PPSU

P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING
INSTITUTE OF DIPLOMA STUDIES

DIPLOMA IN ELECTRICAL ENGINEERING

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 EUCATIONAL OBJECTIVES
PEO 1	Solve real-world engineering problems, design and develop innovative and cost-effective solutions exhibiting engineering skills/fundamentals to cater needs of society.
PEO 2	Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting comprehensive competitiveness.
PEO 3	Exhibit professional ethics & values, effective communication, teamwork, multidisciplinary approach, and ability to relate engineering issues to broader societal framework.

PO No	PROGRAMME OUTCOMES
PO 1	Engineering Knowledge: Apply 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) ELECTRICAL ENGINEERING
PSO 1	Graduates will apply fundamental science and electrical engineering principles to build, test, operate, and maintain electrical systems safely and efficiently.
PSO 2	Graduates will implement core electrical engineering concepts to design and develop innovative, practical solutions for real-world problems across diverse sustainable energy domains.
PSO 3	Graduates will work collaboratively, communicate professionally, and pursue lifelong learning to excel as competent professionals, entrepreneurs, and aspirants in higher studies and competitive examinations.

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

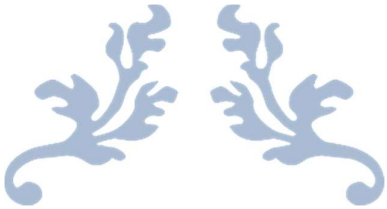
P P Savani University

School of Engineering

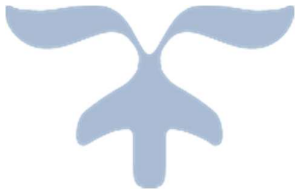
Effective From: 2025-26

Authored by: P P Savani University

CONTENT



FIRST YEAR DIPLOMA IN ELECTRICAL ENGINEERING



P P SAVANI UNIVERSITY															
SCHOOL OF ENGINEERING															
INSTITUTE OF DIPLOMA STUDIES															
TEACHING & EXAMINATION SCHEME FOR DIPLOMA ENGINEERING PROGRAMME AY:2025-26(BATCH:2025)															
Sem.	**Course Code**	**Course Title**	**Offered By**	**Teaching Scheme**					**Examination Scheme**						
				Contact Hours				**Credit**	**Theory**		**Practical**		**Tutorial**		**Total**
				Theory	**Practical**	**Tutorial**	**Total**		**CE**	**ESE**	**CE**	**ESE**	**CE**	**ESE**	
1	IDSH1110	Mathematics-I	SH	3	0	2	5	5	40	60	0	0	100	0	200
	IDSH1140	Chemistry	CH	3	2	0	5	4	40	60	40	60	0	0	200
	IDCV1110	Basics of Civil Engineering	CV	3	0	2	5	5	40	60	0	0	100	0	200
	IDCE1110	Computer Fundamentals	CE	3	4	0	7	5	40	60	40	60	0	0	200
	CFLS2110	Elementary Communicative English-I	CLFS	3	0	0	3	3	100	0	0	0	0	0	100
						Total	**25**	**22**							**900**
2	IDSH1120	Mathematics-II	SH	3	0	2	5	5	40	60	0	0	100	0	200
	IDSH1130	Physics	SH	3	2	0	5	4	40	60	40	60	0	0	200
	IDME1110	Basics of Mechanical Engineering	ME	3	0	2	5	5	40	60	0	0	100	0	200
	IDIT1110	Python Programming	IT	3	2	0	5	4	40	60	40	60	0	0	200
	IDME1120	Workshop Fundamentals	ME	0	2	0	2	2	0	0	100	0	0	0	100
	CFLS2120	Elementary Communicative English-II	CLFS	2	0	0	2	2	100	0	0	0	0	0	100
						Total	**24**	**22**							**1000**

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 data.	10	23

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 - 3rd Edition	Anthony croft & others	Pearson Education Publication

Reference Book:

Title	Author(s)	Publication
Basic Mathematics	G.C. Patel and Ami C. Shah	Atul Prakashan
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	Solve engineering problems using algebraic and trigonometric concepts.
CO 2	Apply coordinate geometry concepts to analyze spatial relationships in engineering contexts.
CO 3	Analyze data sets and interpret statistical results for decision-making in engineering applications.
CO 4	Demonstrate the ability to crack engineering related problems based on determent and matrices.

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

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	-	-	100	00	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 Marksfor 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	ESE	
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	8	25

	and Continue, Nested Loops		
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** • Types of Nouns • Verb • Pronoun (personal, possessive) • Adverbs • Adjectives	05	12
2.	**Parts of Speech – II** • Use of Prepositions of time and place • Conjunctions • Interjections • Articles 'A, An, and The' • Indicators- this, that, these, those	05	13
3.	**Tenses** • 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** • Basic Vocabulary • Academic Vocabulary • Jargons	03	12
2.	**Auxiliary Verb** • So, neither-nor, either-or	03	13

	• Shall, should, can, could, may, might, must		
3.	**Types of Sentences** • 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 Movire'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 Derivative (Maxima, Minima, Velocity & Acceleration).	12	27
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 - 3rd Edition	Anthony croft and others	Pearson Education Publication

Reference Book:

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

Course Evaluation:

Theory:

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

Tutorial:

- Continuous evaluation consists of performance of tutorial which will be evaluated out of 10 Marksfor 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.	08	18

	(Numerical on above topics)		
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	PSO1	PSO2	PSO3
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		Total
Theory	Practical	Tutorial	Credit	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, Cohran 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	8	15

	functions, working four- stroke cycle Petrol/Diesel engines, Comparison between Petrol cycle and diesel cycle. Basic concept of CNG and EV. (No Numericals)		
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 Engineering	P. S. Desai and S. B. Soni	Atul Prakashan
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 Marksfor 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:

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,	08	18

	replace, lstrip, rstrip, strip		
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. No.	List of Practical	Hours
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 Marksfor 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 Dhounchak 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 outof 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
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): -- CFL2110 : 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** • Formal Vs. Functional English • Functional English in daily life • Importance of LSRW Skills	03	10
2.	**Listening** • Difference between Hearing and Listening • Listening to get information • Listening to understand • Listening instructions to follow	05	20
3.	**Speaking** • 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** • Reading to Comprehend • Read to Scan • Read to Skim • Reading information from authentic material	07	25

	• Reading Newspaper, Magazines, Books		
2.	**Writing** • 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):

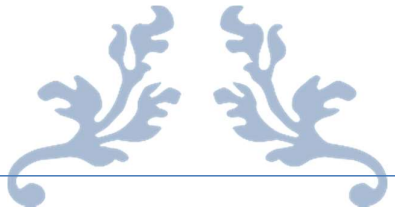
After completion of the course, the student will be able to

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.

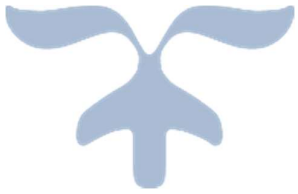
Level of Bloom's Revised Bloom's Taxonomy in Assessment

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

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 DIPLOMA IN ELECTRICAL ENGINEERING



P P SAVANI UNIVERSITY															
SCHOOL OF ENGINEERING															
INSTITUTE OF DIPLOMA STUDIES															
TEACHING & EXAMINATION SCHEME FOR DIPLOMA ELECTRICAL ENGINEERING PROGRAMME AY:2025-26(BATCH:2025)															
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	IDET2010	Fundamental of Power Systems	ET	3	0	2	5	5	40	60	0	0	40	60	200
	IDET2020	Digital Electronics & Microprocessor	ET	3	2	0	5	4	40	60	40	60	0	0	200
	IDET2030	Basics of Electrical & Electronics Engg	ET	3	2	0	5	4	40	60	40	60	0	0	200
	IDMT2330	Renewable Energy Engineering	MT	3	0	1	4	4	40	60	0	0	40	60	200
	IDET2040	Electrical Estimation and Energy Auditing	ET	3	0	2	5	5	40	60	0	0	40	60	200
						Total	**24**	**22**							**1000**
4		Elective - I	ET	3	2	0	5	4	40	60	40	60	0	0	200
		Elective - II	ET	3	2	0	5	4	40	60	40	60	0	0	200
		Project/Industry Exposure - I	ET	15			15	15	0	0	120	180	0	0	300
						Total	**25**	**23**							**700**

P P Savani University
School of Engineering
Institute of Diploma Studies
Department of Electrical Engineering

Course Code: IDET2010
Course Name: Fundamental of Power Systems
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 fundamental structure and functioning of electric power systems.
- Study generation, transmission and distribution of electrical power.
- Learn the working of power system components such as insulators, cables, substations and switchgear.
- Understand tariff system, power factor and load characteristics relevant to power supply.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	**Introduction to Power System:** Structure of power system, conventional & non-conventional power plants, energy sources comparison	05	12
2.	**Transmission of Power:** AC & DC transmission, types of conductors, transposition, skin effect, corona & its effect, efficiency of transmission	06	14
3.	**Transmission Line Parameters:** Resistance, inductance & capacitance of transmission lines (basics), classification of short/medium/long lines	06	14
4.	**Insulators & Cables:** Types of insulators, string efficiency, voltage gradient, types of cables, cable grading, dielectric stress	06	14
5.	**Substations & Switchgear:** Types of substations, bus bar arrangements, isolators, circuit breakers, relays, surge arresters & protection	06	14
6.	**Distribution Systems:** Primary & secondary distribution, AC vs DC distribution, radial, ring & interconnected systems	05	12
7.	**Power Factor & Tariff:** Causes of low PF, compensation using capacitors/filters; domestic & industrial tariff structure, demand charge	05	10
8.	**Load Characteristics & System Stability:** Types of loads, load curve & load factor, diversity factor, reliability & power system	06	10

	stability concepts		
	TOTAL	**45**	**100**

List of Tutorial:

Sr. No.	Name of Tutorial	Hours
1.	A thermal power plant generates 500 MW and consumes coal with a calorific value of 25 MJ/kg. If the plant efficiency is 35%, calculate the coal consumption per hour. Compare the result with a solar plant of the same capacity.	04
2.	A 3-phase transmission line transmits 50 MW at 132 kV with a power factor of 0.8 lagging. Calculate the line current and transmission efficiency if the line resistance is 10 Ω per phase.	02
3.	A conductor has a DC resistance of 0.15 Ω/km. If skin effect increases the resistance by 12% at operating frequency, calculate the AC resistance for a 50 km transmission line.	02
4.	A single-phase transmission line is 80 km long with resistance 0.25 Ω/km. Calculate (i) total line resistance and (ii) power loss when transmitting 100 A current.	04
5.	A transmission line has an inductance of 1.2 mH/km and length of 120 km. Calculate the total inductive reactance at 50 Hz.	02
6.	A string of four suspension insulators has voltage distribution of 20%, 23%, 27%, and 30%. Calculate the string efficiency. Suggest methods to improve it.	04
7.	A single-core cable operates at 33 kV with conductor radius 1.5 cm and sheath radius 5 cm. Calculate the maximum dielectric stress in the cable.	02
8.	A substation feeds a load of 20 MVA at 132 kV. Determine the current rating required for the circuit breaker. If the fault level is 1000 MVA, calculate the fault current.	04
9.	A consumer draws 200 kW at 0.7 lagging power factor. Calculate the capacitor kVAR required to improve the power factor to 0.95 lagging.	02
10.	A power station has a maximum demand of 6000 kW and generates 90,000 kWh per day. Calculate: (i) Load Factor, (ii) Average Load, and (iii) Utilization Factor if the installed capacity is 8000 kW.	04
	TOTAL	**30**

Text Book(s):

Title	Author/s	Publication
Power System Engineering	D. P. Kothari & I. J. Nagrath	McGraw Hill
Electrical Power Systems	C. L. Wadhwa	New Age International
Principles of Power Systems	V. K. Mehta & Rohit Mehta	S. Chand

Reference Book(s):

Title	Author/s	Publication
Modern Power System Analysis	Nagrath & Kothari	McGraw Hill
Switchgear & Protection	Sunil S. Rao	Khanna Publishers
Power System Analysis	Hadi Sadat	McGraw Hill

Web Material Link(s):

- https://courses.theelectricalguy.in/fundamentals-of-electrical-power-systems

- https://www.electrical4u.com/power-system/#google_vignette

Course Evaluation:
Theory:

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

Course Outcome(s):

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

IDET2010	**Fundamental of Power Systems**
CO 1	Understand the structure and components of modern power systems
CO 2	Analyse transmission line concepts and evaluate overhead/underground systems
CO 3	Explain the functions of substations and switchgear elements in power system operation
CO 4	Apply knowledge of tariff and power factor concepts in power system economics
CO 5	Analyse load behaviour, stability and reliability factors related to power networks

Mapping of CO with PO

IDET2010	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2	1	1	1	1	1	1	1	1	1
CO 2	3	3	2	2	2	1	1	1	1	2	2
CO 3	2	3	3	2	2	2	1	1	2	2	3
CO 4	2	2	3	3	2	1	2	1	1	2	2
CO 5	1	2	3	3	3	2	2	1	1	2	2

Mapping of CO with PSO

IDET2010	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	3	2	1
CO 3	3	2	2
CO 4	1	3	2
CO 5	1	2	3

Level of Revised Bloom's Taxonomy in Assessment:

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

Module No	**Content**	**RBT Level**
1	Introduction to Power System	1, 2
2	Transmission of Power	2, 3
3	Transmission Line Parameters	2, 3
4	Insulators & Cables	2, 3
5	Substations & Switchgear	3, 4

6	Distribution Systems	2, 3
7	Power Factor & Tariff	3, 5
8	Load Characteristics & System Stability	3, 4, 6

P P Savani University
School of Engineering
Institute of Diploma Studies
Department of Electrical Engineering

Course Code: IDET2020
Course Name: Digital Electronics & Microprocessor
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 fundamentals of digital electronics, logic circuits, and microprocessor architecture.
- Develop skills to design and analyze digital circuits and systems.
- Gain foundational knowledge of 8085 microprocessor programming and interfacing for practical applications.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	**Number Systems & Digital Fundamentals:** Number systems: Binary, Decimal, Octal, Hexadecimal; Conversions; Binary arithmetic; Digital codes: BCD, Gray, ASCII.	05	12
2.	**Logic Gates & Boolean Algebra:** Basic gates: AND, OR, NOT; Universal gates: NAND, NOR; Boolean laws; Truth tables; Simplification (basic).	06	12
3.	**Combinational Logic Circuits:** Adders, subtractors, multiplexers, demultiplexers, encoders, decoders; Seven-segment display.	06	12
4.	**Sequential Circuits & Memory Devices:** Flip-flops: SR, JK, D, T; Counters (concept); Shift registers; Memory types: ROM, RAM, PROM, EPROM.	06	10
5.	**Introduction to Microprocessors:** Definition; Microprocessor vs Microcontroller; Applications; Basic block diagram.	06	15
6.	**8085 Microprocessor Architecture:** Internal architecture: ALU, registers, flags, buses; Pin diagram; Control & clock (basic).	05	15
7.	**8085 Instruction Set & Programming:** Instruction groups: data transfer, arithmetic, logical, branching; Addressing modes; Simple programs.	06	12
8.	**8085 Interfacing & Applications:** Memory and I/O interfacing concepts; Introduction to 8255; Functional block diagram and description of each block of Programmable peripheral interface Intel 8255, Application using 8255: Seven segment LED display,	05	12

	Square wave generator, Traffic light Controller.		
	TOTAL	**45**	**100**

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Verification of Truth table of logic gates	02
2.	Verification of De Morgan's Theorem	02
3.	Implementation of half adder and full adder circuits using logic gates.	04
4.	Implementation of half subtractor and full subtractor circuits using logic gates.	04
5.	Study of various flip-flops (SR, JK, D, T, and Master-Slave JK) using ICs and verification of their truth tables.	04
6.	Study of A/D Convertor.	04
7.	Assembly Language programming on – • 1's compliment • shift left operator • 8-bit addition of two numbers • Binary division • To find largest number • To find smallest Number • To arrange numbers in ascending order • To arrange numbers in descending order	06
8.	Study of 8255 PPI IC	04
	TOTAL	**30**

Text Book(s):

Title	Author/s	Publication
Digital Electronics and Microprocessors	Debashis Das	Dhanpat Rai Publications

Reference Book(s):

Title	Author/s	Publication
Modern Digital Electronics	R. P. Jain	McGraw-Hill
Microprocessor Architecture, Programming & Applications with 8085	Ramesh S. Gaonkar	PHI
Digital Principles and Applications	Malvino & Leach	McGraw-Hill

Web Material Link(s):

- https://www.geeksforgeeks.org/digital-logic/digital-electronics-logic-design-tutorials/
- https://archive.nptel.ac.in/content/storage2/courses/106108100/pdf/Lecture_Notes/LNm1.pdf
- https://archive.nptel.ac.in/content/storage2/courses/106108099/Digital%20Systems.pdf

Course Evaluation:
Theory:

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

Practical:
- Continuous Evaluation consists of the performance of practical, which will be evaluated out of 10 marks per each practical and the average of the entire practical will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/test consists of 15 marks.
- External viva consists of 15 marks.

Course Outcome(s):

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

IDET2020	**Digital Electronics & Microprocessor**
CO 1	Understand number systems, logic gates, and basic digital concepts.
CO 2	Apply combinational and sequential circuits in simple digital systems.
CO 3	Explain 8085 architecture and instruction set.
CO 4	Develop basic assembly language programs for 8085.
CO 5	Demonstrate simple microprocessor interfacing applications.

Mapping of CO with PO

IDET2020	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2			1	1	1	1			
CO 2	3	3	2	1	2	1	1	1	1		
CO 3	3	2	1	1	2	1	1	1			
CO 4	3	3	2	2	2	1	1	1	1	1	
CO 5	2	2	3	2	3	2	2	1	2	1	1

Mapping of CO with PSO

IDET2020	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	3	2	1
CO 3	3	2	2
CO 4	2	3	2
CO 5	1	2	3

Level of Revised Bloom's Taxonomy in Assessment:

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

Module No	**Content**	**RBT Level**
1	Number Systems & Digital Fundamentals	1, 2

2	Logic Gates & Boolean Algebra	1, 2
3	Combinational Logic Circuits	2, 3
4	Sequential Circuits & Memory Devices	2, 3
5	Introduction to Microprocessors	1,2
6	8085 Microprocessor Architecture	2, 3
7	8085 Instruction Set & Programming	2, 3, 5
8	8085 Interfacing & Applications	3, 4, 6

P P Savani University
School of Engineering
Institute of Diploma Studies
Department of Electrical Engineering

Course Code: IDET2030
Course Name: Basics of Electrical & Electronics 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	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

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

- Understand fundamental concepts of electrical and electronic systems.
- Study DC/AC circuits, electrical measurements, and safety practices.
- Gain introductory knowledge of electrical machines.
- Explore basic semiconductor devices and simple applications.
- Develop practical skills through laboratory experiments.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	**Introduction to Electrical Engineering:** Electrical quantities (charge, current, voltage, power, energy), Ohm's law, resistive elements (R, L, C), electrical safety basics.	05	12
2.	**DC Circuits:** Series & parallel circuits, Kirchhoff's laws, basic circuit analysis, applications of DC circuits.	06	12
3.	**AC Fundamentals:** Concepts of alternating voltage and current – Difference between AC and DC - Definition of cycle, frequency, time period, amplitude, instantaneous value, average value, rms value, maximum value, form factor and peak factor	06	12
4.	**Electrical Machines Basics**: Transformers (concept & applications), DC machines (working principle), Induction motor (overview).	06	10
5.	**Measuring Instruments:** Ammeter, voltmeter, wattmeter, energy meter, digital multimeter, precautions in measurements.	06	15
6.	**Introduction to Electronics:** Conductors, insulators, semiconductors, PN junction diode, rectifiers (half & full wave), Zener diode (applications).	05	15
7.	**Transistors & Amplifiers:** BJT basics, transistor as a switch, CE configuration (concept), basic amplifier applications**.**	06	12
8.	**Electronic Devices & Applications:** LED, LDR, sensors (overview), operational amplifier (basic concept), regulated power supply,	05	12

	simple electronic applications.		
	TOTAL	**45**	**100**

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Study and verify basic electrical quantities (V, I, R) using multimeter & power supply.	02
2.	Verify Ohm's Law and study characteristics of resistors (Series and Parallel).	04
3.	Analyze DC circuits using Kirchhoff's Current and Voltage Laws (KCL & KVL).	04
4.	Study VI characteristics of PN junction diode (forward & reverse bias).	02
5.	Study Zener diode characteristics and use it as a voltage regulator.	02
6.	Design and test rectifier circuits (Half-wave & Full-wave) with filter.	04
7.	Study AC waveform parameters using CRO (RMS, Average, Peak, Frequency).	04
8.	Study transistor (BJT) characteristics in CE configuration.	02
9.	Study functions and measurement techniques of ammeter, voltmeter, and wattmeter.	02
10.	Study and demonstrate the working of a single-phase transformer (no load test).	04
	TOTAL	**30**

Text Book(s):

Title	Author/s	Publication
Electronic Devices and Circuits	Robert L. Boylestad & Louis Nashelsky	Pearson Education
Basic Electronics	B. Grob / S. Salivahanan	McGraw-Hill Education (India)

Reference Book(s):

Title	Author/s	Publication
Basic Electrical Engineering	B.L. Theraja	S.Chand and Co, New Delhi
Basic Electrical and Electronics Engineering	SK Bhattacharya	New Age International Publishers
Basic Electrical Engineering (Vol I & II)	R. K. Rajput	Laxmi Publications.

Web Material Link(s):

- https://www.maritimeknowledge.in/course-details.php?course_id=125&course_name=BasicElectricalandElectronicsEngineering#
- https://www.electrical4u.com/
- https://www.tutorialspoint.com/basic_electronics/index.htm
- https://nptel.ac.in/courses/108105112

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 will be evaluated out of 10 marks per each practical and the average of the entire practical will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/test consists of 15 marks.
- External viva consists of 15 marks.

Course Outcome(s):

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

IDET2030	Basics of Electrical & Electronics Engineering
CO 1	Understand electrical quantities, AC/DC fundamentals and electrical safety concepts
CO 2	Analyze and solve DC and AC circuit problems
CO 3	Demonstrate knowledge of electrical measuring instruments and electrical machines
CO 4	Understand semiconductor devices and apply basic rectifier & regulator circuits
CO 5	Implement transistor and op-amp based simple electronic applications

Mapping of CO with PO

IDET2030	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2			1	1	1				
CO 2	3	3	2	1	2				1		
CO 3	3	2	2	1	2			1	1		
CO 4	3	3	2	2	3			2	1	1	
CO 5	2	2	3	2	3			1	2	1	1

Mapping of CO with PSO

IDET2030	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	3	2	1
CO 3	3	2	2
CO 4	2	3	2
CO 5	1	2	3

Level of Revised Bloom's Taxonomy in Assessment:

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

Module No	Content	RBT Level
1	Introduction to Electrical Engineering:	1, 2
2	DC Circuits	2, 3
3	AC Fundamentals	1, 2
4	Electrical Machines Basics	2, 3
5	Measuring Instruments	2, 3, 4,

6	Introduction to Electronics	2, 3
7	Transistors & Amplifiers	3, 4, 5
8	Electronic Devices & Applications	2, 3, 6

P P Savani University
School of Engineering
Institute of Diploma Studies
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	-	01	04	40	60	00	00	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 %
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.	02
2.	Demonstration of Solar air heater, solar cooker, Solar pyranometer, Solar collector, biogas plant, gasifier.	02
3.	To estimate the solar day time with the help of sunshine recorder.	01
4.	To perform efficiency test of solar water heater with its different parameters.	01
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.	01
7.	To calculate the wind power generation using the small wind mill.	04
	TOTAL	**15**

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/Tutorial:

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

Course Outcome(s):

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

IDMT2330	**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

IDMT2330	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2	1	1	1	1	1	1	1	1	1
CO 2	2	2	2	1	1	3	1	3	1	1	1
CO 3	3	3	3	2	2	1	1	1	2	2	3
CO 4	2	3	2	3	2	1	2	1	1	1	2
CO 5	2	3	2	3	2	2	3	1	1	2	2

Mapping of CO with PSO

IDMT2330	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	3	2	1
CO 3	3	2	2
CO 4	1	3	2
CO 5	1	2	3

Level of Revised Bloom's Taxonomy in Assessment:

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

Module No	Content	RBT Level
1	Fundamentals of Energy Engineering	1, 2
2	Solar Energy: Fundamentals, Power Generation & Applications	1, 2
3	Solar Power Generation	2, 3
4	Solar Applications	2, 3, 5
5	Wind Energy	3, 4, 6
6	Biogas and Biomass	1, 2
7	Ocean Energy Conversion Systems	3, 6
8	Energy Storage System Batteries	3, 6

P P Savani University
School of Engineering
Institute of Diploma Studies
Department of Electrical Engineering

Course Code: IDET2040
Course Name: Electrical Estimation and Energy Auditing
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

- To provide fundamental knowledge of planning and estimating electrical installations.
- To understand different wiring systems, earthing methods, and electrical protection devices.
- To develop skills for implementing safe and efficient electrical installations.
- To create awareness of electrical safety standards and best practices.
- To understand energy management and modern energy-efficient technologies in electrical systems.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	**Electrical Symbols, Standards & Regulations:** Importance of electrical symbols, standard wiring symbols, basic Indian Electricity Rules 1956, and representation of wiring diagrams.	05	12
2.	**Internal Wiring Systems & Service Connections:** Looping system, Joint box system, Tree system. Types of internal wiring (CTS, PVC, Conduit, Batten, etc.). Service connection: Overhead & Underground. Overview of Busbar trunking and Cable tray systems	06	12
3.	**Earthing & Safety in Electrical Installations:** Need and types of earthing, Protection against overload, short circuit, earth fault, Protection against electric shock, Effects of electric shock, first aid & treatment for electric shock, Construction and working of ELCB	06	12
4.	**Domestic Electrical Estimation:** General requirements for residential installations, Lighting and power sub-circuits, Diversity factor, Location of outlets, switches, main board, DB, Voltage drop & wire sizing, Steps for preparing estimates, Estimation for: Small residential building/flat.	06	10
5.	**Industrial & Commercial Estimation:** Estimation of: Factory lighting scheme, Computer centre (10 computers, AC, UPS, lights & fans), Street lighting installation (12 lamp fittings), Workshop with 3-phase 15 HP motor, small workshop with 3–4 machine.	06	15
6.	**Energy Management & Audit Basics:** Definition and need for energy audit, Types of energy audit, Energy audit approach,	05	15

	Understanding energy costs & benchmarking, Matching energy use to requirement, System efficiency & optimization, Fuel and energy substitution, Energy audit instruments.		
7.	**Electrical System Performance & Motor/Lighting Efficiency:** Electrical System: Electricity billing basics, Electrical load management, Maximum demand control, Power factor improvement, system losses. Electric Motors: Types of motors (overview), Losses & efficiency of induction motors, Factors affecting motor performance and efficiency. Lighting System: Light sources, choice of lighting,	06	12
8.	**DG Systems & Energy-Efficient Technologies:** Selection and assessment of diesel generators and introduction to modern energy-saving technologies like APFC, VFDs, efficient motors, sensors, and lighting controls.	05	12
	TOTAL	**45**	**100**

List of Tutorial:

Sr. No.	Name of Tutorial	Hours
1.	Draw standard electrical symbols and prepare wiring diagrams for residential installations using symbols and regulations.	02
2.	Perform layout preparation for CTS, PVC, conduit and batten wiring systems using looping and joint box methods.	02
3.	Prepare overhead and underground service connection layouts and design cable tray/busbar trunking arrangement.	02
4.	Draw and demonstrate pipe earthing and plate earthing arrangements and identify safety measures against electric shock.	04
5.	Study and demonstrate working of fuse, MCB, ELCB and protection circuits for overload and short circuit conditions.	02
6.	Prepare load calculations, wire sizing, circuit distribution and material estimation for a small residential building.	04
7.	Perform estimation and layout preparation for factory lighting, computer centre and street lighting installations.	04
8.	Conduct a basic energy audit for classroom/lab, record observations and identify energy-saving opportunities.	04
9.	Calculate electricity bills, maximum demand and power factor improvement requirements using practical examples.	02
10.	Study DG set specifications and prepare comparison of APFC, VFD, efficient motors and modern lighting controls.	04
	TOTAL	**30**

Text Book(s):

Title	Author/s	Publication
Electrical Design Estimating and Costing	SK Bhattacharya	Tata McGraw Hill, New Delhi
Electrical Wiring, Estimating & Costing	S. L. Uppal	Khanna Publishers
Energy Engineering and Management	Amlan Chakrabarti	PHI Learning Pvt Ltd
Energy Auditing in Electrical Utilities	Rajiv Shankar	Viva Books

Reference Book(s):

Title	Author/s	Publication
A Course in Electrical Installation Estimating & Costing	J. B. Gupta	S.K. Kataria & Sons

Web Material Link(s):

- https://beeindia.gov.in/sites/default/files/1Ch3.pdf
- http://www.gcekjr.ac.in/pdf/lectures/2020/2688I_5th%20Semester_Electrical%20Engineering.pdf

Course Evaluation:

Theory:

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

Practical/Tutorial:

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

Course Outcome(s):

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

IDET2040	**Electrical Estimation and Energy Auditing**
CO 1	Understand electrical symbols, standards, wiring systems, service connections, and regulations.
CO 2	Apply earthing methods, protection systems, and safety practices in electrical installations.
CO 3	Perform domestic, industrial, and commercial electrical estimation for installations.
CO 4	Analyze electrical system performance, demand management, power factor, motor and lighting efficiency.
CO 5	Evaluate energy audit methods, DG systems, and modern energy-efficient technologies.

Mapping of CO with PO

IDET2040	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2	1	1	1	1	1	1	1	1	1
CO 2	2	2	2	1	1	3	1	3	1	1	1
CO 3	3	3	3	2	2	1	1	1	2	2	3
CO 4	2	3	2	3	2	1	2	1	1	1	2
CO 5	2	3	2	3	2	2	3	1	1	2	2

Mapping of CO with PSO

IDET2040	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	3	2	1

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

Level of Revised Bloom's Taxonomy in Assessment:

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

Module No	Content	RBT Level
1	Electrical Symbols, Standards & Regulations	1, 2
2	Internal Wiring Systems & Service Connections	1, 2
3	Earthing & Safety in Electrical Installations	2, 3
4	Domestic Electrical Estimation	2, 3, 5
5	Industrial & Commercial Estimation	3, 4, 6
6	Energy Management & Audit Basics	1, 2
7	Electrical System Performance & Motor/Lighting Efficiency	3, 6
8	DG Systems & Energy-Efficient Technologies	3, 6

P P Savani University
School of Engineering
Institute of Diploma Studies
Department of Electrical Engineering

Course Code: IDET2500
Course Name: Electrical Power Generation
Prerequisite Course(s):

Teaching & Examination Scheme:

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

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

- To provide students with the knowledge and skills required to plan, estimate, and implement safe and efficient electrical installations, understand wiring systems, earthing, protection, and safety practices, and develop awareness of energy management, electrical system performance, and modern energy-efficient technologies used in domestic, commercial, and industrial applications.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	**Basics of Power Generation & Power Plants:** Sources of electrical power & energy classification, Renewable vs Non-renewable energy, General components of a power plant, Comparison of major types of power plant.	04	12
2.	**Hydroelectric Power Plant:** Site selection factors, Classification & layout of hydro plant, Working principle and components, Water hammer effect, Advantages, disadvantages & environmental impact	06	12
3.	**Thermal Power Plant:** Site selection factors, Layout & working of thermal (steam) plant, Comparison of thermal & hydro plant, Advantages, disadvantages & environmental issues.	06	12
4.	**Nuclear, Diesel & Gas Turbine Power Plants:** Nuclear power plant: layout, working & impacts, Diesel power plant: schematic & components, Gas turbine plant: schematic & components.	05	10
5.	**Solar Photovoltaic System:** Photovoltaic effect, Construction of solar cell/module & PV array, Materials used in solar cells, Stand-alone & grid-interactive systems, Environmental impact & merits/demerits.	06	15
6.	**Wind Power Plant:** Global & local wind energy, Site selection factors, Horizontal vs vertical axis wind turbines, Environmental impact of wind plants.	05	15
7.	**Tidal, Wave, Ocean Thermal & Biomass Power Plants:** Tidal power plant – types & layout, Wave energy – devices & classification, Ocean Thermal Energy Conversion (OTEC) – working & advantages, Biomass power & biogas plants.	06	12
8.	**Fuel Cells & Power Factor Improvement:** Fuel cells – classification, working & applications, Hybrid PV systems, Power	07	12

	factor – meaning & causes of low P.F., Methods of power factor improvement & capacitor selection.		
	TOTAL	**45**	**100**

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Study of Hydroelectric Power Plant layout, components & working using model / simulation / chart.	02
2.	Study of Thermal (Steam) Power Plant layout & working; comparison with hydro plant.	02
3.	Study of Nuclear Power Plant & safety systems with block diagram.	02
4.	Study of Diesel & Gas Turbine Power Plant using schematic diagram & simulation kit.	02
5.	Construction and characteristics of Solar PV cell/module; I–V measurements.	04
6.	Study of Solar PV array design and estimation of energy generation for a given location.	02
7.	Study of Horizontal vs Vertical axis Wind Turbine using model/simulation & analysis of power coefficient.	04
8.	Study of Tidal, Wave, OTEC and Biomass power plants with schematic explanation.	04
9.	Study and testing of Fuel Cell stack (Hydrogen / Polymer Electrolyte) and performance measurement.	04
10.	Power Factor improvement experiment using capacitor bank selection and demonstration.	04
	TOTAL	**30**

Text Book(s):

Title	Author/s	Publication
Power Plant Engineering	A.K. Raja, Amit Prakash, Manish Dwivedi	New Age International

Reference Book(s):

Title	Author/s	Publication
Power Plant Engineering	P.K. Nag	Tata McGraw-Hill
A Course in Power Plant Engineering	S.C. Arora & S. Domkundwar	Dhanpat Rai
Renewable Energy: Power for a Sustainable Future	Godfrey Boyle	Oxford University Press
Non-Conventional Energy Sources	G.D. Rai	Khanna Publications

Web Material Link(s):

- **https://www.electrical4u.com/electric-power-generation/**
- **https://study.madeeasy.in/ee/power-generation-concepts/power-generation**
- **https://vardhaman.org/wp-content/uploads/2021/03/Power-System-Generation.pdf**
- https://electrical-engineering-portal.com/download-center/books-and-guides/electricity-generation-t-d/notes-tnd

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 will be evaluated out of 10 marks per each practical and the average of the entire practical will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/test consists of 15 marks.
- External viva consists of 15 marks.

Course Outcome(s):

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

IDET2500	**Electrical Power Generation**
CO 1	Understand basics of power generation and types of power plants
CO 2	Explain the construction and working of hydro, thermal, nuclear, diesel & gas turbine power plants.
CO 3	Analyze layout, operation & performance of solar and wind power systems.
CO 4	Evaluate operating principles of tidal, wave, OTEC & biomass power plants and compare advantages/disadvantages.
CO 5	Apply concepts of fuel cells and power factor improvement in electrical systems.

Mapping of CO with PO

IDET2500	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2	1	1	1	2	1	1	2	1	2
CO 2	3	3	2	2	1	2	1	1	2	2	2
CO 3	3	3	3	2	2	3	1	1	2	2	2
CO 4	2	3	3	2	3	3	1	1	2	2	3
CO 5	2	3	2	3	2	3	1	2	2	3	3

Mapping of CO with PSO

IDET2500	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	3	2	1
CO 3	3	3	2
CO 4	3	2	3
CO 5	2	3	3

Level of Revised Bloom's Taxonomy in Assessment:

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

Module No	Content	RBT Level
1	Basics of Power Generation	1,2
2	Hydroelectric Power Plant	2, 3
3	Thermal Power Plant	2,3,4
4	Nuclear, Diesel & Gas Turbine Power Plants	2, 3, 4
5	Solar PV Systems	3,4,5
6	Wind Power Plant	3,4
7	Tidal / Wave / OTEC / Biomass	3,4,5
8	Fuel Cells & Power Factor Improvement	3,5

P P Savani University
School of Engineering
Institute of Diploma Studies
Department of Electrical Engineering

Course Code: IDET2510
Course Name: Introduction to Switchgear & Protection
Prerequisite Course(s):

Teaching & Examination Scheme:

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

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

- To help learners to gain knowledge of the operation and testing of basic switchgear, circuit breakers and relays, and be able to apply protection techniques for electrical equipment.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	**Basics of Switchgear & Protection:** Need of switchgear, indoor/outdoor types, fault types, introduction to fuses & MCB	05	10
2.	**Fuses & Miniature Circuit Breaker:** Types of fuses, HRC fuse operation, fuse characteristics, MCB rating & application.	06	12
3.	**ELCB / RCCB / MCCB:** Working principles, differences, applications, advantages of earth leakage protection.	06	12
4.	**Basics of High-Voltage Circuit Breakers:** Introduction to ACB, VCB and SF6 breakers - purpose, advantages and industry examples	06	12
5.	**Introduction to Protective Relays:** Need of relays, types - over-current, earth-fault, over-voltage; simple relay characteristics.	06	14
6.	**Equipment Protection Basics:** Transformer protection (Buchholz idea), alternator protection (simple overview), feeder protection (time grading idea).	06	14
7.	**Control Panels & Contactors:** Control panel sections, isolators, SFU, contactors, push buttons, indicators.	05	12
8.	**Testing and Field Practices:** Preventive maintenance of switchgear, simple continuity & insulation testing, safety checks.	05	14
	TOTAL	**45**	**100**

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Identification of switchgear components (Fuse, MCB, ELCB, MCCB)	02
2.	Testing of fuse and selection of fuse rating	02
3.	Testing of MCB and plotting time–current characteristics	04
4.	Demonstration of ELCB/RCCB operation	04
5.	Study and servicing of MCCB	02
6.	Study of contactor and auxiliary contacts	02
7.	Continuity and insulation testing on a control panel	04

8.	Identification and wiring of push buttons and selector switches	02
9.	Assembly and testing of a mini-control panel for motor start/stop	04
10.	Safety inspection and preventive maintenance checklist for a switchgear panel	04
	TOTAL	**30**

Text Book(s):

Title	Author/s	Publication
Switchgear and Protection	Sunil S. Rao	Khanna Publishers
Power System Protection & Switchgear	Badri Ram	Tata McGraw-Hill
Electrical Power Systems	C. L. Wadhwa	New Age International

Reference Book(s):

Title	Author/s	Publication
Protection and Switchgear	Bhuvanesh Oza	McGraw-Hill
Principles of Power Systems	V.K. Mehta	S. Chand
Electrical Safety & Industrial Practices	Andrew Hurst	Elsevier

Web Material Link(s):

- https://www.electrical4u.com/electrical-switchgear-protection/
- https://www.youtube.com/playlist?list=PLm_MSClsnwm_MGFxcos9bQ1BPujUF7YEx
- https://onlinecourses.nptel.ac.in/noc21_ee110/preview

Course Evaluation:

Theory:

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

Course Outcome(s):

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

IDET2510	Introduction to Switchgear & Protection
CO 1	Identify and explain basic switchgear equipment, fault types, and protection devices used in electrical systems.
CO 2	Demonstrate the operation, characteristics, applications, and testing of common protection devices such as fuse, MCB, ELCB, RCCB, and MCCB.
CO 3	Understand the working principles and applications of high-voltage circuit breakers including ACB, VCB, and SF6 breakers.
CO 3	Understand the working of protective relays used for protection of transformers, alternators, feeders, and distribution systems.
CO 4	Perform basic inspection, continuity and insulation testing of low-voltage control panels and apply preventive maintenance and safety practices.

Mapping of CO with PO

IDET2510	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2			1						
CO 2	3	3		1	2						

CO 3	3	2			1						
CO 4	3	3	1	1	2						
CO5	2	2	1	2	3			1	1	1	

Mapping of CO with PSO

IDET2510	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	3	2	2
CO 3	3	3	2
CO 4	2	3	3
CO5	1	2	1

Level of Revised Bloom's Taxonomy in Assessment:

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

Module No	Content	RBT Level
1	Basics of Switchgear & Protection	1, 2
2	Fuses & Miniature Circuit Breaker	2, 3
3	ELCB / RCCB / MCCB	2, 3
4	Basics of High-Voltage Circuit Breakers	2, 3
5	Introduction to Protective Relays	3, 4
6	Equipment Protection Basics	3, 4
7	Control Panels & Contactors	2, 3
8	Testing and Field Practices	3, 5

P P Savani University
School of Engineering
Institute of Diploma Studies
Department of Electrical Engineering

Course Code: IDET2520
Course Name: Basic Electrical Power Transmission
Prerequisite Course(s):

Teaching & Examination Scheme:

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

CE: Continuous Evaluation, ESE: End Semester Exam

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

- Understand the basic concepts of electric power transmission and distribution.
- Learn types of transmission lines, line parameters, insulators and string efficiency.
- Acquire knowledge of corona, sag, stringing charts and line performance.
- Study components of substations, protection and distribution systems.
- Develop the ability to analyse modern HVDC, EHV AC, underground cables and smart-grid technologies.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	**Introduction to Power Transmission:** Structure of power system, transmission vs. distribution, high voltage advantages, standard transmission voltages, bundled & compact conductors.	04	10
2.	**Transmission Line Components:** Line conductors, line supports, insulators, types of insulators, string efficiency, grading, cross-arms, line hardware fittings.	06	12
3.	**Line Parameters:** Resistance, inductance, capacitance of single-phase & 3-phase lines, transposition of lines, line modelling (short, medium, long line concept – qualitative).	06	12
4.	**Performance of Transmission:** Voltage regulation, transmission efficiency, ABCD parameters (basics), power flow concepts.	05	10
5.	**Corona & Sag:** Corona formation, critical voltages, corona loss, factors affecting corona; Sag in overhead lines, stringing charts, effect of ice/wind.	06	15
6.	**Underground Cables:** Classification, construction, insulating materials, capacitance of single-core cable, grading of cables, comparison between overhead & underground systems.	05	15
7.	**Substations & Distribution:** Substations – types, layout, busbars, isolators, circuit breakers; Distribution systems – radial, ring, interconnected, voltage drop, feeder design.	06	13
8.	**EHV, HVDC & Smart Grid:** HVDC transmission basics, advantages, comparison with HVAC; FACTS devices (elementary ideas), smart grid, SCADA basics.	07	13

	TOTAL	**45**	**100**

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Demonstrate the construction and types of overhead transmission line conductors (ACSR, AAAC, bundled conductors).	04
2.	Demonstrate cable jointing procedures of LV/MV underground unarmored cables.	02
3.	Demonstrate cable jointing procedures of LV/MV armored cables.	02
4.	Study about the types of insulators used in transmission (pin, suspension, strain, post insulators) and calculate string efficiency.	04
5.	Perform practical on different types of conductors & line hardware (clamps, spacers, dampers, ties, jumper fittings).	04
6.	Study about the types of transmission towers (tangent, tension, terminal, special towers) with dimensions & materials.	04
7.	Perform practical on different types of connectors used in transmission lines (compression, bolted, wedge, PG clamps).	04
8.	Demonstrate corona effect using high-voltage demonstration kit / simulation and prepare observation report.	02
9.	Interpret and explain a given 132/220/400 kV Sub-Station blueprint (single line diagram).	02
10.	Demonstrate use of crimping tools to fit lugs at the ends of overhead line conductors / XLPE cables.	02
	TOTAL	**30**

Text Book(s):

Title	Author/s	Publication
Electrical Power Systems	C.L. Wadhwa	New Age International

Reference Book(s):

Title	Author/s	Publication
Principles of Power System	V.K. Mehta & Rohit Mehta	S. Chand
A Course in Power Systems	J.B. Gupta	S.K. Kataria & Sons
Power System Analysis	Hadi Saadat	McGraw Hill

Web Material Link(s):

- https://electrical-engineering-portal.com/download-center/books-and-guides/electricity-generation-t-d/class-notes-power-tnd
- https://www.electrical4u.com/transmission-line-in-power-system/
- https://www.electricaleasy.com/2016/03/basics-of-electrical-power-transmission.html
- https://www.power-and-beyond.com/basics-of-an-electrical-power-transmission-system-a-9430aaa14780c59e275d80ca9e4605f1/

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 will be evaluated out of 10 marks per each practical and the average of the entire practical will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/test consists of 15 marks.
- External viva consists of 15 marks.

Course Outcome(s):

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

IDET2520	**Basic Electrical Power Transmission**
CO 1	Understand the structure of power transmission systems and identify line components.
CO 2	Analyze transmission line parameters and evaluate their impact on system performance.
CO 3	Evaluate corona, sag, overhead line behavior and compare with underground cable systems.
CO 4	Explain substation components, layouts, distribution systems and safety devices.
CO 5	Apply concepts of EHV, HVDC transmission and smart–grid technologies.

Mapping of CO with PO

IDET2520	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	3	2	1	1	2	1	1	2	1	2
CO 2	3	3	3	2	1	2	1	1	2	2	2
CO 3	3	3	2	2	2	3	1	1	2	2	3
CO 4	2	3	3	2	3	3	1	1	2	2	3
CO 5	2	3	2	3	2	3	1	2	2	3	3

Mapping of CO with PSO

IDET2520	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	3	2	1
CO 3	3	3	2
CO 4	3	2	3
CO 5	2	3	3

Level of Revised Bloom's Taxonomy in Assessment:

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

Module No	**Content**	**RBT Level**
1	Introduction to Power Transmission	1, 2
2	Line Components	2, 3

3	Line Parameters	2, 3, 4
4	Line Performance	2, 4
5	Corona & Sag	2, 4
6	Underground Cables	3, 4
7	Substations & Distribution	2, 3, 4
8	EHV, HVDC & Smart Grid	3, 5

P P Savani University
School of Engineering
Institute of Diploma Studies
Department of Electrical Engineering

Course Code: IDET2530
Course Name: Basic Distribution and Utilization of Electrical Power
Prerequisite Course(s):

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
				Theory		Practical		Tutorial		Total
Theory	Practical	Tutorial	Credit	CE	ESE	CE	ESE	CE	ESE	
03	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 the fundamentals of electrical power distribution systems and utilization of electrical energy.
- To study various distribution schemes, equipment, tariffs, and protection methods.
- To develop knowledge of electrical heating, illumination, electric traction, and energy-efficient utilization systems.
- To familiarize students with modern electrical utilization practices and safety measures.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	**Electrical Traction Supply System**: Current scenario of railway electrification in India, single line diagram of traction substation, OHE system, catenary and contact wire, span, stagger, interrupter, isolator, pantograph, neutral section, NETRA car, auxiliary supply systems, train lighting supply, distributed and concentrated power systems, comparison of powering methods.	06	14
2.	**Electrical Locomotive Systems:** Classification of electrical locomotives, electric supply to locomotive, pantograph, ARNO converter, static converter, hotel load converter, dynamic, rheostatic and regenerative braking, DPWCS, locomotive power circuit block diagram, three-phase AC locomotive, effect of speed on specific energy consumption.	07	14
3.	**Applications of Electric Furnace:** Application of electric arc furnace in steel industries, steel industry scenario in India, methods of steel production, construction and operation of EAF, terminology related to EAF, energy balance, energy-efficient EAF technologies.	06	12
4.	**Electrostatics Applications**: Applications of electrostatics in paint systems, charged particles, electrostatic painting principles, charging methods, Faraday cage effect, wraparound effect, high-voltage supply systems, electrostatic accessories, importance of coating material resistivity.	05	10
5.	**Electroplating Applications:** Industrial applications of electroplating, principle of electroplating, materials used in electroplating, electroplating process and industrial safety	04	10

	considerations.		
6.	**Street Lighting & Illumination Engineering**: Components of street lighting systems, luminous flux, intensity, luminous efficacy, chromaticity coordinates, colour temperature, colour rendering index, laws of illumination, street light pole arrangement, pole spacing optimization, wattage estimation, illumination measurement, ILER, energy-efficient lighting practices.	08	18
7.	**Applications of Regenerative Braking**: Regenerative braking in electric vehicles, trains, metros, e-bicycles and buses, energy-saving calculations considering different efficiencies, comparison of energy-saving methods and braking performance.	04	10
8.	**Reactive Power Compensation**: Concept of reactive power, causes of low power factor, capacitor compensation methods, centralized/group/individual compensation, capacitor rating calculations, star and delta capacitor connections.	05	12
	TOTAL	**45**	**100**

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Draw and explain substation layout from supply to electric train preferably using computer software tool. (Autocad)	04
2.	Estimate illuminance points and average illuminance levelat any residential / commercial / industrial /academic workplace.	04
3.	Measurement of illumination at specific point / place using inverse square law	02
4.	To estimate the Installed Load Efficacy Ratio (ILER) of a drawing hall or workshop.	04
5.	To estimate energy saving due to braking in an electric vehicle on both flat and descending road surfaces.	04
6.	To estimate energy saving by regenerative braking in an electric train considering the number of stops.	02
7.	To perform power factor improvement in a single phase circuit using a capacitor and measurement of reactive power before and after improvement	02
8.	To perform the power factor improvement in a three phase circuit using capacitor connection in star and delta configuration and measurement of reactive power before and after improvement	04
9.	To estimate the optimum distance between two streetlight poles.	02
10.	To estimate the wattage rating of a street-light luminaire using assumed or standard data	02
	TOTAL	**30**

Text Book(s):

Title	Author/s	Publication
Utilization of electrical power and electric traction	J B Gupta	Khanna Publication
Utilization of electric energy	Er. Tarlok Singh	S.K. Kataria & Sons

Reference Book(s):

Title	Author/s	Publication
Principal of power system	V. K. Mehta	S. Chand & Company Ltd

Web Material Link(s):

- https://formlabs.com/global/blog/electroplating-metal-

plating/?srsltid=AfmBOoqfMcQKJi7weqMbEJuzz2Bliye9y9DBZ
- https://howelectrical.com/electroplating/
- Street Lighting Design: Layout & Calculations | Electrical4U

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 will be evaluated out of 10 marks per each practical and the average of the entire practical will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/test consists of 15 marks.
- External viva consists of 15 marks.

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

IDET2530	Basic Distribution and Utilization of Electrical Power
CO 1	Understand electrical traction supply systems, locomotive systems, and modern railway electrification practices.
CO 2	Explain the construction, operation, and energy-efficient technologies used in electric furnaces and induction heating systems.
CO 3	Understand electrostatic painting, electroplating processes, and their industrial applications.
CO 4	Analyze illumination systems, street lighting design, and regenerative braking applications for energy conservation.
CO 5	Apply reactive power compensation methods and power factor improvement techniques for efficient utilization of electrical power.

Mapping of CO with PO

IDET2530	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	3	2	1	1	1	1	1	2	1	2
CO 2	3	3	3	2	1	1	1	1	2	2	2
CO 3	3	3	3	2	2	1	1	1	2	2	2
CO 4	2	3	3	3	1	1	1	2	2	3	2
CO 5	2	3	3	3	1	1	1	2	2	3	2

Mapping of CO with PSO

IDET2530	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	3	2	1

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

Level of Revised Bloom's Taxonomy in Assessment:

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

Module No	Content	RBT Level
1	Electrical Traction Supply System	1, 2
2	Electrical Locomotive Systems	3
3	Applications of Electric Furnace	4
4	Electrostatics Applications	2
5	Electroplating Applications	3, 4
6	Street Lighting & Illumination Engineering	3, 4
7	Applications of Regenerative Braking	2, 5
8	Reactive Power Compensation	3, 6

P P Savani University
School of Engineering
Institute of Diploma Studies
Department of Electrical Engineering

Course Code: IDET2540
Course Name: Power Electronics
Prerequisite Course(s):

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
				Theory		Practical		Tutorial		Total
Theory	Practical	Tutorial	Credit	CE	ESE	CE	ESE	CE	ESE	
03	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 the fundamentals of power electronic devices and circuits.
- To study the operation of rectifiers, choppers and inverters.
- To learn protection and control techniques used in power electronics.
- To understand applications of power electronics in industrial and renewable energy systems.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	**Introduction to Power Electronic Devices:** Need, classification and applications of power electronic devices. Overview of SCR, TRIAC, DIAC, UJT, IGBT, GTO, MCT and power transistor.	05	10
2.	**Characteristics and Protection of Power Semiconductor Devices:** Working, characteristics, ratings and protection of SCR and other devices, dv/dt, di/dt protection, snubber circuit, heatsink, freewheeling diode, commutation methods and datasheet parameters.	08	18
3.	**Uncontrolled Rectifiers:** Single-phase and three-phase uncontrolled rectifiers, six-phase rectifiers, RMS and average values, transformer reactance and PIV.	06	14
4.	**Controlled Rectifiers and Regulators:** Single-phase half-wave and full-wave controlled rectifiers, AC load control using SCR and regulator circuits.	05	10
5.	**DC Choppers:** Working principle of choppers, classification and configuration of choppers, Class A, B, C, D and E choppers, chopper control techniques, Jones chopper and Morgan chopper, applications of choppers in DC drives and renewable energy systems.	06	14
6.	**Inverters and PWM Techniques:** Principle and classification of inverters, single-phase series and parallel inverters, half-bridge and full-bridge inverters, square-wave and quasi-square-wave inverters, voltage control methods, PWM techniques.	06	14
7.	**Multilevel Inverters and Harmonics:** Introduction to multilevel inverters, three-level diode-clamped and capacitor-clamped	04	10

	inverters, basics of harmonics, harmonic effects on power quality.		
8.	**Applications of Power Electronics in Renewable Energy Systems:** Applications of inverters in solar energy systems, buck and boost converters, power quality improvement, role of power electronics in energy-efficient systems, industrial and modern applications of power converters.	05	10
	TOTAL	**45**	**100**

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Study of SCR, TRIAC and DIAC characteristics	04
2.	Study of commutation and protection circuits	04
3.	Analysis of rectifier circuits	02
4.	Study of controlled rectifier circuits	02
5.	Study of chopper circuits	04
6.	Implementation of inverter circuits	02
7.	PWM waveform analysis	02
8.	Harmonic analysis in inverter circuits	04
9.	Study of multilevel inverter	04
10.	Study of solar inverter applications	02
	TOTAL	**30**

Text Book(s):

Title	Author/s	Publication
Power Electronics	Rashid, Muhammad H.	PHI Learning, New Delhi latest edition
Power Electronics	Singh,M. D. K. Khanchandani, B.	Tata Mc. Graw Hill, New Delhi

Reference Book(s):

Title	Author/s	Publication
Power Electronics	Bimbhra, P.S.	Khanna Publisher, New Delhi latest edition
Power Electronics and its Application	Alok Jain	PENRAM International Publishing

Web Material Link(s):

- www.nptel.iitm.ac.in
- www.howstuffworks.com
  https://www.vlab.co.in/

Course Evaluation:

Theory:

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

Practical:

- Continuous Evaluation consists of the performance of practical, which will be evaluated out of 10 marks per each practical and the average of the entire practical will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/test consists of 15 marks.
- External viva consists of 15 marks.

Course Outcome(s):

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

IDET2540	Power Electronics
CO 1	Identify and explain various power semiconductor devices and their applications.
CO 2	Understand protection methods and commutation techniques used in power electronic devices.
CO 3	Analyze uncontrolled and controlled rectifier circuits and regulators.
CO 4	Explain the operation and control of choppers and inverter circuits.
CO 5	Apply PWM techniques and power electronic converters in renewable energy systems.

Mapping of CO with PO

IDET2540	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	2			1						
CO 2	3	3		1	2						1
CO 3	3	3	1	1	2			1			
CO 4	3	2	2	1	2				1		
CO 5	2	2	2	1	3	1	1		1	1	

Mapping of CO with PSO

IDET2540	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	3	2	1
CO 3	3	2	3
CO 4	3	3	2
CO 5	3	3	3

Level of Revised Bloom's Taxonomy in Assessment:

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

Module No	Content	RBT Level
1	Introduction to Power Electronic Devices	1, 2
2	Characteristics and Protection of Power Semiconductor Devices	3
3	Uncontrolled Rectifiers	2,4
4	Controlled Rectifiers & Regulators	3, 4
5	DC Choppers	4
6	Inverters & PWM Techniques	3, 5
7	Multilevel Inverters & Harmonics	4
8	Renewable Energy Applications	6

P P Savani University
School of Engineering
Institute of Diploma Studies
Department of Electrical Engineering

Course Code: IDET2550
Course Name: Electrical Measurements and Measuring Instruments
Prerequisite Course(s):

Teaching & Examination Scheme:

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

CE: Continuous Evaluation, ESE: End Semester Exam

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

- To understand the basics of electrical measurement and measuring instruments.
- To learn the working and construction of ammeters, voltmeters, watt meters and energy meters.
- To develop skills in calibration and testing of electrical instruments.
- To apply different methods for measurement of resistance, inductance and capacitance.
- To use transducers and CRO for measurement of electrical and physical quantities.

Course Content:

Module No.	Content	Hours	Weightage in %
1.	**MEASURING INSTRUMENTS:** Define Accuracy, precision, Errors, Resolutions Sensitivity and tolerance. Classification of measuring instruments. Explain Deflecting, controlling and damping arrangements in indicating type of instruments. Calibration of instruments.	06	12
2.	**ANALOG AMMETERS AND VOLTMETERS:** Describe Construction, principle of operation, errors, ranges merits and demerits of: Moving iron type instruments. Permanent Magnet Moving coil type instruments. Dynamometer type instruments Rectifier type instruments Induction type instruments Extend the range of instruments by use of shunts and Multipliers. Solve Numerical	06	12
3.	**WATTMETERS AND MEASUREMENT OF POWER:** Describe Construction, principle of working of Dynamometer type wattmeter. (LPF and UPF type) The Errors in Dynamometer type wattmeter and methods of their correction. Discuss Induction type watt meters.	06	12
4.	**Energy Meters & Power Measurement:** Induction type energy meter – construction & working, Calibration and testing of energy meter, Measurement of 1-phase and 3-phase power, Power measurement under balanced and unbalanced conditions	05	10
5.	**Resistance Measurement Techniques**: Classification of resistance – low/medium/high, Kelvin's double bridge, Wheatstone bridge, Ammeter–voltmeter method, Ohmmeter,	07	15

	megger, multi-meter, Importance of earth resistance and earth tester		
6.	**A.C. Bridges – Capacitance & Inductance Measurement:** Working principle of A.C. bridges, Maxwell, Anderson, Hays & Desauty bridge, Wien's bridge, Applications in measurement of inductance & capacitance.	07	15
7.	**Transducers:** Sensors and transducers, their types, and applications in measuring temperature, pressure, and flow	04	12
8.	**OSCILLOSCOPE:** Principle of operation of Cathode Ray Tube. Principle of operation of Oscilloscope (with help of block diagram). Measurement of DC Voltage & current. Measurement of AC Voltage, current, phase & frequency	04	12
	TOTAL	**45**	**100**

List of Practical/Tutorial:

Sr. No.	Name of Tutorial	Hours
1.	Calculate absolute error, relative error and percentage error for given instrument readings.	01
2.	Compare PMMC and Moving Iron instruments and calculate instrument sensitivity for given values.	01
3.	Calculate value of shunt and multiplier required to extend the range of ammeter and voltmeter.	02
4.	Solve numerical problems on power measurement using dynamometer wattmeter under UPF and LPF conditions.	02
5.	Calculate energy consumption, meter constant and percentage error during calibration of energy meter.	01
6.	Measure and calculate power in balanced and unbalanced three-phase systems using wattmeter methods.	02
7.	Determine unknown resistance using Wheatstone bridge, Kelvin double bridge and Ammeter-Voltmeter method.	02
8.	Solve numerical problems using Maxwell, Anderson, Hays and Wien bridge for inductance and capacitance measurement.	01
9.	Calculate sensitivity and output response of temperature and pressure transducers for given input conditions.	01
10.	Calculate frequency, phase angle and peak-to-peak voltage using CRO waveforms and time-period measurements.	02
	TOTAL	**15**

Text Book(s):

Title	Author/s	Publication
Electrical & Electronic Measurements & Instrument	A.K. Sawhney	Dhanpat Rai Publications

Reference Book(s):

Title	Author/s	Publication
Electrical Measurement & Measuring Instruments	E W Golding & FC Widdis	5th Edition London, Sir Isaac Pitman & Sons Ltd., London

Web Material Link(s):

- https://www.tutorialspoint.com/electronic_measuring_instruments/index.htm
- https://onlinecourses.nptel.ac.in/noc25_ee123/preview

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

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 will be evaluated out of 10 marks per each practical and the average of the entire practical will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/test consists of 15 marks.
- External viva consists of 15 marks.

Course Outcome(s):

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

IDET2550	**Electrical Measurements and Measuring Instruments**
CO 1	Understand the basic concepts of measurement, accuracy, precision and classification of measuring instruments.
CO 2	Explain the construction, working and characteristics of various ammeters, voltmeters and watt meters.
CO 3	Analyze the working, calibration and testing of energy meters and measurement of single-phase and three-phase power.
CO 4	Apply suitable methods for measurement of low, medium and high resistance using bridges and testing instruments.
CO 5	Measure inductance and capacitance using A.C. bridges; and analyze transducers and CRO for electrical measurements.

Mapping of CO with PO

IDET2550	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	3	2	1	1	1	1	1	2	1	2
CO 2	3	3	3	2	1	1	1	1	2	2	2
CO 3	3	3	3	2	2	1	1	1	2	2	2
CO 4	2	3	3	3	1	1	1	2	2	3	2
CO 5	2	3	3	3	1	1	1	2	2	3	2

Mapping of CO with PSO

IDET2550	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	3	2	1
CO 3	3	2	3
CO 4	3	3	2

CO 5	3	3	3

Level of Revised Bloom's Taxonomy in Assessment:

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

Module No	Content	RBT Level
1	Measuring Instruments.	1, 2
2	Analog Ammeters & Voltmeters.	2, 3
3	Wattmeters & Power Measurement.	2, 3, 4
4	Energy Meters & 1-Φ / 3-Φ Power Measurement	3, 4, 5
5	Resistance Measurement Techniques	3, 4
6	A.C. Bridges Capacitance & Inductance Measurement	3, 4, 5
7	Transducers	2, 3
8	Oscilloscope (CRO)	3, 4