level**
1	Basics of Computer system	1, 2
2	Computer Software	1, 2
3	Using MS-Word	2, 3
4	Using MS-Excel	2, 3, 4
5	Using MS-Powerpoint	2, 3
6	Multi Media, Internet Usage and Google Applications	2, 3, 5

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME1020
Course Name: Engineering Workshop
Prerequisite Course(s): -

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
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 know-how of various hand tools and their use in different sections of manufacturing
- Understand the use of workshop practices in day to day industrial as well domestic life that help to dissolve the routine problems
- Build the understanding of the complexity of the industrial job, along with time and skills requirements of the job
- Learn about the safety measures to be taken while working in workshop.
- Learn about operation wise tool selection.

Course Content:

Module No.	Content	Hours
1.	**Introduction and Demonstration of Safety Norms and various shops:** 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 performing other operations	-
3.	**Carpentry shop:** Introduction of carpentry shop, Safety, Making a job as per drawing including marking and performing other operations	-
4.	**Smithy shop:** Introduction of smithy shop, Safety, Making a job as per drawing including marking and performing other operations	-
5.	**Sheet metal shop:** Introduction of sheet metal shop, Safety, Making a job as per drawing including marking and performing other operations	
6.	**Pipe fitting:**	-

	Introduction of pipe fitting shop, Safety, understanding various pipe fitting tools and performing operations	
7.	**Machine Shop:** Introduction and demonstration of various machines like Lathe, Drilling, Grinding, Hack Saw Cutting etc.	-

List of Practical:

Sr. No.	List of Practical	Hours
1.	Introduction and Demonstration of Safety Norms and various shops.	02
2.	To Perform a Job of Fitting Shop.	04
3.	To Perform a Job of Carpentry Shop.	06
4.	To Perform a Job of Black Smithy shop.	06
5.	To Perform a Job of Sheet metal Shop.	04
6.	To Perform a Job of Plumbing Shop	04
7.	Introduction to Machine Tool	04

Reference Book(s):

Title	Author/s	Publication
Workshop Technology-I	Hazra and Chaudhary	Media promoters & Publisher private limited.
Workshop practice manual	K.Venkata Reddy	B. S. Publications
Mechanical workshop practice	K.C. John	PHI

Course Evaluation:

Practical:

- Continuous Evaluation Consist 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 20 Marks.
- Internal Viva component of 20 Marks.
- Practical performance/quiz/test of 30 Marks during End Semester Exam.
- Viva/Oral performance of 30 Marks during End Semester Exam.

Course Outcome(s):

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

IDME1020	ENGINEERING WORKSHOP
CO 1	Understand the various measuring instruments and safety norms required in the workshop.
CO 2	Apply workshop trades such as welding, plumbing, drilling, grinding, fitting, and carpentry for preparation of job.
CO 3	Apply the use of machine tools, hand tools and power tools.

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

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

Module No	Content	RBT Level
1	Introduction and Demonstration of Safety Norms and Various Shops	1, 2, 3, 4
2	Fitting Shop	1, 2, 3
3	Carpentry Shop	1, 2, 3
4	Smithy Shop	1, 2, 3
5	Sheet metal shop	1, 2, 3
6	Pipe fittings	1, 2, 3
7	Machine Shop	1, 2, 3

P P Savani University
School of Engineering
Department of Science & Humanities

Course Code: IDSH1040
Course Name: Engineering Mathematics
Prerequisite Course(s): Algebra, Geometry, Trigonometry till 9th 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 provide a comprehensive knowledge of basic mathematics essential for diploma students.
To help learners to

- This course is designed to give a comprehensive coverage at an introductory level to the subject of Functions and Limits, Differentiation, Integration and First Order Differential Equations.
- Recognize importance of differentiation and integration for solving engineering problems.

Course Content:

Module No.	Content	Hours	Weightage in %
	Section I		
1.	**Functions and Limits** Introduction, Function, Types of function, Classification of function, Limit of a function, Properties of limit, Standard limits, limit of trigonometric functions.	5	14
2.	**Differentiation** Introduction, Differentiation, Geometric meaning, Derivative using first principle, Derivative of standard functions, Working rules, Differentiation of composite function, Differentiation of parametric functions, Differentiation of implicit function, Derivative using logarithms, Successive differentiation, Applications of differentiation (Velocity, Acceleration, Maxima & Minima simple problems).	9	18
3.	**Integration** Introduction, Integration of standard functions, Integration by substitution, Integration by parts, Integration using partial fraction, Definite integrals, Theorem on definite integrals, Applications of Integration (Area and Volume simple problems).	9	18
	Section II		
4.	**Differential Equations of First order and First degree** Introduction, Formation of differential equations, Solution of differential equations, Separation of variables, Homogeneous equations, Exact Differential Equations, Integrating factor method, Linear differential equation.	9	18
5.	**Complex Number** Introduction, Mathematical Operations, Polar form, Modulus, Amplitude Farm, De Movire's Theorem.	6	18

6.	**Statistics** Introduction, Central tendency, Mean, Mean of discrete observations, Mean of grouped data, Step deviation method, Median, Median for grouped data, Mode, Standard deviation, Standard deviation for grouped data.	7	14

List of Tutorials:

Sr. No.	Name of Tutorial	Hours
1.	Functions and Limits-1	1
2.	Functions and Limits-2	1
3.	Differentiation-1	1
4	Differentiation-2	2
5.	Integration-1	1
6.	Integration-2	2
7.	Differential Equations of First order and First degree-1	1
8.	Differential Equations of First order and First degree-2	2
9.	Complex Number-1	1
10.	Complex Number-2	1
11.	Statistics-1	1
12.	Statistics-2	1

Text Book:

Title	Author(s)	Publication
Advanced Mathematics for Polytechnic	Dr.N.R. Pandya	Macmillan Publication
Engineering Mathematics - 3rd Edition	Anthony croft and others	Pearson Education Publication

Reference Book:

Title	Author(s)	Publication
Applied Mathematics for Polytechnics - 10th Edition	H. K. Dass	H. K. Dass
Applied Mathematics	W. R.Neelkanth	Sapna Publication
Polytechnic Mathematics	Deshpande S P	Pune Vidyarthi Gruh Prakashan,1984
Polytechnic Mathematics	Prakash D S	S Chand,1985

Course Evaluation:

Theory:

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

Tutorial:

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

Course Outcome(s):

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

IDSH1040	ENGINEERING MATHEMATICS
CO1	Apply differentiation and integration for solving engineering problems and The cumulative effect of the original quality or equation is the integration.
CO2	Implementing statistical methods for solving real world problems.
CO3	Develop the ability to apply differentiation to significant applied problems.
CO4	Evaluate the limiting value of algebraic and trigonometric functions.
CO5	Represent complex numbers algebraically and geometrically for solving engineering related problems.

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

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

Module No	Content	RBT Level
1	Functions and Limits	1,2,3,5
2	Differentiation	2,3,4,5
3	Integration	2,3,4,5,6
4	Differential Equations of First order and First degree	2,3,5
5	Complex Number	2,3,5
6	Statics	1,2,3,5

P P Savani University
Institute of Diploma Studies

Department of Chemical Engineering

Course Code: IDSH1050
Course Name: Fundamentals of Chemistry
Prerequisite Course(s): --

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

- The student will understand the interdisciplinary nature of chemistry and to integrate knowledge of mathematics, physics and other disciplines to a wide variety of chemical problems.
- The student will understand the importance of the Periodic Table of the Elements, how it came to be, and its role in organizing chemical information.
- The student will acquire a foundation of chemistry of sufficient breadth and depth.

Course Content:

Module. No.	Content	Hours	Weightage in %
	Section I		
1.	**Atomic Structure, Molecular Mass, Acids and Bases** Atom Definition Fundamental particles of Atom their Mass, Charge and Location. Atomic number and Mass number, Definition Isotopes and Isobars with suitable examples. Formation of cation and anion by electronic concept of oxidation and reduction.	04	15
2.	**Molecular Mass** Molecule, Molecular Formula, Molecular Mass, Mole, Definition Simple calculations. Avogadro's Hypothesis – Relationship between Molecular Mass and vapour Density, Avogadro Number.	04	10
3.	**Chemical Bonding and Structure of Molecules** Chemical Bond, Valence, Valence Electrons, Bonding and Non Bonding Electrons, Lewis Symbols, Octet Rule. Definition, Condition for Formation of Ionic Bond, Factors Governing Formation of Ionic Bond, Metallic Bond, Covalent Bond and Co-ordinate Covalent Bond: Hydrogen Bonding,	06	15
4.	**Acids and Bases** Theories of Acids and Bases, Arrhenius Theory, Lowry – Bronsted Theory, Lewis Theory, Advantages of Lewis Theory, pH and pOH Definition, Numerical problems, Indicator, Definition and Examples, Buffer solution, Definition, Types of buffer solution with	06	10

	examples, Application of pH in Industries.		
Section II			
5.	**Solutions** Definition, Methods of expressing concentration of a solution Molarity, Molality, Normality, Mole fraction and Percentage Mass – Simple problems.	04	10
6.	**Colloids** True solution and Colloidal solution, Definition, Differences, Types of colloids – Lyophilic and Lyophobic colloids. Differences Properties, Tyndall effect, Brownian movement, Electrophoresis and Coagulation. Industrial applications of colloids, Smoke Precipitation by Cottrell's method, Purification of water, Cleansing action of soap, Tanning of leather and Sewage disposal.	06	15
7.	**Electrochemistry** Electrolyte definition, Strong and Weak electrolytes, Examples. Electrolysis definition, Mechanism, Industrial application of Electrolysis, Electroplating, Preparation of surface, Process Factors affecting the stability of the coating, Chrome plating, Electroless plating definition, Advantages of Electroless plating over electroplating , Applications of Electroless plating.	06	15
8.	**Electrochemical-Cell** Electrochemical Cell definition, Representation of a Cell, Single Electrode Potential definition, Galvanic Cell, Formation of Daniel Cell, Electrochemical Series, Definition and Significance, Electrolytic Concentration Cell definition and Formation.	06	10

List of Practical

Sr No	Name of Practical/Tutorial	Hours
1.	Using a chemical balance.	02
2.	Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.	04
3.	Demonstration: Preparation of solutions of different concentrations	04
4.	Preparation of standard solution of Oxalic acid.	04
5.	Preparation of standard solution of Sodium Carbonate.	04
6.	Determination of strength of a given solution of Sodium Hydroxide by titrating it against standard solution of Oxalic acid.	04
7.	Determination of strength of a given solution of Hydrochloric acid by titrating it against standard Sodium Carbonate solution.	04
8.	Determination of temporary and permanent hardness in water sample using EDTA as standard solution.	02
9.	Conduct metric titration of strong acid vs. strong base	02

Text Book(s):

Title	Author/s	Publication
Text Book of Engineering Chemistry	Chawla S.	Dhanpat Rai & Co. Pvt.

		Ltd., Delhi, 2003.
Engineering Chemistry	Sharma B. K.	Krishna Prakashan Media (P) Ltd, Meerut.,2001

Reference Book(s):

Title	Author/s	Publication
Concise Inorganic Chemistry	J.D. Lee	Wiley India
Textbook of Engineering Chemistry (4th Edition)	R. Gopalan, D. Venkappaya, S. Nagarajan	Vikas Publishing house Ltd.

Web Material Link(s):

https://onlinecourses.nptel.ac.in/noc21_cy45/preview

https://nptel.ac.in/noc/courses/noc17/SEM2/noc17-cy03/

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 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 presentation consists of 15 marks during End Semester Exam.

Course Outcome(s):

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

IDSH1050	FUNDAMENTALS OF CHEMISTRY
CO1	Implement and evaluate quality control procedures.
CO2	Perform and validate laboratory procedures to conduct tests.
CO3	Improve industrial or chemical processes and laboratory equipment.
CO4	Prepare and purify compounds using standard chemical procedure.

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

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

Module No	Content	RBT Level
1	Atomic structures, molecular mass, acids and bases	1,2
2	Molecular Mass	1, 2,3

3	Chemical Bonding and Structure of Molecules	1, 2,3
4	Acids and Bases	2,3,4
5	Solutions	2,3,4
6	Colloids	2, 3, 4
7	Electrochemistry	1, 2, 5
8	Electrochemical Cell	1, 2, 5

P P Savani University
Faculty of Diploma Studies

Department of Mechanical Engineering

Course Code: IDCV1010
Course Name: Engineering 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
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 behavior of structural element under the influence of various loads.

Course Content:

Section I			
Module No.	**Content**	**Hours**	Weightage in %
1.	**Introduction Engineering Mechanics** Basic concepts: Definitions, Basic assumptions, Scalar & Vector quantities, Free, Forced and fixed vectors, Force System: Force, Classification & Representation,	04	09
2.	**Coplanar Concurrent Force system** Force as a Vector, Composition of forces, Parallelogram Law, Resolution, Principle of Transmissibility of forces, Resultant of coplanar force system., Equilibrium of coplanar force system, Free body diagrams, Determination of reactions, Equilibrium of a body under three forces, Lami's theorem	10	22
3.	**Coplanar Non-Concurrent force systems:** Moment of a force, Vector representation, Moment for coplanar force system, Varignon's theorem, Couple, Vector representation, Resolution of a force into a force and a couple., force Systems: Coplanar Concurrent Force system and Coplanar Non-Concurrent force system.	09	19
Section II			
4.	**Friction:** Introduction, Wet and Dry friction, Theory of Dry friction, Angle of friction, Angle of Repose, Cone of friction,	06	14

	Coulomb's laws of friction.		
5.	**Centre of Gravity:** Center of Gravity, Center of Mass and Centroid of curves, areas, volumes, Determination of centroid by integration, Centroid of composite bodies.	06	14
6.	**Moment of Inertia:** Definition of Moment of inertia of area, Perpendicular axis theorem and Polar moment of Inertia, Parallel axis theorem, Moment of inertia of simple areas by integration, Moment of Inertia of Composite Areas., Moment of Inertia of masses, Parallel axis theorem for mass moment of inertia, Mass moment of inertia of simple bodies by integration, Mass moment of inertia of composite bodies	10	22

List of Practical:

Sr. No.	Details of Practical	Hours
20.	Coplanar Concurrent Forces	02
21.	Law of parallelogram	02
22.	Coplanar Non concurrent forces	02
23.	Lami's Theorem	02
24.	Coefficient of static friction	02
25.	Parallel force system	02
26.	Numerical practice on Force System	02
27.	Numerical practice on C.G.	02
28.	Numerical practice on M.I.	02
29.	Numerical practice on Friction	02

Reference Book(s):

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

Course Evaluation:

Theory:

- Continuous evaluation consists of two tests each of 15 marks and 1 hour of duration.
- Submission of assignment which consists of solving 20 numerical and it carried 10 marks of evaluation.
- End semester examination will consist of 60 marks exam.

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

Course Outcome(s):

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

IDCV1010	**ENGINEERING MECHANICS**
CO1	Apply fundamental principles of mechanics, equilibrium, statics reactions and internal forces in statically determinate beams.
CO2	Apply principles of statics to determine C.G and M.I of a different geometrical shape and Understand basics of friction and its importance.
CO3	Critically analyze problems and solve the problem related to mechanical elements and analyze the deformation behavior for different types of loads.

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

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

Module No	**Content**	**RBT Level**
1	Introduction to Engineering Mechanics	1, 2
2	coplanar concurrent force system	1,2,3
3	coplanar non-concurrent force system	1,2,3,5
4	Friction	1,2,3,4,5
5	center of gravity	1, 2, 4, 5
6	Moment of inertia	2, 2, 4, 5

P P Savani University Institute of Diploma Studies

Department of Information Technology

Course Code: IDIT1010
Course Name: Introduction to Computer Programming
Prerequisite Course (s): NA

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	04	00	05	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- develop understanding of basic concepts that can be used in programming language.
- develop the algorithm as well as flowchart for particular problem.
- enforce logical thinking.
- understand the fundamentals of programming concepts and methodology.

Course Content:

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to Programming Language** 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, the Structure of C Program, Flow Charts and Algorithms Types of Errors, Debugging, Tracing the Execution of the 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.	08	18
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 to Reading a Character, Writing a Character, Formatted Input and Output.	06	15
4.	**Conditional Statements:** Decision Making & Branching: Decision Making with If and If - else Statements, Nesting of If-else Statements, The Switch and	07	15

	go-to statements, Ternary (?:) Operator. Looping: The while Statement, The Break Statement & The Do. While loop, The FOR loop, Jump within loops - Programs.		
Section II			
5.	**Arrays:** Introduction, One-dimensional Arrays, Two-dimensional Arrays, Concept of Multidimensional Arrays.	07	14
6.	**Strings:** Declaring and Initializing String Variables, Arithmetic Operations on Characters, Putting Strings Together, Comparison of Two Strings, String Handling Functions.	06	14
7.	**User-Defined Functions:** Concepts of User-defined Functions, Prototypes, function Definition, Parameters, Parameter Passing, Calling a Function, Recursive Function, Macros and Macro Substitution	07	14

List of Practical:

Sr. No	Name of Practical	Hours
1.	Introduction to C programming environment, compiler, Linker, loader, and editor. C Program to display "HELLO PPSU"	04
2.	Working with basic elements of C languages (different input functions, different output functions, different data types, and different operators)	08
3.	Working with C control structures (if statement, if-else statement, nested if-else statement, switch statement, break statement, goto statement)	10
4.	Working with C looping constructs (for loop, while loop, do-while and nested for loop)	10
5.	Working with the array in C (1-D array, and 2-D array)	08
6.	Working with strings in C (input, output, different string inbuilt functions)	08
7.	Working with user-defined functions in C (function with/without return type, function with/without argument, function and array)	08
8.	Working with recursive function in C	04

Text Book(s):

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

Reference Book(s):

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

Web Material Link(s):

- http://www.digimat.in/nptel/courses/video/106104128/L01.html

- https://www.youtube.com/watch?v=3QiItmIWmOM

Course Evaluation:

Theory:

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

Practical:

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

Course Outcome(s):

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

IDIT1010	**INTRODUCTION TO COMPUTER PROGRAMMING**
CO1	Understand foundation concepts, data representation, algorithms and coding methods in computer system.
CO2	Acquire the knowledge about programming language syntax.
CO3	Apply basic principles of imperative and structural programming to solve complex problems.
CO4	Able to develop, debug and test application programs.

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

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

Module No	**Content**	**RBT Level**
1	Introduction to Programming Language	1,2
2	Introduction to C, Constants, Variables and Data Types	1, 2,3
3	Operations, Expressions, and Managing I/O Operations	2, 3, 4, 6
4	Conditional Statements	2, 4, 5
5	Arrays	2. 4. 6
6	Strings	2, 4, 6
7	User-Defined Functions	2, 4, 6

P P Savani University
School of Engineering
Institute of Diploma Studies

Department of Science & Humanities

Course Code: IDSH1060
Course Name: Electrical & Electronics Workshop
Prerequisite Course(s): Concept of Science up to 9th Standard

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	00	00	20	30	0	0	50

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

- think in core concept of their engineering application by studying various topics involved in branch specific applications.
- identify basic fundamental electronic components in circuits.
- learn to use common electronic component on breadboard.
- understand components of instruments, terminology and applications.
- demonstrate the ability to collect and analyze data and to prepare coherent reports of his or her findings.

Sr. No.	List of Practical	Hours
1	To Understand & Draw the symbols of various electronic devices.	2
2	To identify resistors, capacitors using Different codes.	2
3	Verification of Truth tables of Logic Gates (NAND, NOR, EX-OR, AND, OR, NOT).	4
4	To study cathode ray oscilloscope and perform measurements.	4
5	To study digital multi-meter and perform testing of various components.	2
6	To study soldering- de-soldering techniques.	2
7	To study wiring diagram of ceiling Fan.	2
8	How Fluorescent Lights Work.	2
9	To study about stair case wiring two-way switch.	2
10	Explaining the function of Refrigerator and Air conditioner.	4
11	Explaining the core concept of power transmission.	4

Evaluation:

- Continuous Evaluation consists of performance of practical which will be evaluated out of

10marks for each practical and average of the same will be converted to 20 marks.

- Internal viva consists of 30 marks.

Course Outcome(s):

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

IDSH1060	**ELECTRICAL & ELECTRONIC WORKSHOP**
CO1	Recognize the basic rules for wiring and developing the ability to wire the discrete
CO2	Demonstrate the ability to think in core concept of their engineering application by studying various topics involved in branch specific applications.
CO3	Develop the ability to collect and analyze data and to prepare coherent reports of his or her findings.
CO4	Recognize the PCBs which is inserted in any of the electronic gadgets.

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

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

Module No	**Content**	**RBT Level**
1	Electronic components	1,2, 3, 4
2	Electronic Devices	1, 2,3, 4
3	Logic Gates	1, 2, 3, 5, 6
4	CRO	1, 2, 4, 5
5	Digital Multimeter	1, 2, 3, 4, 5
6	Soldering & Desoldering	1, 2, 3, 4, 5, 6
7	Wiring of ceiling fan	1, 2, 3, 4, 5, 6
8	Wiring of two switch	1, 2, 3, 4, 5, 6
9	Working of AC Refrigerator	1, 2, 3, 4, 5
10	Concept of Power transmission	1, 2, 3, 4, 5
11	Working of Fluorescent Light	1, 2, 3, 5, 6

SECOND YEAR DIPLOMA

P P SAVANI UNIVERSITY															
TEACHING & EXAMINATION SCHEME FOR DIPLOMA MECHANICAL PROGRAMME AY:2023-24															
Sem	**Course Code**	**Course Title**	**Offered By**	**Teaching Scheme**					**Examination Scheme**						
				Contact Hours				**Credit**	**Theory**		**Practical**		**Tutorial**		**Total**
				Theory	**Practical**	**Tutorial**	**Total**		**CE**	**ESE**	**CE**	**ESE**	**CE**	**ESE**	
3	IDME2010	Basics of Engineering Drawing	ME	2	4	0	6	4	50	0	100	0	0	0	150
	IDME2020	Thermodynamics	ME	3	4	0	7	5	40	60	40	60	0	0	200
	IDME2030	Material Science & Metallurgy	ME	3	2	0	5	4	40	60	20	30	0	0	150
	IDME2040	Theory of Machines	ME	3	4	0	7	5	40	60	40	60	0	0	200
	IDCV2031	Strength of Materials	CV	3	2	0	5	4	40	60	20	30	0	0	150
						Total	**30**	**22**							**850**
4	IDME2050	Engineering Contracting & Costing	SH	3	2	0	5	4	40	60	20	30	0	0	150
	IDME2060	Fluid Mechanics & Hydraulic Machines	ME	3	2	0	5	4	40	60	40	60	0	0	200
	IDME2070	Manufacturing Engineering - I	ME	3	4	0	7	5	40	60	40	60	0	0	200
	IDME2080	Thermal Engineering - I	ME	3	0	0	3	3	40	60	0	0	0	0	100
	IDME2090	Mechanical Drafting	ME	2	4	0	6	4	50	0	100	0	0	0	150
	CLSC2010	Universal Human Values	CLSC	2	0	0	2	2	100	0	0	0	0	0	100
						Total	**28**	**22**							**900**

P P Savani University

Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME2010
Course Name: Basics of Engineering Drawing
Prerequisite Course(s): None

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	04	00	04	50	00	100	00	00	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- Understand the language and familiarize with Indian Standards related to engineering drawings
- Develop drafting and sketching skills, application of drawing equipment's.
- Read various engineering curves, projections and dimensioning styles.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Introduction BIS SP-46, Drawing Instruments and their uses, Letters and numbers – Standard Sizes and Layout of drawing sheets-Types of lines and their applications- Different types of Dimensioning techniques, Scale (reduced, enlarged & full size), plain scale and diagonal scale, Geometrical constructions.	04	11
2.	Orthographic projections of points and lines: Introduction to orthographic projection, First angle and Third angle method, their symbols. Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. Projections of points Projections of lines in different quadrants, inclinations, True lengths of the lines projections on auxiliary planes	12	25
3.	**Projections of plane figures:** Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one or both reference planes).	06	13
Section II			
1.	**Projection of solids:** Types of Solid. Projection of Cone, Cylinder, Prism &pyramids. Simple cases when solid are placed in different positions Axis faces and tines lying in the faces of the solid making given angles.	12	26
2.	**Isometric projection:** Introduction to isometric projections. Isometric scale and Natural scale. Isometric view and isometric projection. Illustrative problems related to objects containing lines, circles and arcs shape only	11	25

List of Practical:

Sr No	Name of Practical	Hours
1.	Letters and numbers, Dimensioning techniques, Scale (reduced, enlarged & full size), plain scale and diagonal scale, Geometrical constructions.	02
2.	Orthographic projections of points and lines:	15
3.	Projections of plane figures	15
4.	Projection of solids	12
5.	Isometric projection	16

Text Book(s):

Title	Author/s	Publication
A Text Book of Engineering Graphics	P J Shah	S. Chand & Company Ltd., New Delhi
Engineering Drawing	N D Bhatt	Charotar Publishing House, Anand

Reference Book(s):

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 Link(s):

- 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 20 marks as per the guidelines provided by the course coordinator.

Practical:

- Continuous Evaluation consists of Performance of Practical/Tutorial which will be evaluated out of 10 for each practical/Tutorial and average of the same will be converted to 20 Marks.
- Internal Viva consists of 30 Marks.
- Practical performance/quiz/drawing/test of 50 marks during End Semester Exam.

Course Outcome(s):

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

IDME2010	BASICS OF ENGINEERING DRAWING
CO 1	Know and understand “Drawing is a language of Engineers.”
CO 2	Interpret general assembly technical drawing.
CO 3	Create traditions and the strategies for Engineering Drawing.
CO 4	Evaluate basic and intermediate geometry.
CO 5	Apply the knowledge of principles of projections.
CO 6	Enhance their technical communication skill in the form of talkative drawings.

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

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

Module No	Content	RBT Level
1	Introduction	1, 2
2	Orthographic projections of points and lines	1, 2, 3, 4, 5, 6
3	Projections of plane figures	1, 2, 3, 4, 5, 6
4	Projection of Solids	1, 2, 3, 4, 5, 6
5	Isometric projection	1, 2, 3, 4, 6

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME2020
Course Name: Thermodynamics
Prerequisite Course(s): --- IDME1010 – Basics of Mechanical & Civil 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	04	00	05	40	60	40	60	00	00	200

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.	10	20
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,	7	18
3.	**Entropy** Clausius theorem, property of entropy, Clausius inequality, entropy change in an irreversible process, principle of increase of entropy, entropy change for non-flow and flow processes, third law of thermodynamics, PPM3, Entropy change for phase changing process.	5	11
Section II			
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	10	20

5.	**Vapour Power Cycles** Carnot vapor cycle, Rankine cycle, comparison of Carnot and Rankine cycle, carnot cycle efficiency, variables affecting efficiency of Rankine cycle.	7	16
6.	**Gas Power Cycles** Carnot, Otto and Diesel cycle, Dual cycle, Comparison of Otto, Diesel and Dual cycles, air standard efficiency, mean effective pressure, brake thermal efficiency, relative efficiency, Brayton cycle.	6	15

List of Practicals:

Sr No	Name of Practical	Hours
1.	To interpret comparison of heat and work and solution of basic numerical on heat and work interaction.	06
2.	To solve numerical on S.F.E.E and its application to engineering devices like boiler, heat exchanger, turbine compressor etc.	06
3.	To understand concept of heat engine, heat pump, and refrigerator based on second law of thermodynamics.	08
4.	To solve basic numerical on concept of Entropy.	08
5.	To solve numerical on vapour power cylces.	08
6.	To understand reheat cycle, regenerative cycle, reheat-regenerative cycle, feedwater heaters for rankine cycle.	08
7.	To solve numerical on gas power cycles.	08
8.	To understand effect of reheat, regeneration and intercooling on brayton cycle.	08

Text Book(s):

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

Reference Book(s):

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

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.

Practical:

- Circuits and charts for gas & vapour power cycle consists of 20 marks.
- Internal Viva consists of 20 marks.
- Viva/Oral performance consists of 60 marks during End Semester Exam.

Course Outcome(s):

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

IDME2020	**THERMODYNAMICS**
CO 1	Interpret basics terms of thermodynamics.
CO 2	Define and demonstrate laws of thermodynamics and its application.
CO 3	Interpret differentiate concept of entropy, energy and exergy and their application.

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

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

Module No	**Content**	**RBT Level**
1	Basic Concepts of Thermodynamics	1, 2
2	First and Second Law of Thermodynamics	1, 2, 3
3	Entropy	1, 2, 3, 5
4	Exergy	1, 2, 5
5	Vapour Power Cycles	1, 2, 5
6	Gas Power Cycles	1, 2, 5

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME2030
Course Name: Material Science & Metallurgy
Prerequisite Course(s): --- None

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	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 crystal structures and atomic bonds. Classification of ferrous metals and their properties.
- Describe non-ferrous metals, cutting tool materials and composites along with their properties. Principle of corrosion, their types and tis prevention methods along with the various surface engineering processes.
- Apply various parameters to understand the properties and composites of materials.
- Understand the phase diagrams of ferrous metals and alloys, composition and use of non-ferrous metals.
- Evaluate different methods of failure analysis and testing of materials.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Crystal Structures and Bonds** Unit cell and space lattice: Crystal system: The seven basic crystal systems; Crystal structure for metallic elements: BCC, FCC and HCP, Coordination number for Simple Cubic, BCC and FCC; Atomic radius: definition, atomic radius for Simple Cubic, BCC and FCC; Atomic Packing Factor for Simple Cubic, BCC, FCC and HCP, Simple problems on finding number of atoms for a unit cell. Bonds in solids: Classification - primary or chemical bond, secondary or molecular bond; Types of primary bonds: Ionic, Covalent and Metallic Bonds; Types of secondary bonds: Dispersion bond, Dipole bond and Hydrogen bond.	10	20
2.	**Phase Diagrams, Ferrous Metals and its Alloys** Isomorphs, eutectic and eutectoid systems.Iron-Carbon binary diagram; Iron and Carbon Steels; flow sheet for production of iron and steel; Iron ores – Pig iron: classification, composition and effects of impurities on iron; Cast Iron: classification, composition, properties and uses; Wrought Iron: properties, uses/applications of wrought Iron; comparison of cast iron, wrought iron and mild steel and high carbon steel; standard commercial grades of steel as per BIS and AISI. Alloy Steels – purpose of alloying; effects of alloying elements– Important	7	18

	alloy steels: Silicon steel, High Speed Steel (HSS), heat resisting steel, spring steel, Stainless Steel (SS): types of SS, applications of SS – magnet steel – composition, properties and uses.		
3.	**Non Ferrous Metals and Its Alloys** Properties and uses of aluminum, copper, tin, lead, zinc, magnesium and nickel, Copper alloys: Brasses, bronzes – composition, properties and uses; Aluminum alloys: Duralumin, hindalium, magnesium – composition, properties and uses; Nickel alloys: Inconel, Monel, nicPerome – composition, properties and uses.Anti-friction/Bearing alloys: Various types of bearing bronzes - Standard commercial grades as per BIS/ASME.	5	12
	Section II		
4.	**Failure Analysis & Testing of Materials** Introduction to failure analysis; Fracture: ductile fracture, brittle fracture; cleavage; notch sensitivity. fatigue; endurance limit; characteristics of fatigue fracture; variables affecting fatigue life; creep; creep curve; creep fracture. Destructive testing: Tensile testing; compression testing; Hardness testing: Brinell, Rockwell; bend test; torsion test; fatigue test; creep test. Non-destructive testing: Visual Inspection; magnetic particle inspection; liquid penetrant test; ultrasonic inspection; radiography.	12	26
5.	**Corrosion and Surface Engineering** Nature of corrosion and its causes; Electrochemical reactions; Electrolytes; Factors affecting corrosion: Environment, Material properties and physical conditions; Types of corrosion; Corrosion control: Material selection, environment control and design.Surface engineering processes: Coatings and surface treatments; Cleaning and mechanical finishing of surfaces; Organic coatings; Electroplating and Special metallic plating;Electro polishing and photo- etching ;– Conversion coatings: Oxide, phosphate and chromate coatings; Thin film coatings: PVD and CVD; Surface analysis; Hard-facing, thermal spraying and high-energy processes; Process/material selection. Pollution norms for treating effluents as per standards.	11	24

List of Practical:

Sr No	Name of Practical	Hours
1.	To understand construction and working of metallographic microscope.	06
2.	To study procedure of specimen preparation for microscopic examination and to carry out a specimen preparation.	06
3.	To understand what is micro examination, importance of micro examination and to study various ferrous, non-ferrous microstructures.	08
4.	To show the effect of different quenching media like Oil, Water and Brine on the hardness of medium carbon steel.	08
5.	To find out the effect of varying section size on hardenability of steel and obtain hardness distribution curves of hardened steel cross-section.	08
6.	To determine machine defects by dye -penetrant test and magnetic particle test.	08
7.	To determine the hardenability by Jominy end quench test.	08
8.	Study of different heat treatment processes- annealing, normalizing, hardening and tempering, surface and casehardening to improve	08

	properties of steel during processes and applications with the help of muffle furnace.	

Text Book(s):

Title	Author/s	Publication
A TextBook of Material Science & Metallurgy	O.P. Khanna	Dhanpat Rai and Sons
Material Science & Engineering	R.K. Rajput	S.K. Materials & Sons

Reference Book(s):

Title	Author/s	Publication
Material Science	R.S. Khurmi	S.Chand & Co. Ltd

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

IDME2030	MATERIAL SCIENCE & METALLURGY
CO 1	Interpret important mechanical properties and classification of engineering materials and metals.
CO 2	Define different heat treatment process used in industrial applications.
CO 3	Understand the solidification process of metals and alloys.
CO 4	Analyze different microstructure, crystallography and defects of cast iron and steel specimen.
CO 5	Identify different destructive & nondestructive testing methods used in the practical field and their applications.
CO 6	Understand the use powder metallurgy and their application to industries.

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

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

Module No	Content	RBT Level
1	Crystal Structures and Bonds	1, 2
2	Phase Diagrams, Ferrous Metals and its Alloys	1, 2, 4
3	Non-Ferrous Metals and its Alloys	1, 2, 4
4	Failure Analysis & Testing of Materials	1, 2
5	Corrosion and Surface Engineering	1, 2, 4

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME2040
Course Name: Theory of Machines
Prerequisite Course(s): --- None

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	04	00	05	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

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

- 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.	07	14
2.	**Cams & Followers** Concept; Definition and application of Cams and Followers; Classification of Cams and Followers; Different follower motions and their displacement diagrams like uniform velocity, SHM, uniform acceleration and Retardation; Drawing of profile of radial cam with knife-edge with and without offset with reciprocating motion (graphical method). Drawing of profile of radial cam with roller follower with and without offset with reciprocating motion (graphical method).	06	10
3.	**Power Transmission** Types of Drives – Belt, Chain, Rope, Gear drives & their comparison; Belt Drives - flat belt, V– belt & its applications; Material for flat and V-belt; Angle of lap, Belt length. Slip and Creep. Determination of Velocity Ratio, Ratio of tight side and slack side tension. Centrifugal tension and Initial tension; Condition for maximum power transmission (Simple numericals); Chain Drives – Advantages & Disadvantages; Selection of Chain & Sprocket wheels. Methods of lubrication; Gear Drives – Spur gear terminology. Types of gears and gear	09	18

	trains, their selection for different applications. Train value & Velocity ratio for compound, reverted and simple epicyclic gear train. Methods of lubrication. Law of gearing. Rope Drives – Types, applications, advantages & limitations of Steel ropes.		
Section II			
4.	**Flywheel and Governors** Flywheel - Concept, function and application. Turning moment diagram for single cylinder 4-Stroke I.C. Engine (no Numericals). Coefficient of fluctuation of energy, Coefficient of fluctuation of speed and its significance. Governors - Types and explanation with neat sketches (Centrifugal, Watt and Porter); Concept, function and applications & Terminology of Governors. Comparison between Flywheel and Governor.	05	14
5.	**Brakes Dynamometers, Clutches & Bearings** Function of brakes and dynamometers; Types of brakes and Dynamometers, Comparison between brakes and dynamometers. Construction and working of i) shoe brake, ii) Band Brake, iii) Internal expanding shoe brake iv) Disc Brake; Concept of Self Locking & Self energizing brakes; Numerical problems to find braking force and braking torque for shoe & band brakes; Construction and working of i) Rope Brake Dynamometer, ii) Hydraulic Dynamometer, iii) Eddy current Dynamometers. Clutches- Uniform pressure and Uniform Wear theories. Function of Clutch and its application; Construction and working of i) Single plate clutch, ii) Multiplate clutch, iii) Centrifugal Clutch iv) Cone clutch and v) Diaphragm clutch. (Simple numericals on single and Multiplate clutch); Bearings – i) Simple Pivot, ii) Collar Bearing, iii) Conical pivot. Torque & power lost in friction (no derivation). Simple numerical.	09	22
6.	**Balancing & Vibrations** Concept of balancing. Balancing of single rotating mass; Graphical method for balancing of several masses revolving in same plane; Concept and terminology used in vibrations, Causes of vibrations in machines; their harmful effects and remedies.	09	22

List of Practical:

Sr No	Name of Practical	Hours
1.	Study of Ackerman‟s Steering Gear Mechanism.	06
2.	To study various types of gears.	06
3.	To study various types of gear trains.	04
4.	To draw velocity diagram of slider crank mechanism.	04
5.	To draw acceleration diagram of four bar mechanism.	08
6.	To draw displacement diagram, velocity diagram & acceleration diagram of cam follower.	08
7.	Layout of cam profile for reciprocating knife edge follower	06
8.	Layout of cam profile for offset reciprocating roller follower	06
9.	Layout of cam profile for flat faced reciprocating follower	06
10.	Layout of cam profile for oscillating follower	06

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.

Practical:

- Continuous Evaluation consists of solution of Practical which will be evaluated out of 20 for each and average of the same will be converted to 20 Marks.
- Internal Viva consists of 20 marks.
- Viva/Oral performance consists of 60 marks during End Semester Exam.

Course Outcome(s):

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

IDME2040	THEORY OF MACHINES
CO 1	Demonstrate an understanding of the concepts of various mechanisms and pairs.
CO 2	Understand velocity and acceleration analysis of different mechanism.
CO 3	Design a layout of cam and follower for specific motion.
CO 4	Demonstrate an understanding of principle of gears.

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

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

Module No	Content	RBT Level
1	Basics of Mechanisms	1, 2
2	Cams & Followers	2, 3, 4, 5, 6
3	Power Transmission	1, 2, 3, 5
4	Flywheel and Governors	1, 2, 5
5	Brakes Dynamometers, Clutches and Bearings	1, 2, 4, 5
6	Balancing & Vibrations	1, 2, 3, 4, 5

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: IDCV2031
Course Name: Strength of Materials
Prerequisite Course/s: Engineering Mechanics (IDCV1010)

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 structural behavior before and after application of loads.
- able to determine deflections of beams and frames using classical methods.
- ability to idealize and analyze statically determinate and indeterminate structures.
- able to analyze statically determinate trusses, beams, and frames and obtain internal loading.
- able to analyze cable and arch structures

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1	**Mechanical Properties of Materials** Introduction, Classification of materials, Properties related to axial, bending, and torsional & shear loading, Toughness, hardness, Ductility, Brittleness. Proof stress, Factor of safety, Working stress, Load factor.	08	16
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 constant, Relation between Elastic constants.	14	28
Section II			
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.	14	28

2	**Center of Gravity & Moment of Inertia** Centroid of lines, plane areas and volumes, Examples related to centroid of composite geometry, Pappus –Guldinus theorems, Parallel and Perpendicular axis theorems, Polar moment of inertia, Radius of gyration of areas, Examples related to moment of inertia of composite geometry.	14	28

Text Book(s):

Title	Author/s	Publication
Mechanics of Structures	S.B Junarkar	Charotar Publishing House
Strength of Materials & Mechanics of Structures	Dr. B.C. Punmia	Laxmi Publications (p) Ltd.

Reference Book(s):

Title	Author/s	Publication
Strength of Material	Singer and Pytel	Harper Collins Publishers.
Elements of Strength of Materials	Timoshenko & Young	Mc Graw Hill Book Co

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Compressive Strength Test	02
2.	Impact Test (Izod)	02
3.	Impact Test (Charpy)	02
4.	Tensile Strength Test	02
5.	Rockwell Hardness Test	02
6.	Brinnal's Hardness Test	02
7.	Tutorials	02
8.	Tutorials	02

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 Outcome(s):

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

IDCV2031	STRENGTH OF MATERIAL
CO 1	Apply mathematical knowledge to calculate the deformation behavior of simple structure.
CO 2	Critically analyze problem and solve the problem related to mechanical elements and analyze the deformation behavior for different types of loads
CO 3	Understand the different types of stresses and strains developed in the member subjected to axial, bending, shear & torsional effects.
CO 4	Understand the physical properties of materials

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

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

Module No	Content	RBT Level
1	Mechanical Properties of Materials	1, 2, 3, 5
2	Simple Stress and Strain	1, 2, 3, 4, 5
3	Shear Force and Bending Moment	1, 2, 3, 4, 6
4	Center of Gravity & Moment of Inertia	1, 2, 3, 4

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME2050
Course Name: Engineering Contracting & Costing
Prerequisite Course(s): --- None

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	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 Machine hour rate and Process hour rate with different methods/ process.
- Understand Breakeven analysis analytically as well as graphically.
- learn estimation of cost for forging, welding and casting.
- understand cost estimation of machined parts.
- Learn the methods of preparation of budgeting and contracting.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction** Need, Scope & importance of ECC in industries, Difference between costing and estimating, Terminology associated with various cost elements and their classification, Terminology associated with overheads, their classification and allocation, Determination of selling price and catalogue price. Depreciation and obsolescence: Definition, types, different methods of calculating depreciation. Concept of machine hour rate (MHR) and process hour rate (PHR), method to calculate MHR and PHR for any process.	10	20
2.	**Break Even Analysis** Classification of costs as fixed and variable costs, Relationship between the costs and quantity of production, Definition of break even point (BEP), Procedure of construction of Break Even Chart, Assumptions made in constructing Break even chart, Calculation of BEP analytically and graphically, Margin of safety, its importance and its derivation, effect of changing various parameters on BEP, Basic Numericals.	7	18
3.	**Cost Estimation of Welding, Forging and Casting** Elements of Cost in Arc Welding, Factors affecting arc welding cost, Estimation of cost elements for consumables in arc welding, Cost terminology associated with forging shop, Procedure of calculating material cost of a product for forging	5	12

	shop, Procedure of estimating forging cost, Procedure of estimating cost of forging dies, Cost terminology associated with product in foundry shop, procedure of estimating cost of pattern making, procedure of estimating foundry cost.		
Section II			
4.	**Cost estimation of machined part** Terminology associated with machine shop estimation, procedure to estimate material cost, procedure of estimating cost of machined part for: (a) lathe operation (facing, turning, boring, drilling, grooving, threading), (b) drilling operations (drilling, reaming, tapping), (c) Shaping operations, (d) milling operations (face milling, side and face cutting, end milling, gear forming), (e) cylindrical grinding (plain).	10	20
5.	**Estimation of process cost** Understand importance of estimating various process costs, procedure and steps to estimate cost for following processes: (a) producing power using diesel generating set (cost/ hour and cost/ unit), (b) power produced at thermal power plants (cost/ unit), (c) pouch packaging (cost/ pouch), (d) heat exchanger, cooling or heating (cost/ hour),	7	15
6.	**Budgeting and contracting** Define budget and budgetary control, purpose of budget, various types of budget, Prepare simple budget given.	6	15

List of Practical:

Sr No	Name of Practical	Hours
9.	Collection of market rates for various consumables like diesel, welding rods, gas, cutting tools, electricity rates etc.	2
10.	Collection of finished parts from industries/ market/ scrap merchants consisting welded parts, casted parts, forged parts. Measure and prepare production drawings for all parts.	2
11.	Determine raw material volume of welded parts, estimate quantity of welding rod, determine material and consumables cost.	4
12.	Determine raw material volume for all casted parts (calculate input weight, cut weight, net weight, losses etc), prepare pattern drawings with all dimensions, estimate pattern cost, determine material and consumables costs.	2
13.	Determine raw material volume for all forged parts. Prepare die drawings for all parts, estimate dies cost, determine material and consumables costs,	4
14.	Estimate hourly rate of running diesel generating set. Show assumptions and steps followed to estimate the rate.	4
15.	Sketch the parts taken in design of machine elements under mini projects. Prepare process plan, estimate the material, consumables and manufacturing process.	4
16.	Estimate costs of parts and assembly and show the assumptions and steps followed to estimate the costs.	4
17.	Present the work including work distribution, photographs and movies of actual project work using power point presentation	4

Text Book(s):

Title	Author/s	Publication
Mechanical Estimating and Costing	Banga and sharma	Khanna Publishers

Reference Book(s):

Title	Author/s	Publication
Mechanical Estimating and costing	Shrimali and Jain	Khanna Publishers
Mechanical costing and estimation	Singh and Khan	Khanna Publishers
Learning package in ECC	NITTTR, Bhopal	NITTTR, Bhopal

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

IDME2050	ENGINEERING CONTRACTING & COSTING
CO 1	Calculate material cost of given component/ product.
CO 2	Identify and estimate elements of cost in various processes.
CO 3	Perform break even analysis to calculate break even quantity.
CO 4	Investigate the problem of cost and suggest their solution using cost reduction techniques.
CO 5	Interpret given model of balance sheet and profit loss account.
CO 6	Prepare simple engineering contracts.

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

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

Module No	Content	RBT Level
1	Introduction	1, 2, 4
2	Break Even Analysis	1, 2, 3, 5
3	Cost Estimation of Welding, Forging and Casting	1, 2, 3, 4, 5
4	Cost Estimation of machined part	1, 2, 3, 4, 5
5	Estimation of Process cost	1, 2, 3, 4, 5
6	Budgeting and Contracting	1, 2, 3, 4, 5

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME2060
Course Name: Fluid Mechanics & Hydraulic Machines
Prerequisite Course(s): -- None

Teaching & Examination Scheme:

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

CE: Continuous Evaluation, ESE: End Semester Exam

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

- Understand basic fundamentals of Fluid Mechanics, which is used in the applications of Aerodynamics, Hydraulics, Marine Engineering, Gas dynamics etc.
- understand the importance of flow measurement and its applications in Industries and to obtain the loss of flow in a flow system.
- 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.	**Properties of Fluid and Pressure Measurement** Density, specific gravity, specific weight, specific volume, dynamic viscosity, surface tension, capillarity, vapour pressure, compressibility, Fluid Pressure & Pressure Measurement: Fluid pressure, pressure head, pressure intensity, concept of vacuum and gauge pressures, atmospheric pressure, absolute pressure, simple and differential manometers, Bourdon pressure gauge, concept of total pressure on immersed bodies, center of pressure, simple problems on manometers.	09	22
2.	**Fluid Flow** Types of fluid flows, path line and stream line, continuity equation, Bernouli's theorem, Principle of operation of venturimeter, Orifice meter and pitot tube, derivations for discharge, coefficient of discharge and numerical problems, laminar and turbulent flows, Darcy's equation and chezy's equation for frictional losses, minor in pipes, hydraulic gradient and total gradient line, Numerical problems to estimate major and minor losses.	07	18
3.	**Impact of Jets** Impact of Jet on fixed vertical flat plates, Impact of jet on curved-vanes with special reference to turbines & pumps, simple numerical on work done and efficiency.	06	14
Section II			

4.	**Hydraulic Turbines** Layout of hydroelectric power plant, features of hydroelectric power plant, classification of hydraulic turbines, selection of turbine on the basis of head and discharge available, construction and working principle of pelton wheel, Francis and Kaplan turbines, Draft tubes – types and construction, concept of cavitation in turbines, calculation of work done, Power, efficiency of turbines, unit quantities and simple numerical.	11	22
5.	**Centrifugal Pumps and Reciprocating Pumps** Principle of working and applications, types of casings and impellers, concept of multistage, Priming and its methods, cavitation, manometric head, work done, manometric efficiency, overall efficiency, Numericals on calculations of overall efficiency and power required to drive pumps, reciprocating pumps: construction, working principle and applications of single and double acting recriprocating pumps, concept of slip, negative slip, cavitation and separation.	12	24

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Verification of Bernouli's theorem.	06
2.	Determination of coefficient of discharge of venturimeter.	06
3.	Determination of coefficient of discharge, coefficient of contraction and coefficient of velocity of orificemeter.	06
4.	Determination of coefficient of friction of flow through pipes.	06
5.	Determination of force exerted by the jet of water on the given vane.	06
6.	Determination of minor losses of flow through pipes.	06
7.	Calibration of pressure gauge using dead weight pressure gauge tester.	06
8.	Trial on recriprocating pump to determine overall efficiency.	06
9	Trial on pelton wheel to determine overall efficiency.	06
10	Trial on Francis/ Kaplan turbine to determine overall efficiency.	06

Text Book (s):

Title	Author/s	Publication
Fluid Mechanics & Hydraulic Machines	S.S. Rattan	Khanna Publishing House, Delhi
Hydraulic, fluid mechanics & Fluid machines	Modi P.N. and Seth S.M.	Standard book house, New delhi
One Thousand Solved problems in fluid mechanics	K. Subramanya	Tata McGraw Hill

Reference Book(s):

Title	Author/s	Publication
Hydraulic, fluid mechanics & fluid machines	S. Ramamrutham	Dhanpat Rai and Sons
Fluid Mechanics and Hydraulic machines	R.K. Bansal	Laxmi Publications, New Delhi

Web Material Links:

- https://nptel.ac.in/courses/112104117/
- 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 solution of Practical which will be evaluated out of 20 for each and average of the same will be converted to 20 Marks.
- Internal Viva consists of 20 marks.
- Viva/Oral performance consists of 60 marks during End Semester Exam.

Course Outcome(s):

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

IDME2060	**FLUID MECHANICS & HYDRAULIC MACHINES**
CO 1	Understand fundamentals of fluids.
CO 2	Analyze various flow problems and flow characteristics.
CO 3	Determine major and minor losses through different pipes.
CO 4	Apply the concept of fluid mechanics to design various system.
CO 5	Analyze complete performance of Hydraulic Turbines Experimentally and Theoretically.
CO 6	Understand working and construction of different Fluid Machines. apply the principles of Fluid Statics and Fluid Kinematics to various Fluid Machines

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

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

Module No	**Content**	**RBT Level**
1	Properties of Fluid and Pressure Measurement	1, 2, 3, 5
2	Fluid Flow	1, 2, 3, 5
3	Impact of Jets	1, 2, 3, 4, 5
4	Hydraulic Turbines	1, 2, 5
5	Centrifugal and Reciprocating pumps	1, 2, 5

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME2070
Course Name: Manufacturing Engineering - I
Prerequisite Course(s): -- IDME2030 – Material Science & 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	04	00	05	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to
- understand the manufacturing science using conventional methods.
- understand various manufacturing techniques.
- 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.	**Casting** Patterns-Material used, types, Patterns allowances, Cores, Core allowances. Moulds-Mould materials, Types of sand ,Mounding processes Sand moulding ,Pit moulding, machine moulding .Shell moulding.Melting practice. Types of furnaces with specific applicationCupola furnace, Electric arc furnace. Casting principle and operation,Special casting processes. viz die casting, centrifugal casting, Investment casting. Casting defects.	09	22
2.	**Forging** Forging Processes–Drop forging, Upset forging ,Die forging or press forging.Types of dies- Open Die, Closed Die(Single Impression and Multi-impression) Closed die Forging operations- Fullering ,Edging, Bending, Blocking, Finishing,Forge able material and forge ability, Forging temperature, Grain flow in forged parts, Types of Press sand hammers.	07	18
3.	**Rolling and Extrusion** Principles of rolling and extrusion. Hot and cold rolling.Types of rolling mills Different sections of rolled parts, Methods of extrusion–Direct ,Indirect ,backward &impact Extrusion, Hot extrusion, Cold extrusion Advantages, disadvantages and applications.	06	16
Section II			
4.	**Press Working** Types of presses and Specifications. Press working	11	22

	operations- Cutting, bending, drawing, punching, blanking, notching, lancing, Die set components. -punch and die shoe, guide pin, bolster plate,stripper, stock guide ,feedstock ,pilot.Punch and die Clearances for blank in gland piercing, effect of clearance.		
5.	**Welding** Classification. Gas welding techniques.Types of welding flames. Arc Welding–Principle, Equipment, ApplicationsShielded metal arc welding. Sub merged arc welding. TIG/MIG welding. Resistance welding- Spot welding, Seam welding, Projection welding, Welding defects. Brazing and soldering: Types, Principles, Applications.	12	22

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Moulding & Casting of (i) Connecting rod, (ii) solid bearing, (iii) V-Pulley/ Gear Pulley	02
2.	Preparation of two piece patterns, cope and drag patterns, gated patterns etc.	04
3.	Arc welding (i) Lap joint, (ii) Butt Joint, (iii) T-Joint	04
4.	Study of straight polarity and reverse polarity on quality of weld	04
5.	Gas welding (i) Lap joint, (ii) Butt Joint	04
6.	Spot welding (i) Lap joint	04
7.	Simple products by sheet metal working such as ducts of T-shape.	04
8.	Open die forging of mild steel to prepare chisel, hexagonal rods, etc.	04

Text Book(s):

Title	Author/s	Publication
Elements of workshop Technology – Volume I & II	S.K. Hajra Chaudary, Bose & Roy	Media Promoter sand publishers limited
Production Technology – Volume I & II	O.P. Khanna and Lal	
Production Technology	Jain & Gupta	Khanna Publishers

Reference Book(s):

Title	Author/s	Publication
Introduction to manufacturing processes	Jhon A. Schey	McGraw Hills International
Manufacturing Technology	M. Aduthan and A.b. Gupta	New Age International
Workshop Technology	Jain & Gupta	Raghuwansi Khanna Publishers

Web Material Links:

- http://nptel.iitm.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Manuf%20Proc%20II/New_index1.html
- https://nptel.ac.in/courses/112107145

Course Evaluation:

- 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 20 for each and average of the same will be converted to 20 Marks.
- Internal Viva consists of 20 marks.
- Viva/Oral performance consists of 60 marks during End Semester Exam.

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

IDME2070	**MANUFACTURING ENGINEERING - I**
CO 1	Interpret important mechanical properties and classification of traditional manufacturing process.
CO 2	Define different forming process and its application in industry for shaping products.
CO 3	Understand the press working operation with its application in industry. identify different welding operation and techniques for welding different alloys.

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

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

Module No	**Content**	**RBT Level**
1	Casting	1, 2, 3, 6
2	Forging	1, 2, 3
3	Rolling and Extrusion	1, 2, 3
4	Press Working	1, 2, 5, 6
5	Welding	1, 2, 5, 6

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME2100
Course Name: Thermal Engineering - I
Prerequisite Course(s): -- IDME1010 – Basics of Mechanical & Civil Engineering, IDME2020 - 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	04	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

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

- 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.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Sources of Energy** Brief description of energy Sources: Classification of energy sources - Renewable, Non-Renewable; Fossil fuels, including CNG, LPG.Solar Energy: Flat plate and concentrating collectors & its applications (Solar Water Heater, Photovoltaic Cell, Solar Distillation).Wind Energy; Tidal Energy; Ocean Thermal Energy; Geothermal Energy; Biogas, Biomass, Bio-diesel; Hydraulic Energy, Nuclear Energy; Fuel cell.	06	14
2.	**Internal Combustion Engines** Assumptions made in air standard cycle analysis; Brief description of Carnot, Otto and Diesel cycles with P-V and T-S diagrams. Internal and external combustion engines. classification of I.C. engines; neat sketch of I.C. engine indicating component parts; Function of each part and materials used for the component parts - Cylinder, crank case, crank pin, crank, crank shaft, connecting rod, wrist pin, piston, cooling pins cylinder heads, exhaust valve, inlet valve.Working of four-stroke and two-stroke petrol and diesel engines; Comparison of two stroke and four stroke engines; Comparison of C.I. and S.I. engines; Valve timing and port timing diagrams for four stroke and two stroke engines..	08	19

3.	**I.C. Engine Systems** Fuel system of Petrol engines; Principle of operation of simple and Zenith carburettors; Fuel system of Diesel engines; Types of injectors and fuel pumps. Cooling system - air cooling, water cooling system with thermo siphon method of circulation and water cooling system with radiator and forced circulation (description with line diagram). Comparison of air cooling and water cooling system. Ignition systems – Battery coil ignition and magneto ignition (description and working). Comparison of two systems; Types of lubricating systems used in I.C. engines with line diagram; Types of governing of I.C. engines – hit and miss method, quantitative method, qualitative method and combination methods of governing; their applications; Objective of super charging.	08	14
Section II			
4.	**Performance of I.C. Engines** Brake power; Indicated power; Frictional power; Brake and Indicated mean effective pressures; Brake and Indicated thermal efficiencies; Mechanical efficiency; Relative efficiency. Performance test; Morse test; Heat balance sheet; Methods of determination of B,P., I.P. and F.P. Simple numerical problems on performance of I.C. engines.	10	24
5.	**Air Compressors, Refrigeration & Air-Conditioning** Types of air compressors; Single stage reciprocating air compressor - its construction and working (with line diagram) using P-V diagram; Multi stage compressors – Advantages over single stage compressors; Rotary compressors: Centrifugal compressor, axial flow type compressor and vane type compressors. Refrigeration; Refrigerant; COP; Air Refrigeration system: components, working & applications; Vapour Compression system: components, working & applications. Air conditioning; Classification of Air-conditioning systems; Comfort and Industrial Air-Conditioning; Window Air-Conditioner; Summer Air-Conditioning system, Winter Air-Conditioning system, Year-round Air-Conditioning system.	13	29

Text Book(s):

Title	Author/s	Publication
Introduction to Renewable Energy	Vaughn Nelson	CRC Press
Thermal Engineering	P.L. Ballaney	Khanna Publishers, 2002
A Course in Thermal Engineering	S. Domkundwar & C.P. Kothandaraman	Dhanpat Rai

Reference Book(s):

Title	Author/s	Publication
Thermal Engineering	R.S. Khurmi and J.K. Gupta	S.Chand & Co.
Thermal Engineering	Er. R . K. Rajput	Laxmi Publications Pvt. Ltd

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:
- End Semester Exam Viva consists of 50 marks.

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

IDME2080	**THERMAL ENGINEERING – I**
CO 1	Measure and test the different performance parameters of I. C engine.
CO 2	Define the role and importance of fuel supply system for various engine.
CO 3	Understand the concepts & types of ignition and governing systems used for I.C Engine.
CO 4	Clarity of concepts of air-condition and idea about different conditioning systems.
CO 5	Use of refrigeration in industrial application with types.

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

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

Module No	**Content**	**RBT Level**
1	Sources of Engineering	1, 2
2	Internal Combustion Engines	1, 2, 4, 5
3	I.C. Engine Systems	1, 2, 4, 5
4	Performance of I.C. Engines	1, 2, 3, 5
5	Air Compressors, Refrigeration & Air-Conditioning	1, 2, 3, 4, 5

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME2090
Course Name: Mechanical Drafting
Prerequisite Course(s): -- IDME2010 – Basics 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	
02	04	00	04	50	00	100	00	00	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

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

- understand different drafting symbols used in industry.
- learn the layouts for weld, pipe and duct and its application relevant to industry.
- understand the assembly drawings and prepare bill of materials.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Drafting Symbols** Machining symbol and its interpretation, Geometrical symbols and its interpretation, Other drafting symbols like threading, dowels, pins, ribs, bearings, etc, notes in drawing like heat treatment conditions, surface conditions, assembly notes, etc. (All symbols as per BIS).	02	06
2.	**Welded Joints, Piping & Duct Layouts** Weld symbols as per BIS -813/ ASME (Primary symbols & supplementary symbols), Weld nomenclature, weld dimensions, welding drawing interpretations (like simple heat exchangers, pressure vessels, etc.), Pipe-types, standards and designation methods, pipe line symbol as per passing fluid air, gas, water etc. Piping fitting symbols, pipe line diagram, Interpretation of process flow diagram & piping isometrics & pipe schedule chart, ducts-types and applications, duct layout.	12	43
3.	**Details & Assembly** Importance and difference of drawings, detail drawing from given assembly, assembly drawings from given details, preparing bill of material (part lists).	08	25
Section II			
4.	**Fasteners** Detachable & permanent fasteners, sketches of threads (square, acme, knuckle, internal-external threads, left hand - right hand threads, single & multi start threads), sketches of studs (cap screws, machine screws, set screws), sketches of bolts & nut (hexagonal square), sketches of rivets (snap, pan,	11	13

	countersunk, conical), sketches of keys.		
5.	**Development of surfaces** Importance of development of surfaces, drawing of development of surfaces of prism, pyramid, cylinder and cone – independent, sectioned and combination.	12	13

List of Practical:

Sr No	Name of Practical	Hours
1.	Draw various drafting symbols: threading, machining, geometrical, welding, piping.	04
2.	Surface development: Draw development of surface prism, pyramid, cylinder and cone – independent, sectioned and combination – Total 4 problems.	04
3.	Penetration and Intersection: Draw the intersection curves – 4 problems (prism into prism, cylinder into cylinder, cylinder into prism, cone into cylinder), with varied dimensions.	12
4.	Weld Joint Assembly: Draw the weld joint drawing with weld symbols and nomenclature. Take minimum 3 parts for weld joint assembly.	12
5.	Piping layout: Prepare piping layout for given application/ situation with piping symbols and nomenclature. Also prepare isometric piping layout for the same problem.	12
6.	Details: Draw the details of all parts for the assembly selected and sketched as student activity.	08
7.	Assembly: Draw the assembly of all parts drawn for Sr No. 5. This includes minimum ones sectional view and also the parts list.	08

Text Book(s):

Title	Author/s	Publication
Engineering Drawing	N.D. Bhatt	Charotar Publishing House, Anand
Engineering Drawing	K.R. Gopalakrishna	Subhash Publications, Bangalore
Engineering Drawing	P.J. Shah	S.Chand, New Delhi

Reference Book(s):

Title	Author/s	Publication
Machine Drawing	P. Sidheswar, P. Kannaiah & VVS Sastry	Tata-McGraw Hill Publishing Co. Ltd – New Delhi
Fundamentals of Engineering Drawing	Warren J. Luzadder	Prentice-hall of India Pvt. Ltd-New Delhi
Westernmann Table, Revised to Indian Standards	Jutz, Scharkus	New age international publishers

Web Material Links:
https://nptel.ac.in/courses/112107145

Course Evaluation:
Theory:

- Continuous evaluation consists of two tests each of 20 marks and 1 hour of duration and average of the same will be converted to 20 marks.

- Faculty evaluation consists of 30 marks as per the guidelines provided by Course Coordinator.

Practical:
- Practical performance/quiz/drawing/test of 50 marks during End Semester Exam.
- Viva/Oral performance of 50 marks during End Semester Exam.

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

IDME2090	**MECHANICAL DRAFTING**
CO 1	Acquire basic knowledge of various drafting symbols.
CO 2	Conduct various experiments on surface development.
CO 3	Understand the different types of welding symbols, pipe fitting symbols and duct layout.
CO 4	Demonstrate an ability to assembly drawing.

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

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

Module No	**Content**	**RBT Level**
1	Drafting Symbols	1, 2, 4, 5
2	Welded Joints, Piping & Duct Layouts	1, 2, 4, 5
3	Details & Assembly	1, 2, 3, 4, 5
4	Fasteners	1, 2, 4, 5
5	Development of Surfaces	1, 2, 4, 5, 6

THIRD YEAR DIPLOMA

P P SAVANI UNIVERSITY															
TEACHING & EXAMINATION SCHEME FOR DIPLOMA MECHANICAL PROGRAMME AY:2023-24															
Sem	**Course Code**	**Course Title**	**Offered By**	**Teaching Scheme**					**Examination Scheme**						
				Contact Hours				**Credit**	**Theory**		**Practical**		**Tutorial**		**Total**
				Theory	**Practical**	**Tutorial**	**Total**		**CE**	**ESE**	**CE**	**ESE**	**CE**	**ESE**	
5	IDME3071	Thermal Engineering-II	ME	3	0	0	3	3	40	60	0	0	0	0	100
	IDME3020	Metrology & Instrumentation	ME	3	4	0	7	5	40	60	40	60	0	0	200
	IDME3031	Manufacturing Engineering-II	ME	3	4	0	7	5	40	60	40	60	0	0	200
	IDME3080	Software Tools for Mechanical Engineers	ME	0	2	0	2	1	0	0	50	0	0	0	50
		Elective - I	ME	3	2	0	5	4	40	60	20	30	0	0	150
	IDME3910	Summer Training	ME	4			0	4	0	0	100	0	0	0	100
		Language Training Elective Course	CFLS	3	0	0	3	3	100	0	0	0	0	0	3
		Life Skill Elective Course	CLSC	2	0	0	2	2	100	0	0	0	0	0	2
						Total	**29**	**27**							**1000**
6	TNPC3010	Corporate Grooming & Etiquette	SH	3	0	0	3	3	100	0	0	0	0	0	100
	IDME3050	Computer Aided Design & Manufacturing	ME	1	2	0	3	2	50	0	20	30	0	0	100
	IDME3060	Design of Machine Elements	ME	3	0	0	3	3	40	60	0	0	0	0	100
	-	Elective - II	ME	3	0	0	3	3	40	60	0	0	0	0	100
	IDME3750	MOOC Course	ME	3	0	0	3	3	100	0	0	0	0	0	100
	IDME3930	Project/Training	CLSC	11			11	11	0	0	200	300	0	0	500
						Total	**26**	**25**							**1000**

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME3071
Course Name: Thermal Engineering - II
Prerequisite Course(s): -- IDME1010 - Basics of Mechanical & Civil Engineering, IDME2020 – Thermodynamics, IDME2080 - Thermal Engineering - I

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
				Theory		Practical		Tutorial		Total
Theory	Practical	Tutorial	Credit	CE	ESE	CE	ESE	CE	ESE	
03	00	00	04	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 steam properties and dryness fractions.
- Understand various boilers, mounting s and accessories and their functioning.
- Study about the steam prime movers
- Identify the elements and processes of steam condensers and cooling towers.
- understand the role of compressor and its performance.
- Calculate heat transfer for given heat transfer system.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
6.	**Two phase system** Concept of two-phase system, Formation of steam, its various phases, definition and representation of wet steam, dry steam, saturated steam and superheated steam on PV, T-s and H-s diagram. Concept and determination of dryness fraction and degree of superheat, Concept and determination of latent, heat, sensible heat, enthalpy, entropy and specific volume of steam. Use of Steam tables and Mollier chart- (Heat Entropy Chart). Numerical examples based on above. **Throttling process.** Methods of measurement of steam quality, Calorimeters- Bucket, Separating, Throttling and Combined calorimeters. (No numerical Problems).	07	15
7.	**Boilers, mountings and accessories** Steam boiler-concept, definition as per Indian Boilers Regulation (IBR), functions, features and classification. Working, merits and demerits of low-pressure steam boilers: Simple vertical boiler, Lancashire boiler, Cornish boiler, Cochran boiler, Babcock and Wilcox water tube boiler, Packaged boiler, Waste heat recovery boiler. **Boiler mountings and accessories**- functions, working and location on boilers. Boiler draught system-concept and	10	21

	classification. Boiler performance – parameters, evaporative capacity, equivalent evaporation, efficiency, heat balance sheet, simple numerical examples based on these. **Concept of fluidized bed combustion boilers**, maintenance, inspection and safety precautions in boiler house (As per IBR), check list in boilers.		
8.	**Steam prime movers** Concept and classification of prime movers. Steam nozzles-types, working and applications. Mass and velocity of steam discharge through nozzle (No derivation). Simple examples. Steam turbine – concept and classification. Impulse and reaction turbines (constructional and materials details.)-working and differences. **Compounding of steam turbine**: Need, Pressure compounding, Velocity compounding, Pressure velocity compounding.	06	14
	Section II		
9.	**Steam condensers and cooling towers** Elements of a steam condensing plant, concept, function and classification of condensers. Jet condensers and surface condensers- constructional sketch, working and differences. Vacuum efficiency and condenser efficiency of condensers-simple numerical example. Classification, function and working of cooling towers.	03	10
10.	**Air compressors** Air compressor-concepts, functions, classification and applications. Working of reciprocating air compressor and rotary air compressors. Single stage air compressor and multistage air compressor: Working, Inter-cooling & after cooling. Power required and efficiency of reciprocating air compressors-single and two stages, simple numerical examples. Concept of screw compressors for oil free air.	08	20
11.	**Heat transfer** Various modes of heat transfer. Conduction heat transfer-Fourier's law- explanation (No Cartesian or other equation derivation), thermal conductivity, heat transfer through a plain wall, composite wall and cylinder. Convection heat transfer, Newton's law of convection, Free and force convection, coefficient of convection. Radiation heat transfer, Blackbody concept, emissivity, refractivity, absorptivity, Stefan and Boltzmann's law, thermal conductivity, Difference between hot and cold insulation, Over all heat transfer coefficient. Simple numerical examples based on above. **Heat exchanger:** introduction, types and applications-Logarithmic Mean Temperature Difference (LMTD) concept-(No derivation & no numerical examples).	08	20
	Total Hours	45	

List of Tutorial:

Sr. No.	Name of Tutorials	Hours

1.	To study properties of steam using steam table and Mollier chart.	02
2.	To understand construction and working of various types of boilers	02
3.	To understand construction and working of mountings	02
4.	To understand construction and working of accessories	02
5.	Study of petrol and diesel engine components	01
6.	To study the construction and working of various Steam turbines.	02
7.	To understand construction and working of condensers	01
8.	To understand construction and working of air compressors.	02
9.	Study of various mode of heat transfer	01

Text Book(s):

Title	Author/s	Publication
Thermal Engineering	P.L. Ballaney	Khanna Publishers, 2002
A Course in Thermal Engineering	S. Domkundwar & C.P. Kothandaraman	Dhanpat Rai
Thermodynamics and Heat power Engg.	Mathur and Mehta	Tata Mcgraw- Hill
A Text book of Thermal Engineering	R S Khurmi& J K Gupta	S Chand & Co.

Reference Book(s):

Title	Author/s	Publication
Thermal Engineering	R.S. Khurmi and J.K. Gupta	S. Chand & Co.
Thermal Engineering	Er. R . K. Rajput	Laxmi Publications Pvt. Ltd
Heat and mass transfer	R K Rajput	S. Chand & Co.

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:

- End Semester Exam Viva consists of 50 marks.

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

IDME3071	THERMAL ENGINEERING – II
CO 1	Determine steam properties and dryness fractions.
CO 2	Classify and explain boilers, boiler mountings and accessories.

	Determine boiler performance based on given specific parameters.
CO 3	Explain working of steam prime movers. Identify the elements and processes of steam condensers and cooling towers.
CO 4	Operate air compressors and observe the parameters affecting the performance.
CO 5	Calculate heat transfer for given heat transfer system.

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

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

Module No	**Content**	**RBT Level**
1	Two phase system	1, 2
2	Boilers, mountings and accessories	1, 2, 4, 5
3	Steam prime-movers	1, 2, 4, 5
4	Steam condenser & cooling towers	1, 2, 3, 5
5	Air compressors	1, 2, 3, 4, 5
6	Heat transfer	1,2,4

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME3020
Course Name: Metrology & Instrumentation
Prerequisite Course(s): -- None

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	04	0	05	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help 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 %
6.	**Linear and angular measurement** 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. 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	08	18
7.	**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.	08	18
8.	**Surface Roughness Metrology** Introduction, Surface Texture, Methods of Measuring Surface finish, Comparison Methods and Direct Instrument Measurement, Sample Length, Numerical Evaluation of Surface Texture, Indication of Surface roughness Symbols used, Adverse effects of poor surface finish	07	14
Section II			

9.	**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	14
10.	**Limit gauges, transducers and sensors** Limit gauges-classification, sketch and applications, Comparators-concept, types and applications, Static characteristics of instruments, Transducers-concept, classifications, physical quantities which can be measured, advantages and disadvantages, Electrical transducers-types, working principles and applications. i Linear Variable Differential Transformer (LVDT) type pressure gauge. ii Resistance type. iii Capacitance type. iv Inductance type (LVDT). v Piezo-electric, Sensors- classification and applications.	08	18
11.	**Measurement of geometrical tolerances** Dial indicators/gauge-types, constructional sketch and applications. Definition, symbol and measuring methods of: i. Straightness. ii. Flatness. iii. Squareness. iv. Parallism. v. Perpendicularity. vi. Roundness. vii. Concentricity. viii. Cylindricity. ix. Run out and ovality.	06	18

List of Practical:

Sr No	Name of Practical	Hours
8.	To study various instrument characteristics	06
9.	To use of linear measuring instruments	06
10.	To use and calibration of miscellaneous linear measuring instruments	06
11.	To use of slip gauge	06
12.	To use and calibration of angle measuring instrument	06
13.	To use and measurement of spur gear tooth elements	06
14.	To study, use and measurement of surface roughness value	06
15.	To measure roundness, straightness and flatness of specimen	06
16.	To study and use of Linear Variable Differential Transducer (L. V. D. T.)	06
17.	To measure temperature using R.T.D.	06

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:
https://nptel.ac.in/courses/112107145

Course Evaluation:
Theory:

- Continuous Evaluation consists of Two Tests 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 carries 10 Marks of Evaluation (Banner or Presentation on modern measuring Instruments).
- End Semester Examination will consist of 60 Marks Exam.

Practical:

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

IDME3020	Metrology & Instrumentation
CO 1	Measure the given mechanical elements and assemblies using linear and angular analog /digital measuring instruments.
CO 2	Explain temperature & surface roughness checking instruments.
CO 3	Measure and derive important dimensions of various thread forms and gears.
CO 4	Check the dimensions using the gauges.
CO 5	Select and measure variables using appropriate sensors and transducers.

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

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

Module No	Content	RBT Level
1	Linear and angular measurement	1, 2, 3
2	Temperature measurement	1, 2, 3
3	Surface Roughness Metrology	1, 2, 3
4	Screw threads and gear Metrology	1, 2, 3
5	Limit gauges, transducers and sensors	1, 2, 3
6	Measurement of geometrical tolerances	1, 2, 3

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME3031
Course Name: Manufacturing Engineering - II
Prerequisite Course(s): --IDME2070 Manufacturing Engineering - I

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
				Theory		Practical		Tutorial		
Theory	Practical	Tutorial	Credit	CE	ESE	CE	ESE	CE	ESE	Total
03	04	00	05	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

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

- understand different cutting tools and geometry.
- learn the layouts machine tools and cutting tool holders.
- understand the importance of Automates.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction and Mechanics of Cutting** Need, scope & importance of manufacturing processes in industries. Need of attitude, knowledge & skill required for shop floor supervisor in machine tools based industries. Differentiate between forming and generating processes. Mechanics of cutting action, orthogonal and oblique cutting. (Without derivation). Chip formation, types of chips. Forces acting on tool and chip, methods to compute cutting force using dynamometer. Concept and definition of cutting speed, feed and depth of cut. Cutting fluid- basic need, types, properties and its applications. Influence of cutting variables on surface finish, tool life, economy, and mass production. Safety precautions in machine tools.	06	13
2.	**Basic Machine Tools - I** Define and classify basic machine tools. Movements of tool, job, slides and work holding devices during cutting operation on various machine tools. Lathe machine - Types. Working principle. All geared head stock centre lathe. Constructional features. Kinematics-(drive, head stock, feedbox, carriage, cross slide, top slide, swivel, apron, tailstock,) constructional sketch, working, and use. iii. Detailed specifications. Operations performed. Work holding devicesconstructional sketch, working and applications. (3 jaw chuck, 4 jaw chuck, face plate, centers). Lead screw and feed rod mechanisms. Thread cutting setting-concept methods and simple	08	18

	numerical. viii. Accessories- types, constructional sketch, working and applications. Metal removal rate (MRR) – concept and method to calculate on lathe. Drilling machine – Types, Working principle. Redial drilling machining - Constructional features. Kinematics (drive, spindle speeds, feed mechanism, radial movement, etc.) constructional sketch, working, and use. Detailed specifications. Accessories-types, constructional sketch, working and applications. Tool holding and setting methods. Operations performed. Work holding devicesconstructional sketch, working and applications. Metal removal rate (MRR) –method to calculate on drilling machine.		
3.	**Basic Machine Tools - II** Milling machine Types. Working principle. Plain horizontal milling machining. Constructional features. Kinematics (drive, spindle speeds, feed mechanism, table movement, etc.) constructional sketch, working, and use. Operations performed. Milling cutters-types and applications. Up milling and down milling- concept, advantages, disadvantages and applications. Indexing-dividing head- constructional sketch, working, and use. Simple, differential and compound indexing methods with simple numerical. Work holding devices-constructional sketch, working and applications. Metal removal rate (MRR) – concept and method to calculate on milling.	08	18
Section II			
4.	**Basic Machine Tools - III** Shaping machine – Types, Working principle Constructional features and detailed specifications. iv. Quick return mechanisms kinematic sketch, working and advantages. Operations performed. Work holding devices constructional sketch, working and applications. Slotting machine – Types, Working principle. Operations performed. Work holding devices constructional sketch, working and applications. Planning machine – Types, Working principle. Operations performed. Work holding devices constructional sketch, working and applications.	08	18
5.	**Cutting Tools and Tool Holders** Various cutting tool materials, their compositions and properties. Alloying elements in tool materials and their effects. Carbide inserts: Designation method for turning, milling and drilling (As per ISO). Need. Benefits. Tool holders for carbide inserts: Designation method for turning, milling and drilling (As per ISO). Need. Benefits. Mounting and replacement methods of carbide insert. General cutting parameters for various cutting tool materials (HSS and Carbide) and work piece materials.(low carbon steel, high carbon steel, stainless steel, gunmetal, cast iron and aluminum). Cutting tool angles and their functions. Various cutting tools (with tool geometry, nomenclature, tool materials, sketch/drawing of each, ISO/BIS standards) used for various operations on lathe, milling and drilling machines. Single point cutting tool. Plain milling cutter. Side and face	08	18

	milling cutter. Centre drill. Twist drill. Functions and types of chip breakers. Tool life, tool wear and machinability, factors affecting them.		
12.	**Automates** Capstan and turret lathe: Constructional features and working principle. Functions and applications. Difference between capstan and turret lathe. Preparation of tool layout. Merits and demerits. Turret lathe in comparison with basic centre lathe. Work holding devices. Single spindle Automats: Need. Constructional features. Working principle and applications. Collets-constructional features and applications. Introduction to multi spindle automates and special purpose automates.	07	15

List of Practical:

Sr No	Name of Practical	Hours
1.	**Preparatory Activity:** For given work piece and tool material; select, set and observe cutting speed, feed and depth of cut on lathe machine. Also define these terms. Calculate metal removal rate (MRR) for above case. Identify various cutting tools, its geometry and material available at workshop. Sketch them. Identify various carbide inserts and ISO codification. Calculate revolution per minute (RPM) for lathe, milling cutter and drill spindle based on given data.	04
2.	**Effect of Varying Cutting Parameters:** Demonstrate type of chips, surface finishes and tool life for varying cutting parameters for same work piece material and tool material. Tabulate the observations.	04
3.	**Effect of Varying Cutting Parameters:** Demonstrate type of chips, surface finishes and tool life for varying work piece material with same cutting parameters. Tabulate the observations**.**	12
4.	**Turning Job:** Prepare a job on centre lathe as per the given drawing. (Including plain turning, taper turning, knurling, threading, grooving, etc). Student will also prepare report including: a. Drawing of the job. b. Operation sequences including details of cutting parameters used. c. Sketch of cutting tools used. d. Specification of machines used. e. Machine settings for threading.	12
5.	**Milling Job:** Prepare a job using milling operations including use of indexing head (Excluding gear tooth cutting). Student will also prepare report including: a. Drawing of the job. b. Operation sequences including details of cutting parameters used. c. Sketch of cutting tools used. d. Specification of machines used. e. Machine settings for indexing.	12
6.	**Shaping and Drilling Job:** Prepare a job having plain and inclined surfaces on shaping machine with minimum two holes as per given drawing. Student will also prepare report including: a. Drawing of the job. b. Operation sequences including details of cutting parameters used. c. Sketch of cutting tools used. d. Specification of machines used.	05
7.	**Single Point Cutting Tool:** Sketch single point cutting tool(SPCT) with nomenclature. b. Grind SPCT as per given geometry. c. Sketch the set up to grind each angle of SPCT.	05

8.	**Tool Layout:** Prepare a tool lay-out of a given component for capstan and turret lathe.	06

Text Book(s):

Title	Author/s	Publication
Workshop Technology I, II & III	W.A.J. Chapman	Viva Books
Manufacturing Processes	M.L. Begman	John Wiley & Sons
Elements of Workshop Technology Volume No. II Machine Tools	Hajira Choudhary, Bose S.K., Roy Nirjhar	Media Promotors and Publishers Pvt. Limited

Reference Book(s):

Title	Author/s	Publication
Manufacturing Processes	S.E. Russinoff	Times of India Press
Production Technology	H.H. Marshall	Pitman
Production Technology	HMT	Tata Mcgraw-Hill Publishing Co.

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.

Practical:

- Practical performance/quiz/drawing/test of 40 marks during End Semester Exam.
- Viva/Oral performance of 60 marks during End Semester Exam.

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

IDME3031	MANUFACTURING ENGINEERING - II
CO 1	Explain Mechanics of Cutting.
CO 2	Classify and explain working of basic machine tools with kinematics.
CO 3	Observe and conclude the effect of varying tool materials, cutting parameters and work piece materials.
CO 4	Interpret and select tool and tool holder designation system.
CO 5	Identify the machine tool and select cutting parameters for given job.

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

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

Module No	Content	RBT Level
1	Introduction and mechanics of cutting	1, 2, 4, 5
2	Basic Machine Tools - I	1, 2, 4, 5

3	Basic Machine Tools - II	1, 2, 3, 4, 5
4	Basic Machine Tools - III	1, 2, 4, 5
5	Cutting tools and tool holders	1, 2, 4, 5, 6
6	Automates	1, 2, 3, 4, 5

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME3080
Course Name: Software Tools for Mechanical Engineers
Prerequisite Course(s): -- None

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
00	04	00	02	00	00	50	00	00	00	50

CE: Continuous Evaluation, ESE: End Semester Exam

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

- Develop computer aided drawings and models using codes, norms, standards and CAD software.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to CAD** Computer graphics & its terminology. CAD definition, concept & need. CAD process. Functional areas of CAD. Coordinate systems. Geometric transformation-concept and types dimensional (2D) geometric transformation- translation, scaling, rotation and mirror with numeric examples.	-	-
2.	**CAD Hardware** Difference between 2D & 3D models. Geometric modeling – concept, types, features and applications. Solid modeling methods like Constructive Solid Geometry, Pure primitives & Boundary Representation Feature base modeling-concept, illustrative examples. Parametric & non parametric modeling- concept, differences and illustration.	-	-
3.	**3D Modelling Using AUTOCAD** Introduction to AutoCAD-3D features and 2D commands overview. 3D primitives-types and defining parameters. User coordinate system (UCS) and its options. 3D draw commands. 3D modify and editing commands. 3D viewing & views generation.	-	-

List of Practical:

Sr. No.	**Name of Practical**	**Hours**

1.	Preparatory Activity on 2D Drawing using AutoCAD and 2D parametric sketcher environment	07
2.	3D Solid Modelling – To prepare 3D solid models using AutoCAD (Four Components)	07
3.	To prepare simple surface model suing AutoCAD (Four Components)	07
4.	To demonstrate activity of AutoCAD using mini project and presentation by preparing solid models of dismantled part of an assembly, assemble parts and present the project.	09

Text Book(s):

Title	Author/s	Publication
Computer Aided Design: A conceptual Approach	Jayanta Sarkar	CRC Press
CAD/ CAM	Broover	Pearson

Reference Book(s):

Title	Author/s	Publication
AutoCAD	James Leach	SDC Publication
Creo 2.0 for designer and engineers	Sham Tickoo	Dreamtech Press

Web Material Link(s):

https://www.youtube.com/watch?v=WY0YuCkJWdw
https://www.youtube.com/watch?v=OIYrkF_FId8
https://www.youtube.com/watch?v=zoMW_usjaJo
https://www.youtube.com/watch?v=rtjDfZXscrI

Course Evaluation:

Practical:

- Continuous Evaluation consists of Practical/ Viva of 50 Marks.

Course Outcome(s):

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

IDME3080	SOFTWARE TOOLS FOR MECHANICAL ENGINEERS
CO 1	Create drafting using 2D models.
CO 2	Develop and design shapes using the knowledge of 3D modelling.
CO 3	Understand and create surface models.
CO 4	Understand the design and drawings of Industry.

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

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

Module No	Content	RBT Level
1	Introduction to CAD	1, 2, 3, 4, 5
2	CAD Hardware	1, 2, 3, 4, 5, 6
3	Geometric Modelling	1, 2, 3, 4, 5, 6
4	3D Modelling Using AutoCAD	1, 2, 3, 4, 5, 6

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME3050
Course Name: Computer Aided Design & Manufacturing
Prerequisite Course(s): -- IDME3080 – Software Tools for Mechanical Engineers

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
01	02	0	02	50	00	20	30	0	0	100

CE: Continuous Evaluation, ESE: End Semester Exam

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

- gain exposure over the concepts of computer graphics
- learn geometric modelling and transformation
- develop strong skill of writing CNC programs.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Fundamentals of CAD** CAD definition, concept & need, Functional areas of CAD, Geometric transformation-concept and types, 2 dimensional (2D) geometric transformation- translation, scaling, rotation and mirror with numeric examples.	04	25
2.	**Geometric Modelling** Difference between 2D & 3D models, Geometric modeling – concept, types, features and applications, Feature base modeling-concept, illustrative examples, Parametric & non parametric modeling-concept, differences and illustration.	03	25
Section II			
3.	**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, Automatic tool changer, Automatic Pallet Changer, Machine tool structure, Guideways, Transmission system, Drives and Feedback Devices, NC/CNC tooling, Canned cycles and subroutines.	08	50

List of Practical:

Sr No	Name of Practical	Hours
1.	Prepare 3D solid models using Solidworks	04
2.	Mini Project:	18

	a. Prepare solid models of dismantled parts of an assembly. b. Assemble the parts. c. Get orthographic production drawings of solid models prepared at "a" above. d. Get orthographic production drawings of assembly model prepared at "b" above. e. Prepare the bill of material (BOM) . f. Present the project.	
3.	Mini Project: CNC code generation using any CAM software (Any One Part)	08

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
Mathematical Elements for Computer Graphics	David Rogers, J. Alan Adams	Tata McGraw Hill Publishing company Ltd.

Web Material Links:

- 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 20 marks as per the guidelines provided by the course coordinator.

Practical:

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

IDME3050	**COMPUTER AIDED DESIGN & MANUFACTURING**
CO 1	understand mathematical aspects of geometrical modelling and transformation
CO 2	Design, develop and model the given part using various CAD software likeCreo/Catia /Unigraphics/Solid edge/Solid Works/Inventor/ AutoCAD, etc.
CO 3	Prepare solid models & assembly of mechanical parts.
CO 4	develop programs related to manufacturing using CNC codes

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

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

Module No	**Content**	**RBT Level**
1	Fundamentals of CAD	1, 2, 3
2	Geometric Modelling	1, 2, 3,4
3	CNC Machine Tools	3,4,5

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME3060
Course Name: Design of Machine Elements
Prerequisite Course(s): -- IDME2010 Basic of Engineering Drawing, IDME2090 – Mechanical Drafting

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

- Design couplings, pressure vessels, etc. .
- Understand the concept of selection of materials for design consideration.
- understand the factors and parameters needed for design of machine elements.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Design Considerations** Standardization, Preferred numbers, Tolerances and Fits, Ergonomics, System design, Manufacturing considerations.	06	13
2.	**Design of Coupling** Types of coupling, Design of Muff coupling, Clamp coupling, Rigid flange coupling and Bush pin type flexible coupling.	08	18
3.	**Spring** Types of spring, Stress and deflection equations, Design of helical spring, Concentric springs, Design of Multi-leaf spring.	08	18
Section II			
4.	**Pressure Vessels** Thin cylinder, Thin spherical vessels, Thick cylinders, Lame's equation, Clavarino's and Birnie's equations, Cylinder with external pressure, Autofrettage, Compound cylinder.	08	18
5.	**Rolling Contact Bearings** Types of rolling-contact bearings, Selection of bearing type, Static load carrying capacity of bearing, Dynamic load carrying capacity of bearing, Equivalent bearing load, Load-life relationship, Selection of bearing from manufacturer's catalogue, Bearing with probability of survival other than 90 percent, Design for cyclic load. **Sliding Contact Bearing** Basic mode of lubrication, Measurement of viscosity, Viscosity	08	18

	index, Petroff's equation, McKee's equations, Interpretation of Reynold's equation, Difference between hydrodynamic and hydrostatic bearing, Performance parameters for journal bearings, Bearing design – selection of parameters for journal bearing.		
6.	**Design of Gear Drives** Classification of gears, Selection of type of gears, Standard system of gear tooth, Force analysis, Gear tooth failures, selection of material, Beam strength of gear tooth, Wear strength of gear tooth, Virtual number of teeth, Thermal considerations for worm gear.	07	15

Text Book(s):

Title	Author/s	Publication
Design of Machine Elements	V.B. Bhandari	Tata McGraw Hill
A textbook of Machine Design	P.C. Sharma and D.K. Aggarwal	S.K. Kataria & Sons
Machine Design: An Integrated Approach	R.L. Norton	Pearson

Reference Book(s):

Title	Author/s	Publication
Shingley's Mechanical Engineering Design	R. G. Budnyas, J.K. Nisbett	McGraw Hill
Machine Tool Design and Numerical Control	N.K. Mehta	Tata McGraw Hill Edu.
Design Data, Faculty of Mechanical Engineering	Faculty of Mechanical Engineering	PSG College of Engineering, Coimbatore

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.

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

IDME3060	DESIGN OF MACHINE ELEMENTS
CO 1	Relate various standard used in industry and utilize knowledge of manufacturing process in design of machine elements.
CO 2	Determine forces acting on machine elements like couplings, springs, gears, bearings and perform stress analysis for machine components.
CO 3	Estimate life of rolling element bearings and determine performance parameters of sliding contact bearings.
CO 4	Evaluate speed variation on gear box shafts and optimize fluctuation of shaft speeds in gear box.

CO 5	Design and dissect mechanisms for strength and improve their life.

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

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

Module No	**Content**	**RBT Level**
1	Design Considerations	1, 2, 3, 4, 5
2	Design of Coupling	1, 2, 3, 4, 5, 6
3	Spring	1, 2, 3, 4, 5, 6
4	Pressure Vessels	1, 2, 3. 4, 5, 6
5	Rolling Contact Bearings & Sliding Contact Bearings	1, 2, 3, 4, 5, 6
6	Design of Gear Drives	1, 2, 3, 4, 5, 6

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME3512
Course Name: Power Plant Engineering
Prerequisite Course(s): IDME2020-Thermodynamics; IDME2080-Thermal Engineering-I, IDME3071 – Thermal Engineering - II

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

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Thermal Power Plant** General Layout of modern power plant, Site selection, Present status of power generation in India.	03	07
2.	**Economics of Power Generation** Load duration curves, Connected load, Maximum load, Peak load, Base load and peak load power plants, Load factor, Plant capacity factor, Plant use factor, Demand factor, Diversity factor, Cost of power plant, Performance and operating characteristics of power plant, Tariff for electric energy. (No Derivation)	08	18
3.	**High Pressure Steam Generators** Unique features and advantages, La-Mont; Benson; Velox, Loeffler and Schmidt-Hartmann boilers, Supercritical, Positive circulation, Fluidized bed combustion.	05	12

4.	**Coal and Ash handling Systems** Coal handling and preparation, Combustion equipment and firing methods, Pulverized mills, Mechanical Stokers, Pulverized coal firing systems, Cyclone Furnace, Necessity of Ash disposal, Ash handling systems, Dust collection and its disposal, Mechanical Dust Collector, Electrostatic precipitator.	06	13
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. (No Derivation).	04	08
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.	08	17
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	05	12
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.	06	13

List of Practical:

Sr. No.	Name of Practical	Hours
1.	To solve the numerical based on Economics of power generation.	04
2.	Study the various Feed water treatment for steam generators.	04
3.	Selection of induced and forced draft fans and height of chimney.	04
4.	A case study of Nuclear Power Plant.	04
5.	To understand India's 3-Stage Nuclear Programme and nuclear power plants in India.	04
6.	To Study various types of condenser and cooling towers.	04
7.	A Case study of thermal power plant.	04
8.	Industrial visit report on Power Plant Visit.	02

Text Book (s):

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

Reference Book(s):

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

Web Material Link(s):

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

Course Evaluation:

Theory:

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

Tutorial:

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

Course Outcome(s):

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

IDME3512	POWER PLANT ENGINEERING
CO 1	Interpret different parameters associate with power generation and supply.
CO 2	Define the role of various power plants for fulfilment of energy requirement of country.
CO 3	Identify the India‘s 3 stage nuclear programme and current power generation by nuclear plants.
CO 4	Understand various components and requirements of different power plants.
CO 5	Estimate the height of chimney and maximum flow of gas through chimney.

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

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

Module No	Content	RBT Level
1	Thermal Power Plant	1, 2
2	Economics of Power Generation	1, 2, 3

3	High Pressure Steam Generators	1, 2, 3
4	Coal and Ash Handling Systems	1, 2
5	Draught System	1, 2, 3
6	Nuclear and Hydro Power Plant	1, 2
7	Feed Water Treatments	1, 2
8	Condenser and Cooling Tower	1, 2, 3

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME3521
Course Name: Refrigeration & Air-Conditioning
Prerequisite Course(s): IDME2020-Thermodynamics; IDME2080-Thermal Engineering-I, IDME3071 – Thermal Engineering - II

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

- Classify different refrigeration systems.
- Understand the working principle of various refrigeration system.
- Classify and understand the importance of refrigerants.
- Interpret the relation of importance of human comfort based on air refrigeration system.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Introduction and Refrigerant** Brief history and need of refrigeration and air conditioning, methods of producing cooling, ton of refrigeration, coefficient of performance, types and application of refrigeration and air condensing systems, Recapitulation of desirable properties of refrigerants, secondary refrigerants, future industrial refrigerants.	03	07
2.	**Air Refrigeration** Aircraft refrigeration, working and analysis of Simple, Bootstrap, Reduced ambient and Regenerative air refrigeration systems.	08	18
3.	**Compound Compression VCR system** 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.	05	12

4.	**Absorption Refrigeration System** Practical H2O -NH3 cycle, LiBr – H2O system and its working, h-x diagram and simple calculation of various process like adiabatic mixing and mixing with heat transfer, throttling.	06	13
Section II			
Module. No.	Content	Hours	Weightage in %
1.	**Refrigeration System Components** Types, construction, working, comparison and selection of compressors, condensers, expansion devices and evaporators; refrigeration piping accessories, evacuation and charging of refrigerant, properties and classification of thermal insulation.	04	08
2.	**Human Comfort and Load Analysis** 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 Site survey, outdoor and indoor design conditions, classification of loads, flywheel effect of building material and its use in design, effect of wall construction on cooling load, instantaneous heat gain (IHG) and instantaneous cooling load (ICL) heat transmission through sunlit and shaded glass using tables, method of reduction of solar heat gain through glass, calculations of cooling load TETD due to sunlit and shaded roof and walls using tables, ventilation and air infiltration, load due to outside air, heat gain from occupants; electric lights; product; electric motor and appliances, load calculations for automobiles, use of load estimation sheet.	08	17
3.	**Duct Design and Air Distribution** Function; classification and economic factors influencing duct layout, equal friction, velocity reduction and static regain methods of duct design, use of friction chart, dynamic losses and its determination, Requirements of air distribution system, air distribution, grills, outlets, application, location.	05	12
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.	06	13

List of Practical:

Sr. No.	Name of Practical	Hours
1.	To analyze multi-evaporator systems with different configurations.	04
2.	To analyze cascade refrigeration system.	02
3.	To analyze NH_3-H_2O system for specific application.	02
4.	To analyze LiBr-H_2O system for specific application.	02

5.	To understand construction and working of reciprocating and centrifugal compressor used for R & AC.	02
6.	To understand various tools used for refrigeration tubing and to perform various operations like flaring, swaging, bending, brazing etc.	04
7.	To calculate cooling load of a confined space using table and compare the same with load estimation sheet.	04
8.	To design duct layout of the confined space selected for above.	02
9.	To select and analyze proper air-conditioning system for the confined space selected above.	02
10.	To Calculate cooling load of an automobile.	04

Text Book (s):

Title	Author/s	Publication
Refrigeration and Air Conditioning	C.P. Arora	McGraw Hill India Publishing Ltd.
Refrigeration and Air-Conditioning	Ramesh Arora	Prentice Hall India

Reference Book(s):

Title	Author/s	Publication
Refrigeration and Air Conditioning	Manohar Prasad	New Age International Publisher
ASHRAE Handbook	Fundamentals 2017	ASHRAE
Automobile Air Conditioning	Crouse and Anglin	McGraw Hill Publications

Web Material Link(s):

- https://nptel.ac.in/courses/112107216/ (Review of Thermodynamics)
- https://nptel.ac.in/courses/108105058/8 (Thermal Power Plants)

Course Evaluation:

Theory:

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

Tutorial:

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

Course Outcome(s):

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

IDME3521	REFRIGERATION & AIR-CONDITIONING
CO 1	Select proper refrigerant for various applications.
CO 2	Analyze multi-evaporator systems and simple vapor absorption systems.
CO 3	Explain construction and working of different refrigeration system components.
CO 4	Solve air-conditioning load calculations for buildings and automobiles.
CO 5	Select proper air-conditioning system for various applications and construct duct layout for the systems.

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

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

Module No	Content	RBT Level
1	Introduction and Refrigerant.	1, 2, 3
2	Air Refrigeration.	1, 2, 3, 4
3	Compound compression VCR system.	1, 2, 3, 4, 5
4	Absorption Refrigeration Systems.	1, 2, 3, 4, 5
5	Refrigeration Systems Components	1, 2, 3, 4
6	Human Comfort and Load Analysis.	1, 2, 4
7	Duct Design and Air Distribution.	1, 2, 3, 4, 5, 6
8	Air Conditioning Systems.	1, 2, 4

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME3532
Course Name: Automobile Engineering
Prerequisite Course(s): - IDME2080 – Thermal Engineering - I

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

- 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 final drive, the differential, rear axle, Simple problems in all	10	20

	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

List of Practical:

Sr. No.	Name of Practical	Hours
1.	To analyze different braking systems.	04
2.	To analyze transmission systems.	02
3.	To study antilock braking system.	02
4.	To study front wheel arrangements.	02
5.	To study rear wheel arrangements.	02
6.	To understand wheels and Tyres selection.	04
7.	To study electrical and electronic systems.	04
8.	To understand front and rear suspension system.	02
9.	To understand steering layout.	02
10.	To study steering geometry.	04

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.

Tutorial:

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

Course Outcome(s):

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

IDME3532	**AUTOMOBILE ENGINEERING**
CO 1	Know about history of automobile vehicle & learn major component of automobile vehicle.
CO 2	Explain the various braking systems and in which circumstances each one of them is used.
CO 3	Identify the role of different transmission system of automobile vehicle.
CO 4	Understand types of wheels & tyres and its constructional details used in automobile.
CO 5	Understand the electrical and electronics system in automobile.

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

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

Module No	**Content**	**RBT Level**
1	Introduction and Performance	1, 2, 3
2	Brakes	1, 2, 3, 5
3	Transmission System	1, 2, 3
4	Wheels and Tyres	1, 2, 3
1	Electrical and Electronics Systems	1, 2, 3, 4
2	Steering System	1, 2, 3, 4
3	Suspension	1, 2, 3, 4

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME3541
Course Name: Mechatronics
Prerequisite Course(s): - IDSH1060 – Electrical and Electronics Workshop

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	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 applications signal processing, sensors, actuators.
- Apply the importance of mechatronics systems.
- Understand the importance of maintenance and safety in Robotics systems.

Course Content:

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

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

List of Practical:

Sr. No.	Name of Practical	Hours
1.	To analyze open and closed loop system.	04
2.	To study about signal processing.	02
3.	To study about sensors.	02
4.	To study about actuators.	02
5.	To study about mechatronics systems.	02

Text Book (s):

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

Reference Book(s):

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

Course Evaluation:

Theory:

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

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

Tutorial:

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

Course Outcome(s):

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

IDME3541	**MECHATRONICS**
CO 1	Understand the basic concept of signal processing.
CO 2	Understand the working principle of sensors and actuators.
CO 3	Define and identify various mechatronics systems.
CO 4	Understand the importance of maintenance and safety of Robotics.

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

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

Module No	**Content**	**RBT Level**
1	Introduction	1, 2, 3
2	Signal Processing	1, 2, 3, 5
3	Sensor	1, 2, 3
4	Actuators	1, 2, 3
5	Mechatronics Systems	1, 2, 3, 4
6	Robotics Applications, Maintenance and Safety	1, 2, 3, 4

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME3551
Course Name: Hydraulic and Pneumatic Systems
Prerequisite Course(s): - IDME2060 – Fluid Mechanics & Hydraulic Machines

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	50	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

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

- Draw symbols used in hydraulic systems.
- Operate different types of valves used in hydraulic systems.
- Classify the valves used in hydraulic systems.
- Maintain different valves and auxiliaries.
- Assemble pumps and motors to rectify problems.
- Develop efficient hydraulic circuits.
- Maintain the pneumatic and hydraulic system.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Basic Concepts of Hydraulics** Introduction & Definitions of important terms like Hydraulics, Pressure, Force, Vacuum etc. Pascal's Law and its Application to Hydraulics. Bernoulli's Principle. Hydraulic Jack. Hydraulic Symbols. Advantages and Disadvantages of Hydraulic System. Hydraulic Oil. Purpose of Hydraulic Oil Ideal Characteristics of Hydraulic Oil. Maintenance of Hydraulic Oil.	04	08
2.	**Accessories of Hydraulic System** Connectors. Steel pipe. Tubing. Hose. Gauges. Packing & Seals. Filters & Strainers. Hydraulic Tank	06	14

3.	**Hydraulic Valves and Auxiliaries** Directional Control Valves. Pressure Control Valves. Flow Control Valves. Pressure Intensifiers. Accumulators. Cartridge Valves.	08	18
4.	**Hydraulic Pumps and Motors** Pump Specifications. Construction & Working of Gear Pump, Vane Pump, Radial Piston Pump, Pump Maintenance & Trouble Shooting. Hydraulic Motor Specifications. Construction & Working of Gear Motor, Vane Motor Radial Piston Motor.	04	08
Section II			
Module No.	Content	Hours	Weightage in %
5.	**Hydraulic Circuits** Clamp Control Circuit. Injection Control Circuit . Reciprocating Screw Circuit. Oil Filtration Circuit. Deceleration Circuit. Prefill Circuit. Hydraulic Motor Circuit Hi-Low Pump Circuit.	11	25
6.	**Pneumatics** Pneumatics. Comparison with Hydraulic System. Air Compressors: Single Acting and Double Acting. Components of Pneumatic System. Air receiver and pressure control 6.6 Stages of Air Treatment. Intercooler. Lubricator. Filter, Air dryer, Pneumatic Circuit for Plastic Processing Machine.	12	27

List of Tutorial:

Sr. No.	Name of Tutorial	Hours
1.	Draw graphical sysmbols.	01
2.	Demonstrate application of Pascal's Law in Hydraulic system.	01
3.	Demonstrate various accessories and their uses in hydraulic system.	01
4.	Demonstrate use of directional control valves.	02
5.	Demonstrate use of pressure control valves.	02
6.	Demonstrate used of pressure intensifier.	02
7.	Demonstrate applications of flow control valves.	02
8.	Demonstrate applications of various types of pumps.	01
9.	Demonstrate use of hydraulic motors.	01
10.	Demonstrate application of injection control circuit.	01
11.	Demonstrate application of single stage compressors.	01

Text Book (s):

Title	Author/s	Publication
Industrial Hydraulic Manual	-	Vickers (Second Edition)
Injection Moulding	Irvin I.Rubin	Wiley
Hydraulic and Pneumatics	Andrew Parr	Elsvier (3rd Edition)

Reference Book(s):

Title	Author/s	Publication
Injection Moulding Machine	Whelan	Elsvier Applied Science
Hydraulic and Pneumatic Power and Control	Franklin D. Yeaple	McGraw-Hill

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.

Tutorial:

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

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

IDME3551	**HYDRAULIC & PNEUMATIC SYSTEMS**
CO 1	Differentiate hydraulic and pneumatic fluid based systems.
CO 2	Select and operate various hydraulic and pneumatic elements.
CO 3	Operate and maintain hydraulic and pneumatic devices.
CO 4	Operate and maintain various hydraulic and pneumatic circuits.
CO 5	Troubleshoot various hydraulic and pneumatic installations.

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

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

Module No	**Content**	**RBT Level**
1	Basic Concepts of Hydraulics	1, 2, 3
2	Accessories of Hydraulic System	1, 2, 3, 5
3	Hydraulic Valves and Auxiliaries	1, 2, 3
4	Hydraulic Pumps and Motors	1, 2, 3
5	Hydraulic Circuits	1, 2, 3, 4
6	Pneumatics	1, 2, 3, 4