



# **First Year Curriculum**

**Admission Year 2026-27**

## **Bachelor of Technology Robotics and Artificial Intelligence**

**Faculty of Engineering & Technology**

**Parul University**

**Vadodara, Gujarat, India**

## Semester 1

- . **Course Name:** Principles of Communication Skills
- a. **Course Code:** 03010001HM01
- b. **Prerequisite:** Knowledge of English Language till 12th standard.
- c. **Rationale:** Basic Communication Skills are essential for all Engineers.
- d. **Course Learning Objective:**

<b>CLOBJ 1</b>	Understand the fundamental grammatical structures including parts of speech, punctuation, tenses, phrases, clauses, determiners, Quantifiers, sentence types, and basic concepts of phonetics (IPA symbols, speech sounds, stress, and intonation) for accurate and effective language use.
<b>CLOBJ 2</b>	Develop basic reading and listening comprehension skills by using appropriate strategies to understand simple texts and spoken content with improved pronunciation awareness.
<b>CLOBJ 3</b>	Organize and express ideas clearly in written form through picture-based perception activities.
<b>CLOBJ 4</b>	Build confidence and fluency in spoken communication through correct pronunciation practice, meeting and greeting activities, extempore speech, and everyday conversational exercises.
<b>CLOBJ 5</b>	Apply goal-setting and self-reflection techniques to monitor personal language learning progress, pronunciation improvement, and overall communication skills development.

### f. Course Learning Outcomes:

<b>CLO 1</b>	Identify and explain parts of speech, punctuation marks, tenses, phrases, clauses, determiners, Quantifiers, sentence structures, and basic IPA phonetic symbols for accurate language use.
<b>CLO 2</b>	Demonstrate effective basic conversational exchanges and short extempore speeches using correct pronunciation, appropriate greetings, logical organization of ideas, and improved fluency.
<b>CLO 3</b>	Apply basic reading and listening strategies to comprehend short passages and spoken texts, recognizing appropriate pronunciation, stress, and intonation patterns.
<b>CLO 4</b>	Analyse personal communication performance and evaluate SMARTER goals through self-assessment and reflective practices to monitor language and pronunciation improvement.
<b>CLO 5</b>	Compose structured short picture-based perceptions by developing clear topic sentences, supporting details, and coherent conclusions with grammatical accuracy.

**g. Teaching & Examination Scheme:**

Teaching Scheme Hrs/Week			Credit	Examination Scheme					Total
Lec.	Tut.	Lab		Internal			External		
				T	CE	P	T	P	
0	0	2	1	-	-	20	-	30	50

**Lec.-** Lecture; **Tut.-** Tutorial; **T-** Theory; **P-** Practical; **CE-** Continuous Evaluation.

**h. Course Content**

**Lab (Practical)**

Sr.	Content	Weightage	Teaching Hrs.	CO	BT
1	Parts of Speech, Punctuation and Tenses using time line <ul style="list-style-type: none"> <li>• Overview of 8 parts of speech</li> <li>• Basic punctuation marks and their usage</li> <li>• Types: Present, Past, Future</li> <li>• Forms and correct usage</li> <li>• Common tense errors</li> </ul>	10%	4	1	1
2	Introduction to Phonetics-Symbols and Pronunciation <ul style="list-style-type: none"> <li>• Introduction to Phonetics and IPA</li> <li>• English Speech Sounds</li> <li>• Stress and Intonation</li> </ul>	10%	4	1	1
3	Phrase and Clauses; Types of Sentence (Structure Wise) <ul style="list-style-type: none"> <li>• Difference between phrases and clauses</li> <li>• Classification of Simple, Compound &amp; Complex</li> <li>• Interchange of Simple to Compound, Simple to Complex, Compound to Complex</li> </ul>	8%	2	1	1
4	Picture Perception <ul style="list-style-type: none"> <li>• Observing and interpreting images</li> <li>• Building a short story or description</li> <li>• Improving vocabulary and creativity</li> </ul>	14%	4	3,4	3,6

5	<p>Determiners and Quantifiers</p> <ul style="list-style-type: none"> <li>• Types of determiners</li> <li>• Order of determiners in a sentence</li> <li>• Quantifiers with countable and uncountable nouns</li> <li>• Common errors in the use of determiners and Quantifiers</li> </ul>	8%	2	3	6
6	<p>Meeting and Greeting (Initiating a conversation)</p> <ul style="list-style-type: none"> <li>• Basic conversation skill</li> <li>• Formal and informal greetings</li> <li>• Common phrases for starting interactions</li> </ul>	10%	4	4	2,3
7	<p>Reading Comprehension (Level of difficulty-Basic)</p> <ul style="list-style-type: none"> <li>• Types – Skimming &amp; Scanning</li> <li>• Reading short passages</li> <li>• Identifying main ideas and details</li> <li>• Answering basic questions</li> </ul>	10%	2	2	2
8	<p>Listening Comprehension</p> <ul style="list-style-type: none"> <li>• Listening to short audios/Conversation</li> <li>• Understanding and responding to key information</li> </ul>	8%	2	2	2
9	<p>Extempore Speech</p> <ul style="list-style-type: none"> <li>• Speaking on random topics</li> <li>• Organizing thoughts quickly</li> <li>• Improving fluency and confidence</li> </ul>	12%	4	4	3
10	<p>Goal Setting and Tracking</p> <ul style="list-style-type: none"> <li>• Setting SMARTER goals</li> <li>• Planning and tracking progress</li> <li>• Self-assessment and reflection</li> </ul>	10%	2	5	5
		<b>100%</b>	<b>30</b>		

#### i. Reference Books:

- Murphy, Raymond. *English Grammar in Use*. Cambridge University Press, 2019.
- Swan, Michael. *Practical English Usage*. Oxford University Press, 2016.
- Lewis, Norman. *Word Power Made Easy*. Goyal Publishers, 2014.
- Raman, Meenakshi, and Sangeeta Sharma. *Communication Skills*. Oxford University Press, 2017.

- Kaul, Asha. *Business Communication*. PHI Learning, 2014.
- Lucas, Stephen E. *The Art of Public Speaking*. McGraw-Hill Education, 2015.
- Bailey, Stephen. *Academic Writing: A Handbook for International Students*. Routledge, 2018.
- Balasubramaniam, T. *A Textbook of English Phonetics for Indian Students*. Macmillan Publishers, 2012

a. **Course Name:** Student Induction Program with Essence of Indian Knowledge System

b. **Course Code:** 03010001MC01

c. **Prerequisite:**

d. **Rationale**

e. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	0	0	0	-	-	-	-	-	-

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

f. **Course Content:**

Sr. No.	Topics	Weightage	Teaching Hours
1	<b>Activities in Mathematics</b> Exploring 3D Shapes (Cylinder, Cone, Cube, Cuboid) The Geometry of Conic Sections: Properties and Applications Measuring the Height of a Tree or Building Using Trigonometry Techniques for Measuring Top and Bottom Angle Reflections Fundamental Elements of Set Theory Set Theory Tools for Probability Analysis Key Concepts in Combinatorial Mathematics Probability Fundamentals: Key Ideas and Concepts Foundations of Statistical Theory: Key Concepts Explained Principles of Geometric Progressions and Series Matrix Application in Cryptography An experimental approach to measure velocity and acceleration Analysing Rate of Change and Optimisation Utilising Integration for Problem Solving A B C of Tangrams	2%	3
2	<b>Activities in Communication Skills</b> Phase-1: Part of Speech, Articles, Tenses, Basic Sentence Formation Phase-2: Verb, Subject Verb Agreement, Active Passive Voice, Idioms and Phrases Phase-3: Introduction to IKS, Indian ways of Speaking and Listening, Healthy Daily Life: The Indian Way, Indian Achievers and Innovations	3%	3
3	<b>Activities in Computer Science</b> <b>Computer Basic Architecture:</b> Introduction to Computer Systems, Von Neumann Architecture, Components of a Computer: CPU, Memory, I/O devices, Data Representation and Number Systems, Registers, ALU, Control Unit, Memory Hierarchy:	5%	2

	Cache, RAM, ROM, Secondary Storage Indian Knowledge System in Context of Computing: Historical Contributions of Indian Scholars to Mathematics and Computing, Algorithms in Ancient Indian Texts, Concept of Zero and Decimal Number System, Indian Logic and Computation Models, Sanskrit Computational Models and Grammar, Traditional Indian Computing Tools and Techniques, Integration of Traditional Knowledge with Modern Computing Emerging Technologies in Computer Engineering: Introduction to Artificial Intelligence and Machine Learning, Internet of Things (IoT), Blockchain Technology, Quantum Computing Basics, Edge Computing and Cloud Computing Advances, Cybersecurity Trends and Challenges, 5G and Networking Innovations, Bioinformatics and Computational Biology, Robotics and Automation in Computing		
4	<b>Activities of Physics</b> Measurement, Electrostatics, Electromagnetism, Optics, Laser and Fiber Optics, Vedic Physics and Cosmology	10%	3

- a. **Course Name:** Engineering Graphics and Design
- b. **Course Code:** 03010901ES02
- c. **Prerequisite:** Zeal to learn the subject
- d. **Rationale:** Engineering Graphics is the language of communication for Engineers. Engineering Graphics course provides tools and techniques of communication for various fields of Engineering

**e. Course Learning Objective:**

<b>CLOBJ 1</b>	Understand the use of drawing instruments, BIS standards, scales, and engineering drawing conventions.
<b>CLOBJ 2</b>	Develop the ability to construct various engineering curves using standard drafting techniques.
<b>CLOBJ 3</b>	Understand and draw projections of points, lines, and planes using orthographic projection methods.
<b>CLOBJ 4</b>	Develop skills in drawing sections of solids and development of surfaces using reference planes.
<b>CLOBJ 5</b>	Apply principles of orthographic and isometric projections for visualization of 3D objects.
<b>CLOBJ 6</b>	Introduce basic 2D and 3D drafting techniques using AutoCAD software.

**f. Course Learning Outcomes:**

<b>CLO 1</b>	Understand the uses of drawing instruments, accessories, scales and BIS drawing standards in engineering graphics
<b>CLO 2</b>	Form various engineering curves using basic drafting techniques.
<b>CLO 3</b>	Illustrate the projections of points, lines and planes in different quadrants using orthographic projection techniques.
<b>CLO 4</b>	Draw section of solids and development of surfaces using reference planes.
<b>CLO 5</b>	. Draw orthographic and isometric projections of 3D objects using basic principles of projection
<b>CLO 6</b>	. Draft 2D and 3D engineering drawings with aid of basic AutoCAD.

**g. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	0	4	4	20	20	20	60	30	150

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**h. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<b>Introduction</b> Scope of Engineering Drawing in all Branches of Engineering, Uses of Drawing Instruments and Accessories, Introduction to Drawing Standards BIS-SP-46, Representative Fraction, Engineering Scales, Dimensioning Terms and Notations, Types of Lines used in Engineering. Practice recommended by BIS	5%	0
2	<b>Engineering Curves</b> Classification of Engineering Curves, Application of Engineering Curves, Constructions of Engineering Curves - Conics, Spirals, Involute and Cycloids with Tangents and Normals.	10%	5
3	<b>Principles of Projections</b> Types of Projection, Parallel Projection, One-point Perspective projection. Introduction to principal planes of projections, Projections of the points: Projections of the points located in same quadrant and different quadrants. Projections of line: Projections of line with its inclination to one reference plane and with two reference planes. True length and inclination with the reference planes. Projections of planes: Projections of planes (polygons, circle and ellipse) with its inclination to one reference plane and with two reference planes, Concept of auxiliary plane method for projections of the plane	10%	4
4	<b>Projections and Development of Solids</b> Projections of Solids: Classifications of basic Solids, Projections of Solids - Right Regular Prism, Pyramid, Cone, Cylinder, Tetrahedron and Cube; Sectional Views. Development of Surfaces: Methods of Development of Lateral Surfaces of Right Regular Solids, Parallel Line Development and Radial Line Development, Applications of Development of Surfaces	10%	4
5	<b>Orthographic and Isometric Projections</b> Orthographic Projections: Principle of orthographic projections, Conversion of pictorial views into orthographic projections including sectional orthographic projections. <b>Isometric Projections:</b> Conversion of orthographic views into isometric projections/views.	20%	10

Sr. No.	Content	Weightage	Teaching Hours
6	<b>Computer Aided Drafting</b> Basic User Interface of Drafting Software, Demonstration of basic modelling commands, Preparation of 2D and 3D models using Drafting Software	5%	0

**i. Text Book and Reference Book:**

1. A Text Book of Engineering Graphics (TextBook) By P.J.Shah | S.Chand & Company Ltd., New Delhi | 2021st edition
2. Engineering Drawing By N. D. Bhatt | Charotar Publishing House | 55th edition, Pub. Year 2010
3. A Text Book of Engineering Drawing By P.S.Gill | S.K. Kataria & Sons | 2013th edition
4. Engineering Graphics with Auto CAD By James D.Bethune, | Pearson Education | 2020th edition

**j. Experiment List:**

Sr. No.	Experiment List
1	Demonstration of different drawing instruments, dimensioning systems, symbols and Engineering Scale.
2	Exercise on Projections of Points and Lines.
3	Exercise on Projections of Planes.
4	To draw a sheet involving Projections of Solids and Sections of Solids
5	To draw a sheet involving Development of Surfaces.
6	Practice sheets on Orthographic Projections. .
7	Practice sheets on Isometric Projection.
8	Demonstration of Industrial Drawings.
9	To create basic objects (2D sketches) using Computer Aided Drafting tool
10	To create precise drawing (3D modeling), dimensions and editing using Computer Aided Drafting tool

- a. **Course Name:** Design Thinking
- b. **Course Code:** 03016001ES01
- c. **Prerequisite:** Observing Nature, Good Listener
- d. **Rationale:** This course is intended for students from any discipline who require an understanding of design thinking for brand, product, and service development. Students will learn a series of design thinking concepts, methods and techniques that are used to bring about innovation in business and in the social sector
- e. **Course Learning Outcomes:**

<b>CLO 1</b>	To expose the student with state-of-the-art perspectives, ideas, concepts, and solutions related to the design and execution of projects using design thinking principles.
<b>CLO 2</b>	To prepare the mindset and discipline of systemic inspiration driven by a desire to identify new sources of ideas, and new models especially outside their regular working atmosphere.
<b>CLO 3</b>	To propose a concrete, feasible, viable and relevant innovation project/challenge.

f. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	0	4	3	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

g. **Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<b>Introduction</b> Introduction to Design Thinking: Introduction to Design Thinking, Understanding the Mindsets-Empathy, Optimism, Embrace Ambiguity, make it, Learn from Failure, Iterate, Create Confidence, Creativity Convergent & Divergent Thinkin	8%	5
2	<b>Approach towards Design Thinking</b> Listening and Empathizing Techniques observation structured open ended approach, Design Thinking Frameworks, Ideation tools: brainstorming, innovation	15%	9

	heuristics, behaviour models, overcoming cognitive fixedness (Exercises and case-based discussions)		
3	<b>Tools in Design Thinking</b> Use of Diagrams and Maps in Design Thinking, Empathy map, Affinity diagram, mind map, journey map, combining ideas into complex innovation concepts. Story telling: improvisation, scenario planning, development of scenarios, evaluation tools, frog design and prototyping Exercises and case-based discussions: Assess developer and user perspectives for bias, apply frameworks to strengthen communication, sustain a culture of innovation.	25%	15
4	<b>The Design Challenge</b> Define the Design Challenge, Prototyping & Iteration- Feasibility Study, Testing Documentation and the Pitching	17%	10
5	<b>Conceptualization</b> Visual thinking, concept generation methodologies, Concept Selection, Concept Testing, Prototyping	10%	6

#### h. Experiment List

Sr. No	Experiment List
1	Conduct a group storytelling activity to introduce the concept of design thinking by identifying a user need and creatively presenting a solution.
2	Carry out empathy-building interviews in pairs to understand user emotions and experiences, then map your findings using an empathy map.
3	Explore creativity by performing divergent and convergent thinking exercises to generate a wide range of ideas and then filter them into practical solutions.
4	Visit a common space and conduct an observational study to understand user behavior and identify challenges or opportunities.
5	Interview a peer using open-ended questions to gain deeper insights into their daily technology-related challenges.
6	Organize a brainstorming session with your team to ideate solutions for a selected campus issue using time-boxed idea generation techniques.
7	Apply innovation heuristics such as TRIZ principles to improve or redesign an existing product or service.
8	Construct an empathy map using real user data collected from interviews to identify user needs, pains, and gains.
9	Create an affinity diagram by grouping and organizing similar insights and observations from your user research
10	Develop a user journey map that outlines a day-in-the-life experience of a target user to highlight pain points and opportunities for design
11	Build a comprehensive mind map to visualize and connect various stakeholders, problems, and potential solution areas.

Sr. No	Experiment List
12	Design and build a low-cost prototype such as a wallet or simple tool using paper, cardboard, or recyclable materials.
13	Frame a clear and focused problem statement for your design project using the “How Might We” approach
14	Create a low-fidelity prototype of your proposed solution by sketching or assembling a basic model.
15	Conduct a peer testing session to gather feedback on your prototype and document key takeaways and suggestions for improvement.
16	Prepare and deliver a 3-minute pitch presentation of your final design solution using visual aids such as slides or posters

- a. **Course Name:** Programming for Problem Solving
- b. **Course Code:** 03016001PC01
- c. **Prerequisite:** Requires Basic Knowledge of Computer
- d. **Rationale:** This course is design to provide basic ideas of computer programming. This course also makes help to understand programming language. It will help to develop their logical abilities
- e. **Course Learning Objective:**

<b>CLOBJ1</b>	Recognize and recall fundamental principles and organizations of computers, demonstrating a foundational understanding of computer architecture and design.
<b>CLOBJ2</b>	Comprehend the concepts of computer programming languages, illustrating a grasp of syntax, semantics, and the essential components of programming languages.
<b>CLOBJ3</b>	Develop algorithms for solving basic engineering problems, demonstrating the ability to apply theoretical knowledge to practical problem-solving scenarios.
<b>CLOBJ4</b>	Demonstrate proficiency in the practical application of C programming by writing, compiling, and debugging programs, showcasing the ability to implement and troubleshoot code effectively.
<b>CLOBJ5</b>	Evaluate and analyse complex computational programs written in C, demonstrating the capacity to assess and understand intricate solutions to computational challenges.
<b>CLOBJ6</b>	Develop simple projects using the C programming language, showcasing creativity and application of learned principles to produce functional and practical software solutions.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	. Recognize the computer's basic principles and organizations
<b>CLO 2</b>	Understand Concepts of Computer Programming Language.
<b>CLO 3</b>	. Develop the algorithm for solving basic Engineering Problems.
<b>CLO 4</b>	Write, Compile and debug program with C Programming.
<b>CLO 5</b>	Analyse the Solved, Complex Computational Program written in C
<b>CLO 6</b>	Develop simple projects using C Language

g. **Teaching Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	2	4	20	20	30	60	20	150

**L-** Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

**h. Course Content:**

<b>Sr. No.</b>	<b>Content</b>	<b>Weightage</b>	<b>Teaching Hours</b>
1	Introduction to 'C' Programming What is C language, History of C language, Application areas of C, Features of C language, structure of C Program, execution flow of program, reading a character, writing a character, formatted input, formatted output functions.	20%	9
2	Constants, Variables, Data Types, Operators and Expressions Constants, Variables, Data Types: Character Set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of Variables, Assigning values to variables, typedef, and Defining symbolic constants. Operators and Expression: Introduction to Operators and its types, Evaluation of expressions, Precedence of arithmetic operators, Type conversions in expressions, Operator precedence and associativity	20%	9
3	Control structures in C Decision Making & branching: Decision making with If & If .. Else statements, If .. Else statements (Nested .... Ladder), The Switch, The break statement & goto statements, The ternary (?:) Operator Looping: The while statement, & The Do.. While loop, The FOR loop, Jump within loops – Program	20%	9
4	Arrays and Strings Arrays: Introduction, One-dimensional array, Two-dimensional array, Concept of Multidimensional arrays. Strings: String declaration, storage, Built-in-string functions	20%	9
5	User-Defined Functions, Structure and Unions User-Defined Functions: Concepts of user defined functions, prototypes, definition of function, parameters, parameter passing, calling a function, recursive function, Macros, Pre-processing. Structure and Unions: Introduction, Structure definition, declaring and initializing Structure variables, Accessing Structure members, Copying & Comparison of structures, Arrays of structures, Arrays within structures, Structures within Structures, Structures and functions, Unions	20%	9
6	Pointers, Dynamic memory allocation and File Management in C Pointers: Basics of pointers, pointer to pointer, pointer and array, Pointer to array, array of pointers , functions returning pointers Dynamic memory allocation: Introduction to Dynamic memory allocation, malloc(), calloc(),		

	free(), realloc(). File Management in C: Introduction and standard file handling functions		
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**i. Text books:**

1. Programming in ANSI C (TextBook) By E. Balaguruswamy | Tata McGraw-Hil
2. C Programming: Test Your Skills By Ashok Kamthane
3. Computer Fundamentals By P.K.Sinha and Priti Sinha | BPB Publications | 4th Editio
4. Star C Programming STAR Certification | C Certification Exam
5. Programming with C By Byron Gottfried | Tata McGraw Hill Educatio
6. C The Complete Reference By Herbert Schild
7. Let Us C By Yeshavant Kanetkar | BPB Publications

**j. Experiment List**

Sr. No	Experiment List
1	<p>Practical Set 1 (Basics)</p> <ol style="list-style-type: none"> <li>1. Write a program to print HELLO FRIENDS!</li> <li>2. Write a program that reads two nos. from key board and gives their addition, subtraction, multiplication, division and modulo.</li> <li>3. Write a program to calculate area of circle,use <math>\Omega</math> as symbolic constants.</li> <li>4. Write a program to convert days into months and days.</li> <li>5. Write a program which calculates the summation of three digits from the given 3 digit number.</li> <li>6. Write a program to demonstrate enumerates data type.</li> <li>7. Write a program to compute Fahrenheit from centigrade.</li> <li>8. Write a program to calculate simple interest.</li> <li>9. Read the price of item in decimal form e.g. 12.50 and separate Rs and Paise from the given value e.g. 12 rupees and 50 paise.</li> </ol>
2	<ol style="list-style-type: none"> <li>4. Write a C program using do...while and for loop constructs to reverse the digits of the number.</li> <li>5. Write a program to demonstrate use of Switch- Break Statement.</li> <li>6. Write a program to find out all the numbers divisible by 5 and 7 between 1 to 100.</li> </ol> <p>Check for Armstrong number. A number is Armstrong if sum of cube of every digit is same as the original number. E.g.</p> <p>153=13+53+33=153</p>

Sr. No	Experiment List
	<p>1. Write a program to print the output of bellow series. <math>1!+2!+3!+4!+ \dots + n!</math></p> <p>2. Write a program to print the following outputs using for Loop.</p> <p>(a) 1 (b) *</p> <p>12 **</p> <p>123 ***</p> <p>1. Write a program to print the following outputs using for Loop.</p> <p>(a) 1 (b) 321</p> <p>21 21</p> <p>321 1</p>
3	<p>Practical Set 3 (Array &amp; Strings)</p> <p>1. Write a program which sorts 10 numbers into ascending order.</p> <p>2. Write a program to find maximum element from 1-D array.</p> <p>3. Write a program to find number of odd and even elements from the 1-D array.</p> <p>4. Write a program add two 2x2 matrices.</p> <p>5. Write a program to count number of positive, negative and zero elements from 3x3 matrix.</p> <p>6. Write a function for the following operations on string:</p> <p>Copy one string to another</p> <p>Comparing two strings</p> <p>Adding a string to the end of another.</p> <p>1. Write a program to count vowels from a entered String.</p> <p>2. Write a program which finds whether a string is a palindrome or not</p>
4	<p>Practical Set 4 (Functions)</p> <p>1. Write a program to find factorial of a number using recursion.</p> <p>2. Write a program that used user defined function Swap ( ) and interchange the value of two variable.</p> <p>3. Write a function to return 1 if the number is prime otherwise return 0</p>
5	<p>Practical Set 5 (Structures)</p> <p>1. Define a structure type, personal that would contain person name, date of joining and salary.</p> <p>2. Define a structure called cricket that will describe the following information: Player name Team name Batting average</p>
6	<p>Practical Set 6 (Pointers) 1. Write a program to add two numbers using pointers. 2. Write a program to swap two numbers using pointers. Practical Set 6 (Pointers)</p> <p>1. Write a program to add two numbers using pointers.</p>

Sr. No	Experiment List
	2. Write a program to swap two numbers using pointers..
7	Practical Set 7 (File Management) 1. Write a program to illustrate reading files contents. 2. Write a program to illustrate the use of fgets( )

a. **Course Name:** Calculus

b. **Course Code:** 03019101BS01

c. **Prerequisite:** Basic concepts of Calculus

d. **Rationale:** : Calculus is the branch of mathematics that deals with continuous change. Calculus is also called infinitesimal calculus or “the calculus of infinitesimals”. The meaning of classical calculus is the study of continuous change of functions. Most of these quantities are the functions of time such as velocity is equal to change in distance with respect to time

e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Understand the consequences of various mean value theorems and fundamental theorems of calculus.
<b>CLOBJ 2</b>	Apply multivariable calculus techniques for optimization and partial differentiation problems.
<b>CLOBJ 3</b>	Solve problems involving double and triple integration for area and volume calculations.
<b>CLOBJ 4</b>	Analyze line, surface, and volume integrals using vector calculus.
<b>CLOBJ 5</b>	Apply Green’s, Gauss’s, and Stokes’ theorems in engineering and mathematical applications.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Understand the consequences of various mean value theorems for differentiable functions
<b>CLO 2</b>	. Apply the concept of Multivariate calculus in optimization problems. .
<b>CLO 3</b>	Apply the concept of multiple integration in problems.
<b>CLO 4</b>	Analyze Inter-relationship amongst the line integral, double and triple integral formulations.
<b>CLO 5</b>	. Realize importance of Green, Gauss and Stokes’ theorems in other branches of mathematics.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	0	0	4	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

## h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Application of Functions of One Variable Review of the function of one variable, limit, continuity, and differentiability, mean value theorems and applications, Riemann integration, fundamental theorem of calculus, application to length, area, volume, and surface area of revolution.	5%	2
2	Multivariate Calculus Functions of several variables, limit and continuity, partial derivatives and differentiability, composite functions, chain rule, implicit functions, Euler's theorem, Taylor's expansion, Jacobian, maxima and minima, method of Lagrange multipliers.	10%	4
3	Multiple Integration Double integration, change of order, change into polar form, application to area and volume.	10%	2
4	Vector Calculus Vector-valued function, velocity and acceleration, the gradient of a scalar function, directional derivatives, divergence and curl of a vector-valued function. Parameterization of curves and surfaces, vector fields, line integrals, Green's theorem, surface integrals, Gauss divergence theorem and Stokes' theorems with applications.	10%	4

## i. Reference Books:

1. Calculus and Analytic Geometry, (TextBook) By G. B. Thomas, Jr. and R. L. Finney, | Pearson India
2. Calculus, By Ron Larson, Bruce Edwards, | Cengage Learning
3. Calculus: Early Transcendentals, By James Stewart, | Brooks/Cole.
4. Calculus, By Tom M Apostol, | Wiley Publication.
5. Practical English Usage MICHAEL SWAN, A Remedial English Grammar for Foreign Student F.T. WOOD
6. On Writing Well. William Zinsser; Harper Paperbacks, 2006; 30th anniversary edition
7. Oxford Practice Grammar, John Eastwood; Oxford University Press

- a. **Course Name:** Physics of Semiconductors
- b. **Course Code:** 03019201BS01
- c. **Prerequisite:** Knowledge of Physics and some basic concepts in Mathematics like differentiation, integration, limit, differential equation, vector calculus up to 12th science level
- d. **Rationale:** Knowledge of physics is essential for all Engineering branch because physics is the foundation subject of all the branches of engineering and it develops scientific temperament and analytical capability of engineering students. Comprehension of basic physics concepts enables the students to solve engineering problem logically and develop scientific approach

e. **Course Learning Objective:**

<b>CLOJ 1</b>	Understand semiconductor materials using band theory concepts.
<b>CLOJ 2</b>	Explain principles of optoelectronic devices and optical fibers.
<b>CLOJ 3</b>	Understand the fundamentals of quantum mechanics and quantum computing.
<b>CLOJ 4</b>	Analyze low-dimensional and nanomaterials with their applications.
<b>CLOJ 5</b>	Develop knowledge of semiconductor-based modern technologies.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	To conceptualize semiconducting materials on the basis of band theory
<b>CLO 2</b>	To get familiar with optical fibres and semiconductor based optoelectronic devices useful in fibre optic system. .
<b>CLO 3</b>	To conceptualize the foundational principles of quantum Physics and their role in quantum computing.
<b>CLO 4</b>	Formulate and conceptualize various theoretical aspects and the physical phenomena at Low dimensional level (nano)

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	2	4	20	20	20	60	30	150

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

## h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Band theory & Semiconductors Band structure of solid materials, E-k diagram, Direct and Indirect band gap, Effective mass, Concept of Fermi Energy, Density of state, Fermi Level in Intrinsic and Extrinsic Semiconductors, Ohmic and Schottky Junction	5%	2
2	Optoelectronics Interaction of radiation with Matter, Absorption, Spontaneous and Stimulated emission, Characteristics of Lasers, Diode Laser, LED, Photodiode and their applications. Principle and Structure of Optical Fiber, Numerical Aperture of fiber, Types of Optical Fibers, Attenuation in Optical Fibers, Applications of Optical Fibers.	10%	4
3	Quantum Mechanics & Quantum Computing Quantum postulates, wave function, Schrodinger's equation time dependent, independent (No derivation), One dimensional potential well, quantum tunneling and its application in soft computing Key Principles of Quantum Computing, Difference between classical and quantum computing, Quantum Computing advantages Challenges and Application.	10%	2
4	Low Dimensional Materials Basic characteristic including synthesis, properties, quantum confinement, classification: Quantum Dot, Quantum well, Quantum Wire and their applications, Novel Materials and their applications	10%	4

## i. Reference Books:

8. Physics of Semiconductor Devices (TextBook) By S. M. Sze and K. N. Kwok | John Wiley & Son
9. Semiconductor Optoelectronic Devices By P. Bhattacharya | Prentice Hall of India, Pub. Year 1997
10. Engineering Physics (TextBook) By B.K.Pandey S Chaturvedi and M. Venkanna | - Cengage Publication
11. Semiconductor Optoelectronics (TextBook) By J. Singh | McGraw-Hill Inc, Pub. Year 1995

## i. Experiment List

Sr. No.	Experiment List
1	I-V characteristics of light emitting diode in forward bias.
2	I-V characteristics of Zener diode in reverse bias.
3	Determination of Velocity of ultrasonic waves in water. .
4	Determination of Dielectric constants of Dielectric samples.

Sr. No	Experiment List
5	Measurement of Band gap of semiconductor material.
6	Measurement of Hall coefficient and carrier concentration in semiconductor material.
7	Measurement of Planck's constant using LED.
8	Measurement of wavelength of laser light using diffraction grating.
9	Measurement of Numerical aperture of an optical Fiber.
10	Determination of the size of lycopodium powder particles.
11	Measurement of power loss in an optical fibre
12	Moment of Inertia of a flywheel
13	Young's Modulus by bending of beam.
14	Create a low-fidelity prototype of your proposed solution by sketching or assembling a basic model.
15	Conduct a peer testing session to gather feedback on your prototype and document key takeaways and suggestions for improvement.
16	Prepare and deliver a 3-minute pitch presentation of your final design solution using visual aids such as slides or posters

## Semester-2

- a. Course Name:** Mechanics of Solid
- b. Course Code:** 03016002PC01
- c. Prerequisite:** System of units, Laws of motion, Basic idea of force, Concept of centroid, Fundamentals of stress, strain and their relationships
- d. Rationale:** Mechanics of Solids is conceptual application of principles of mechanics in Engineering.
- e. Course Learning Outcomes:**

<b>CLO 1</b>	Apply fundamental principles of mechanics & principles of equilibrium to simple and practical problems of Engineering.
<b>CLO 2</b>	Determine centroid and moment of inertia of a different geometrical shape and able to understand its importance.
<b>CLO 3</b>	Apply principles of statics to determine reactions & internal forces in statically determinate beams.
<b>CLO 4</b>	Know basics of friction and its importance through simple applications.
<b>CLO 5</b>	Understand behavior & properties of engineering materials.

**f. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	2	4	20	20	20	60	30	150

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**g. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<b>INTRODUCTION</b> Forces/Equilibrium of Rigid body, Scalar and vectors, system of forces, resultant force, Statics of particles. Free-body diagrams. Equilibrium of particle in two dimensions, Resultants of three or more concurrent forces, Resolution of a force into components. Rectangular components of a force. Resultants by rectangular components, Concurrent force system in space: Resolution of a force into rectangular components in space, Coplanar Non-Concurrent Force Systems, Moments about Points and Axes, Equilibrium, Non-coplanar Non-concurrent Forces	15	5

Sr. No.	Content	Weightage	Teaching Hours
2	<b>CENTROID MOMENT OF INERTIA</b> Distributed forces: Centroid and centre of gravity. Determination of centroid of lines and areas using the integral technique, Determination of centroid of composite wires and areas, Centroid of volumes. Theorems of Pappus Guldinus and its applications, Second moment of areas, Definition of the moment of inertia. Determination of moment of areas by integration, Parallel axis theorem for Moment of Inertia. MI of composite areas, Concept of Mass moment of inertia of bodies.	15	5
3	<b>BEAMS</b> Definitions, types of beams, types of loading, types of supports. Determination of reactions for simply, Supported and overhanging beams. Relation between distributed load, Shear force and Bending Moment, Shear force and Bending moment in beams with diagrams	20	6
4	<b>FRICITION</b> The Laws of Dry Friction. Coefficients of Friction, Angles of Friction, Analysis of systems involving dry frictions such as ladders spheres etc, Belt Friction, Analysis of flat and v-belt.	10	4
5	<b>SIMPLE STRESSES &amp; STRAINS</b> Basics of stress and strain: 3-D state of stress (Concept only), Normal/axial stresses: Tensile & compressive Stresses: Shear and complementary shear Strains, Linear, shear, lateral, thermal and volumetric. Hooke's law, Elastic Constants: Modulus of elasticity, Poisson's ratio.	10	5

#### h. Text Book and Reference Book:

1.	<b>Engineering Mechanics: Statics and Dynamics</b> By R.C Hibbeler   Prentice Hall of India
2.	<b>Statics and Dynamics</b> By Beer, F.P. and Johnston, E.R. Vector mechanics for engineers   Tata McGraw-Hill
3.	<b>Engineering Mechanics: Statics and Dynamics</b> By J.A Desai and B.B Mistry   Popular Prakashan
4.	<b>Engineering Mechanics: Statics and Dynamics</b> By S Rajsekaran   Vikas Publication
5.	<b>Applied Mechanics (TextBook)</b> By H. J. Shah and S. B. Junarkar   Charotar publication
6.	<b>Engineering Mechanics</b> By S.S. Bhavikatti and K. G. Rajashekarappa   Wiley 'Eastern Ltd
7.	<b>Theory of Structures</b> By S.Ramamrutham   Dhanpat Rai Publishing Company
8.	<b>Theory of Structures</b> By R S KHURMI

a. **Course Name:** Electrical and Electronics Engineering

b. **Course Code:** 03010601ES02

c. **Prerequisite:** Knowledge of Physics and Mathematics up to 12th science level

d. **Rationale:** The main objective of this subject is introductory treatment of the field of Electrical and Electronics Engineering to the students of various branches of engineering.

e. **Course Learning Objective:**

<b>CLOBJ 1</b>	To master the application of circuit laws and network theorems for solving DC electrical circuits.
<b>CLOBJ 2</b>	To develop the ability to analyze and calculate parameters for single-phase and three-phase AC systems.
<b>CLOBJ 3</b>	To understand BJT operation and determine stability through DC load line and Q-point analysis.
<b>CLOBJ 4</b>	To design regulated power supplies and understand the functional principles of various transducers.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Apply fundamental electrical laws and circuit theorems to electrical circuits.
<b>CLO 2</b>	Analyse single-phase and three phase AC circuits
<b>CLO 3</b>	Evaluate the operating regions of BJTs through DC analysis and Q-points using load line analysis
<b>CLO 4</b>	Design DC-regulated power supplies using voltage regulators and introduce various transducers with operation.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	2	4	20	20	20	60	30	150

**L-** Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

#### h. Course Content:

Sr.	Topic	Weightage	Teaching Hrs.
1	<b>DC Circuits</b> Concepts of Electrical Current, Voltage, Power and Energy. Electrical circuit elements (R, L and C), voltage and current sources, - Ohm's Law and Kirchoff's Laws, simplifications of networks using series and parallel resistance circuits and its examples, star-delta conversions. Superposition, Thevenin's and Norton Theorems.	20 %	10
2	<b>AC Circuits</b> Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of instantaneous, peak (maximum), average and R.M.S. values, frequency, cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasors, examples based on theory. Analysis with phasor diagrams of R, L, C, R-L, R-C and R-L-C series circuits and its example. study of parallel R-L, R-C and R-L-C circuit, concept of impedance, admittance, conductance and susceptance in case of above combinations and relevant voltage-current phasor diagrams, Resonance in series and parallel circuits. Q-factor. concept of active, reactive and apparent power and power factor. Concept of three-phase supply and phase sequence. Voltages, currents and power relations in three-phase balanced star-connected loads and delta-connected loads along with phasor diagrams with examples.	30 %	13
3	<b>Diode and Transistors</b> Introduction to Ideal Diode, Effect of temperature Ideal diodes, unbiased diode and Forward and reverse bias of Diode. PIV, surge current, Diode as Uncontrolled switch. Rectifiers: Half wave, Full wave, and bridge wave. Ripple factor, PIV rating. Choke and Capacitor input filter rectifiers, Clipper and Clamper circuits, Construction and working of BJT, Characteristics & specifications of BJT (PNP & NPN transistors), Biased and unbiased BJT, Configuration of the transistor, the concept of gain & BW, Operation of BJT in the cut-off, saturation & active regions (DC analysis), BJT as a switch, Transistor as an amplifier, Voltage divider bias and analysis, VDB load line and Q point.	30 %	12
4	<b>Voltage Regulators and Transducers</b> Basic series and shunt regulator, Types of voltage regulator IC: Fixed and adjustable positive and negative linear voltage regulator, IC linear fixed voltage regulator (78XX, 79XX,) Linear Adjustable Regulator, DC Regulated Power supply. Introduction of Transducers. Types of Transducers and its applications	20 %	10

#### \*Continuous Evaluation:

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

#### Reference Books:

1. A textbook of Electrical technology Vol2 by B.L.Theraja | S. Chand Publication
2. Electrical Engineering Fundamentals (Text Book) By V. D. Toro | Prentice Hall India | 2, Pub. Year 198
3. Electrical and Electronics Technology by E. Hughes | Pearson | 10, Pub. Year 2010
4. Basic Electrical Engineering by D. P. Kothari and I. J. Nagrath, | Tata McGraw Hill | 3, Pub. Year 2010
5. Basic Electrical Engineering by D. C. Kulshreshtha | McGraw Hill | 1, Pub. Year 2009
6. Introduction to Electrical Engineering by M.S Sarma, Oxford university press 2001

**i. List of Experiments:**

<b>Sr. No.</b>	<b>Experiment List</b>
1	To study about various electrical and electronics symbols and demonstrate various measuring instruments used in electrical & electronics laboratories.
2	Verification of superposition theorem with DC source.
3	Verification of Thevenin's theorem with DC source.
4	To obtain the Inductance, Capacitance, Power, and Power Factor of the series R-L-C circuit with AC supply using a phasor diagram.
5	Verification of current and voltage relations in three-phase balanced star and delta-connected loads.
6	To plot V-I characteristics of the P-N junction diode.
7	To perform and observe the response of a half-wave rectifier without filter & with (L, C) filter and measure DC voltage regulation and ripple factor for various load currents in the case of filtered output.
8	To perform and observe the response of full wave rectifiers without filter and with (L,C) filter and measure DC voltage regulation and ripple factor for various load currents in the case of filtered output.
9	To plot and study input-output characteristics of the Common Emitter (CE) configuration of the transistor.
10	To perform and observe the response of voltage regulator IC 7805.

- a. **Course Name:** Privacy and Security in Online Social Media
- b. **Course Code:** 03M10002UE01
- c. **Prerequisite:** Basic knowledge of social media, privacy and security
- d. **Rationale:** The course explores the fundamentals of Online Social Networks (OSNs), focusing on data collection, analysis, trust, security, and privacy.
- e. **Course Learning Outcomes:**

<b>CLO 1</b>	Understand Online Social Networks and Data Collection – Explain the fundamentals of online social networks, data collection methods, and the challenges and opportunities associated with them.
<b>CLO 2</b>	Analyze Trust, Credibility, and Reputation in Social Systems – Evaluate the role of trust and reputation in online communities and develop strategies to detect misinformation and enhance credibility.
<b>CLO 3</b>	Examine Privacy and Security Risks in OSNs – Assess the impact of privacy disclosure, phishing, and fraudulent activities in social media and propose countermeasures
<b>CLO 4</b>	Apply Data Collection and Analysis Techniques – Utilize social media APIs and data processing methods to extract, clean, and analyze information from online social networks.
<b>CLO 5</b>	Conduct Research on Emerging OSN Topics – Engage in discussions and research on social media security, privacy, and law enforcement applications, contributing to the field through case studies and research papers

f. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	0	3	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**g. Course Content:**

<b>Sr. No.</b>	<b>Content</b>	<b>Weightage</b>	<b>Teaching Hours</b>
1	Introduction to Online Social Networks Definition and Evolution of Online Social Networks (OSNs), Data Collection from Social Networks, Challenges, Opportunities, and Pitfalls in OSNs, Social Media APIs for Data Extraction.	25%	7
2	Data Collection and Analysis in OSNs Techniques for Collecting Data from Online Social Media, Ethical Considerations in Social Media Data Collection, Data Processing and Cleaning for Analysis, Case Studies on Social Media Data Collection	20%	6
3	Trust, Credibility, and Reputation in Social Systems Understanding Trust and Credibility in Online Communities, Reputation Systems and Their Impact on User Behavior, Detecting Misinformation and Fake News in OSNs, Methods for Enhancing Trustworthiness in Social Media	25%	7
4	Security, Privacy, and Fraud Detection in OSNs Online Social Media and Its Role in Law Enforcement & Policing, Information Privacy: Disclosure, Revelation, and Its Effects, Phishing Attacks in OSNs and Their Countermeasures, Identifying Fraudulent Entities and Fake Profiles in OSNs.	30%	10
5	Research and Practical Applications Review and Discussion of Key Topics (Refresher), Analyzing Real-World OSN Case Studies, Research Paper Discussions on Online Social Networks and Security, Future Trends in OSN Security and privacy	20%	8

**h. Text Book and Reference Book:**

1. "Social Media Mining: An Introduction" – Reza Zafarani, Mohammad Ali Abbasi, Huan Liu: Provides a comprehensive introduction to social media data mining, including machine learning and network analysis techniques.
2. Mining the Social Web" – Matthew A. Russell: Covers data collection, analysis, and visualization techniques using Python and APIs from platforms like Twitter, Facebook, and LinkedIn
3. Security and Privacy-Preserving Techniques in Social Networks" – Barbara Carminati & Elena Ferrari Explores security challenges, privacy risks, and trust management in online social networks.

- a. **Course Name:** Design, Technology and Innovation
- b. **Course Code:** 303106151
- c. **Prerequisite:** Zeal to learn the subject.
- d. **Rationale:** : Design, Technology, and Innovation (DT&I) subject's lies in equipping students with the skills to be creative problem solvers and innovators in a rapidly evolving world. These subjects foster critical thinking, creative exploration, and the ability to translate ideas into tangible solutions, preparing students for future careers and societal challenges
- e. **Course Learning Outcomes:**

<b>CLO 1</b>	Apply design thinking methodologies to identify and solve user-centered problems
<b>CLO 2</b>	Demonstrate creative thinking and effective ideation strategies.
<b>CLO 3</b>	Develop low-fidelity and high-fidelity prototypes and understand fabrication challenges.
<b>CLO 4</b>	Incorporate engineering principles into design and innovation.
<b>CLO 5</b>	Communicate ideas visually through sketching and graphical tools.
<b>CLO 6</b>	Understand the fundamentals of entrepreneurship and the startup process.

f. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	0	3	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

g. **Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	Design Thinking and Methodologies Introduction to Design Thinking:Understanding the design process, user needs, and problem definition. Design Process:Exploring different design methodologies, including brainstorming, sketching, and prototyping. Human and Culture Centered Design:Focusing on user needs, ergonomics, and user	16%	7

<b>Sr. No.</b>	<b>Content</b>	<b>Weightage</b>	<b>Teaching Hours</b>
	experience. Design for Social and Life style change. Concept Generation and Evaluation:Developing and evaluating design concepts through various techniques.		
<b>2</b>	Technology and its Role in Design Technology for Design: Exploring how technology enables and enhances the design process. Specific Technologies: Relevant areas like CAD and Graphics software, 3D printing, Machining technologies, digital fabrication, and other relevant technology. Innovation in Emerging Technologies and methods like AR/VR, IOT, AI and ML, Supply Chain Management and Project Management. Technology to Solution: Understanding how technology can be leveraged to solve real-world problems. Engineering Aspect of design Electrical, Mechanical, Design, Material, Aspect, Safety and Reliability aspect, Sustainable and Eco friendly materials.	<b>22%</b>	<b>10</b>
<b>3</b>	Innovation and EntrepreneurshipIntroduction to Innovation: Understanding the principles of innovation and its role in product development. Role of Innovation in Life and Society Grassroots Innovation: Learning from innovative solutions developed at the community level. Collaborative Innovation: Exploring how different individuals and teams can collaborate to drive innovation. Intellectual Property: Learning about patents, copyrights, and other forms of intellectual property. Business Model Development: Exploring how to develop a business model for a new product or service. Entrepreneurship: Fundamentals of starting a business and the challenges and opportunities of entrepreneurship	<b>18%</b>	<b>8</b>



1	0	2	2	40	-	20	60	30	150
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**Lec.-** Lecture; **Tut.-** Tutorial; **T-** Theory; **P-** Practical; **CE-** Continuous Evaluation.

#### **h. Course Content:**

##### **Lecture**

<b>Sr.</b>	<b>Content</b>	<b>Weightage</b>	<b>Teaching Hrs.</b>	<b>CO</b>	<b>BT</b>
1	Subject Verb Agreement <ul style="list-style-type: none"> <li>• Rules of subject-verb matching</li> <li>• Singular vs plural forms</li> <li>• Common agreement errors</li> </ul>	10%	1	1	1
2	Reported Speech <ul style="list-style-type: none"> <li>• Direct and indirect speech</li> <li>• Changing tenses, pronouns, and time expressions</li> <li>• Reporting statements, questions, and commands</li> </ul>	10%	1	1	1
3	Active and Passive Voice <ul style="list-style-type: none"> <li>• Difference between Active and Passive</li> <li>• Rules for converting sentences</li> <li>• Usage in real-life contexts</li> </ul>	10%	1	1	1
4	Building Vocabulary <ul style="list-style-type: none"> <li>• Word meanings and usage</li> <li>• Synonyms and antonyms</li> <li>• Homonyms, Homophones, Homographs, Idioms</li> </ul>	10%	2	2	2
5	Grooming and Personality Development <ul style="list-style-type: none"> <li>• Importance of dressing and professional etiquette</li> <li>• Building confidence and positive body language</li> </ul>	10%	2	4	3

6	<p>SWOT Analysis and Self Introduction</p> <ul style="list-style-type: none"> <li>Identifying strengths, weaknesses, opportunities, threats</li> <li>Preparing and delivering a confident self-introduction</li> <li>Developing self-awareness and growth mind set</li> </ul>	10%	2	4,5	3,5
7	<p>Reading Comprehension (Level of difficulty-Intermediate)</p> <ul style="list-style-type: none"> <li>Understanding written texts</li> <li>Finding main ideas and supporting details</li> <li>Answering questions accurately</li> </ul>	10%	2	3	4
8	<p>Paragraph Development</p> <ul style="list-style-type: none"> <li>Elements of a paragraph</li> <li>Unity and coherence</li> <li>Types of paragraphs</li> </ul>	10%	1	3	4
9	<p>Essay Writing</p> <ul style="list-style-type: none"> <li>Structure of an essay: introduction, body, conclusion</li> <li>Organizing ideas logically</li> <li>Using appropriate language and tone</li> </ul>	10%	2	4	3
10	<p>Time Management</p> <ul style="list-style-type: none"> <li>Importance of managing time</li> <li>Pomodoro and Eisenhower matrix</li> <li>Prioritization</li> <li>Creating schedules</li> <li>Time Wasters and Time Distractors</li> </ul>	10%	1	5	5
		<b>100%</b>	<b>15</b>		

### Lab (Practical)

Sr.	Content	Weightage	Teaching Hrs.	CO	BT
1	Subject Verb Agreement <ul style="list-style-type: none"> <li>• Fill-in-the-blank exercises</li> <li>• Sentence correction tasks</li> <li>• Group quiz competition</li> <li>• Role-play using correct subject-verb forms</li> </ul>	10%	2	1	1
2	Reported Speech <ul style="list-style-type: none"> <li>• Dialogue conversion practice</li> <li>• Pair work: narrate a conversation</li> <li>• Reporting classroom news</li> <li>• Role-play followed by reporting</li> </ul>	10%	2	1	1
3	Active and Passive Voice <ul style="list-style-type: none"> <li>• Transform active sentences to passive and vice versa</li> <li>• Rewrite instructions in passive voice</li> <li>• Classroom narration using passive structures</li> <li>• Group activity: change story voice</li> </ul>	10%	2	1	1
4	Building Vocabulary <ul style="list-style-type: none"> <li>• Daily word journal</li> <li>• Vocabulary flashcards and games</li> <li>• Synonym-antonym match-up</li> <li>• Word building through storytelling</li> </ul>	10%	4	2	2
5	Grooming and Personality Development <ul style="list-style-type: none"> <li>• Personal grooming checklist task</li> <li>• Group discussion on personality traits</li> <li>• Mock social interaction</li> <li>• Confidence-building exercises</li> </ul>	10%	4	4	3
6	SWOT Analysis with Self Introduction <ul style="list-style-type: none"> <li>• SWOT worksheet filling</li> <li>• Self-introduction in pairs or groups</li> <li>• Strength-sharing circle</li> <li>• Feedback on introductions</li> </ul>	10%	4	4,5	3,5
7	Reading Comprehension (Level of Difficulty –Intermediate) <ul style="list-style-type: none"> <li>• Reading passage followed by Q&amp;A</li> <li>• Find-the-theme activity</li> <li>• Vocabulary hunt from the passage</li> <li>• Summarizing a short text</li> </ul>	10%	4	3	4

8	Paragraph Development <ul style="list-style-type: none"> <li>• Paragraph writing using prompts</li> <li>• Sentence reordering activity</li> <li>• Peer editing for coherence</li> </ul>	10%	2	3	4
9	Essay Writing <ul style="list-style-type: none"> <li>• Brainstorming and outline creation</li> <li>• Writing on guided topics</li> <li>• Peer feedback session</li> <li>• Editing and final draft submission</li> </ul>	10%	4	4	3
10	Time Management and Team Building <ul style="list-style-type: none"> <li>• Create a weekly schedule</li> <li>• Prioritization task (urgent vs important)</li> <li>• Reflection on time use habits</li> </ul>	10%	2	5	5
		<b>100%</b>	<b>30</b>		

**i. Reference Books:**

- Dhanavel, S. P. *English and Soft Skills*. Orient Blackswan, 2010.
- Mitra, Barun K. *Personality Development and Soft Skills*. Oxford University Press, 2011.
- Murphy, Raymond. *English Grammar in Use*. 5th ed., Cambridge University Press, 2019.
- Raman, Meenakshi, and Sangeeta Sharma. *Technical Communication: Principles and Practice*. Oxford University Press, 2004.
- Wren, P. C., and H. Martin. *High School English Grammar and Composition*. S. Chand & Company, 1995.

a. **Course Name:** Environmental Science

b. **Course Code:** 03010002MC01

c. **Prerequisite:** Knowledge of Physics, Chemistry and Mathematics up to 12th science level and Biology up to 10th science level | 03010002MC01 - Environmental Science

d. **Rationale:** The proposed syllabus of Environmental Science is comprehensive and multidisciplinary, reflecting the interconnectedness of ecological systems, technological development, human behavior, and urban planning. This rationale explains the relevance and importance of each thematic area covered: Environmental Health, Ecology, and Quality of Life; Pollution Prevention; Population Growth and Global Environmental Challenges; Environmental Information Systems and Technological Tools; Smart Cities

e. **Course Learning Outcomes**

<b>CLO 1</b>	Analyze the impact of human activities on environmental sustainability and ecosystems.
<b>CLO 2</b>	Promote awareness about biodiversity conservation and its importance for ecological balance.
<b>CLO 3</b>	Assess the effects of pollution and propose strategies for pollution control and waste management
<b>CLO 4</b>	Describe the significance of climate change and its global implications on ecosystems and human life.
<b>CLO 5</b>	Develop skills to evaluate and mitigate environmental risks in industrial and urban development

f. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	0	0	0	20	20	0	60	0	100

**L-** Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

**g. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<p>FUNDAMENTALS OF ENVIRONMENTAL SCIENCE Definition, Principles and Scope of Environmental Science. Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere. Laws of thermodynamics, heat transfer processes, mass and energy transfer across various interfaces, material balance. Meteorological parameters - pressure, temperature, precipitation, humidity, radiation and wind velocity. Interaction between Earth, Man and Environment. Biogeographic provinces of the world and agro-climatic zones of India. Concept of sustainable development goals. Environmental education and awareness. Environmental ethics</p>	14%	4
2	<p>ENVIRONMENTAL POLLUTION AND CONTROL Air, Noise, Water, Soil, Thermal, Marine, and Radioactive pollution, focusing on sources, types of pollutants, and their impacts on human health, plants, and materials. It includes the measurement techniques and standards for air and water quality, along with pollution control devices and methods. Key topics include criteria air pollutants, noise indices, wastewater treatment, and soil pollution management.</p>	14%	4
3	<p>ENVIRONMENT MANAGEMENT AND LEGISLATION Overview of Environmental Laws in India: Constitutional provisions in India (Article 48A and 51A), Forest Conservation Act, 1980, Water (Prevention and Control of Pollution) Act, 1974 amended 1988 and Rules 1975, Air (Prevention and Control of Pollution) Act, 1981 amended 1987 and Rules 1982, Environmental (Protection) Act, 1986 and Rules 1986, The Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016, The Solid Waste Management Rules, 2016, , Noise Pollution (Regulation and Control) Rules, 2000, Environmental Conventions and Agreements: Stockholm Conference on Human Environment 1972, Montreal Protocol, 1987, Basel Convention (1989, 1992), Earth Summit at Rio de Janeiro, 1992, Agenda-21, Global Environmental Facility (GEF), Convention on Biodiversity (1992), UNFCCC, Kyoto Protocol, 1997, Clean Development Mechanism (CDM), Copenhagen Summit, 2009.</p>	14%	4
4	<p>CONTEMPORARY ENVIRONMENTAL ISSUES Current Environmental Issues in India: Environmental issues related to water resource projects - Narmada dam, Tehri dam etc., Hydro-power projects in Jammu &amp; Kashmir etc.. Water conservation-development of watersheds, Rain water harvesting and ground water recharge. National river conservation plan – Namami Gange and Yamuna Action Plan. Eutrophication and restoration of lakes. Conservation of wetlands,</p>	16%	4

	Ramsar sites in India. Climate change - adaptability, energy security, food security and sustainability. Wild life conservation projects: Project tiger, Project Elephant etc., Carbon sequestration and carbon credits. Waste Management – Swachha Bharat Abhiyan. Sustainable Habitat: Green Building, GRIHA Rating Norms. Vehicular emission norms in India. Epidemiological Issues: Fluorosis, Arsenocosis, Goitre, Dengue. Environmental Disasters: Minnamata Disaster, Love Canal Disaster, Bhopal Gas Disaster, 1984		
5	CLIMATE RESILIENT CITY Introduction to Climate Resilience – Understanding the need for cities to adapt to climate change. Impact of Climate Change on Cities – Urban heat islands, flooding, pollution, and infrastructure challenges. Sustainable Urban Planning – Role of green spaces, energy-efficient buildings, and smart city concepts. Green Infrastructure – Importance of urban forests, permeable surfaces, and nature-based solutions. Case Studies and Future Trends – Learning from cities like Singapore, Rotterdam, and Copenhagen.	16%	4

### Reference Books

1. Textbook of Environmental Studies for Undergraduate Courses  
By Erach Bharucha | Universities press
2. Basics of Environmental Studies  
By U K Khare | Tata McGraw Hi
3. Environmental Studies  
By Anindita Basak | Drling Kindersley(India)Pvt. Ltd Pearson
4. Environmental Sciences  
By Daniel B Botkin & Edward A Keller | John Wiley & Sons
5. Air Pollution  
By M. N. Rao and H. V. N. Rao; | Tata McGraw-Hill Publishing Company
6. Environmental Engineering  
By Howard S. Peavy, Donald R. Rowe, George Tchobanoglous | McGraw-Hil

- a. **Course Name:** Workshop
- b. **Course Code:** 03010902ES01
- c. **Prerequisite:** Basics of Physics
- d. **Rationale:** This subject provides essential skills in precision measurement, introduces key manufacturing processes, and builds a strong foundation in engineering materials. It enables students to select appropriate tools, processes, and materials for efficient and high-quality engineering applications

**e. Course Learning Outcomes:**

<b>CLO 1</b>	. Comprehend the safety measures required to be taken while working in workshop
<b>CLO 2</b>	Select the appropriate tools required for specific operation
<b>CLO 3</b>	Select appropriate manufacturing process for a specific job
<b>CLO 4</b>	Prepare the Job by using different manufacturing technique
<b>CLO 5</b>	. Comprehend the properties and characteristic of engineering materials.
<b>CLO 6</b>	Interface Conventional Manufacturing with Internet of Things.

**f. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-	2	3	20	20	20	60	30	150

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**g. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	Metrology and Measurement By Anand Bewoor & Vinay Kulkarni   McGraw-Hill	10%	5
2	Materials Science and Engineering By William D. Callister   Jr, John Wiley & sons   7	15%	6

Sr. No.	Content	Weightage	Teaching Hours
3	Fundamentals of machining and machine tools By Boothroyd   CRC Publication	15%	6
4	Engineering Metrology and Measurement By N V Raghavendra and Krishnamurthy   Oxford University Press	20%	10
5	Production Technology By R.K. Jain   Khanna Pub.	20%	5
6	"Internet of Things: A Hands-on Approach" By Arshdeep Bahga, Vijay Madiseti   Universities Press	10%	5

#### **h. Text Book and Reference Book:**

1. Elements of Mechanical Engineering, by S.B. Mathur, S. Domkundwar, Dhanpat Rai & Sons Publications.
2. Thermal Engineering, by R.K Rajput, Laxmi Publications.
3. Thermal Science and Engineering, by Dr. D. S. Kumar, S. K. Kataria and sons Publishers.
4. Basic Mechanical Engineering, by T. S. Rajan, Wiley Eastern Ltd
5. Fundamental of Mechanical Engineering, by G. S. Sawhney, PHI Publication New Delhi.

#### **i. Experiment List**

Sr. No.	Experiment List
1	Identify different sections of workshop and Draw Workshop Layout. Familiarization with work shop facility, Introduction to different shops of the Workshop and equipment and Workshop Layout
2	Discuss safety precautions for working on shop floor. Introduction to Industrial safety and its norms, Introduction to various safety equipment and its application, Importance of Industrial safety, Causes of accidents and its prevention method
3	Measure a given job using Vernier caliper and micrometer. Introduction to measuring instruments Hands on practice of the Vernier caliper, micrometer and bevel protractor
4	Demonstration of basic hand tools and power tools. Introduction to basic hand tools - Tape measure, combination square, hammers, fasteners, wrenches, pliers, saws, tube cutter, chisels, vice and clamps, tapping and threading. Adhesives Introduction to Power tools: Power saws, band saw, jigsaw, angle grinder, belt sander, bench grinder, rotary tools. Various types of drill bits
5	Demonstration of operations performed on Lathe Machine. Demonstrations of Conventional manufacturing Prozesse
6	Demonstration of welding, soldering and brazing

7	Demonstration of Casting Process .
8	Prepare a job of Fitting, Carpentry and Sheet metal.
9	Demonstration of CNC milling
10	Demonstration of 3D Printing and AR-VR.
11	Demonstration of Metallography
12	Interfacing Raspberry Pi board with LED

a. **Course Name:** Linear Algebra

b. **Course Code:** 03019102BS01

c. **Prerequisite:** Basic Knowledge of Matrix and Determinant

d. **Rationale:** To attain the knowledge of Matrices and apply to the engineering field to check the consistency of the system. The concept of vector space helps to understand programming in field of computer engg.

e. **Course Learning Outcomes:**

<b>CLO 1</b>	Understand system of linear algebraic equation and solution techniques using matrix
<b>CLO 2</b>	Exhibit the understanding of vector space and subspace and solve related problems.
<b>CLO 3</b>	Compute eigenvalues and eigenvectors and diagonalize the matrix
<b>CLO 4</b>	Create orthogonal and orthonormal bases: Gram-Schmidt process and use bases and orthonormal bases to solve application problem

f. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

g. **Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	Matrices Introduction, System of linear equations (Homogeneous and Nonhomogeneous systems) by Gauss Elimination, and LU Decomposition Method, Rank, Eigenvalues and Eigenvectors, Algebraic and Geometric Multiplicity, Diagonalization, Cayley-Hamilton theorem and Applications-coding-decoding, Principal Component Analysis (PCA).	8%	5
2	Vector Space Vector spaces over the field of real numbers, Elementary Properties of Vector Spaces, Subspaces, Spanning set, Linear	15%	9

	independence and dependence, Basis and Dimension.		
3	Linear Transformation Definition of Linear Transformation from $\mathbb{R}^n$ to $\mathbb{R}^m$ Some Standard Linear Transformation, The Null Space & Column Space, The Rank-Nullity Theorem, Matrix of Linear Transformation.	25%	15
4	Inner Product Spaces Inner-product spaces, norm and its properties, angle between two vectors, orthogonal vectors, orthonormal vector, Gram-Schmidt process, orthonormal basis	17%	10

**h. Text Book and Reference Book:**

1. Elementary Linear Algebra with Applications, (TextBook) By H. Anton | John Wiley
2. Linear Algebra and Its Applications By G. Strang | Brooks/Cole India
3. Advanced Engineering Mathematics By Erwin Kreyszig | Willey India Education
4. Linear Algebra, By K. Hoffman and R. Kunze, | Prentice Hall
5. Calculus By T.M. Apostol | John Wiley Publication | Vol. I
6. Linear Algebra: A Modern Introduction, By D. Poole, | 2nd Edition, Brooks/Col