



PPSU

P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

DIPLOMA

**MECHANICAL ENGINEERING
(INDUSTRY INTEGRATED)**

SYLLABUS BOOK

AY 2025-26

INSTITUTE VISION

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

INSTITUTE MISSION

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

Graduates will demonstrate ability to:

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

PO No	PROGRAMME OUTCOMES
PO 1	Engineering Knowledge: Apply foundational math, science, and engineering principles.
PO 2	Problem Analysis: Identify and solve well-defined engineering problems.
PO 3	Design/Development: Design solutions for technical problems with safety and environmental considerations.
PO 4	Investigation: Conduct investigations and experiments on technical problems.
PO 5	Modern Tool Usage: Apply appropriate techniques, resources, and modern IT tools.
PO 6	Engineer & Society: Analyze societal, health, safety, and legal responsibilities.
PO 7	Environment & Sustainability: Understand the impact of solutions on the environment and sustainability.
PO 8	Ethics: Apply ethical principles to professional practices.
PO 9	Individual & Teamwork: Function effectively as an individual or in a team.
PO 10	Communication: Communicate effectively with the engineering community and society.
PO 11	Project Management & Finance: Demonstrate knowledge of management and finance in projects.

PSO No	PROGRAMME SPECIFIC OUTCOMES (PSO) MECHANICAL ENGINEERING (INDUSTRY INTEGRATED)
PSO 1	Apply mechanical engineering principles, manufacturing processes, and material science knowledge to design, test, operate, and maintain mechanical systems in alignment with sustainable industrial standards.
PSO 2	Analyze real-world industrial challenges and develop effective solutions by utilizing modern tools, interdisciplinary approaches, and innovative techniques in manufacturing and production environments.
PSO 3	Emerge as technically skilled professionals, entrepreneurs, and lifelong learners, equipped to meet evolving industry demands, succeed in competitive environments, and pursue higher education in mechanical and sustainable energy fields..

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

Institute of Diploma studies



P P Savani University

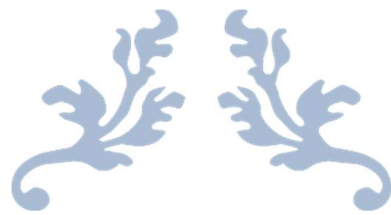
School of Engineering

Effective From: 2025-26

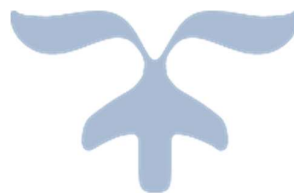
Authored by: P P Savani University

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FIRST YEAR
INSTITUTE OF DIPLOMA
STUDIES



P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

INSTITUTE OF DIPLOMA STUDIES

TEACHING & EXAMINATION SCHEME FOR DIPLOMA ENGINEERING PROGRAMME AY:2025-26

Sem.	Course Code	Course Title	Offered By	Teaching Scheme				Credit
				Contact Hours				
				Theory	Practical	Tutorial	Total	
1	IDSH1110	Mathematics-I	SH	3	0	2	5	5
	IDSH1130	Physics	SH	3	2	0	5	4
	IDCV1110	Basics of Civil Engineering	CV	3	0	2	5	5
	IDCE1110	Computer Fundamentals	CE	3	4	0	7	5
	CFLS2110	Elementary Communicative English-I	CLFS	3	0	0	3	3
							Total	25
2	IDSH1120	Mathematics-II	SH	3	0	2	5	5
	IDSH1140	Chemistry	CH	3	2	0	5	4
	IDME1110	Basics of Mechanical Engineering	ME	3	0	2	5	5
	IDIT1110	Python Programming	IT	3	2	0	5	4
	IDME1120	Workshop Fundamentals	ME	0	2	0	2	2
	CFLS2120	Elementary Communicative English-II	CLFS	2	0	0	2	2
							Total	24

P P Savani University
School of Engineering
Institute of Diploma Studies

Department of Applied Science & Humanities

Course Code: IDSH1110

Course Name: Mathematics-1

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	
03	-	02	05	40	60	-	-	100	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the course:

To help learners to

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

Course Content:

Module No.	Content	Hours	Weightage in %
1.	Logarithm Basic concept of logarithm, Rules and related examples, Applications of logarithm.	5	11
2.	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 formula.	10	21
3.	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.	8	18
4.	Statistics Introduction, Central tendency, Mean, Mean of grouped data, Median, Median for grouped data, Mode for grouped data, Mode, Standard deviation, Standard deviation for grouped	10	23

	data.		
5.	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.	12	27
	TOTAL	45	100

List of Tutorials:

Sr. No.	List of Tutorial	Hours
1.	Logarithm-1	4
2.	Logarithm-2	2
3.	Trigonometry-1	2
4.	Trigonometry-2	2
5.	Trigonometry-3	2
6.	Co-ordinate geometry-1	4
7.	Co-ordinate geometry-2	2
8.	Statistics-1	2
9.	Statistics-1	2
10.	Statistics-2	2
11.	Determinants and Matrices-1	2
12.	Determinants and Matrices-2	2
13.	Determinants and Matrices-3	2
	TOTAL	30

Text Book:

Title	Author(s)	Publication
Diploma Engineering Mathematics	H. K. Dass	H. K. Dass
Engineering Mathematics - 3 rd Edition	Anthony croft & others	Pearson Education Publication

Reference Book:

Title	Author(s)	Publication
Basic Mathematics	G.C. Patel and Ami C. Shah	Atul Prakashan
Advanced Mathematics for Polytechnic	Dr. N. R. Pandya	Macmillan Publication
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 75 marks.
- Viva of 25 marks.

Course Outcome(s):

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

IDSH1110	MATHEMATICS-1
CO 1	Apply algebraic concepts to solve engineering-related mathematical problems.
CO 2	Use trigonometric concepts and identities to solve engineering and real-world problems.
CO 3	Apply coordinate geometry concepts to analyze spatial relationships in engineering contexts.
CO 4	Analyze and interpret data sets using statistical methods to support decision-making in engineering applications.
CO 5	Solve engineering-related problems using determinants and matrices, including systems of linear equations.

Mapping of CO with PO

IDSH1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2			1						
CO 2	3	2	1		1						
CO 3	3	3	1	2	1						
CO 4	2	3		3	2					1	
CO 5	3	3	2	2	2						1

Mapping of CO with PSO

IDSH1110	PSO1	PSO2	PSO3
CO 1	2	1	2
CO 2	2	1	2
CO 3	2	1	2
CO 4	1	1	2
CO 5	3	2	2

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

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

Module No	Content	RBT Level
1	Logarithm	1,2,3,5
2	Trigonometry	2,3,4,5,6
3	Coordinate geometry	2,3,4,5
4	Statistics	1,2,3,4,5

5	Determinants and Matrices	2,3,4,5
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P P Savani University
School of Engineering
Institute of Diploma Studies

Department of Applied Science & Humanities

Course Code: IDSH1140
 Course Name: Chemistry
 Prerequisite Course(s): --

Teaching & Examination Scheme:

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

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- 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 %
1.	Atomic Mass and Molecular Structure Atom, Fundamental particles of Atom their Mass, Charge and Location. Atomic number and Mass number, Octet Rule, Isotopes and Isobars with suitable examples, Formation of Cation and Anion by electronic concept of oxidation and reduction, Molecule, Molecular Formula, Molecular Mass, Mole, Avogadro Number, Avogadro's Hypothesis - Relationship between Molecular Mass and Vapour Density, Simple calculations.	10	20
2.	Chemical Bonding Chemical Bond, Valence, Valence Electrons, Bonding and Non Bonding Electrons, Lewis Symbols. Condition for Formation of Ionic Bond, Factors Governing Formation of Ionic Bond, Metallic Bond, Covalent Bond and Co-ordinate Covalent Bond: Hydrogen Bonding.	06	20
3.	Acids and Bases Theories of Acids and Bases, Arrhenius Theory, Lowry - Bronsted Theory, Lewis Theory, pH and pOH, Indicator, Buffer solution, Types of buffer solution with examples, Application of pH in Industries, Numericals	06	10

4.	Solutions and Colloids Methods of expressing concentration of a solution Molarity, Molality, Normality, Mole fraction and Percentage Mass – Simple problems. True solution and Colloidal solution, Definition, Differences, Types of colloids – Lyophilic and Lyophobic colloids. Industrial applications of colloids.	08	20
5.	Electrochemistry Electrolyte, Strong and Weak electrolytes, Electrolysis, Industrial application of Electrolysis, Electroplating, Preparation of surface, Process Factors affecting the stability of the coating, Applications of Electro plating.	08	15
6.	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.	07	15
TOTAL		45	30

List of Practical

Sr No	Name of Practical/Tutorial	Hours
1.	Using a chemical balance.	04
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 and Sodium Carbonate.	04
5.	Determination of strength of a given solution of Sodium Hydroxide by titrating it against standard solution of Oxalic acid.	04
6.	Determination of strength of a given solution of Hydrochloric acid by titrating it against standard Sodium Carbonate solution.	04
7.	Determination of temporary and permanent hardness in water sample using EDTA as standard solution.	04
8.	Determination of pH	02
TOTAL		30

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 the 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:

IDSH1140	Chemistry
CO1	Explain basic atomic structure, chemical bonding, and periodic trends.
CO2	Apply principles of acids, bases, solutions, and electrochemistry to solve problems.
CO3	Perform chemistry laboratory experiments safely using standard techniques.
CO4	Analyze electrochemical processes and industrial applications of chemistry.
CO5	Practice professional ethics, teamwork, and safety in laboratory and industrial work.

Mapping of CO with PO

IDSH1140	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	2	1									1
CO 2	2	2	1		1						1
CO 3	1	1		2	2	1	2	2	1		1
CO 4	2	2	2	2	1	2	1		1		1
CO 5							2	2	2	1	1

Mapping of CO with PSO

IDSH1140	PSO1	PSO2	PSO3
CO 1	2	1	2
CO 2	3	1	2
CO 3	2	3	2
CO 4	3	2	2
CO 5	1	2	3

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

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

Module No	Content	RBT Level
1	Atomic Mass and Molecular Structure	1, 2, 5
2	Chemical Bonding	1, 2, 3
3	Acids and Bases	2, 3, 4
4	Solutions and Colloids	2, 3, 4,5
5	Electrochemistry	1, 2, 5
6	Electrochemical-Cell	1, 2, 5

P P Savani University
School of Engineering
Institute of Diploma Studies

Department of Civil Engineering

Course Code: IDCV1110

Course Name: Basics of 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	
03	-	02	05	40	60	-	-	40	60	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the course:

To help learners to

- Scope and significance of civil engineering in infrastructural development.
- Surveying and levelling techniques and their importance in construction and land measurements.
- construction materials, their properties, and their selection based on strength, durability, economy, and environmental considerations.
- Highlight advancements in civil engineering, focusing on sustainable practices, smart city planning, and innovative systems for urban development.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	Introduction: Branches of Civil Engineering, Scope of Civil Engineering, Role of Civil Engineer in Society. Impact of infrastructural development on the economy of a country.	4	8
2.	Surveying and Levelling: Definition of Surveying, Aims and applications, Fundamental principles of surveying, Classification of surveying, Plans and maps, Scales, and Units of measurement, Introduction to liner and angular measurements, Types of compass. Introduction to levelling, Aims and application of levelling, Methods of levelling.	10	22
3.	Overview of Construction Material: Scope of construction materials in Building Construction, Selection of materials for different civil engineering structures based on strength, durability, Eco friendly and economy.	9	20

4.	Building Construction: Introduction, Classification of buildings (types of buildings), Types of loads acting on buildings, Building Components and their functions and nominal dimensions, Bonds in brickwork.	6	13
5.	Building Services: Introduction, Water supply system in a building, drainage, House drainage system, Electrification, Building finishes.	8	19
6.	Advancements in Civil Engineering: Smart city and its features, Solid waste management systems, Mass transport systems, Bus Rapid Transit System (BRTS), Metro, Green Building, Features of earthquake resistance structures.	8	18
TOTAL		45	100

List of Tutorials:

Sr. No.	List of Tutorial	Hours
1.	Units of Conversion exercise	4
2.	Preparation of sketches on Conventional signs, symbols and abbreviations	2
3.	Assignment of Surveying and levelling	2
4.	Chart preparation of various materials. Collection of rate and sample.	4
5.	Preparation of sketchbook showing various bonds.	4
6.	Preparation sketch of various building components.	4
7.	Assignment based upon house drainage system.	2
8.	Assignment based on green building.	2
9.	Case studies on smart cities.	2
10.	Case study on BRTS and metro.	4
TOTAL		30

Text Book:

Title	Author(s)	Publication
Elements of Civil Engineering	Anurag Kandya	Charotar Publication
Building Construction	Dr.B.C.Punmia	Laxmi Publication

Reference Book:

Title	Author(s)	Publication
Surveying and leveling	N. N. Basak	Tata McGraw Hill Education
Engineering Material	S.C. Rangwala	Charotar Publication
Basic Civil Engineering	M.S.Palanichamy	McGraw Hill

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and the 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 the performance of the tutorial which will be evaluated out of 10 Marks for each tutorial and the 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:

IDCV1110	BASICS OF CIVIL ENGINEERING
CO 1	Understand the scope and applications of Civil Engineering.
CO 2	Describe the methods of levelling and demonstrate its applications in real-world scenarios.
CO 3	Evaluate materials based on strength, durability, eco-friendliness, and economic considerations for different civil engineering structures.
CO 4	Identify the various building components, methods of construction, and services.
CO 5	Describe the Concept of Smart Cities and promote sustainable civil engineering practices.

Mapping of CO with PO

IDCV1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2	1			2	2				
CO 2	3	3	2	1		1	2				
CO 3	3	2	3			3	3		1		1
CO 4	3	2	1		3	2	3				
CO 5	3	2	2	3				2		1	

Mapping of CO with PSO

IDCV1110	PSO1	PSO2	PSO3
CO 1	2	2	2
CO 2	2	2	2
CO 3	3	2	2
CO 4	3	2	2
CO 5	2	2	2

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

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

Module No	Content	RBT Level
1	Introduction	1,2,3,4
2	Surveying and Levelling	2,3,4,5
3	Overview of Construction Material	2,3,4,5,6
4	Building Construction	1,2,3,5

5	Building Services	2,3,5
6	Advancements in Civil Engineering	1,2,3,5

P P Savani University
School of Engineering
Institute of Diploma Studies

Department of Computer Engineering

Course Code: IDCE1110

Course Name: Computer Fundamentals

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	ES E	
03	04	-	05	40	60	40	60	-	-	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:

Module No.	Content	Hours	Weightage in %
1.	Introduction to Computers Evolution of Computers: Generations of Computers, Functional Components of a Computer, Types of Software: System Software, Application Software, Utility Programs, Number Systems: Binary, Octal, Decimal, and Hexadecimal, Introduction to Computer Networks and the Internet	7	15
2.	Basics of C Programming: Introduction to Computer Programming, Importance of Programming in Problem Solving, Programming Methodologies (Structured, Object-Oriented, etc.), Steps in Program Development, Overview of Programming Languages, Features of C and Its Importance, Writing, Compiling, and Executing C Programs, Understanding Errors: Syntax Errors, Logical Errors, and Runtime Errors	6	18
3.	Data Types, Operators, and Tokens: Data Types and Variables, Primitive Data Types in C, Variables and Constants, Scope and Lifetime of Variables, Operators, Types of Operators in C, Expressions and Operator Precedence, Tokens, Overview of Tokens: Keywords, Identifiers, Constants, Strings, and Operator	10	22

4.	Control Structures in C: Decision-Making, Simple If and If-Else Statements, Switch Case and Nested If-Else, Loops, For, While, and Do-While Loops, Using Break and Continue, Nested Loops	8	25
5.	Arrays and Strings: Arrays, Introduction to Arrays, Accessing Elements and Array Operations, Applications of Arrays, Strings, Declaring and Initializing Strings, String Functions: strlen(), strcat(), strcpy(), strcmp(), Input and Output with Strings	14	20
	TOTAL	45	100

List of practical:

Sr. No.	List of Practical	Hours
1.	Identify CPU, RAM, Hard Disk, and other internal components.	2
2.	Compare various types of operating systems.	2
3.	Write and execute a "Hello, World!" program. Write a program to perform addition, subtraction, multiplication, and division of two numbers.	2
4.	Develop a program to calculate the area and perimeter of a rectangle.	4
5.	Declare and initialize variables of different data types.	4
6.	Write a program to evaluate a complex mathematical expression using arithmetic operators.	4
7.	Demonstrate the use of relational and logical operators in a program.	4
8.	Write a program to determine whether a number is positive, negative, or zero.	6
9.	Develop a program to calculate grade based on marks using if-else or switch statements.	6
10.	Write a program to display the multiplication table of a given number using a loop.	6
11.	Calculate the factorial of a number using a for loop.	4
12.	Write a program to generate pyramid patterns using nested loops.	4
13.	Develop a program to check whether a number is prime using nested control structures.	4
14.	Write a program to input and display elements of an array.	2
15.	Implement a program to search for a specific element in an array.	2
16.	Write a program to reverse a given string without using inbuilt function.	2
17.	Develop a program to count the number of vowels, consonants, and digits in a string.	2
	TOTAL	60

Text Book:

Title	Author(s)	Publication
Programming in ANSI C	E. Balagurusamy	McGraw Hill Education
Fundamentals of Computers	V. Rajaraman	PHI Learning Pvt. Ltd.

Reference Book:

Title	Author(s)	Publication
Computer Fundamentals	N.M. Desai	University Granth Nirman Board
Microsoft Office Guide	Hiren Desai	Parshwa 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 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:

IDCE1110	COMPUTER FUNDAMENTALS
CO 1	Understand computer architecture, software types, number systems, and basics of networks.
CO 2	Use MS Office tools for document creation, data management, and multimedia presentations.
CO 3	Develop and debug basic C programs using programming methodologies.
CO 4	Implement solutions using data types, operators, and control structures in C programming.
CO 5	Solve problems with arrays and strings, including data manipulation and algorithm implementation.

Mapping of CO with PO

IDCE1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2		1	2	1				1	
CO 2	2	2	1		3				1	3	1
CO 3	3	3	2	1	3				1	1	
CO 4	3	3	2	2	3				1	1	
CO 5	3	3	2	2	3				1	1	

Mapping of CO with PSO

IDCE1110	PSO1	PSO2	PSO3
CO 1	2	1	
CO 2	2	2	1
CO 3	3	2	1

CO 4	3	2	1
CO 5	3	3	1

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

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

Module No	Content	RBT Level
1	Introduction to Computers	1,2,3,5
2	Essentials of MS Office	2,3,4,5
3	Basics of C Programming	2,3,4,5,6
4	Data Types, Operators, and Tokens:	2,3,5
5	Control Statements in C	2,3,5
6	Arrays and Strings	1,2,3,5

P P Savani University
Centre for Language Studies

Course Code: CFLS2110

Course Name: Elementary communicative English-I

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	-	-	03	100	00	-	-	-	-	100

Objective(s) of the Course:

To help learners to

- hone English Grammar to use language effectively in everyday life.
- use tenses to build vocabulary.
- understand and use Sentence formation and types.
- use comparative degree to express comparison.
- create sentence in active-passive voice.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	Parts of Speech – I <ul style="list-style-type: none"> • Types of Nouns • Verb • Pronoun (personal, possessive) • Adverbs • Adjectives 	05	12
2.	Parts of Speech – II <ul style="list-style-type: none"> • Use of Prepositions of time and place • Conjunctions • Interjections • Articles 'A, An, and The' • Indicators- this, that, these, those 	05	13
3.	Tenses <ul style="list-style-type: none"> • Present and past simple form of 'to be' – am/is/are/was/were • Present Tense (all forms) • Past Tense (all forms) • Future Tense (all forms) 	06	25
Section II			
Module No.	Content	Hours	Weightage in %
1.	Vocabulary <ul style="list-style-type: none"> • Basic Vocabulary 	03	12

	<ul style="list-style-type: none"> Academic Vocabulary Jargons 		
2.	Auxiliary Verb <ul style="list-style-type: none"> So, neither-nor, either-or Shall, should, can, could, may, might, must 	03	13
3.	Types of Sentences <ul style="list-style-type: none"> Simple, Compound, and Complex sentences Practice of Assertive, Negative, Interrogative, Exclamatory Sentences Question Tag 'WH' Questions 'How much' & 'How Many' Reported Speech Active-Passive voice 	08	25

Text Book (s):

Title	Author/s	Publication
High School English Grammar & Composition	Wren & Martin	Blackie ELT Books (An imprint of S. Chand Publishing)

Reference Book (s):

Title	Author	Publication
Intermediate English Grammar (Second Edition)	Raymond Murphy	Cambridge University Press
Advanced English Grammar	Martin Hewings	Cambridge University Press

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 25 marks.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

CFLS2110	ELEMENTARY COMMUNICATIVE ENGLISH-I
CO 1	Identify and use parts of speech effectively to express them.
CO 2	Understand familiar words related to everyday communication.
CO 3	Use English grammar to communicate effectively.
CO 4	Utilize tenses in real-world communication.
CO 5	Apply various vocabularies to express thoughts.
CO 6	Express comparison effectively.
CO 7	Use active-passive voice and reported speech.

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	Grammar & Vocabulary	1,3
2	Listening	2,4,5
3	Speaking	3,6
4	Reading	2,4,5
5	Writing	3,6

P P Savani University
School of Engineering
Institute of Diploma Studies

Department of Applied Science & Humanities

Course Code: IDSH1120

Course Name: Mathematics-II

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	
03	-	02	05	40	60	-	-	100	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the course:

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 %
1.	Complex Number Introduction, Mathematical Operations, Polar form, De Moivre's Theorem.	6	13
2.	Functions and Limits Introduction of Function, Types of function, Classification of function, Limit of a function, Properties of limit, Standard limits, limit of trigonometric functions.	8	18
3.	Differentiation Introduction of Differentiation, Derivative of standard functions, Working rules, Differentiation of composite function, Differentiation of parametric functions, Differentiation of implicit function, Derivative using logarithms, Successive differentiation, Application of	12	27

	Derivative (Maxima, Minima, Velocity & Acceleration).		
4.	Integration Introduction of Integration, Integration of standard functions, Integration by substitution, Integration by parts, Integration using partial fraction.	10	22
5.	Mensuration Basic concept of Mensuration, Area of Triangle, Square, Rectangle, Trapezium, Parallelogram, Rhombus and Circle surface, Volume of Cuboids, Cone, Cylinder and Sphere.	9	20
	TOTAL	45	100

List of Tutorials:

Sr. No.	List of Tutorial	Hours
1.	Complex Number-1	2
2.	Complex Number-2	2
3.	Complex Number-3	2
4.	Functions and Limits-1	4
5.	Functions and Limits-2	2
6.	Differentiation-1	2
7.	Differentiation-2	2
8.	Differentiation-3	2
9.	Integration-1	2
10.	Integration-2	2
11.	Integration-3	2
12.	Mensuration-1	4
13.	Mensuration-2	2
	TOTAL	30

Text Book:

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

Reference Book:

Title	Author(s)	Publication
Applied Mathematics for Polytechnics - 10 th 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 75 marks.
- Viva of 25 marks.

Course Outcome(s):

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

IDSH1120	MATHEMATICS-II
CO 1	Apply the properties and algebraic operations of complex numbers, including polar form and De Moivre's Theorem, to solve engineering problems.
CO 2	Analyze functions and evaluate limits, including standard and trigonometric limits, to model engineering problems.
CO 3	Apply differentiation techniques to determine rates of change and solve engineering problems involving maxima, minima, velocity, and acceleration.
CO 4	Use integration techniques to compute areas, volumes, and solve engineering problems involving physical quantities.
CO 5	Compute areas, perimeters, surface areas, and volumes of standard geometrical shapes to solve real-world engineering problems in mensuration.

Mapping of CO with PO

IDSH1120	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2		1	1						
CO 2	3	3		2	1						
CO 3	3	3	2	2	1						
CO 4	3	3	2	2	1						
CO 5	3	2	2	1	1		1				

Mapping of CO with PSO

IDSH1120	PSO1	PSO2	PSO3
CO 1	3	1	2
CO 2	3	1	2
CO 3	3	1	2

CO 4	3	2	2
CO 5	2	1	2

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

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

Module No	Content	RBT Level
1	Complex Number	1,2,3,4,6
2	Function and Limits	1,2,3,4
3	Differentiation	2,3,5
4	Integration	2,3,5
5	Mensuration	1,2,3,5

**P P Savani University
School of Engineering
Institute of Diploma Studies**

Department of Applied Science & Humanities

Course Code: IDSH1130

Course Name: 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	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- understand the basic principles of physics and apply for the advancement of engineering and technology.
- experimenting the laboratory concepts to apply in their career of engineering.

Course Content:

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. (Numerical on above topics)	07	15
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
TOTAL		45	100

List of Practical:

Sr. No.	Name of Practical	Hours
1.	To study about basic unit conversion and dimension analysis.	04
2.	To measure diameter and the dimension of regular body of known mass using Vernier Calipers.	04
3.	To measure the thickness of a sheet and diameter of a wire with the help of Micrometer Screw Gauge.	04
4.	To determine the radius of curvature of a given spherical surface by a spherometer.	04
5.	To verify ohm's law by using ammeter and voltmeter.	02
6.	To determine the coefficient of viscosity of a given viscous liquid by measuring the terminal velocity of a given spherical body.	04
7.	To determine the value of 'g' using simple pendulum.	04
8.	To study the relationship between the temperature of a hot body and time by plotting a cooling curve.	04
TOTAL		30

Text Book(s):

Title	Author/s	Publication
Physics Part-I and II	Resnick and Haliday	Wiley Eastern Publication
Concept of the Modern Physics	A. Beiser	Tata McGraw-Hill Education
Concept of Physics	H.C. Verma	Bharati Bhawan
Fundamentals of Physics	Gomber and Gogia	Pradeep publications
NCERT Physics part 1 & 2		NCERT

Course Evaluation:

Theory:

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

Practical:

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

Course Outcome(s):

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

IDSH1130	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.

Mapping of CO with PO

IDSH1130	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2	1	2	2	1	1	1	1	1	1
CO 2	3	3	2	2		1	1		1	1	1
CO 3	3	3	2	1	1				1	1	1
CO 4	3	2	3	2	1	1			1	1	1
CO 5	3	2	2	2	1	2	2	1	1	1	1

Mapping of CO with PSO

IDSH1130	PS01	PS02	PS03
CO 1	1	1	3
CO 2	1	1	3
CO 3	1	1	3
CO 4	1	2	3
CO 5	1	2	3

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

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

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

**P P Savani University
School of Engineering
Institute of Diploma Studies**

Department of Mechanical Engineering

Course Code: IDME1110

Course Name: Basics of Mechanical Engineering

Prerequisite Course(s): Zeal to learn the course

Teaching & Examination Scheme:

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

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the course:

To help learners to

- Use relevant mechanical power and hand tools in real life applications.
- Recognize the various properties of gases, steams and their applications in an engineering industry.
- Explore the working principles of different prime movers like IC Engine, Boilers
- Select relevant power transmission mode in simple engineering situations.
- Identify and comprehend various hydro-pneumatic devices/equipment, brakes, clutch and couplings.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	Introduction and Basic Mechanical Applications Concept of Force, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Prime movers and its types. Basic Mechanical Components and its applications like bolts, nuts, washers, bearings, valves, bushes, springs, levers, rivets, keys, shafts, axles.	6	15
2.	Properties of Gases Difference between vapour and gas, perfect gas, gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant and universal gas constant, N.T.P, S.T.P	6	15

3.	Steam Generators Introduction, I.B.R, Classification of boilers, Cochran and Babcock and Wilcox boiler, only Functioning of different mountings (Only Purposes) and accessories.	6	10
4.	Pumps Types, Construction and working of Reciprocating, Centrifugal pumps and Rotary pumps	4	10
5.	Internal Combustion Engines Introduction, Difference between I.C. Engine and E.C. Engine, Classification of I.C. Engine, Main Components of Engine and their functions, working four- stroke cycle Petrol/Diesel engines, Comparison between Petrol cycle and diesel cycle. Basic concept of CNG and EV. (No Numericals)	8	15
6.	Transmission of Motion and Power Shaft and axle, Various types of Belt drive, Chain drive, Friction drive, Gear drive.	8	15
7.	Couplings, Clutches and Brakes Concept and applications of Couplings (Box; Flange; Pin type flexible; Universal and Oldham), Clutches (Disc and Centrifugal), and Brakes (Block; Shoe; Band, and Disc).	7	20
	TOTAL	45	100

List of Tutorials:

Sr. No.	List of Tutorial	Hours
1.	Demonstration of various types of boilers.	4
2.	Demonstration of different boiler mountings and accessories.	4
3.	Demonstration of four stoke petrol/diesel engines.	2
4.	Demonstration of centrifugal, reciprocating, and rotary pump.	4
5.	Demonstration of various belt drives and chain drive.	4
6.	Demonstration of various gear drives.	2
7.	Demonstration of various couplings.	2
8.	Demonstration of various brakes.	2
9.	Demonstration of various clutches.	2
	TOTAL	30

Text Book:

Title	Author(s)	Publication
Elements of Mechanical Engineering	N M Bhatt and J R Mehta	Mahajan Publishing House
Elements of Mechanical Engineering	Sadhu Singh	S. Chand Publication

Reference Book:

Title	Author(s)	Publication
Elements of Mechanical	P. S. Desai and S. B. Soni	Atul Prakashan

Engineering		
Basic Mechanical Engineering	Pravin Kumar	Pearson Education

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 10 marks.
- ESE Viva will be conducted of 30 marks.
- Test or MCQ based quiz of 30 marks.

Course Outcome(s):

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

IDME1110	BASICS OF MECHANICAL ENGINEERING
CO 1	Use relevant mechanical power and hand tools in real-life applications
CO 2	Describe the various properties of gases, steams and their applications in the engineering industry
CO 3	Explain the working principles of different prime movers like IC Engine, Boilers
CO 4	Explain the relevant power transmission mode in simple engineering situation.
CO 5	Summarize various hydro-pneumatic devices/equipment, brakes, clutch and couplings.

Mapping of CO with PO

IDME1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2	1			2	2				
CO 2	3	3	2	1		1	2				
CO 3	3	2	3			3	3		1		1
CO 4	3	2	1		3	2	3				
CO 5	3	2	2	3				2		1	

Mapping of CO with PSO

IDME1110	PSO1	PSO2	PSO3
CO 1	2	2	2
CO 2	2	2	2

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

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

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

Module No	Content	RBT Level
1	Introduction and Basic Mechanical Applications	1,2,3
2	Properties of Gases	1,2,3,4
3	Steam Generators	1,2,3
4	Pumps	1,2,3
5	Internal Combustion Engines	1,2,3,4
6	Transmission of Motion and Power	1,2,3,4
7	Couplings, Clutches and Brakes	1,2,3,4

**P P Savani University
School of Engineering
Institute of Diploma Studies**

Department of Information Technology

Course Code: IDIT1110

Course Name: Python Programming

Prerequisite Course(s):

Teaching & Examination Scheme:

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

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the course:

To help learners to

- To understand basic of python programming.
- To implement various control structures on different data types and analyze the use of different data structures in Python.
- Develop logic building and problem-solving skills.

Course Content:

Module No.	Content	Hours	Weightage in %

1.	Introduction to Python History, Features and application of python, installing Python, Basic structure of python program, Input and Output Functions in Python, Variable, Identifiers, Basic Operators, Expressions and Types of Data Int, Float, Complex, String, List, Tuple, Set, Dictionary and its Methods, Type Conversions, Comments, Input Processing and output.	06	14
2.	Control Flow Structures in Python Conditional Blocks Using if, if_Else and Else If, Simple for Loops in Python, For Loop Using Ranges, String, List and Dictionaries Use of While Loops in Python, Loop Manipulation Using Pass, Continue, Break and Else	07	18
3.	Array and Strings Array, Advantages of array, Creating an array, Importing the array module, Indexing and slicing on arrays, Processing the arrays, Types of arrays. Introduction to String, Access String elements using index operator, String functions: Basic functions: len, max, min, Testing functions: isalnum, isalpha, isdigit, isidentifier, islower, isupper, Searching functions: endswith, startswith, find, rfind, count, Manipulation functions: capitalize, lower, upper, title, swapcase, replace, lstrip,rstrip, strip	08	18
4.	Lists, Tuples, Sets, and Dictionaries Dictionaries, Accessing Values in Dictionaries, Working with Dictionaries, Properties, Functions and Methods. Sets, Accessing Values in Set, Working with Set Properties, Functions and Methods, Tuple, Accessing Tuples, Operations, Working, Functions and Methods. List, Accessing List, Operations, Working With Lists, Function and methods, two-dimensional lists.	08	15
5.	Functions, Modules and Packages Introduction to Functions, defining a Function, Calling a Function, Types of Functions, Function Arguments, Anonymous Functions, Global and Local Variables, Importing Module, Math Module, Random Module, Introduction to Packages: Numpy, Pandas, Matplotlib.	08	15
6.	File Handling Introduction to Text files, File Handling functions: Basic functions: open, close, Reading file: read, readline, readlines, Writing file: write, append, writelines	08	20
TOTAL		45	100

List of Practical:

Sr.	List of Practical	Hours
-----	-------------------	-------

No.		
1.	Introduction to Python (Introduction to IDLE, different data types, Input Output in Python, Operators, Operator precedence).	04
2.	Implementation of Dictionaries, Sets, Tuples and Lists and its various methods in Python.	06
3.	Working with decision structures in Python	04
4.	Working with array in Python	04
5.	Manipulation of Strings.	02
6.	Working with functions in Python.	04
7.	Working with modules and packages in Python.	04
8.	Implementation of file handling in Python.	02
	TOTAL	30

Text Book:

Title	Author(s)	Publication
Python approach Programming: A modular	Sheetal Taneja, Naveen Kumar	Pearson

Reference Book:

Title	Author(s)	Publication
Think Python: How to Think Like a Computer Scientist	Allen Downey	Green Tea Press
Python Cookbook	David Ascher, Alex Martelli Oreilly	O Reilly Media

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:

IDIT1110	PYTHON PROGRAMMING
CO 1	Interpret the fundamental Python syntax and semantics and control flow statements.
CO 2	Determine the methods for creating and manipulating Python programs by utilizing data structures like lists, dictionaries, tuples, and sets.

CO 3	Apply a modular programming approach to solve the given problems using user-defined functions.
CO 4	Perform string manipulation and file handling operations.
CO 5	Utilize Python modules, packages, and libraries (Math, Random, NumPy, Pandas, and Matplotlib) to develop efficient, reusable, and data-oriented Python applications.

Mapping of CO with PO

IDIT1110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2	1		2				1	1	
CO 2	3	3	2	1	3				1	1	
CO 3	3	3	2	2	3				1	1	1
CO 4	3	3	2	2	3				1	2	
CO 5	3	3	2	2	3				1	2	1

Mapping of CO with PSO

IDIT1110	PSO1	PSO2	PSO3
CO 1	3	2	1
CO 2	3	3	1
CO 3	3	3	2
CO 4	3	3	2
CO 5	3	3	2

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

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

Module No	Content	RBT Level
1	Introduction to Python	1,2,4
2	Control Flow Structures in Python	1,2,3
3	Array and Strings	1,2,3
4	Lists, Tuples, Sets, and Dictionaries	2,3,4
5	Functions, Modules, and Packages	2,3,4
6	File Handling	3,4,5

**P P Savani University
School of Engineering
Institute of Diploma Studies**

Department of Mechanical Engineering

Course Code: IDME1120

Course Name: Workshop Fundamentals

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	-	02	00	00	100	00	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the course:

To help learners to

- Introduce essential tools and machines used in workshops, emphasizing their functions, handling, and maintenance.
- Provide practical training in machining, fitting, carpentry, and other foundational manufacturing techniques.
- Instill the importance of workshop safety protocols to prevent accidents and ensure a secure working environment.
- Bridge the gap between classroom learning and real-world applications by implementing engineering principles in practical tasks.

Course Content:

Module No.	Content	Weightage in %
1.	Introduction to Workshop Practice Workshop Layout, Overview of workshop safety rules and regulations, Importance of various sections/shops in workshop, Understanding tools, materials, and machinery.	7
2.	Carpentry, Fitting and Bench work Basic wood types and their properties, Tools: saws, chisels, planes, hammer, and clamps, Preparation of Job as per Drawing including Marking and other Performing Operations Tools: files, hammers, punches, and measuring instruments, Techniques: filing, drilling, tapping, and sawing.	33

3.	Introduction to Machine Tools and Sheet Metal Work Introduction and Demonstration of various Machine Tools like Lathe, Drilling, Grinding, Hack Saw Cutting etc. Introduction to sheet metal materials and their uses, Tools: snips, mallets, and stakes, Techniques: bending, cutting, joining, and soldering	26
4.	Welding and Plumbing Types of welding: gas, arc, and MIG/TIG welding, Tools and safety equipment for welding, Welding techniques and applications. Introduction and Demonstration of Plumbing Shop.	7
5.	Forging and Smithy Tools: hammers, anvils, and tongs, Techniques: heating, bending, and shaping metals Applications of forging in engineering.	13
6.	Measurement and Metrology Introduction to measuring tools: Vernier calipers, micrometers, and gauges, Precision and accuracy in measurements.	7
7.	Electrical and Electronic Skill Use of Multimeter, Soldering of electrical circuits having discrete components (R, L, C & diode) and ICs on PCB, connections on Breadboard	7
TOTAL		100

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.	08
3.	To Perform a Job of Carpentry Shop.	04
4.	To Perform a Job of Black Smithy shop.	04
5.	To Perform a Job of Sheet metal Shop.	08
6.	To Perform a Job of Plumbing Shop	02
7.	Introduction to Machine Tool	02
TOTAL		30

Text Book:

Title	Author(s)	Publication
Elements of Workshop Technology	S K Hajra Choudhury	Media Promoters & Publishers
A text book in Electrical Technology	B L Theraja	S Chand and Co

Reference Book:

Title	Author(s)	Publication
A Textbook of Workshop Technology	Deepak Dhouchak and Lalit Kumar Biban	White Falcon Publishing; 1st edition
Elements Of Workshop Technology Vol 2 Machine	S. K. Hajra Choudhury and Nirjhar Roy	Media Promoter and Publishers Pvt. Ltd.
Basic Electronics: A text lab manual	P.B. Zbar, A.P. Malvino, M.A. Miller	Mc-Graw Hill.

Course Evaluation:

Practical:

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

Course Outcome(s):

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

IDME1120	WORKSHOP FUNDAMENTALS
CO 1	Students will demonstrate proficiency in basic workshop operations such as carpentry, fitting, welding, and machining.
CO 2	Understand the proper use and maintenance of hand tools, power tools, and workshop machinery, and sheet metal work
CO 3	Adopt essential safety protocols to ensure a hazard-free workshop environment.
CO 4	Identify and utilize various materials effectively, understanding their properties and applications in engineering projects.
CO 5	Use precision measuring instruments and electrical/electronic tools such as Vernier calipers, micrometers, multimeters, soldering equipment, and breadboards to carry out accurate measurements and basic circuit assembly.

Mapping of CO with PO

IDME1120	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	2			1	2				2		1
CO 2	2				3			3	3		1
CO 3	2			1	2				1		1
CO 4	2								3		2
CO 5	2		1	1	2				1		1

Mapping of CO with PSO

IDME1120	PSO1	PSO2	PSO3
CO 1	1	1	1
CO 2	1	1	1
CO 3	1	1	1
CO 4	1	1	1
CO 5	1	1	1

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

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

Module No	Content	RBT Level
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1	Introduction to Workshop Practice	1,2
2	Carpentry, Fitting, and Benchwork	1,2,3
3	Introduction to Machine Tools and Sheet Metal Work	1,2,3,4
4	Welding and Plumbing	1,2,3,4
5	Forging and Smithy	1,2,4
6	Measurement and Metrology	1,2,3,4,5
7	Electrical and Electronic Skill	1,2,3

P P Savani University
Centre for Language Studies

Course Code: CFLS2120

Course Name: Elementary Communicative English-II

Prerequisite Course(s): -- CFLS2110 : Elementary communicative English-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	
02	-	-	02	100	00	-	-	-	-	100

Objective(s) of the Course:

To help learners to:

- Understand difference between formal and functional English.
- Use English in daily life.
- Communicate thoughts.
- Be an efficient Listener.
- Be an efficient speaker.
- Sharpen reading skills.
- Improve writing skills.

Course Content:

Section I			
Module No.	Content	Hours	Weightage In %
1.	Introduction to Functional English <ul style="list-style-type: none"> • Formal Vs. Functional English • Functional English in daily life • Importance of LSRW Skills 	03	10
2.	Listening <ul style="list-style-type: none"> • Difference between Hearing and Listening • Listening to get information • Listening to understand • Listening instructions to follow 	05	20
3.	Speaking <ul style="list-style-type: none"> • Introducing Self • Expressing likes and dislikes • Talking about Family • Describing Surrounding • Narrating Memorable Incidents • Inquiring, Requesting, Ordering, Questioning, Answering 	07	20

Section II			
Module No.	Content	Hours	Weightage in %
1.	Reading <ul style="list-style-type: none"> • Reading to Comprehend • Read to Scan • Read to Skim • Reading information from authentic material • Reading Newspaper, Magazines, Books 	07	25
2.	Writing <ul style="list-style-type: none"> • Importance of Punctuations • Strategies to develop Paragraphs • Paragraph writing by comprehending pictures, map, tables, and authentic material • Expressing like, dislikes, experiences • Narrating stories, incidents • Writing short letters 	08	25

Text Book (s):

Title	Author/s	Publication
Communication Skills	Parul Popat & Kaushal Kotadia	Pearson, 2015

Reference Book (s):

Title	Author/s	Publication
Communication Skills, Second Edition	Sanjay Kumar, PushpLata	Oxford University Press, 2015
Communication Skills for Engineers	Sunita Mishra	Pearson, 2011

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 25 marks. Test one can be based on Reading and Writing Skills whereas Test Two can be based on Listening and Reading Skills.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

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

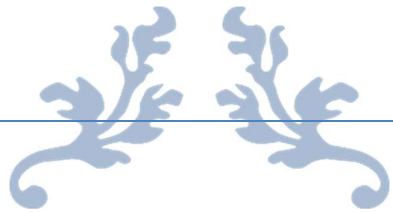
CFLS2120	ELEMENTARY COMMUNICATIVE ENGLISH-II
CO 1	Narrate incidents, events, experiences.
CO 2	recognize the difference between formal and functional English.
CO 3	Comprehend authentic material.
CO 4	Define the need of Communication Skills in personal and professional life.
CO 5	Introduce them and talk about family efficiently.
CO 6	Identify their likes, dislikes, desires effectively.
CO 8	Practice scanning and skimming.
CO 9	Use punctuations accurately while writing.
CO 10	Recall listening skills.
CO 11	Draft paragraphs, and letters.

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

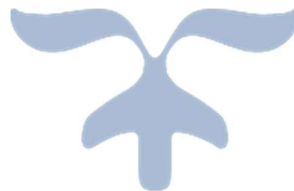
1: Remember	2: Understand	3: Apply
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4: Analyze	5: Evaluate	6: Create
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Module No	Content	RBT Level
1	Introduction to Functional English	2
2	Listening	2,4,5
3	Speaking	3,6
4	Reading	2,4,5
5	Writing	3,6



SECOND YEAR
INSTITUTE OF DIPLOMA STUDIES



P P SAVANI UNIVERSITY															
SCHOOL OF ENGINEERING															
INSTITUTE OF DIPLOMA STUDIES															
TEACHING & EXAMINATION SCHEME FOR DIPLOMA ENGINEERING PROGRAMME AY:2026-27(BATCH:2026)															
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	IDCV2151	Strength of Materials	CV	3	2	0	5	4	40	60	40	60	0	0	200
	IDMT2020	Thermodynamics	MT	3	0	2	5	5	40	60	0	0	40	60	200
	IDME2220	Material Science & Metallurgy	ME	3	2	0	5	4	40	60	40	60	0	0	200
	IDMT2330	Renewable Energy Engineering	MT	3	0	2	5	5	40	60	0	0	40	60	200
	IDME2200	Basics of Engineering Drawing	ME	2	4	0	4	4	40	60	40	60	0	0	200
								Total	24	22					
4		Elective – I	MT	3	2	0	5	4	40	60	40	60	0	0	200
		Elective – II	MT	3	2	0	5	4	40	60	40	60	0	0	200
		Project/Industry Exposure - I	MT	15			15	15	0	0	120	180	0	0	300
								Total	25	23					

P P Savani University
School of Engineering
Institute of Diploma Studies

Department of Civil Engineering

Course Code: IDCV2151

Course Name: Strength of material

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	-	04	40	60	40	60	-	-	200

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.	Fundamental of Static: Force, types of forces, Characteristics of a force, System of forces, Composition and resolution of forces.	03	04
2.	Concurrent Forces: Resultant of coplanar concurrent force system by analytical method, Law of triangle of forces, Law of polygon of forces, Equilibrium conditions for coplanar concurrent forces.	05	10
3.	Non-Concurrent Forces: Moments & couples, Characteristics of moment and couple, Varignon's theorem, Resultant of non-concurrent forces by analytical method, Equilibrium conditions of coplanar non-concurrent force system.	05	12
4.	Centroid and Centre of Gravity: Centroid of lines, plane areas and volumes, Examples related to centroid of composite geometry, Pappus Guldinus theorems.	05	12

5.	Moment of Inertia: Parallel and Perpendicular axis theorems, Polar moment of inertia, Radius of gyration of areas, Examples related to moment of inertia of composite geometry.	05	12
6.	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.	03	10
7.	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.	10	20
8.	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.	09	20
TOTAL			45

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	04
2.	Impact Test (Izod)	02
3.	Impact Test (Charpy)	04
4.	Tensile Strength Test	04
5.	Rockwell Hardness Test	04
6.	Brinnal's Hardness Test	04

7.	Tutorials	04
8.	Tutorials	04
TOTAL		30

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

IDCV2151	STRENGTH OF MATERIAL
CO 1	Understand and analyze different types of forces and force systems acting on particles and rigid bodies.
CO 2	Analyze concurrent and non-concurrent force systems and determine resultant and equilibrium conditions.
CO 3	Explain mechanical properties of materials and stress-strain behavior under different loading conditions.
CO 4	Understand the physical properties of materials
CO 5	Analyze simple structures such as beams for shear force, bending moment, and stress distribution.

Mapping of CO with PO

IDCV2151	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2	-	-	-	-	-	-	-	-	1
CO 2	3	3	1	-	-	-	-	-	-	-	1
CO 3	3	2	1	-	-	-	-	-	-	-	1
CO 4	3	2	2	-	-	-	-	-	-	-	1
CO 5	3	3	2	-	-	-	-	-	-	1	1

Mapping of CO with PSO

IDCV2151	PSO1	PSO2	PSO3
CO 1	3	2	1
CO 2	3	3	1

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

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

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

Module No	Content	RBT Level
1.	Fundamental of Static	1, 2, 3, 5
2.	Concurrent Forces	1, 2, 3, 4, 5
3.	Non-Concurrent Forces	1, 2, 3, 4, 6
4.	Center of Gravity	1, 2, 3, 4
5.	Moment of Inertia:	3, 4, 6
6.	Mechanical Properties of Materials	3, 4, 6
7.	Simple Stress and Strain	3, 4, 6
8.	Shear Force and Bending Moment	3, 4, 6

**P P Savani University
Institute of Diploma Studies**

Department of Mechanical Engineering

Course Code: IDMT2020

Course Name: Thermodynamics

Prerequisite Course(s): ---

Teaching & Examination Scheme:

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

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- identify different aspects of thermodynamics and their application.
- interpret different laws of thermodynamics and their application to field and daily life.
- understand the role of entropy, exergy to the universe.
- understand the basic construction and working of I.C. Engine.

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.	08	18
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,	06	17
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	05	11

	process.		
4.	Exergy Energy of a heat input in a cycle, exergy destruction in heat transfer process, exergy of finite heat capacity body, exergy of closed and steady flow system, irreversibility and Gouy-Stodola theorem and its applications, second law efficiency	08	17
5.	Vapour Power Cycles Carnot vapor cycle, Rankine cycle, comparison of Carnot and Rankine cycle, carnot cycle efficiency, variables affecting efficiency of Rankine cycle.	06	15
6.	Gas Power Cycles Carnot, Otto and Diesel cycle, Dual cycle, Comparison of Otto, Diesel and Dual cycles, air standard efficiency, mean effective pressure, brake thermal efficiency, relative efficiency, Brayton cycle.	06	15
7.	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.	06	07
	Total	45	100

List of Tutorials:

Sr. No	Name of Tutorial	Hours
1.	To interpret comparison of heat and work and solution of basic numerical on heat and work interaction.	03
2.	To solve numerical on S.F.E.E and its application to engineering devices like boiler, heat exchanger, turbine compressor etc.	03
3.	To understand concept of heat engine, heat pump, and refrigerator based on second law of thermodynamics.	04
4.	To solve basic numerical on concept of Entropy.	04
5.	To solve numerical on Vapour Power Cycles.	04
6.	To understand reheat cycle, regenerative cycle, reheat-regenerative cycle, feed water heaters for Rankine cycle.	04
7.	To solve numerical on gas power cycles.	04
8.	To understand effect of reheat, regeneration and intercooling on brayton cycle.	04
	Total	30

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:

IDMT2010	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 and its application.
CO 4	Analyze the concepts of energy and exergy.
CO 5	Develop knowledge about I C Engineering.

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

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

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME2220

Course Name: Material Science & Metallurgy

Prerequisite Course(s): --

Teaching & Examination Scheme:

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

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 their 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:

Module No.	Content	Hours	Weightage in %
1.	Crystal Structures 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.	6	12
2.	Bonds 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.	4	8

3.	<p>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 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.</p>	7	18
4.	<p>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, hinalium, 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.</p>	5	12
5.	<p>Failure Analysis 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.</p>	4	10
6.	<p>Testing of Materials 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.</p>	8	16
7.	<p>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.</p>	4	10
8.	<p>Surface Engineering 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</p>	7	14

	spraying and high-energy processes; Process/material selection. Pollution norms for treating effluents as per standards.		
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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 properties of steel during processes and applications with the help of muffle furnace.	08

Text Book(s):

Title	Author/s	Publication
A TextBook of Material Science & Metallurgy	O.P. Khanna	Dhanpat Rai and Sons

Reference Book(s):

Title	Author/s	Publication
Material Science	R.S. Khurmi	S.Chand & Co. Ltd
Material Science & Engineering	R.K. Rajput	S.K. Materials & Sons

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:

IDME2220	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.

Mapping of CO with PO

IDME2220	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3										3
CO 2	3	3									2
CO 3	3	3	2	3	1		1	3		1	1
CO 4	3	3	3	1	1	1			1		3
CO 5	3	3		3		2	1	1			3

Mapping of CO with PSO

IDME2220	PSO1	PSO2	PSO3
CO 1	3		
CO 2	3	1	
CO 3	3	3	
CO 4	3	2	1
CO 5	3	1	1

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

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

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

P P Savani University
School of Engineering

Department of Mechanical Engineering

Course Code: IDMT2330

Course Name: Renewable Energy Engineering

Prerequisite Course(s): --

Teaching & Examination Scheme:

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

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

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

Course Content:

Module No.	Content	Hours	Weightage in %
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1.	Fundamentals of Energy Engineering Energy resources: Renewable vs. non-renewable, Global & national energy scenario, Energy units, conversions, energy security, Environmental impacts & climate change	04	10
2.	Solar Energy: Fundamentals, Power Generation & Applications Fundamentals: Energy Available from the Sun, Spectral Distribution, Sun-Earth basic Angles and their Relations, Measuring Techniques and Estimation of Solar Radiation Outside and the Earth's Atmosphere, Radiation on Tilted Surface	07	15
3.	Solar Power Generation: Photovoltaic System for Power Generation, Types of Solar Cell Modules and Arrays, Solar Cell Types, Grid Connection, Payback Period Calculation, Advantages and Disadvantages, Site Selection and other Parameters.	06	20
4.	Solar Applications Conversion of Solar Energy In to Heat, Solar Thermal Collectors, Solar Concentrators Analysis and Performance Evaluation, Solar Energy Thermal Storage, Solar Based Devices like: Solar Pumping, Solar Cooker, Solar Still, Solar Drier, Solar Refrigeration and Air Conditioning, Solar Pond, Heliostat, Solar Furnace	06	12
5.	Wind Energy: Fundamentals, Power Generation & Applications Fundamentals: Principle and Basics of Wind Energy Conversion, Energy Available from Wind, Basics of Lift and Drag, Effect of Density, Angle of Attack and Wind Speed. Wind Power Conversion: Wind Turbine Rotors, Horizontal and Vertical Axes Rotors, Drag, Lift, Torque and Power Coefficients, Tip Speed Ratio, Solidity of Turbine, Applications: Site Selection and Basics of Wind Farm, Solar-Wind Hybrid System	06	14

6.	Biogas and Biomass: Fundamentals, Power Generation & Applications Energy from Biomass, Sources of Biomass, Different Species, Conversion Process, Advantages and Disadvantages, Properties of Biomass, Biomass Energy: Biogas Generation Conversion of Biomass into Fuels, Gasification and Combustion, Aerobic and Anaerobic Bio-Conversion, Types of Biogas Plants, Design and Operation, Factors Affecting Biogas Generation, Gasification, Types and Applications of Gasifiers	06	10
7	Ocean Energy Conversion Systems Ocean Thermal Energy Conversion, Availability, Advantages and Limitations; Open, Closed and Hybrid Cycle Otec System, Wave and Tidal Energy, Estimation of Tidal Power, Tidal Power Plants, Single and Double Basin Plants, Site Requirements	05	10
8	Energy Storage System Batteries: Li-ion, flow batteries, Na-ion, solid state Super capacitors Hydrogen production, storage & fuel cells Thermal storage systems (sensible, latent, chemical) Grid-scale energy storage systems	05	09
	TOTAL	45	100

List of Tutorial:

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

6.	To estimate the solar power generation using PV panel and estimation of Payback period.	04
7.	To calculate the wind power generation using the small wind mill.	04
	TOTAL	30

Text Book (s):

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

Reference Book(s):

Title	Author/s	Publication
Principles of Solar Engineering	F. Kreith and J.F. Kreider	McGraw Hill
Solar Energy thermal processes	J.A. Duffie and W.A. Beckman	J. Wiley
Wind energy Theory and Practice	Ahmed	PHI, Eastern Economy Edition
Renewable Energy Sources and Emerging Technologies	Kothari	PHI, Eastern Economy Edition

Web Material Links:

- <https://nptel.ac.in/courses/103103206>

Course Evaluation:

Theory:

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

Practical:

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

Semester Exam.

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

Course Outcome(s):

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

IDMT2230	Renewable Energy Engineering
CO 1	Explain the basics of energy engineering, energy resources, energy conversion, and environmental impacts.
CO 2	Describe the principles and applications of solar energy systems and solar power generation.
CO 3	Analyze wind, biomass, and biogas energy systems and their practical applications.
CO 4	Explain ocean energy systems and modern energy storage technologies.
CO 5	Evaluate the performance, feasibility, and sustainability of renewable energy systems.

Mapping of CO with PO

IDMT2230	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2	1		2				1	1	
CO 2	3	3	2	1	3				1	1	
CO 3	3	3	2	2	3				1	1	1
CO 4	3	3	2	2	3				1	2	
CO 5	3	3	2	2	3				1	2	1

Mapping of CO with PSO

IDMT2230	PSO1	PSO2	PSO3
CO 1	3	2	1
CO 2	3	3	1
CO 3	3	3	2
CO 4	3	3	2
CO 5	3	3	2

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

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

Module No	Content	RBT Level
1	Fundamentals of Energy Engineering	1,2
2	Solar Energy	2,3

3	Solar Power Generation	2,3,4
4	Solar Applications	3,4,5
5	Wind Energy	2,3,4
6	Biogas and Biomass	3,4
7	Ocean Energy Conversion Systems	2,3,4
8	Energy Storage System Batteries	3,4,5

**P P Savani University
Institute of Diploma Studies**

Department of Mechanical Engineering

Course Code: IDME2200

Course Name: Basics of Engineering Drawing

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	-	04	40	60	40	60	-	-	200

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:

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.	02	05
2.	Scale: Scale (reduced, enlarged & full size), plain scale and diagonal scale, Geometrical constructions.	02	05
3.	Orthographic projections of points: 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	06	12
4.	Projections of lines: Lines in different quadrants, inclinations, True lengths of the lines projections on auxiliary planes	04	07
5.	Application of lines: Typical applications of lines & traces	02	06
6.	Projections of plane figures:	04	23

	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).		
7.	Projection of solids: Types of Solid. Projection of Cone, Cylinder, Prism & pyramids. Simple cases when solid are placed in different positions Axis faces and lines lying in the faces of the solid making given angles.	06	22
8.	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	04	20

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
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:

IDME2200	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.

Mapping of CO with PO

IDME2200	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2	2		3						1
CO 2	3	2	1	1	3		2				1
CO 3	2	1		1	1	1				1	1
CO 4	3	3	2	3	3		2	2	1		2
CO 5	3	3	3	1	3						1

Mapping of CO with PSO

IDME2200	PSO1	PSO2	PSO3
CO 1	2		1
CO 2	2	1	
CO 3	1	2	3
CO 4	3	3	2
CO 5	3		

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

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

Module No	Content	RBT Level
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1	Introduction	2
2	Scale	2, 3, 4, 5, 6
3	Orthographic projections of points and lines	2, 3, 4, 5, 6
4	Projections of lines	2, 3, 4, 5, 6
5	Applications of lines	2, 3
6	Projection of Plane figures	2, 3, 4, 6
7	Projection of Solids	2, 3, 4, 6
8	Isometric Projection	2, 3, 4, 6

**P P Savani University
Institute of Diploma Studies**

Department of Mechanical Engineering

Course Code: IDME2240

Course Name: Engineering Contracting & Costing

Prerequisite Course(s): --

Teaching & Examination Scheme:

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

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:

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.	6	14
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.	6	14

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,	4	8
4.	Cost Estimation of Forging Cost terminology associated with forging shop, Procedure of calculating material cost of a product for forging shop, Procedure of estimating forging cost, Procedure of estimating cost of forging dies.	4	8
5.	Cost Estimation of Casting Cost terminology associated with product in foundry shop, procedure of estimating cost of pattern making, procedure of estimating foundry cost.	4	9
6.	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).	6	14
7.	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),	10	22
8.	Budgeting and contracting Define budget and budgetary control, purpose of budget, various types of budget, Prepare simple budget given.	5	11

List of Practical:

Sr No	Name of Practical	Hours
1.	Collection of market rates for various consumables like diesel, welding rods, gas, cutting tools, electricity rates etc.	1
2.	Collection of finished parts from industries/ market/ scrap merchants consisting welded parts, casted parts, forged parts. Measure and prepare production drawings for all parts.	1
3.	Determine raw material volume of welded parts, estimate quantity of welding rod, determine material and consumables cost.	2
4.	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.	1

5.	Determine raw material volume for all forged parts. Prepare die drawings for all parts, estimate dies cost, determine material and consumables costs,	2
6.	Estimate hourly rate of running diesel generating set. Show assumptions and steps followed to estimate the rate.	2
7.	Sketch the parts taken in design of machine elements under mini projects. Prepare process plan, estimate the material, consumables and manufacturing process.	2
8.	Estimate costs of parts and assembly and show the assumptions and steps followed to estimate the costs.	2
9.	Present the work including work distribution, photographs and movies of actual project work using power point presentation	2

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:

IDME2240	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 and preparation of engineering contracts.

Mapping of CO with PO

IDME2240	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	3	2								1
CO 2	3	3				1		3	1		1
CO 3	3	3	3		1	2	1				3
CO 4	3	3	3	2		3	1	2		3	3
CO 5	3	3	3	2	3	3	1	2	3	3	3

Mapping of CO with PSO

IDME2240	PSO1	PSO2	PSO3
CO 1	2		
CO 2	2		
CO 3	3	3	
CO 4	3	1	2
CO 5	3	1	3

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

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

Module No	Content	RBT Level
1	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: IDME2250

Course Name: Fluid Mechanics & Hydraulic Machines

Prerequisite Course(s): --

Teaching & Examination Scheme:

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

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- Understand 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 Density, specific gravity, specific weight, specific volume, dynamic viscosity, surface tension, capillarity, vapour pressure, compressibility,	04	09
2.	Pressure Measurement 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.	05	11
3.	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	06	14
4.	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	04	08
5.	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.	05	11
6.	Draft Tubes Draft tubes – types and construction, concept of cavitation in turbines, calculation of work done, Power, efficiency of turbines, unit quantities and simple numerical.	05	11
7.	Centrifugal 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.	08	18

8.	Reciprocating Pumps Reciprocating pumps: construction, working principle and applications of single and double acting reciprocating pumps, concept of slip, negative slip, cavitation and separation	08	18
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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 reciprocating 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

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
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

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:

IDME2250	FLUID MECHANICS & HYDRAULIC MACHINES
CO 1	Analyze fundamentals of fluids for various flow problems and flow characteristics.
CO 2	Determine major and minor losses through different pipes.
CO 3	Apply the concept of fluid mechanics to design various system.
CO 4	Analyze complete performance of Hydraulic Turbines Experimentally and Theoretically.
CO 5	Evaluate the principles of Fluid Statics and Fluid Kinematics to various Fluid Machines for working and construction of different Fluid Machines in real life engineering problems.

Mapping of CO with PO

IDME2250	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	1									1
CO 2	3	3		1							1
CO 3	3	2									3
CO 4	3	3	1	1	2			2	1		1
CO 5	3		3	3	3	3	1	2	3	1	3

Mapping of CO with PSO

IDME2250	PSO1	PSO2	PSO3
CO 1	3		
CO 2	3		1
CO 3	3	2	
CO 4	3		1
CO 5	3	3	3

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

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

Module No	Content	RBT Level
1	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: IDME2100

Course Name: Thermal Engineering - I

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	-	01	04	40	60	-	-	40	60	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:

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.	6	14
2.	Internal Combustion Engines: Construction and thermal analysis. 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.	5	12
3.	Working of I C Engine 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.	5	12

4.	I.C. Engine: Fuel Injection and Cooling 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.	5	10
5.	I.C. Engine: Ignition systems & Governing 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.	6	12
6.	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.	7	15
7.	Air Compressors 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.	5	13
8.	Refrigeration & Air Conditioning 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.	6	12
	Total	45	100

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Study of petrol and diesel engine components and models	02
2.	Port timing diagram of 2 stroke Petrol & Diesel Engine	02

3.	Valve timing diagram of 4 Stroke Petrol & Diesel Engine	02
4.	Numerical problems on performance of I.C. engines.	04
5.	Analysis of different types of Refrigeration cycles.	05
	Total	15

Text Book(s):

Title	Author/s	Publication
Introduction to Renewable Energy	Vaughn Nelson	CRC Press

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
Thermal Engineering	P.L. Ballaney	Khanna Publishers, 2002

Course Evaluation:

Theory:

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

Course Outcome(s):

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

IDME2100	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.

Mapping of CO with PO

IDME2100	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3		1	3		1		1	1		2
CO 2	3										2
CO 3	3	2	1		1						3
CO 4	3	1	2			1	1				3
CO 5	3									1	3

Mapping of CO with PSO

IDME2100	PSO1	PSO2	PSO3
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CO 1	3		
CO 2	1		
CO 3	1	1	1
CO 4	2	1	
CO 5	1		

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

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

Module No	Content	RBT Level
1	Sources of Energy	1, 2
2	Internal Combustion Engines: Construction & Thermai Analysis.	1, 2, 4, 5
3	Working of I C Engine	1, 2, 4, 5
4	I.C. Engine: Fuel Injection and Cooling Systems	1, 2, 3, 5
5	I.C. Engine: Ignition systems & Governing	1, 2, 3, 4, 5
6	Performance of I.C. Engines	3, 4, 5
7	Air Compressors	2,3,4
8	Refrigeration & Air-Conditioning	3,4,5

**P P Savani University
Institute of Diploma Studies**

Department of Mechanical Engineering

Course Code: IDMT2530

Course Name: Manufacturing Engineering

Prerequisite Course(s): --

Teaching & Examination Scheme:

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

Module No.	Content	Hours	Weightage in %
1.	Casting Patterns-Material used, types, Patterns allowances, Cores, Core allowances. Moulds-Mould materials, Types of sand ,Moulding processes Sand moulding ,Pit moulding, machine moulding .Shell moulding.Melting practice. Types of furnaces with specific application, Cupola furnace, Electric arc furnace. Casting principle and operation,Special casting processes. viz die casting, centrifugal casting, Investment casting. Casting defects.	08	17
2.	Forging	08	18

	Forging Processes–Drop forging, Upset forging ,Die forging or press forging.Types of dies- Open Die, Closed Die(Single Impression and Multi-impession) 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.		
3.	Rolling Principles of rolling. Hot and cold rolling. Types of rolling mills Different sections of rolled parts.	05	11
4.	Extrusion Methods of extrusion–Direct ,Indirect ,backward & impact Extrusion, Hot extrusion, Cold extrusion Advantages, disadvantages and applications.	07	15
5.	Press Working Types of presses and Specifications. Press working 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.	08	18
6.	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.	05	11
7.	Brazing Types, Materials Required for brazing, Preparation of surfaces, Principles, Applications.	02	05
8.	Soldering Types, Materials Required for Soldering, Preparation of surfaces, Principles, Applications.	02	05

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

	Total	30
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Text Book(s):

Title	Author/s	Publication
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:

IDMT2530	MANUFACTURING ENGINEERING
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.
CO4	Understand the Brazing types and its applications
CO5	Apply the fundamentals of soldering types and its applications

Mapping of CO with PO

IDMT2530	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011
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CO 1	3	1										1
CO 2	3	3		1								1
CO 3	3											3
CO 4	3	3	1	1	2			2	1			1
CO 5	3		3	3	3	3	1	2	3	1		3

Mapping of CO with PSO

IDMT2530	PSO1	PSO2	PSO3
CO 1	3		
CO 2	3		1
CO 3	3	2	
CO 4	3		1
CO 5	3	3	3

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

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

Module No	Content	RBT Level
1	Casting	2, 3, 6
2	Forging	2, 3
3	Rolling	2, 3
4	Extrusion	2, 5, 6
5	Press Working	2, 5, 6
6	Welding	2, 3, 4
7	Brazing	2, 3, 4
8	Soldering	2, 3, 4

**P P Savani University
Institute of Diploma Studies**

Department of Mechanical Engineering

Course Code: IDMT2521

Course Name: Emerging Technologies in Solar Energy

Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to understand

- To understand the fundamentals and emerging technologies in solar PV, solar thermal, and hybrid energy systems.
- To analyze and apply solar energy systems for industrial applications, energy storage, and system integration.

- To evaluate economic, policy, and sustainability aspects including system design, maintenance, and recycling of solar technologies.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	Fundamentals & Emerging PV Technologies Solar Radiation Mechanics: Sun-Earth geometry, Declination, Hour angle, Azimuth angle. Advanced PV Cells: Beyond Silicon – Perovskites, Bifacial modules (Albedo effect), and Thin-film technologies. PV Panel Cooling: Necessity of cooling; Passive (fins, heat pipes) vs. Active cooling (water/air circulation) techniques to maintain efficiency.	6	14
2.	Solar Thermal & Concentrated Solar Power (CSP) CSP Technologies: Construction and working of Parabolic Trough Collectors (PTC), Linear Fresnel Reflectors, and Solar Power Towers. Stirling Engines: Solar Dish-Stirling systems; working principle and thermodynamic cycle. Heat Transfer Fluids (HTF): Properties of synthetic oils and molten salts used in high-temperature solar applications.	5	12
3.	Solar Industrial Process Heat (SIPH) Industrial Collectors: Evacuated Tube Collectors (ETC) and Flat Plate Collectors (FPC) for process heat. Applications : Solar drying systems (forced convection vs. natural convection), Solar desalination/distillation, and Solar water pumping. System Integration: Piping, insulation standards, and integration with existing industrial boilers.	5	12
4.	Hybrid PV/Thermal (PV/T) Systems Concept of Co-generation: Extracting both electricity and heat simultaneously. PV/T Collector Design: Sheet-and-tube design, channel design, and absorber materials. Applications: PV/T for space heating, pool heating, and pre-heating industrial water.	5	10
5.	Thermal Energy Storage (TES) Sensible Heat Storage: Water tanks and rock bed storage systems. Latent Heat Storage (PCM): Phase Change Materials (Organic vs. Inorganic), encapsulation techniques, and heat exchanger design for PCM. Thermochemical Storage: Basic introduction to sorption storage.	6	12
6.	Mechanical Structures & Tracking Systems Mounting Structures: Roof-mount vs. Ground-mount; Material selection (Galvanized Iron, Aluminum); Wind load considerations. Floating PV (FPV): Buoyancy design, anchoring/mooring mechanisms, and advantages (cooling effect, evaporation reduction). Sun Tracking: Single-axis vs. Dual-axis trackers; Actuators and drive mechanisms (Gear drives, Linear actuators).	7	15

7.	Maintenance Automation & Manufacturing Manufacturing Process: Brief overview of ingot to wafer to module assembly line. Soiling Losses: Effect of dust and shading on performance. Automated Cleaning: Robotic dry cleaning systems, wiper mechanisms, and electrostatic cleaning technologies.	5	13
8.	Economics, Policy & Recycling Solar Economics: Levelized Cost of Energy (LCOE), Simple Payback Period, and Net Present Value (NPV). End-of-Life Management: Recycling of PV panels (glass, aluminum, silicon recovery) and disposal of heat transfer fluids. Future Trends: Building Integrated PV (BIPV) and Solar Chimneys.	6	12
	Total	45	100

List of Experiments:

S.No.	Name of Experiment	Hours
1	Study of Solar Radiation Angles and Sun Path Determination of declination, hour angle, altitude angle, and azimuth angle for solar applications.	02
2	Performance Analysis of Advanced PV Modules Comparative study of monocrystalline, bifacial, and thin-film solar PV modules under different conditions.	04
3	Experiment on PV Panel Cooling Techniques Performance evaluation of passive and active cooling methods for improving PV efficiency.	04
4	Study of Concentrated Solar Power (CSP) Systems Demonstration and analysis of Parabolic Trough Collector, Fresnel reflector, or Solar Tower models.	04
5	Performance Testing of Solar Thermal Collectors Efficiency analysis of Flat Plate Collector (FPC) and Evacuated Tube Collector (ETC).	04
6	Design and Analysis of Hybrid PV/T System Study of simultaneous electrical and thermal energy generation using PV/T collectors.	04
7	Experiment on Thermal Energy Storage System Performance study of sensible heat and PCM-based latent heat storage systems.	04
8	Study of Solar Tracking and Automated Cleaning Systems Demonstration of single-axis/dual-axis solar trackers and robotic cleaning mechanisms for PV panels.	04
	Total	30

Text Book(s):

Title	Author/s	Publication
Introduction to Renewable Energy	Vaughn Nelson	CRC Press

Reference Book(s):

Title	Author/s	Publication
Solar Energy Engineering"	Soteris Kalogirou	Academic Press

Course Evaluation:

Theory:

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

Course Outcome(s):

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

IDMT2521	EMERGING TECHNOLOGIES IN SOLAR ENERGY
CO 1	Explain the construction, working principles, and cooling mechanisms of advanced PV and Hybrid PV/Thermal systems.
CO 2	Analyze the performance of Concentrated Solar Power (CSP) technologies and Industrial Process Heat systems.
CO 3	Apply concepts of heat transfer and thermodynamics to select suitable Thermal Energy Storage (TES) materials and methods.
CO 4	Demonstrate the mechanical design aspects of solar mounting structures, tracking mechanisms, and cleaning systems.
CO 5	Evaluate the economic viability and environmental impact of solar installations including recycling and lifecycle analysis.

Mapping of CO with PO

IDMT2521	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3		1	3		1		1	1		2
CO 2	3										2
CO 3	3	2	1		1						3
CO 4	3	1	2			1	1				3
CO 5	3									1	3

Mapping of CO with PSO

IDMT2521	PSO1	PSO2	PSO3
CO 1	3		
CO 2	1		
CO 3	1	1	1
CO 4	2	1	
CO 5	1		

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

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

Module No	Content	RBT Level
1	Fundamentals & Emerging PV Technologies	2, 3, 6
2	Solar Thermal & Concentrated Solar Power (CSP)	2, 3
3	Solar Industrial Process Heat (SIPH)	2, 3
4	Hybrid PV/Thermal (PV/T) Systems	3, 5, 6
5	Thermal Energy Storage (TES)	3, 5, 6
6	Mechanical Structures & Tracking Systems	3, 4
7	Maintenance Automation & Manufacturing	3, 4
8	Economics, Policy & Recycling	2, 3, 4