



First Year Curriculum

Admission Year 2026-27

Bachelor of Technology Mathematics and Computing

Faculty of Engineering & Technology

Parul University

Vadodara, Gujarat, India

Semester 1

- a. **Course Name:** Calculus and It's Applications
- b. **Course Code:** 03016101PC01
- c. **Prerequisite:** Derivative and Integration
- d. **Course Learning Objective**

CLOBJ 1	Understand the concepts of improper integrals and their convergence.
CLOBJ 2	Apply multivariable calculus techniques for optimization problems.
CLOBJ 3	Solve problems involving double and triple integration for area and volume calculations.
CLOBJ 4	Analyze line, surface, and volume integrals using vector calculus.
CLOBJ 5	Apply Green's, Gauss's, and Stokes' theorems in engineering and mathematical applications.

e. Course Learning Outcomes:

CLO 1	Understand the concept of Improper Integral.
CLO 2	Apply the concept of Multivariate calculus in optimization problems.
CLO 3	Apply the concept of multiple integration for the area and volume.
CLO 4	Analyze Inter-relationship amongst the line integral, double and triple integral formulations.
CLO 5	Realize importance of Green, Gauss and Stokes' theorems in other branches of mathematics.

f. 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

g. Course Content:

Sr.	Topics	Weightage %	Teaching hours
1	Improper Integral: Definition and type of Improper Integral, Convergence of Improper Integrals, Gamma and Beta function and its properties.	20 %	12
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	25%	15
3	Multiple Integration: Double integration, change of order, change into polar form, application to area and volume.	25%	15
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.	30 %	18

h. Text Book and Reference Book:

1. Calculus and Analytic Geometry, By G. B. Thomas, Jr. and R. L. Finney, | Pearson India.
2. Calculus with early transcendental functions By James Stewart | Cengage Learning
3. Calculus, By Tom M Apostol, | Wiley Publication.
4. Calculus, By Ron Larson, Bruce Edwards, | Cengage Learning

- a. **Course Name:** Foundations of Statistical Analysis
 b. **Course Code:** 03016101BS01
 c. **Prerequisite:** None
 d. **Course Learning Objective:**

CLOBJ 1	Understand fundamental concepts of statistical data collection and analysis.
CLOBJ 2	Apply statistical tools such as mean, median, variance, skewness, and kurtosis.
CLOBJ 3	Analyze correlation and regression between variables.
CLOBJ 4	Develop curve fitting models using least square techniques.
CLOBJ 5	Interpret multivariate statistical analysis using multiple regression methods.

e. **Course Learning Outcomes:**

CLO 1	Demonstrate an ability to explain the basic knowledge on data collection and data analysis using various statistical elementary tools such as mean, median, mode, standard deviation and variance, skewness and kurtosis.
CLO 2	Fit a curve such as straight-line, second-degree parabola, logarithmic curve, exponential curve to the given set of values of the variables.
CLO 3	Analyse correlation and regression between two variables based on the given set of values.
CLO 4	Analyse multiple regression coefficients to assess their significance in multivariate analysis.

f. **Teaching & Examination Scheme:**

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

g. **Course Content:**

Sr.	Topics	Weightage %	Teaching hours
1	Introduction Statistics: definition, organization, collection, and interpretation of data Measures of location (or central tendency) and dispersion: mean, median and mode, standard deviation and variance, coefficient of variance.	25%	15
2	Skewness, Moments, and Kurtosis Introduction, difference between dispersion and skewness, test of skewness, measures of skewness, moments, kurtosis, measures of kurtosis.	25%	15
3	Correlation, Regression and Curve Fitting Correlation, Karl's Pearsons coefficient of correlation, Spearman's Rank correlation coefficient, Regression analysis, Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and exponential curves.	25%	15
4	Partial Correlation, Multiple Regression Analysis Introduction, partial correlation, partial correlation coefficient, multiple correlation, multiple regression analysis, reliability of estimates	25%	15

h. Text Book and Reference Book:

1. Statistical Method, S. P. Gupta, Sultan Chand & Sons Educational Publication.
2. Applied Business Statistics By Ken Black, Willey Publication
3. Essential of Modern Business Statistics, By Anderson, Sweeney, Williams, | Cengage Learning
4. Probability and Statistics for Data Science, By Dr. D.C Agarwal, Dr. Pradeep K Joshi, | Shree Sai Publication

- 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. **Course Learning Objective:**

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

e. **Course Learning Outcomes:**

CLO 1	To conceptualize semiconducting materials on the basis of band theory.
CLO 2	To get familiar with optical fibres and semiconductor based optoelectronic devices useful in fibre 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)

f. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-	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.	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

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

i. Text Book and Reference Book:

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

- a. **Course Name:** Programming for Problem Solving
b. **Course Code:** 03010501ES01
c. **Prerequisite:** Requires Basic Knowledge of Computer
d. **Course Learning Objective:**

CLOBJ 1	Understand the basic organization and operation of computer systems.
CLOBJ 2	Learn programming concepts and problem-solving methodologies using C language.
CLOBJ 3	Develop algorithms for engineering and computational problems.
CLOBJ 4	Implement programs using control structures, arrays, functions, and pointers.
CLOBJ 5	Apply file handling and dynamic memory allocation concepts in programming.

e. **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.

f. **Teaching & Examination Scheme:**

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

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g. **Course Content:**

Sr. No.	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.	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 & go to 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
7	Motion And Power Transmission Devices Shaft and Axle; Belt Drive; Chain Drive; Friction Drive; Gear Drive; Clutch, Coupling and Brake.	5%	3
8	Conventional And Non-Conventional Energy Sources Introduction and Classification of Energy Sources; Conventional Energy Sources E.g. Solid, Liquid, Gaseous and Nuclear fuels; Calorific Value of Fuels; Non-Conventional Energy Sources E.g. Solar Energy, Wind Energy, Hydro Power, Biomass and Biomass Energy; Comparison of Conventional & Non-Conventional Energy Sources.	5%	3

h. List of Practical

Practical 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.

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	100-80	60-79	35-59	0-34
Grade	Dist	First Class	Second Class	Fail

1. Write a program to read marks of a student from keyboard whether the student id pass (if).

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. $153=1^3+5^3+3^3=153$
7. Write a program to print the output of bellow series. $1!+2!+3!+4!+\dots+n!$
8. Write a program to print the following outputs using for Loop. (a) 1 (b) * 12 ** 123 ***
9. Write a program to print the following outputs using for Loop. (a) 1 (b) 321 21 21 321 1

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.
5. Write a program to count number of positive, negative and zero elements from 3x3 matrix.
6. 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.
7. Write a program to count vowels from a entered String.
8. Write a program which finds whether a string is a palindrome or not.

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.

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 ATeam name Batting average

Practical Set 6 (Pointers)

1. Write a program to add two numbers using pointers.
2. Write a program to swap two numbers using pointer

Practical Set 7 (File Management)

1. Write a program to illustrate reading files contents.
2. Write a program to illustrate the use of fgets().

i. 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:** Electrical and Electronics Engineering

b. **Course Code:** 03010601ES02

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

d. **Course Learning Objective:**

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

e. **Course Learning Outcomes:**

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

f. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-	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.	Topics	Weightage %	Teaching hours
1	DC Circuits: Concepts of Electrical Current, Voltage, Power and Energy. Electrical circuit elements (R, L and C), voltage and current sources, - Ohm's Law and Kirchhoff'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	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. Analysis with phasor diagrams of R, L, C, R-L, R-C and R-L-C series circuits and it's 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	<p>Diode and Transistors: 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.</p>	30%	12
4	<p>Voltage Regulators and Transducers: 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</p>	20%	10

h. List of Practical

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 experimentally investigate the behaviour of a series RLC circuit under AC excitation.
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 half wave rectifier with and without filter.
8. To perform full wave rectifier with and without filter.
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

i. Text Book and Reference Book:

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

a. **Course Name:** Principles of Communication Skills

b. **Course Code:** 03010001HM01

c. **Prerequisite:** Knowledge of English Language studied till 12th standard

d. **Course Learning Objective:**

CLOBJ 1	Develop effective grammar and sentence construction skills.
CLOBJ 2	Enhance reading, writing, listening, and speaking abilities.
CLOBJ 3	Build confidence in formal and informal communication.
CLOBJ 4	Improve presentation and extempore speaking skills.
CLOBJ 5	Develop interpersonal communication and goal-setting abilities.

e. **Course Learning Outcomes:**

CLO 1	Enable students to apply essential grammar rules for accurate and effective communication.
CLO 2	Develop ability to construct clear and coherent sentences and paragraphs using varied sentence structures.
CLO 3	Enhance reading and listening comprehension through identification of main ideas, details, and contextual meanings.
CLO 4	Build s confidence in everyday communication using appropriate greetings, expressions, and speaking skills.
CLO 5	Encourage creative and logical thinking through picture perception and extempore activities.
CLO 6	Help students set and track realistic personal and academic goals for continuous self-improvement.

f. **Teaching Scheme:**

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

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

g. **Course Content:**

S r.	Topics	Weighta ge %	Teachi ng hours
1	Parts of Speech, Punctuation Overview of 8 parts of speech Basic punctuation marks and their usage Importance of grammar in writing	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 voc abulary 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

h. Reference Books:

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:** NA
d. **Course Learning Objective:**

CLOBJ 1	Introduce students to the fundamentals of mathematics, communication, computing, and physics.
CLOBJ 2	Familiarize students with Indian Knowledge Systems and their applications.
CLOBJ 3	Develop analytical, creative, and problem-solving abilities.
CLOBJ 4	Encourage interdisciplinary learning and practical understanding.
CLOBJ 5	Build awareness of emerging technologies and innovation.

e. **Course Learning Outcomes:**

CLO 1	Enable students to learn basic concepts of mathematics
CLO 2	Develop ability to understand physics concepts
CLO 3	Enhance reading and listening comprehension through identification of main ideas, details, and contextual meanings.
CLO 4	Understand the concept of programming.

f. **Teaching & Examination Scheme:**

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

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

g. **Course Content:**

Sr.	Topic	Weightage %	Teaching hours
1	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 Analyzing Rate of Change and Optimization Utilizing Integration for Problem Solving A B C of Tangrams	25%	12
2	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	25%	12

	and Innovations		
3	<p>Activities in Computer Science Computer 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</p> <p>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</p> <p>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, Electromagnetics, Optics, Laser and Fiber Optics, Vedic Physics and Cosmology</p>	25%	12

Semester-2

- a. **Course Name:** Fundamentals of Linear Algebra
 b. **Course Code:** 03016102PC01
 c. **Prerequisite:** Basic Knowledge of Matrix and Determinants.
 d. **Course Learning Objective:**

CLOBJ 1	Understand systems of linear equations and matrix operations.
CLOBJ 2	Analyze vector spaces, subspaces, basis, and dimension.
CLOBJ 3	Apply linear transformations and matrix representations.
CLOBJ 4	Develop orthogonalization techniques using inner product spaces.
CLOBJ 5	Apply linear algebra concepts in coding, PCA, and Markov processes.

e. **Course Learning Outcomes:**

CLO 1	Solve systems of linear equations and analyze matrices using concepts of rank, eigenvalues, eigenvectors, and the Cayley Hamilton theorem.
CLO 2	Explain the structure of vector spaces, including subspaces, linear dependence and independence, basis, and dimension.
CLO 3	Construct linear transformations and determine their matrix representation, null space, column space, and rank.
CLO 4	Apply inner product concepts to find norms, angles, and orthonormal bases using the Gram-Schmidt process.
CLO 5	Use linear algebra techniques in applications such as coding-decoding, PCA, and Markov processes.

f. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	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.	Topics	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.	25%	15
2	Vector Space: Vector spaces over the field of real numbers, Elementary Properties of Vector Spaces, Subspaces, Intersection and sums of subspaces, Spanning set, Linear independence and dependence, Basis and Dimension.	20%	12
3	Linear Transformation: Definition of Linear Transformation from to , 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.	20%	12
5	Applications of Linear Algebra: Coding-decoding, Principal Component Analysis (PCA), Markov Chain Process.	10%	6

i. Text Book and Reference Book:

1. Linear Algebra By Hoffman, K. and Kunze R | Pearson Education(Asia) Pvt. Ltd. Prentice Hall of India
2. Linear Algebra: A Modern Introduction, By D. Poole, | 2nd Edition, Brooks/Cole
3. Elementary Linear Algebra with Applications, (TextBook) By H. Anton | John Wiley
4. Linear Algebra and Its Applications By G. Strang | Brooks/Cole India
5. Advanced Engineering Mathematics By Erwin Kreyszig | Willey India Education

- a. **Course Name:** Physics for Engineers
b. **Course Code:** 03019202BS01
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. **Course Learning Objective:**

CLOBJ 1	Understand concepts of oscillations, waves, and resonance.
CLOBJ 2	Analyze electromagnetic fields and Maxwell's equations.
CLOBJ 3	Study magnetic and superconducting materials with engineering applications.
CLOBJ 4	Apply Python programming for scientific computations and simulations.
CLOBJ 5	Develop computational skills for solving physics-based problems.

e. **Course Learning Outcomes:**

CLO 1	Understand the basic concept of classical mechanics to solve static and dynamic problems.
CLO 2	Understand the basic concept of wave and oscillation.
CLO 3	Formulate and conceptualize various theoretical aspects and the physical phenomena at macro and atomic level.
CLO 4	Understand the theoretical analysis using Python programming.

f. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-	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.	Topics	Weightage %	Teaching hours
1	Oscillations and waves Damped and forced oscillations, Resonance, Q factor, Sharpness of resonance, transverse waves on a string, Equations of longitudinal and transverse waves and solutions, Reflection and transmission of waves at a boundary, Impedance matching between two medium.	25%	10
2	Electrodynamics Concept of Field, Gradient, Divergence, Curl, Scalar and Vector Potential, Maxwell's equations, concept of displacement current, Derivation of wave equation for plane electromagnetic wave, Poynting theorem, Energy density.	25%	10
3	Materials: Magnetic And Superconducting Materials Theory, properties and classification of magnetic materials, soft and hard magnetic materials, ferrites, Applications Superconducting Materials: Meissner effect, penetration depth, type-1 and type-2 superconductors, High temperature superconductors, Applications.	25%	10
4	Scientific computing Basic concepts in Python, Loops, conditions and functions, Basics of Numpy, Basics of Scipy, Basics of Matplotlib, Applications in special problems like Laplace, Poisson diffusion and Schrodinger equation.	25%	15

h. List of Practical

1. Basic programming using functions.
2. Using different python packages like numpy, scipy, etc.
3. Creating Plots using Python.
4. Solving Laplace equation in python.
5. Solving Poisson equation in python.
6. Study of Diffusion equation using Spectral method.
7. Study of Wave equation in python.
8. Study of Schrodinger equation using python.
9. Boundary value problem using shooting method.
10. Eigen function and Eigen values for differential equation.

i. Text Book and Reference Book:

1. Scientific Computing Using Python (TextBook) By Abhijeet Kar Gupta | Techno World Publications.
2. A text book of Engg. Physics, By M. N. Avadhanulu | S. CHAND & COMPANY LTD-NEW DELHI | 8
3. Physics for Computer Science Students By Narciso Garcia, Arthur Damask and Steven Schwarz | Springer | Second Edition

- a. **Course Name:** Probability and Statistical Inference
 b. **Course Code:** 03016102BS01
 c. **Prerequisite:** Basics concepts of Statistics such as frequency distribution, measures of central tendency etc. and probability theory.
 d. **Course Learning Objective:**

CLOBJ 1	Understand fundamental concepts of probability theory.
CLOBJ 2	Apply probability distributions in practical situations.
CLOBJ 3	Analyze sampling techniques and sampling distributions.
CLOBJ 4	Apply estimation and hypothesis testing methods.
CLOBJ 5	Interpret statistical results for decision-making and data analysis.

e. **Course Learning Outcomes:**

CLO 1	Estimate the chances of occurrence of an event using concepts of probability theory.
CLO 2	Use various probability functions and cumulative distribution functions such as Binomial, Uniform, Exponential, Poisson and Normal Distributions.
CLO 3	Demonstrate proficiency in selecting appropriate sampling techniques.
CLO 4	Analyze sampling distributions of sample means (\bar{x}) and proportions using the central limit theorem.
CLO 5	Apply the concepts of point and interval estimators using the interpretation of their properties in practical scenarios.
CLO 6	Apply the different testing tools like t-test, F-test, chi-square test to analyze the relevant real-life problems.

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

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g. **Course Content:**

Sr. No.	Content	Weightage %	Teaching hours
1	Probability Theory Basics of probability, Conditional probability, Bayes' rule.	20%	12
2	Probability Distribution Random variable, probability mass function and probability density function, mathematical expectation and variance, discrete distribution: binomial distribution, Poisson distribution, continuous distributions: uniform distribution, exponential distribution, normal distribution.	25%	15
3	Hypothesis Testing Introduction to hypothesis, testing of hypothesis about a population mean, population proportion, and variance using z-test, t-test, the difference in two mean using z-test, difference between two means (Independent samples and dependent samples) using t-test, two population variance, F- distribution, introduction to design of experiment, analysis of Variance – one way and two-way classification, chi-square test, characteristics of chi-square distribution, chi-square test of goodness of fit, chi-square test as a test of independence.	15%	9

4	PROJECTIONS OF PLANES: Projections of various planes – Polygonal, Circular and Elliptical Shape inclined to one of the Reference Plane and inclined to two Reference Planes; Concept of Auxiliary Plane of Projections.	40%	24
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h. Text Book and Reference Book:

1. Statistical Method, S. P. Gupta, Sultan Chand & Sons Educational Publication. (TextBook)
2. Business Statistics for Contemporary Decision Making By Ken Black | Wiley
3. Essential of Modern Business Statistics, By Anderson, Sweeney, Williams, | Cengage Learning
4. Probability and Statistics for Data Science, By Dr. D.C Agarwal, Dr. Pradeep K Joshi, | Shree Sai Publication.

a. **Course Name:** Objected Oriented Programming

b. **Course Code:** 03010502ES01

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

d. **Rationale:** The Mathematics I syllabus integrates fundamental calculus concepts, advanced mathematical techniques, and vector calculus, preparing students for engineering challenges with optimized problem-solving skills.

e. **Course Learning Objective:**

CLOBJ 1	Understand principles of object-oriented programming.
CLOBJ 2	Apply concepts such as classes, objects, inheritance, and polymorphism.
CLOBJ 3	Develop programs using object-oriented design techniques.
CLOBJ 4	Implement exception handling and file management concepts.
CLOBJ 5	Build modular and reusable software applications.

f. **Course Learning Outcomes:**

CLO 1	Demonstrate the ability to translate physical or engineering problems into mathematical equations and solve them.
CLO 2	Develop analytical and critical thinking skills through the process of solving complex mathematical problems.
CLO 3	Understand and interpret mathematical solutions in the context of the given problems.
CLO 4	Communicate mathematical concepts and solutions clearly and effectively, both in written and verbal forms.
CLO 5	Present mathematical arguments and solutions in a logical and organized manner.
CLO 6	Lay a solid foundation for more advanced courses in mathematics and related disciplines.

g. **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

h. **Course Content:**

Sr.	Topics	Weightage %	Teaching hours
1	UNIT 1 : Higher order ordinary differential equations: Ordinary differential equations of higher orders, Homogeneous Linear ODEs of Higher Order, Homogeneous Linear ODEs with Constant Coefficients, Euler-Cauchy equations, Nonhomogeneous ODEs, Method of Undetermined Coefficients, Solution by Variation of Parameters, Applications	8%	5
2	UNIT 2 : Power Series: Power series solutions at ordinary point and regular singular point; Legendre polynomials, Bessel functions of the first kind and their property	15%	9
3	UNIT 3 : Laplace Transform: Laplace Transform and inverse Laplace transform, Linearity, First Shifting Theorem (s-Shifting), Transforms of Derivatives and Integrals, ODEs, UNIT Step Function (Heaviside Function), Second Shifting Theorem (t-Shifting), Laplace transform of periodic functions, Short Impulses, Dirac's Delta Function, Convolution, Integral Equations, Differentiation and Integration of Transforms, Solution of ordinary differential equation by Laplace transform	25%	15

4	UNIT 4: Fourier Integral: Fourier Integral, Fourier Cosine Integral and Fourier Sine Integral	17%	10
5	UNIT 5: Vector Calculus: Gradient of scalar field, Directional Derivative, Divergence and curl of Vector field, Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.	10%	6
6	UNIT 6: Multivariable Calculus (Integration): Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Triple integrals (Cartesian)	25%	15

i. Text Book and Reference Book:

1. Calculus and Analytic Geometry (Textbook) | By G.B. Thomas and R.L. Finney | Addison Wesley
2. Calculus with early transcendental functions | By James Stewart | Cengage Learning
3. Higher Engineering Mathematics | By B. S. Grewal | Khanna Publications
4. Elementary Linear Algebra (Textbook) | By Howard Anton, Chris Rorres | Willy India Edition | 9th Edition
5. Advanced Engineering Mathematics (Textbook) | By Erwin Kreyszig | Willey India Education

- a. **Course Name:** ICT Workshop
 b. **Course Code:** 03010702ES01
 c. **Prerequisite:** NA
 d. **Course Learning Objective:**

CLOBJ 1	Develop basic computer and ICT skills.
CLOBJ 2	Apply office automation tools and internet technologies.
CLOBJ 3	Understand networking and communication technologies.
CLOBJ 4	Enhance practical knowledge of digital tools for engineering applications.
CLOBJ 5	Improve technical documentation and presentation skills.

e. Course Learning Outcomes:

CLO 1	Understand the basic concepts and applications of Information and Communication Technology (ICT) in education and professional environments.
CLO 2	Develop practical skills in using ICT tools such as word processing, presentations, spreadsheets, and online communication platforms.
CLO 3	Apply ICT techniques for effective data management, digital collaboration, and problem-solving in academic and workplace settings.

f. Teaching & Examination Scheme:

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

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

g. List of Practical

1. Introduction to Breadboard and Digital Multi Meter, Verify the circuit analysis (voltage and current).
2. Identification, symbolic representation and testing of various electronics components.
3. To study CRO and Function generator with specifications.
4. To verify Ideal Value and practical value of voltage regulator ICs.
5. Introduction to Arduino IDE with LED Blinking.
6. Interfacing Button-Controlled LED with Arduino board.
7. Buzzer Alarm System Using Arduino.
8. Demonstrate the function of LCD Display Interfacing with Arduino.
9. Relay-Based ON/OFF Control System with Arduino.
10. Demonstrate the working of Temperature Sensor-DHT11
11. Demonstrate the working of Ultrasonic Distance Measurement sensor.
12. Verify the functionality of water flow sensor
13. Demonstrate the working of PIR Sensor using Arduino.
14. Project based on electronics components and sensors

***Continuous Evaluation:**

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

- a. **Course Name:** Advanced Communication and Interpersonal Skills
b. **Course Code:** 03010002HM01
c. **Prerequisite:** Basic Communication Skills are essential for all Engineers.
d. **Course Learning Objective:**

CLOBJ 1	Develop advanced verbal and written communication skills.
CLOBJ 2	Improve professional presentation and group discussion abilities.
CLOBJ 3	Enhance interpersonal and team communication skills.
CLOBJ 4	Build confidence in professional and workplace interactions.
CLOBJ 5	Strengthen leadership and personality development skills.

e. **Course Learning Outcomes:**

CLO 1	To demonstrate proficiency in applying subject-verb agreement rules, reported speech transformations, and active-passive voice conversions for effective professional communication.
CLO 2	To effectively apply vocabulary-building strategies and comprehension skills to interpret and respond to reading and listening tasks in real-life and workplace scenarios.
CLO 3	To present a confident and professional self-image through structured self-introduction, appropriate grooming, and the use of positive body language and etiquette.
CLO 4	To compose well-organized essays and formal communications using logical structure, accurate grammar, and appropriate tone for academic and professional purposes.
CLO 5	To apply time management strategies and conduct a personal SWOT analysis to enhance self-awareness, productivity, and career development.

f. **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	-	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:**

Unit No.	Topic	Weightage %	Teaching hours
1	Subject Verb Agreement Rules of subject-verb matching Singular vs plural forms 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

h. 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. **Course Learning Objective:**

CLOBJ 1	Understand environmental systems and ecological balance.
CLOBJ 2	Analyze environmental pollution and its control measures.
CLOBJ 3	Develop awareness about sustainable development practices.
CLOBJ 4	Understand environmental laws and policies.
CLOBJ 5	Promote environmental responsibility and conservation ethics.

e. **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.

f. **Teaching & Examination Scheme:**

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

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	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.	15%	5
2	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.	20%	8

3	<p>ENVIRONMENT MANAGEMENT AND LEGISLATION</p> <p>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 8 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%	10
4	<p>CONTEMPORARY ENVIRONMENTAL ISSUES</p> <p>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 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.</p>	10%	5
5	<p>CLIMATE RESILIENT CITY</p> <p>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.</p>	10%	6

h. 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