



First Year Curriculum

Admission Year 2026-27

**Bachelor of Technology
Electronics and Communication Engineering**

Faculty of Engineering & Technology

Parul University

Vadodara, Gujarat, India

Semester 1

- a. **Course Name:** Electronic Devices and Circuits-1
- b. **Course Code:** 03010701PC01
- c. **Prerequisite:** Basic Knowledge of Electronics
- d. **Rationale:** Electronics is playing a key role in all engineering applications. All engineers should have basic knowledge of electronics. Purpose of this subject is make students familiar with basic electronics concepts. Students will be able to operate electronic test and measurement equipment like multi-meter, CRO, DC power supply and function generator.

e. Course Learning Objective:

CLOBJ 1	To introduce students to the fundamental concepts of electronic devices and basic electronic circuits used in engineering applications.
CLOBJ 2	To develop understanding of semiconductor diodes, their characteristics, operation, and applications in rectifier, clipping, clamping, and power supply circuits.
CLOBJ 3	To enable students to study the construction, operation, characteristics, and applications of Bipolar Junction Transistors (BJTs) in different configurations.
CLOBJ 4	To provide knowledge of transistor biasing techniques and help students analyze and design stable transistor circuits for practical applications.
CLOBJ 5	To familiarize students with special purpose electronic devices such as LEDs, Zener diodes, photodiodes, opto-couplers, displays, and their practical uses.
CLOBJ 6	To introduce Field Effect Transistors (JFETs and MOSFETs), their characteristics, operation, and applications, along with the use of basic electronic measuring instruments and laboratory practices.

f. Course Learning Outcomes:

CLO 1	Understand Diode characteristics and it's applications.
CLO 2	Understand transistor characteristics, analyze and design transistor circuits, and apply them in various applications like amplifiers, oscillators, and switching circuits.
CLO 3	Describe various transistor biasing circuits.
CLO 4	Describe the behavior of special purpose diodes.
CLO 5	Understand the principles of operation of FETs, including JFETs and MOSFETs, and their different types (n-channel, p channel)

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.	Topics	Weightage %	Teaching hours
1	Diode Theory and Applications: Basic idea about forward bias, reverse bias and VI characteristics, ideal diode, second and third approximation, testing of diode with multi-meter, half wave rectifier, full wave rectifier, bridge rectifier, RC and LC filters, Design of un-regulated DC power supply, Clipping circuit, Clamping circuit, voltage multiplier circuit, Reading datasheet of semiconductor diode	20 %	10
2	Bipolar Junction Transistor: Introduction, Transistor construction, Operation, Common- base configuration & characteristic, Transistor Amplifying action, Common-Emitter configuration & characteristic, Common collector configuration & characteristic, Limits of operation, study of Transistor data sheet	25%	10
3	DC-biasing of Bipolar Junction Transistors: Introduction, operating point, fixed biased configuration, Emitter-bias configuration, Voltage divider bias configuration, collector feedback configuration, Emitter follower configuration, Miscellaneous configuration, Design operations, current mirror circuits, current source circuits, PNP transistors, Transistor switching networks, bias stabilization of transistors, Practical applications	20%	10
4	Special purpose diodes and transistors: Light emitting diode (LED). Zener diode, Zener diode circuit for voltage regulation, Photo diode, Solar cell, PIN diode, Varactor, Schottky diode, Varistors, Tunnel diode, Seven Segment display, sixteen segment display, identify segments on pin using multi-meter, Dot-matrix LED display, Photo transistor, Opto-coupler, Reading datasheet of optoelectronics devices	15 %	5
5	Field effect transistors (FET) : Types of FETs, Junction field effect transistors (JFET), Comparison of BJT and FET, Structure & Operation, JFET characteristics, Types of MOSFETs, MOSFET Operation, Applications of FETs	20 %	10 %
Total		100%	45

i. List of Practical

1. Obtain VI characteristics of semiconductor rectifier diode.
2. To observe waveform at the output of half wave rectifier with and without filter capacitor.
To measure DC voltage, DC current, ripple factor with and without filter capacitor.
3. To observe waveform at the output of full wave rectifier with and without filter capacitor.
To measure DC voltage, DC current, ripple factor with and without filter.
4. To observe waveform at the output of bridge rectifier with and without filter capacitor.
To measure DC voltage, DC current, ripple factor with and without filter capacitor.
5. To construct clamper circuits and observe waveforms at the output of clamper circuits.
6. To construct clipper circuits and observe waveforms at the output of clipper circuit.
7. To obtain common emitter characteristics of NPN transistor
8. To obtain common base characteristics of NPN transistor
9. To obtain common collector characteristics of NPN transistor
10. To design, study and compare various transistor-biasing techniques.
11. Obtain VI characteristics of LED, Photo-diode

12. To obtain characteristics of field effect transistor (FET)

13. Open Ended Problem.

j. Text Book and Reference Book:

1. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, Fifth edition
2. Albert Malvino & David, "Electronic Principles", Tata McGraw-Hill, Seventh edition
3. R. L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education, Tenth Edition
4. Jaccob Millman, Chritos Halkias, Chetan D Parikh, "Integrated Electronics", Tata McGraw-Hill, Second Edition
5. Albert Malvino & David, "Problems and Solutions in Basic Electronics, McGraw Hill Education
6. Floyd, "Electronic Devices", PHI, 7th Edition.

- a. **Course Name:** Linear Algebra and Calculus
- b. **Course Code:** 03019101BS02
- c. **Prerequisite:** Elementary Algebra, Matrices, Differentiation and Integration
- d. **Rationale:** This syllabus builds essential mathematical tools for engineering applications, covering differential equations, Laplace transforms, and vector calculus.

e. **Course Learning Objective:**

CLOBJ 1	Analyze and solve systems of linear equations using matrix methods and understand eigenvalue problems.
CLOBJ 2	Apply first-order ordinary differential equations to model physical phenomena like cooling and electrical circuits.
CLOBJ 3	Understand the principles of partial differentiation for multivariable functions and their applications.
CLOBJ 4	Utilize multiple integration techniques in various coordinate systems to compute geometric properties.
CLOBJ 5	Develop mathematical modeling skills for engineering applications through calculus and linear algebra.

f. **Course Learning Outcomes:**

CLO 1	Understand the concept of eigenvalues and eigenvectors of a matrix.
CLO 2	Formulate first-order differential equation to solve the real-world problem.
CLO 3	Apply partial differentiation to optimize multivariable function.
CLO 4	Evaluate multiple integration in cartesian and polar coordinates.

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	0	60	0	100

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

h. Course Content:

Sr.	Topics	Weightage %	Teaching hours
1	Linear Algebra Review of Determinant and Matrices, types of matrices, Rank of a matrix, System of Linear equations- homogenous and non-homogenous equations, solving techniques- Gauss Elimination method, Gauss-Jordan method, Consistency and inconsistency of the system, Eigenvalues and Eigenvector: Eigenvalues and Eigenvector, Algebraic multiplicity and Geometric multiplicity, Caley-Hamilton theorem, Diagonalization	30 %	18
2	First Order Ordinary Differential Equations and Applications: First Order Ordinary Differential Equations: Exact and non-exact differential equations, Integrating factor- function of x only and functions of y only, Linear and non linear differential equations Applications: Newton's Law of cooling, Growth model and RL-Circuit and RC-Circuit	20%	12
3	Partial Differentiation and its application Partial Differentiation: Functions of several variables, Limit of function, continuity, partial differentiation, chain rule, Implicit functions and their derivatives, Homogeneous functions and Euler's theorem Applications of Partial Differentiation: Tangent plane and normal line, Maxima and minima,	30%	18
4	Multiple Integration Multiple Integration: Double integration, change of order, change into polar form, triple integrations Applications: Area, Volume	20 %	12
Total		100%	60

i. Text Book and Reference Book:

1. Advanced Engineering Mathematics (TextBook) By Erwin Kreyszig | Willey India Education
2. Elementary Linear Algebra By Howard Anton, Chris Rorres | Willy India Edition | 9th Edition
3. Calculus with early transcendental functions By James Stewart | Cengage Learning
4. Thomas' Calculus By Maurice D. Weir, Joel Hass, Frank R. Giordano | Pearson Education

- 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:**

CLOBJ 1	To develop understanding of band theory and semiconductor physics including energy bands, Fermi level, and charge carrier behavior in intrinsic and extrinsic semiconductors.
CLOBJ 2	To introduce the principles and applications of optoelectronic devices such as LEDs, laser diodes, photodiodes, and optical fibre communication systems.
CLOBJ 3	To provide fundamental knowledge of quantum mechanics, wave functions, Schrödinger equations, and quantum tunneling phenomena.
CLOBJ 4	To familiarize students with the basic principles, advantages, challenges, and applications of quantum computing in modern technology.
CLOBJ 5	To introduce low-dimensional and nanomaterials such as quantum dots, quantum wires, and quantum wells along with their unique properties and engineering applications.
CLOBJ 6	To enhance experimental and analytical skills through laboratory experiments related to semiconductors, lasers, optical fibres, and material characterization techniques.

f. **Course Learning Outcomes:**

CLO 1	To conceptualize semiconducting materials on the basis of band theory
CLO 2	To get familiar with optical fibers and semiconductor based optoelectronic devices useful in fiber optic system.
CLO 3	To conceptualize the foundational principles of quantum Physics and their role in quantum computing.
CLO 4	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.	Topics	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	25 %	11
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.	25%	11
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.	30%	13
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	20%	10
Total		100%	45

i. List of Practical

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.
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 fiber.
12. Moment of Inertia of a flywheel.
13. Young's Modulus by bending of beam.

j. Text Book and Reference Book:

1. Physics of Semiconductor Devices (TextBook) By S. M. Sze and K. N. Kwok | John Wiley & Sons
2. Semiconductor Optoelectronic Devices by P. Bhattacharya | Prentice Hall of India, Pub. Year 1997

3. Engineering Physics (TextBook) by B.K.Pandey S Chaturvedi and M. Venkanna | - Cengage Publication
4. Semiconductor Optoelectronics (TextBook) By J. Singh | McGraw-Hill Inc, Pub. Year 1995

a. Course Name: Basic Electrical Engineering

b. Course Code: 03010601ES01

c. Prerequisite: Standard 12th Science

d. Rationale: Basic Electrical Engineering provides fundamental knowledge of electrical principles, components, and systems that form the backbone of all engineering disciplines. Understanding concepts such as DC and AC circuit analysis, electrical machines, measurement techniques, and safety practices equips students with the skills to interpret, design, and troubleshoot basic electrical systems. This course bridges theoretical understanding with practical applications, enabling learners to apply electrical engineering concepts in multidisciplinary contexts, industrial environments, and further specialized studies.

e. Course Learning Objective:

CLOBJ 1	Apply network laws and theorems to solve for voltage, current, and power in DC and AC networks.
CLOBJ 2	Analyse the behaviour of R, L, and C components and solve series RLC circuits using phasor diagram.
CLOBJ 3	Examine the construction and operational characteristics of transformers to determine efficiency and regulation.
CLOBJ 4	Evaluate the principles, construction, and performance of DC and AC machines under varying loads.
CLOBJ 5	Explain the utility of protective devices and wiring components in domestic and industrial installations.

f. Course Learning Outcomes:

CLO 1	Solve basic electrical circuit problems using Ohm's law, Kirchhoff's laws, and network theorems in DC and AC circuits.
CLO 2	Discuss the role and performance characteristics of resistor, capacitor, and inductor in pure R, pure L, and pure C circuits.
CLO 3	Calculate active, reactive, and apparent power using analytical and phasor methods in series RL, RC, and RLC AC circuits.
CLO 4	Analyze the construction and working principle of a transformer under no-load and load conditions.
CLO 5	Assess the construction and operation of DC and AC machines under different loading conditions.
CLO 6	Explain the function and application of various electrical components and protective devices in domestic and industrial electrical systems.

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.	Topics	Weightage %	Teaching hours
1	DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, Mesh and Node analysis, Simplifications of networks using series and parallel combinations and star-delta conversions. Superposition, Thevenin and Norton Theorems.	22 %	10
2	AC Circuits: 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. Study of A.C. circuits consisting of pure resistance, pure inductance, pure capacitance and corresponding voltage-current phasor diagrams and waveforms. Development of concept of reactance, study of series R-L, R-C, R-L-C circuit and resonance, study of parallel R-L, R-C and RLC circuit, concept of impedance, admittance, conductance and susceptance in case of above combinations and relevant voltage-current phasor diagrams, concept of active, reactive and apparent power and power factor, examples based on theory. 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.	33%	15
3	Transformers: Magnetic effect of an electric current, right hand thumb rule, Concept of m.m.f., flux, flux density, reluctance, permeability and field strength, their units and relationships, comparison between electrical and magnetic parameters. Flemings left hand rule. Self and mutual inductance, Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency.	20%	9

4	Electrical Machines: Construction, working and application of DC Motor and Generator. Generation of 3 phase rotating magnetic fields, Construction and working of a three-phase and Single-phase induction motor and its types. Construction and working of Synchronous generator	15%	7
5	Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries	10%	4
Total		100%	45

***Continuous Evaluation:**

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

Reference Books:

1. Electrical Technology (Vol-II) (TextBook) By B L Theraja & A K Theraja | S Chand
2. Basic Electrical Engineering by D. P. Kothari and I. J. Nagrath, | Tata McGraw Hill | 3, Pub. Year 2010
3. Basic Electrical Engineering by D. C. Kulshreshtha | McGraw Hill | 1, Pub. Year 2009
4. Fundamentals of Electrical Engineering by Leonard S. Bobrow | Oxford University Press | 2, Pub. Year 1996
5. Electrical and Electronics Technology by E. Hughes | Pearson | 10, Pub. Year 2010
6. Electrical Engineering Fundamentals by Vincent Del Toro | PHI

i. List of Experiments:

Sr. No.	Experiment List
1	To Study about Various Electrical and Electronics Symbols and demonstrate various measuring instruments used in Basic electrical Engineering laboratory.
2	To Perform and Solve Electrical Networks with Series and Parallel Combinations of Resistors Using Kirchhoff's Laws.
3	Verification of superposition theorem with DC source.
4	Verification of Thevenin's theorem with DC source.
5	Verification of Norton's theorems in DC circuits.
6	To Obtain Inductance, Power and Power Factor of the Series RL Circuit with AC Supply Using Phasor Diagram.
7	To Obtain Capacitance, Power and Power Factor of the Series RC Circuit with AC Supply Using Phasor Diagram.
8	To Obtain Inductance, Capacitance, Power and Power Factor of the Series R-L-C Circuit With AC Supply Using Phasor.
9	Verification of Current and Voltage Relations in Three Phase Balanced Star and Delta Connected Loads.
10	Find out the Efficiency and Voltage Regulation of Single-Phase Transformer by Direct Load Test.

j. Text Book and Reference Book:

1. Electrical Technology (Vol-II) (TextBook) By B L Theraja & A K Theraja | S Chand
2. Basic Electrical Engineering by D. P. Kothari and I. J. Nagrath, | Tata McGraw Hill | 3, Pub. Year 2010
3. Basic Electrical Engineering by D. C. Kulshreshtha | McGraw Hill | 1, Pub. Year 2009
4. Fundamentals of Electrical Engineering by Leonard S. Bobrow | Oxford University Press | 2, Pub. Year 1996
5. Electrical and Electronics Technology by E. Hughes | Pearson | 10, Pub. Year 2010
6. Electrical Engineering Fundamentals by Vincent Del Toro | PHI

- a. **Course Name:** Programming for Problem Solving
- b. **Course Code:** 03010501ES01
- 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:**

CLOBJ 1	To introduce the fundamentals of computer programming and develop understanding of the structure and execution of C programs.
CLOBJ 2	To familiarize students with constants, variables, data types, operators, and expressions used in problem-solving through C programming.
CLOBJ 3	To develop logical and analytical thinking skills using decision-making statements, loops, and control structures.
CLOBJ 4	To provide knowledge of arrays, strings, functions, structures, unions, and their applications in developing modular programs.
CLOBJ 5	To enable students to understand pointers, dynamic memory allocation, and file handling techniques for efficient programming.
CLOBJ 6	To enhance programming, debugging, and problem-solving skills by developing practical applications and simple projects using the C programming language.

f. **Course Learning Outcomes:**

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

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.	Topics	Weightage %	Teaching hours
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. Theorems.	10%	8
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.	15%	5
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 – Programs	15%	4
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%	7
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%	10
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.	20	8
Total		100%	42

i. List of Practical

1. Set 1 (Basics)

1. Write a program to print HELLO FRIENDS!
2. Write a program that reads two nos. from key board and gives their addition, subtraction, multiplication, division and modulo.
3. Write a program to calculate area of circle, use Ω as symbolic constants.
4. Write a program to convert days into months and days.
5. Write a program which calculates the summation of three digits from the given 3-digit number.
6. Write a program to demonstrate enumerates data type.
7. Write a program to compute Fahrenheit from centigrade.
8. Write a program to calculate simple interest.
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.

2. Practical Set 2 (Control Structures)

1. Write a program to find the largest of the three nos. using Nested-If-Else statement.
2. Write a C program to enter a character and to check whether it is a small letter or it is a capital letter or it is a digit or it is a special symbol.
3. Write a program to read marks from keyboard and your program should display equivalent grade according to following table.
Marks Grade 100-80 Dist 60-79 First Class 35-59 Second Class 0-34 Fail
1. Write a program to read marks of a student from keyboard whether the student id pass (if). Page 2 of 3 Printed on: 09-05-2026 04:52 PM Subject Syllabus 03010501ES01 - Programming for Problem Solving
2. Write a program to find the sum of first N odd numbers.
3. Write a program using while loop construct which finds the factorial of a given integer number.
4. Write a C program using do...while and for loop constructs to reverse the digits of the number.
5. Write a program to demonstrate use of Switch- Break Statement.
6. Write a program to find out all the numbers divisible by 5 and 7 between 1 to 100. Check for Armstrong number. A number is Armstrong if sum of cube of every digit is same as the original number. E.g. $153=1^3+5^3+3^3=153$
1. Write a program to print the output of bellow series. $1!+2!+3!+4!+\dots+n!$
2. Write a program to print the following outputs using for Loop.
(a) 1 (b) * 12 ** 123 *** 1. Write a program to print the following outputs using for Loop.
(a) 1 (b) 321 21 21 321 1

3. Practical Set 3 (Array & Strings)

1. Write a program which sorts 10 numbers into ascending order.
2. Write a program to find maximum element from 1-D array.
3. Write a program to find number of odd and even elements from the 1-D array.
4. Write a program add two 2x2 matrices.
4. Write a program to count number of positive, negative and zero elements from 3x3 matrix.
5. Write a function for the following operations on string: Copy one string to another Comparing two strings Adding a string to the end of another.
1. Write a program to count vowels from a entered String.
2. Write a program which finds whether a string is a palindrome or not.

4. Practical Set 4 (Functions)

1. Write a program to find factorial of a number using recursion.
2. Write a program that used user defined function Swap () and interchange the value of two

variable.

3. Write a function to return 1 if the number is prime otherwise return 0.

5. Practical Set 5 (Structures)

1. Define a structure type, personal that would contain person name, date of joining and salary.

2. Define a structure called cricket that will describe the following information: Player name
Team name Batting average

6. Practical Set 6 (Pointers)

1. Write a program to add two numbers using pointers.

2. Write a program to swap two numbers using pointer

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 ().

j. Text Book and Reference Book:

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

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

e. **Course Learning Objective:**

CLOBJ 1	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.
CLOBJ 2	Develop basic reading and listening comprehension skills by using appropriate strategies to understand simple texts and spoken content with improved pronunciation awareness.
CLOBJ 3	Organize and express ideas clearly in written form through picture-based perception activities.
CLOBJ 4	Build confidence and fluency in spoken communication through correct pronunciation practice, meeting and greeting activities, extempore speech, and everyday conversational exercises.
CLOBJ 5	Apply goal-setting and self-reflection techniques to monitor personal language learning progress, pronunciation improvement, and overall communication skills development.
CLOBJ 1	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.

f. **Course Learning Outcomes:**

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

g. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
0	0	2	1	0	0	20	0	30	50

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

h. Course Content:

Sr.	Topics	Weightage %	Teaching hours
1	Parts of Speech, Punctuation: Overview of 8 parts of speech Basic punctuation marks and their usage Importance of grammar in writing Theorems.	10%	4
2	Tenses-Types: Present, Past, Future Forms and correct usage Common tense errors	8%	2
3	Phrase and Clauses; Types of Sentences (Structure Wise): Difference between phrases and clauses Classification of Simple, Compound & Complex Interchange of Simple to Compound, Simple to Complex, Compound to Complex	10%	4
4	Picture Perception: Observing and interpreting images Building a short story or description Improving vocabulary and creativity	15%	4
5	Paragraph Development Structure: Topic sentence, development, conclusion	8%	2
6	Meeting and Greeting (Initiating a conversation): Basic conversation skills Formal and informal greetings Common phrases for starting interactions	7%	2
7	Reading Comprehension (Basic Level): Types – Skimming & Scanning Reading short passages Identifying main ideas and details Answering basic questions	12%	4
8	Listening Comprehension (Basic Level): Listening to short audios/Conversation Understanding and responding to key information	8%	2
9	Extempore Speech: Speaking on random topics Organizing thoughts quickly Improving fluency and confidence	15%	4
10	Goal Setting and Tracking: Setting SMART goals Planning and tracking progress Self-assessment and reflection	7%	2
Total		100%	45

i. Text Book and Reference Book:

1. English Grammar in Use (TextBook) By Murphy, Raymond | Cambridge University Press, Pub. Year 2019
2. A Practical English Grammar (TextBook) By Thomson & Martinet | Oxford University Press, Pub. Year 1986

3. The St. Martin's Guide to Writing By Rise B. Axelrod & Charles R. | Cooper, Bedford/St. Martin's, Pub. Year 2021
4. Tactics for Listening (Basic) By Jack C. Richards | Oxford University Press, Pub. Year 2011
5. Active Skills for Reading: Book 1 By Neil J. Anderson | Cengage Learning, Pub. Year 2013
6. Speak with Impact By Allison Shapira | HarperCollins Leadership, Pub. Year 2018

- a. **Course Name:** Student Induction Program with Essence of Indian Knowledge System
- b. **Course Code:** 03010001MC01
- c. **Prerequisite:** Basic understanding of school-level Mathematics, Science, Communication Skills, and Computer Fundamentals.
- d. **Rationale:** This course is designed to develop foundational knowledge, practical skills, and awareness of Indian Knowledge Systems for the holistic development of first-year engineering students.

e. **Course Learning Objective:**

CLOBJ 1	To familiarize students with the academic environment, institutional culture, and multidisciplinary learning approach of engineering education.
CLOBJ 2	To develop fundamental understanding of mathematical, scientific, communication, and computing concepts through activity-based learning.
CLOBJ 3	To introduce students to the principles and applications of Indian Knowledge Systems (IKS) in mathematics, science, communication, and computing.
CLOBJ 4	To enhance analytical, logical, problem-solving, and creative thinking abilities through practical and experiential activities.
CLOBJ 5	To improve communication skills, teamwork, interpersonal interaction, and confidence through interactive sessions and collaborative learning.
CLOBJ 6	To motivate students towards ethical values, self-discipline, lifelong learning, and holistic personal and professional development.

f. **Course Learning Outcomes:**

CLO 1	Apply fundamental concepts of mathematics, science, communication, computing, and physics through activity-based learning approaches.
CLO 2	Demonstrate understanding of Indian Knowledge Systems and their contributions to modern science, technology, and communication.
CLO 3	Develop analytical, logical, and problem-solving abilities using practical exercises and real-life applications.
CLO 4	Communicate effectively through basic speaking, listening, writing, and collaborative interaction activities.
CLO 5	Utilize basic computing concepts, emerging technologies, and scientific principles for academic and professional growth.
CLO 6	Exhibit teamwork, self-learning, ethical values, and holistic development essential for engineering education and lifelong learning.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
12	0	0	0	0	50	0	0	0	50

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

h. Course Content:

Sr.	Topics	Weightage %	Teaching hours
1	<p>Activities in Mathematics: 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</p>	25 %	12
2	<p>Activities in Communication Skills: 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</p>	25%	12
3	<p>Activities in Computer Science Basic Architecture: 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: 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.</p>	25%	12
4	<p>Activities of Physics: Measurement, Electrostatics, Electromagnetism, Optics, Laser and Fiber Optics, Vedic Physics and Cosmology</p>	25 %	12
Total		100%	48

Semester-2

- a. **Course Name:** Electronic Devices and Circuits-2
- b. **Course Code:** 03010702PC01
- c. **Prerequisite:** Electronic Devices, Basic Electrical Theorems, etc.
- d. **Rationale:** This course provides a strong foundation in the AC analysis and design of BJT and FET amplifier circuits, emphasizing biasing, small-signal models, frequency response, and power amplification. It equips students with analytical and practical skills essential for advanced studies and real-world applications in analog electronics and communication systems.

e. Course Learning Objective:

CLOBJ 1	To develop understanding of AC analysis of BJT amplifier circuits using small-signal models, hybrid parameters, and equivalent circuits.
CLOBJ 2	To provide knowledge of various FET biasing techniques and analyze their impact on amplifier stability and performance.
CLOBJ 3	To enable students to design and analyze JFET and MOSFET amplifier circuits for desired gain, impedance, and bandwidth characteristics.
CLOBJ 4	To introduce the concepts of low-frequency and high-frequency response of BJT and FET amplifiers using Bode plots and frequency analysis techniques.
CLOBJ 5	To familiarize students with the operation, efficiency, and applications of different classes of power amplifiers and practical feedback circuits.
CLOBJ 6	To develop practical skills in designing and testing oscillator circuits and amplifier systems using feedback principles and electronic laboratory instruments.

f. Course Learning Outcomes:

CLO 1	Analyze the AC analysis of BJT circuits by applying hybrid equivalent and π models to determine voltage gain, input/output impedance, and current gain.
CLO 2	Evaluate various FET biasing configurations to determine the stability and performance of amplifiers
CLO 3	Design JFET and MOSFET amplifier circuits to achieve specific gain, bandwidth, and impedance characteristics.
CLO 4	Apply concepts of frequency response to investigate the performance of BJT and FET amplifiers at low and high frequencies.
CLO 5	Construct and test different classes of power amplifiers to assess their efficiency, linearity, and distortion.
CLO 6	Create oscillator circuits using feedback concepts and evaluate their frequency of operation using practical implementations.

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.	Topics	Weightage %	Teaching hours
1	BJT AC Analysis: Introduction, Amplification in the AC Domain, BJT Transistor Modeling, The re Transistor Model, Common-Emitter Fixed-Bias Configuration, Voltage- Divider Bias, CE Emitter-Bias Configuration, Emitter- Follower Configuration, Common-Base Configuration, Collector Feedback Configuration, Collector DC Feedback Configuration, Effect of RL and RS, Determining the Current Gain, Two-Port Systems Approach, Cascaded Systems, Darlington Connection, Feedback Pair, The Hybrid Equivalent Model, Approximate Hybrid Equivalent Circuit, Complete Hybrid Equivalent Model, Hybrid π Model, Variations of Transistor Parameters	17%	8
2	FET Biasing: Introduction, Fixed-Bias Configuration, Self-Bias Configuration, Voltage-Divider Biasing, Common-Gate Configuration, Special Case $V_{GSQ}=0V$, Depletion-Type MOSFETs, Enhancement-Type MOSFETs, Combination Networks, Design, p-Channel FETs, Universal JFET Bias Curve	15%	7
3	FET Amplifiers: Introduction, JFET Small-Signal Model, Fixed-Bias Configuration, Self-Bias Configuration, Voltage Divider Configuration, Common-Gate Configuration, Source- Follower (Common- Drain) Configuration, Depletion Type MOSFETs, Enhancement-Type MOSFETs, E- MOSFET Drain-Feedback Configuration, E-MOSFET Voltage Divider Configuration, Designing FET Amplifier Networks, Effect of RL and RSIG, Cascade Configuration	21%	10
4	BJT and JFET Frequency Response: Introduction, Logarithms, Decibels, General Frequency Considerations, Normalization Process, Low- Frequency Analysis—Bode Plot, Low-Frequency Response—BJT Amplifier with RL, Impact of RS on the BJT Low-Frequency Response, Low-Frequency Response—FET Amplifier, Miller Effect Capacitance, High-Frequency Response—BJT Amplifier, High- Frequency Response—FET Amplifier, Multistage Frequency Effects	17%	8
5	Power Amplifiers: Introduction—Definitions and Amplifier Types, Series- Fed Class A Amplifier, Transformer Coupled Class A Amplifier, Class B Amplifier Operation, Class B Amplifier Circuits, Amplifier Distortion, Power Transistor Heat Sinking, Class C and Class D Amplifiers	15%	7
6	Feedback and Oscillator: Concepts, Feedback Connection Types, Practical Feedback Circuits, Feedback Amplifier— Phase and Frequency Considerations, Oscillator Operation, Phase- Shift Oscillator, Wien Bridge Oscillator, Tuned Oscillator Circuit, Crystal Oscillator, Unijunction	15%	7

	Oscillator		
		Total	100%
			47

i. List of Practical

1. Plot the frequency response of Push Pull Amplifier and find Bandwidth.
2. Measure & calculate the gain of JFET Amplifier.
3. Plot the frequency response of the JFET amplifier and find the Bandwidth
4. Measure Input Impedance and Output Impedance of the JFET amplifier
5. Measure & calculate the gain of Metal Oxide Semiconductor Field Effect Transistor
6. Plot the frequency response of MOSFET amplifier and find the Bandwidth
7. To verify the operation of RC phase shift Oscillators & measure its frequency
8. To verify the operation of Colpitt Oscillators & measure its frequency
9. To verify the operation of Hartely Oscillators & measure its frequency
10. To verify the operation of Wein Bridge Oscillators & measure its frequency

j. Text Book and Reference Book:

1. Electronic Devices and Circuits by Robert L. Boylestad and Louis Nashelsky | Pearson, Prentice Hall.
2. Albert Malvino & David, "Electronic Principles", Tata McGraw-Hill, Seventh edition
3. Electronic Devices by Thomas L. Floyd | Pearson, Prentice Hall
4. Albert Malvino & David, "Problems and Solutions in Basic Electronics, McGraw Hill Education

- 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 Objective:

CLOBJ 1	To introduce the fundamental concepts, evolution, and applications of Online Social Networks (OSNs) and social media platforms.
CLOBJ 2	To develop understanding of social media data collection techniques, APIs, data processing, and analysis methods used in OSNs.
CLOBJ 3	To familiarize students with the concepts of trust, credibility, reputation systems, and misinformation detection in online communities.
CLOBJ 4	To provide knowledge of privacy, security threats, phishing attacks, fraud detection, and countermeasures in social networking environments.
CLOBJ 5	To enhance analytical and research skills through case studies, research paper discussions, and practical applications related to OSN security and privacy.
CLOBJ 6	To encourage ethical awareness and responsible use of online social media data while addressing emerging challenges and future trends in social network security.

f. Course Learning Outcomes:

CLO 1	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.
CLO 2	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.
CLO 3	Examine Privacy and Security Risks in OSNs – Assess the impact of privacy disclosure, phishing, and fraudulent activities in social media and propose countermeasures.
CLO 4	Apply Data Collection and Analysis Techniques – Utilize social media APIs and data processing methods to extract, clean, and analyze information from online social networks.
CLO 5	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.

g. 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	0	60	0	100

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

h. Course Content:

Sr.	Topics	Weightage %	Teaching hours
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.	20 %	8
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%	8
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.	20%	8
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.	20 %	8
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	20 %	8
	Security, Future Trends in OSN Security and privacy		
Total		100%	40

i. 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:** Indian Economy: Some Contemporary Perspective
- b. **Course Code:** 06M10102UE02
- c. **Prerequisite:** Basic understanding of economic principles and macroeconomic concepts is recommended. Familiarity with the Indian economic structure and current affairs will be beneficial but is not mandatory.
- d. **Rationale:** This course is designed to provide students with a comprehensive understanding of the Indian economy's evolution, key reforms, and current challenges.

e. Course Learning Objective:

CLOBJ 1	To provide students with an understanding of the evolution and development of the Indian economy since independence.
CLOBJ 2	To familiarize students with major agricultural, industrial, and economic reforms implemented during the pre- and post-liberalization periods.
CLOBJ 3	To develop understanding of financial sector reforms, taxation policies, banking systems, and financial inclusion initiatives in India.
CLOBJ 4	To analyze the role of globalization, WTO regulations, and international economic relations in shaping the Indian economy.
CLOBJ 5	To examine the impact of recent policy initiatives, structural shocks, and socio-economic challenges on economic growth and stability.
CLOBJ 6	To enhance analytical and critical thinking skills for evaluating contemporary economic issues and future challenges of the Indian economy.

f. Course Learning Outcomes:

CLO 1	To critically assess the trajectory of India's economic development since independence and explain the impact of major sectoral reforms in agriculture and industry.
CLO 2	To evaluate the effectiveness of financial sector reforms, tax policies, and India's engagement with WTO regulations in promoting inclusive and sustainable economic growth.
CLO 3	To analyze the impact of recent policy shocks and government initiatives on the Indian economy and identify key challenges to future economic stability and growth.

g. 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	0	60	0	100

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

h. Course Content:

Sr.	Topics	Weightage %	Teaching hours
1	Module 1: Indian economy since independence; analysis of the pre- and post-reform periods of India's economic growth and development; Assessment of agriculture sector reforms; industrial reforms in a mixed economic set up and tracing the contours of liberalization and self-reliance. Theorems.	40%	18
2	Module 2: Socio-economic development and tax reforms; Financial sector reforms and financial inclusion; Indian banking sector crisis and recent developments.	40%	18
3	Module 3: India and WTO regulations: Inward and outward analysis; Structural shocks and analysis of recent policy initiatives; Indian economy: Recent outlook and challenges.	20%	9
Total		100%	45

- a. **Course Name:** Design, Technology and Innovation
- b. **Course Code:** 03M10002UE02
- 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 Objective:**

CLOBJ 1	To introduce the principles and methodologies of design thinking for identifying user needs and solving real-world problems creatively.
CLOBJ 2	To develop creative thinking, brainstorming, concept generation, and evaluation skills for innovative product and solution development.
CLOBJ 3	To familiarize students with modern technologies such as CAD tools, 3D printing, digital fabrication, IoT, AI, ML, AR/VR, and their role in design and innovation.
CLOBJ 4	To provide understanding of engineering, sustainability, safety, reliability, and material aspects involved in the design process.
CLOBJ 5	To encourage innovation, collaborative problem-solving, and awareness of intellectual property rights, patents, and copyrights.
CLOBJ 6	To develop entrepreneurial mindset and business model development skills required for transforming innovative ideas into practical products, services, and startups.

f. **Course Learning Outcomes:**

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

g. **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	0	60	0	100

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

h. Course Content:

Sr.	Topics	Weightage %	Teaching hours
1	<p>Design Thinking and Methodologies</p> <p>Introduction to Design Thinking: Understanding the design process, user needs, and problem definition. Design Process: Exploring different design methodologies, including brainstorming, sketching, and prototyping.</p> <p>Human and Culture Centered Design: Focusing on user needs, ergonomics, and user experience. Design for Social and Life style change. Concept Generation and Evaluation: Developing and evaluating design concepts through various techniques.</p>	30%	12
2	<p>Technology and its Role in Design Technology for Design: Exploring how technology enables and enhances the design process.</p> <p>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.</p> <p>Engineering Aspect of Design: Electrical, Mechanical, Design, Material, Aspect, Safety and Reliability aspect, Sustainable and Eco-friendly materials.</p>	35%	16
3	<p>Innovation and Entrepreneurship</p> <p>Introduction to Innovation: Understanding the principles of innovation and its role in product development. Role of Innovation in Life and Society</p> <p>Grassroots Innovation: Learning from innovative solutions developed at the community level. Collaborative Innovation: Exploring how different individuals and teams can collaborate to drive innovation.</p> <p>Intellectual Property: Learning about patents, copyrights, and other forms of intellectual property.</p> <p>Business Model Development: Exploring how to develop a business model for a new product or service.</p> <p>Entrepreneurship: Fundamentals of starting a business and the challenges and opportunities of entrepreneurship.</p>	35%	16
Total		100%	44

- a. **Course Name:** Intellectual Property
- b. **Course Code:** 06M10502UE03
- c. **Prerequisite:** A basic understanding of business, innovation, or creativity-related fields will be helpful.
- d. **Rationale:** The course aims to empower future managers, entrepreneurs, and innovators to make informed IP-related decisions.

e. **Course Learning Objective:**

CLOBJ 1	To introduce the fundamental concepts, types, and significance of Intellectual Property (IP) in the modern knowledge-based economy.
CLOBJ 2	To develop understanding of patents, trademarks, copyrights, and other forms of intellectual property along with their practical applications.
CLOBJ 3	To familiarize students with unconventional intellectual property rights and the evolving scope of IP protection in different industries.
CLOBJ 4	To provide knowledge of IP enforcement mechanisms, legal protection strategies, and methods for safeguarding intellectual assets.
CLOBJ 5	To explore the role of intellectual property in business growth, innovation, research institutions, universities, and creative industries.
CLOBJ 6	To encourage analytical and entrepreneurial thinking for utilizing intellectual property as a strategic and profit-generating business asset.

f. **Course Learning Outcomes:**

CLO 1	To identify different forms of IP, understand their role in value creation, and analyze real-world examples of patents, trademarks, and copyrights.
CLO 2	To evaluate unconventional IPs, assess enforcement mechanisms, and apply business strategies to monetize intellectual assets.
CLO 3	To analyze the role of IP in research institutions and creative industries and assess the importance of policy and education in strengthening the IP framework.

g. **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	0	60	0	100

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

h. Course Content:

Sr.	Topics	Weightage %	Teaching hours
1	Module 1: Basics of Intellectual Property; The Intangible Economy; Patents—From ball pens to biologics; Trade Marks—What does red soles and barbie girl mean?; Copyright—Is it right to copy?	40%	18
2	Module 2: Unconventional IP—The expanding scope; Enforcement of IP—Protecting your rights; IP for Business—A profit making asset class.	40%	18
3	Module 3: IP, Research, and Universities; IP for the Creative and Entertainment Industries; Governments Role in Fostering IP; Teaching IP—Let everyone learn IP.	20%	9
	Total	100%	45

- a. **Course Name:** Principles of Management
- b. **Course Code:** 06M10102UE01
- c. **Prerequisite:** Basic understanding of organizational structure and general awareness of business operations.
- d. **Rationale:** This course lays the foundational framework for understanding managerial roles and functions in contemporary business settings.

e. **Course Learning Objective:**

CLOBJ 1	To introduce the fundamental concepts, principles, and functions of management in modern business organizations.
CLOBJ 2	To develop understanding of the evolution of management thought and the influence of business environments on managerial decision-making.
CLOBJ 3	To provide knowledge of planning, forecasting, organizing, staffing, coordination, and directing functions in management practices.
CLOBJ 4	To familiarize students with different management styles, management by objectives (MBO), and effective decision-making techniques.
CLOBJ 5	To enhance leadership, communication, teamwork, and career development skills required for organizational success.
CLOBJ 6	To develop the ability to analyze organizational change, contemporary business challenges, and managerial strategies for effective business operations.

f. **Course Learning Outcomes:**

CLO 1	To describe the core principles of management, analyze historical developments, and apply planning techniques considering environmental factors.
CLO 2	To evaluate various management styles, design effective organizational structures, and apply decision-making and staffing techniques in managerial contexts.
CLO 3	To demonstrate effective leadership and communication strategies, manage organizational change, and critically assess modern-day managerial challenges.

g. **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	0	60	0	100

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

h. Course Content:

Sr.	Topics	Weightage %	Teaching hours
1	Module 1: Introduction to Management; Evolution of Management Thought; Planning; Understanding environment of business; Forecasting and Premising.	40 %	18
2	Module 2: Decision-making; Management by Objectives and Styles of Management; Organizing and Directing; Staffing and Coordination.	20%	9
3	Module 3: Career Development Strategy; Leadership styles of Managers; Organizational Communication; Change management; Challenges of Contemporary Business	40%	18
	Total	100%	45

- a. **Course Name:** Differential Equations and Vector Calculus
- b. **Course Code:** 03019102BS02
- c. **Prerequisite:** Differential Calculus, Integral Calculus, Vector Algebra, Differential Equations
- d. **Rationale:** This syllabus builds essential mathematical tools for engineering applications, covering differential equations, Laplace transforms, and vector calculus.

e. **Course Learning Objective:**

CLOBJ 1	Understand second and higher-order ordinary differential equations and their solution techniques.
CLOBJ 2	Apply Laplace transform methods and inverse transforms for solving differential equations arising in engineering applications.
CLOBJ 3	Analyze periodic functions using Fourier series and half-range expansions.
CLOBJ 4	Develop understanding of vector differentiation concepts including gradient, divergence, curl, and Laplacian operators.
CLOBJ 5	Apply vector integration techniques such as line integrals and Green's theorem in mathematical and physical problems.
CLOBJ 6	Formulate and solve engineering and scientific problems using differential equations and vector calculus methods.

f. **Course Learning Outcomes:**

CLO 1	Solve Second and Higher-Order Ordinary Differential Equations
CLO 2	Apply Laplace Transform to Solve Differential Equations.
CLO 3	Apply Fourier series techniques to approximate periodic functions in mathematical and engineering contexts.
CLO 4	Compute and interpret vector differentiation concepts.
CLO 5	Evaluate vector integrals.

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	0	60	0	100

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

h. Course Content:

Sr.	Topics	Weightage %	Teaching hours
1	Second and Higher-Order Ordinary Differential Equations: Homogeneous Linear ODE, Homogeneous constant coefficient linear ODE, non-homogeneous linear constant coefficient linear ODE, Undetermined coefficient and Variation of Parameter, Applications of higher order linear differential equations in Free oscillations, forced oscillations, Damped oscillations, RLC circuit	25 %	15
2	Laplace Transformations and Its Applications: Definition and Laplace transformation of elementary functions, Properties of Laplace Transformations - linearity property, First-Shifting Theorem, Derivative of Laplace transformation, Integration of Laplace transformation, Laplace transformation of Integral, Laplace transformation of derivatives, Inverse Laplace Transformation, Convolution theorem and Application of Laplace Transformation to solve ODE.	30%	18
3	Fourier Series: Fourier Series of periodic functions with arbitrary period, Even and Odd functions, Half-Range Fourier Series	15%	9
4	Vector Calculus: Vector Differentiation: Vector-valued functions, smooth curve, vector differentiation, scalar valued function, Gradient of scalar valued function, Divergence and curl of vector-valued functions, Laplacian operator, Scalar potential function Vector Integration: Line integral of scalar functions, Line integral of vector valued function, conservative vector field and independent of path, Green's theorem.	30%	18
Total		100%	60

j. Text Book and Reference Book:

1. Advanced Engineering Mathematics (TextBook) By Erwin Kreyszig | Willey India Education
2. D.A. Murray, Introductory Course in Differential Equations. Orient Longman (India).
3. Fourier Series and Boundary Value Problems, By James Brown and Ruel Churchill, | McGraw Hill
4. Elementary Differential Equations and Boundary Value Problems, By William E Boyce and Richard C. D'Prima | Willey India Edition
5. Advanced Engineering Mathematics, By K. A. Stroud and Dexter Booth, | Macmillan Publication

- a. **Course Name:** Practical Electronics with Arduino
- b. **Course Code:** 03010702ES02
- c. **Prerequisite:** Basic Knowledge of Electronics, Basic C programming Skills.
- d. **Rationale:** This course equips students with essential embedded-system skills by combining logical programming with hands-on hardware experimentation to create real-world automation projects. It provides a strong foundation for cutting-edge technologies such as robotics, IoT, and smart systems, fostering innovation and workforce-ready technical proficiency.

e. **Course Learning Objective:**

CLOBJ 1	To introduce the fundamentals of microcontrollers, Arduino boards, and embedded system development environments.
CLOBJ 2	To develop programming skills using Arduino IDE, including variables, operators, conditional statements, loops, and functions.
CLOBJ 3	To provide practical knowledge of digital and analog interfacing techniques with LEDs, switches, buzzers, potentiometers, and sensors.
CLOBJ 4	To familiarize students with interfacing and programming of various sensors such as temperature, humidity, ultrasonic, PIR, and IR sensors.
CLOBJ 5	To enable students to interface actuators and display devices including motors, relays, and LCD displays for automation applications.
CLOBJ 6	To enhance problem-solving, innovation, and project development skills through hands-on mini projects and real-world automation applications using Arduino platforms.

f. **Course Learning Outcomes:**

CLO 1	Understand the architecture, features, and programming environment of Arduino-based embedded systems.
CLO 2	Develop Arduino programs using variables, operators, loops, conditional statements, functions, and arrays for solving basic engineering problems.
CLO 3	Interface and control digital and analog input/output devices such as LEDs, switches, buzzers, potentiometers, and displays.
CLO 4	Integrate various sensors including DHT11, ultrasonic, PIR, and IR sensors with Arduino for real-time data acquisition and monitoring.
CLO 5	Design and implement actuator-based systems using motors, relays, and display modules for automation applications.
CLO 6	Build and demonstrate mini projects using Arduino to solve practical problems related to smart systems, IoT, and embedded applications.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	0	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

h. Course Content:

Sr.	Topics	Weightage %	Teaching hours
1	Introduction to Arduino: Basics of Microcontrollers and Arduino Overview of Arduino Board (UNO, Mega, Nano) Installing and Setting Up Arduino IDE Writing and Uploading the First Code (Blink LED)	20%	5
2	Arduino Programming Fundamentals: Basic Structure of an Arduino Sketch Variables, Data Types, and Operators Conditional Statements (if, else) and Loops (for, while) Functions and Arrays in Arduino	10%	5
3	Digital and Analog Interfacing: Digital Input and Output (Interfacing LEDs, Switches, and Buzzers) Analog Input and Output (Interfacing Potentiometer, LDR, and PWM) Serial Communication (Using Serial Monitor)	20%	5
4	Interfacing Sensors with Arduino: Temperature and Humidity Sensor (DHT11) Ultrasonic Distance Sensor (HC SR04) Motion Detection using PIR Sensor IR Sensor for Object Detection	20%	5
5	Actuators and Display Interfacing: Interfacing Servo Motor and DC Motor Interfacing 16x2 LCD Display Introduction to Relay Module for Controlling AC Appliances	20%	5
6	Mini Project and Real-World Applications: Building Simple Projects like Automatic Light Control, Smart Door, etc. Project Submission and Assessment	10%	5
Total		100%	30

i. List of Practical

1. Introduction to Arduino IDE
2. Blinking LED – Basic LED ON/OFF using Arduino.
3. Button-Controlled LED – LED control using a push button.
4. Buzzer Alarm System – Using a buzzer for sound alerts.
5. Reading Analog Values – Using a potentiometer with Arduino.
6. LDR-Based Light Control – Automatic LED control based on light intensity.
7. Seven Segment LED – showing numbers as per the diode on /off
8. LCD Display Interface – Showing text on a 16x2 LCD screen.
9. DC Motor Control with Relay – Switching a motor ON/OFF.
10. Interfacing Temperature Sensor (DHT11) – Displaying temperature and humidity.
11. Ultrasonic Distance Measurement – Using HC-SR04 sensor for distance calculation.
12. Motion Detection with PIR Sensor – Automatic light switching.
13. Mini Project: Based on Tinker-CAD software simulation

j. Text Book and Reference Book:

1. Arduino Cookbook By Michael Margolis | O'Really Publication
2. Exploring Arduino By Jeremy Blum | Wiley Publication
3. Beginning Arduino By Michael Patterson | Technology in Action Publication
4. Beginning Arduino (TextBook) By Michael Patterson | Technology in Action Publication
5. Arduino Cookbook, By Michael Margolis, | Shroff/O'Reilly

- a. **Course Name:** Elements of Mechanical Engineering
- b. **Course Code:** 03010901ES01
- c. **Prerequisite:** Knowledge of Physics and Mathematics
- d. **Rationale:** This course introduces the basic principles of Mechanical Engineering to students in various branches of Engineering

e. Course Learning Objective:

CLOBJ 1	To introduce the fundamental concepts, terminology, and applications of mechanical engineering systems and energy sources.
CLOBJ 2	To develop understanding of thermodynamic principles, gas laws, steam properties, and their engineering applications.
CLOBJ 3	To provide knowledge of internal combustion engines, thermodynamic cycles, and methods for evaluating engine power and efficiency.
CLOBJ 4	To familiarize students with the construction, working principles, and applications of boilers, refrigeration, and air conditioning systems.
CLOBJ 5	To introduce the basics of pumps, compressors, and power transmission devices used in industrial and mechanical systems.
CLOBJ 6	To enhance practical understanding and analytical skills through demonstrations, experiments, and case studies related to mechanical engineering applications.

f. Course Learning Outcomes:

CLO 1	Describe basic terminology of mechanical systems and various conventional and non-conventional energy sources.
CLO 2	Estimate the fundamental properties of Gas and Steam.
CLO 3	Calculate the Power and efficiency of the Internal Combustion engine.
CLO 4	Explain the working principle of Steam Generators, IC engines, Refrigeration, Air Conditioning, Pumps, and Compressors.
CLO 5	Differentiate the various power transmission systems and its applications.

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.	Topics	Weightage %	Teaching hours
1	Introduction: Prime Movers, Conventional and Non-Conventional Energy Sources and their applications. Basics of Thermodynamics: Basic terminologies, Specific heat, Internal Energy, Enthalpy, Specific Volume. Change of State, Path, Process, Cycle, and Thermodynamic systems, Statement of Zeroth Law, First Law and Second Law of Thermodynamics.	10%	5
2	Properties of Gases: Gas Laws, Gas Constant, and Relation between specific heat at constant pressure and constant volume, Non-flow processes.	20%	8
3	Heat Engines: Definition and Classification of Heat Engine; Internal Combustion Engine: Classification, Otto and Diesel Cycle, Two and Four Stroke Petrol and Diesel Engine; Calculation of Power and Efficiency.	20%	10
4	Properties of Steam : Types of Steam and Steam Formation, Specific Enthalpy, Specific Volume, Dryness Fraction of Steam, Measurement of Dryness Fraction, Calorimeters, and Steam Table.	15%	7
5	Energy Conversion Devices Steam Generators: Classification; Cochran, Lancashire, Babcock and Wilcox Boiler, Function of Boiler Mounting and Accessories. Refrigeration and Air Conditioning: Refrigerant, Vapor compression refrigeration system, Vapor absorption refrigeration system, Domestic refrigeration, Window and split air conditioners.	20%	8
6	Basics of Pumps and Compressors: Definition, Classification, Applications, Working Principle and Components of Pumps and Compressors.	5%	3
7	Motion and Power Transmission Devices: Shaft and Axle; Belt Drive, Chain Drive, Friction Drive, Gear Drive, Clutch, Coupling, and Brake.		
Total		100%	45

i. List of Practical

1. Case study on Conventional and Non-Conventional Energy Sources.
2. Demonstration of various types of Steam Generators.
3. Demonstration of various types of mountings and accessories.
4. Demonstration of 4-stroke Petrol and Diesel Engines.
5. Demonstration of 2-stroke Petrol and Diesel Engines.
6. Determination of Power and Thermal Efficiency of an IC Engine.
7. Demonstration of Vapor Compression and Vapor Absorption refrigeration cycle.
8. Demonstration of different types of Pumps.
9. Demonstration of different types of Compressors.
10. Demonstration of various Power Transmission Devices.

j. Text Book and Reference Book:

1. Elements of Mechanical Engineering By Sadhu Singh | S. Chand Publisher. | Revised edition, Pub. Year 2013
2. Elements of Mechanical Engineering By S.B.Mathur, S. Domkundwar | Dhanpat Rai & Sons Publications., Pub. Year 2013
3. Fundamental of Mechanical Engineering By G. S. Sawhney | PHI Publication New Delhi. | Third edition, Pub. Year 2015
4. Engineering Thermodynamics By P. K. Nag | Tata McGraw-Hill Education | Sixth edition, Pub. Year 2017
5. Thermal Science and Engineering By Dr. D. S. Kumar | S. K. Kataria and sons Publishers. | Fourth edition, Pub. Year 2022

- a. **Course Name:** Advanced Communication and Interpersonal Skills
- b. **Course Code:** 03010002HM01
- c. **Prerequisite:** Basic Communication Skills are essential for all Engineers
- d. **Rationale:** Strengthen core language and soft skills through applied grammar, communication tasks, and vocabulary building.
- e. **Course Learning Objective:**

CLOBJ 1	Apply core grammatical principles including subject-verb agreement, reported speech, and active-passive voice to improve accuracy in spoken and written communication.
CLOBJ 2	Expand functional vocabulary and language usage by applying synonyms, antonyms, homonyms, idioms, and contextual word meanings effectively.
CLOBJ 3	Develop effective reading comprehension skills to understand, interpret, and respond to intermediate-level texts and spoken content
CLOBJ 4	To improve students' confidence, grooming, personality development, and professional etiquette for personal and career growth.
CLOBJ 5	Develop self-management and personal development skills by applying SWOT analysis, practicing effective time management strategies, and engaging in reflective learning processes

f. Course Learning Outcomes:

CLO 1	Remember the essential rules of English grammar and core vocabulary required for accurate communication.
CLO 2	Understand spoken and written texts at an intermediate level to grasp meaning, ideas, and context.
CLO 3	Apply grammatical structures, vocabulary, and writing skills in essays, self-introductions, and everyday communication.
CLO 4	Analyze personal strengths and weaknesses through SWOT analysis to enhance grooming and personality development.
CLO 5	Analyze communication habits and daily routines to improve time management and professional effectiveness.

g. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	0	2	2	40	0	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.	Topics	Weightage %	Teaching hours
1	Subject Verb Agreement: Rules of subject-verb matching Singular vs plural form Common agreement errors	10%	1

2	Reported Speech: Direct and indirect speech Changing tenses, pronouns, and time expressions Reporting statements, questions, and commands	10%	1
3	Active and Passive Voice: Difference between Active and Passive Rules for converting sentences Usage in real-life contexts	10%	1
4	Building Vocabulary: Word meanings and usage Synonyms and antonyms Homonyms, Homophones, Homographs, Idioms	10%	2
5	Grooming and Personality Development: Importance of dressing and professional etiquette Building confidence and positive body language	10%	2
6	SWOT Analysis with Self Introduction: Identifying strengths, weaknesses, opportunities, threats Preparing and delivering a confident self-introduction. Developing self-awareness and a growth mindset	10%	2
7	Reading Comprehension (Intermediate Level): Understanding written texts Finding main ideas and supporting details Answering questions accurately	10%	2
8	Listening Comprehension (Intermediate Level): Listening for specific information Identifying tone and purpose Responding appropriately	10%	1
9	Essay Writing: Structure of an essay: introduction, body, conclusion Organizing ideas logically Using appropriate language and tone	10%	2
10	Time Management: Importance of managing time Prioritization Creating schedules	10%	1
Total		100%	45

i. List of Practical

- Subject Verb Agreement a. Fill-in-the-blank exercises b. Sentence correction tasks c. Group quiz competition d. Role-play using correct subject-verb forms
- Reported Speech a. Dialogue conversion practice b. Pair work: narrate a conversation c. Reporting classroom news d. Role-play followed by reporting
- Active and Passive Voice a. Transform active sentences to passive and vice versa b. Rewrite instructions in passive voice c. Classroom narration using passive structures d. Group activity: change story voice
- Building Vocabulary a. Daily word journal b. Vocabulary flashcards and games c. Synonym-antonym match-up d. Word building through storytelling
- Grooming and Personality Development a. Personal grooming checklist task b. Group discussion on personality traits c. Mock social interaction d. Confidence-building exercises
- SWOT Analysis with Self Introduction a. SWOT worksheet filling b. Self-introduction in pairs or groups c. Strength-sharing circle d. Feedback on introductions
- Reading Comprehension (Intermediate Level) a. Reading passage followed by Q&A b. Find-the-theme activity c. Vocabulary hunt from the passage d. Summarizing a short text
- Listening Comprehension (Intermediate Level) a. Listen and answer exercises b. Listening and completing notes c. Audio based MCQs d. Paraphrasing what was heard
- Essay Writing a. Brainstorming and outline creation b. Writing on guided topics c. Peer feedback session d. Editing and final draft submission

10. Time Management and Team Building a. Create a weekly schedule b. Prioritization task (urgent vs important) c. Reflection on time use habits

j. Text Book and Reference Book:

1. Technical Communication: Principles And Practice By Sangeetha Sharma, Meenakshi Raman | Oxford University Press | 2nd Edition
2. Personality Development and Soft Skills By Barun K Mitra | Oxford, 2011
3. High School English Grammar and Composition By Wren & Martin | S. Chand Publishing, Pub. Year 2017
4. English Grammar in Use By Raymond Murphy | Cambridge University Press, Pub. Year 2019
5. Communication Skills and Soft Skills By Suresh Kumar | Pearson Publication, 2010

- 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
- 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 Objective:**

CLOBJ 1	To introduce the fundamental concepts, principles, and scope of environmental science and sustainable development.
CLOBJ 2	To develop understanding of environmental pollution, its sources, impacts, measurement techniques, and control methods.
CLOBJ 3	To familiarize students with environmental management practices, Indian environmental legislation, and international environmental agreements.
CLOBJ 4	To create awareness about contemporary environmental issues such as climate change, waste management, biodiversity conservation, and environmental disasters.
CLOBJ 5	To provide knowledge of climate-resilient cities, sustainable urban planning, green infrastructure, and smart environmental solutions.
CLOBJ 6	To develop analytical and problem-solving skills for evaluating environmental challenges and promoting sustainable and eco-friendly practices in society and industry.

f. **Course Learning Outcomes:**

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

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	0	0	0	0	50	0	0	0	50

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

h. Course Content:

Sr.	Topics	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>	15 %	3
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>	25%	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>	25%	3
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 & 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, 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</p>	15%	3

	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.	20%	2
	Total	100%	15

i. Text Book and Reference Book:

1. Textbook of Environmental Studies for Undergraduate Courses' (TextBook) By Erach Bharucha | Universities press
2. Basics of Environmental Studies By U K Khare | Tata McGraw Hi
3. Environmental Studies (TextBook) 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-Hill