First Year Curriculum

Admission Year 2026-27

Diploma in Information Technology

Faculty of Engineering & Technology

Parul University

Vadodara, Gujarat, India

Semester 1

a. **Course Name:** Python Programming
b. **Course Code: 03061601PC01**
c. **Prerequisite:** Basic Computer Knowledge and familiar with program concepts.
d. **Rationale:** The course aims to develop proficiency in writing efficient Python code for problem-solving and real-world applications. It also covers core concepts like data structures, functions, and OOP principles**.**

e. **Course Learning Objective:**

CLOBJ 1	Understand the fundamentals of Python programming including syntax, features, installation process, variables, data types, and operators.
CLOBJ 2	Develop problem-solving skills using control statements, loops, functions, and different data structures such as lists, tuples, sets, and dictionaries.
CLOBJ 3	Apply Python functions and modules to create reusable programs and perform tasks related to mathematical operations, date and time handling, and random number generation.
CLOBJ 4	Build basic Python applications by integrating user input, decision making, looping constructs, functions, and standard modules effectively.

f. **Course Learning Outcomes:**

CLO 1	Understand the Core Syntax & Structure of Python Programming.
CLO 2	Perform Data Handling Using Python's Data Structure.
CLO 3	Implement Control flow Mechanism & Loops.
CLO 4	Use Python Operations.
CLO 5	Implement Function & Utilize Module

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
3	**0**	**4**	**5**	**20**	**20**	**100**	**60**	**-**	**200**

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Basics of Python** History of python, comparison of different versions of python, difference of C and Python, different python editors, Installation of IDLE and setting up python environment, Basic python syntax, Comments in python, Features of Python	**18%**	**8**
2	**Data Type & Operator** Variable, assigning values to a variable, rules to name a variable Keywords, Datatype, User Input, Operators, List Tuples, Set, Dictionaries, Data Structure, String Inbuilt Function.	**20%**	**6**
3	**Control Statements** If. else, while loops, for loops, range, break, Continue	**27%**	**7**
4	**Function** Introduction of functions, Defining user function, Function documentation, Optional Parameter, Default parameter, Variable no. of argument, Keyword Arguments, Scope of variable in function, Lamda, Inbuilt functions	**30%**	**10**
5	**Modules** Sys, Math, Date, Time, Random.	**16%**	**7**

i. Text Book and Reference Book:

1. Introducing Python by Lubanovic Bill, O' ReILLY
2. Beginning Python: Using Python 2.6 and Python By James Payne | Wrox Publication
3. Beginning programming with Python for Dummies By John Paul Mueller | John Wiley & Sons
4. Fluent Python, 2nd Edition by Luciano Ramalho

j. List of Practical

Sr. NO.	Experiment List
1.	Write a program to print Hello word.
2.	Write a program to demonstrate use of comments.
3.	Write a program which accepts the radius of a circle from the user and compute the area.
4.	Write a program which accepts the user's first and last name and print them in reverse order with a space between them.
5.	Write a program to demonstrate all data type in Python.
6.	Write a program to do arithmetical operations.
7.	Write a program to do Logical operations.
8.	Write a program to find area of circle, rectangle & Triangle.
9.	Write a program to Perform Type Conversion: i) convert kilometers to miles & ii) convert Celsius to Fahrenheit.
10.	Write a program to demonstrate list datatype slicing & indexing operator & also any 10 inbuilt function list.
11.	Write a program to demonstrate Tuple datatype slicing & indexing operator & also any 10 inbuilt function tuples.
12.	Write a program to demonstrate Set datatype & also any 10 inbuilt function Set.
13.	Write a program to demonstrate Dictionary datatype & also any 10 inbuilt function Dictionary.
14.	Write a program to get a single string from two given strings, separated by a space and display the first two characters of each string.
15.	Write a program to demonstrate 10 functions of string.
16.	Write a program to find the Maximum number from three numbers.
17.	Write a program to display grade of students.
18.	Write a program to make a simple calculator using if…. else as per user choice.
19.	Write a program to find given number is prime or not.
20.	Write a program to find factorial of given number.
21.	Write a program to Print Right Triangle using While loop.
22.	Write a program to check if a given number is an Armstrong number.
23.	Write a program to print a specified list after removing the 0th, 4th and 5th elements. Go to the editor Sample List: ['Red', 'Green', 'White', 'Black', 'Pink', 'Yellow'] Expected Output: ['Green', 'White', 'Black'].
24.	Write a program to find reveres number of given numbers.
25.	Write a program to Check Input Character is a Vowel on a Constant.
26.	Write a program to demonstrate variable & optional parameter.
27.	Write a program to display triangle pattern using while loop.
28.	Write a program to display the current date and time.
29.	Write a program to print the calendar of a given month and year.
30.	Write a program to use of Random & Math module.

a. **Course Name:** Mathematics - I
b. **Course Code:** 03069101BS01
c. **Prerequisite:** Student must be passed class 10th examination from recognized board of education. Also, students has knowledge of basic concept studied till 10th standard.
d. **Rationale:** The goal of this Mathematics course is to give students a strong foundation in fundamental ideas and procedures that are essential for both everyday problem-solving and future education. This course aims to foster logical reasoning and critical thinking skills while covering subjects that are directly relevant to a variety of engineering, technology, business, and scientific domains.
e. **Course Learning Objective:**

CLOBJ 1	Understand the concept of logarithms and partial fractions for algebraic simplifications with examples
CLOBJ 2	Understand trigonometric functions and relationship between them with examples
CLOBJ 3	Solve the complex numbers in various forms like modulus-amplitude (polar) form, Exponential (Euler) form for engineering applications with examples
CLOBJ 4	Understand the concept of functions and limits with examples
CLOBJ 5	Understand concept of differentiation engineering related problems based on applications of differentiation with examples

f. **Course Learning Outcomes:**

CLO 1	Apply logarithms for calculations and convert rational fractions into sums of partial fractions with examples
CLO 2	Analyze basic functions used in trigonometry with examples
CLO 3	Explain complex numbers in various forms like modulus-amplitude (polar) form, Exponential (Euler) form – illustrate with examples
CLO 4	Evaluate and interpret the function graphically, numerically and analytically with limit of function
CLO 5	Solve engineering related problems based on applications of differentiation

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
3	**1**	**0**	**4**	**20**	**20**	**00**	**60**	**00**	**100**

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

h. Course Content:

Sr. No.	Topics	Weightage	Teaching Hours
1	**Logarithms and Partial Fractions** Logarithms: Definition, Logarithm as a transformation, Antilogarithm, Rules of Logarithms and examples, use logarithmic functions for simplifying arithmetic computations. Partial fractions: Definition of partial fractions, Types of partial fraction (denominator containing non-repeated linear factors, repeated linear factors and irreducible non-repeated quadratic factors).	**17%**	**8**
2	**Trigonometry** Units of Angles (degree and radian), Trigonometric Functions, Allied & Compound Angles, Multiple –Submultiples angles, Graph of Sine and Cosine, Periodic trigonometric functions, Sum and factor formulae**.**	**23%**	**9**
3	**Complex Numbers** Definition of a complex number, real and imaginary parts of a complex number, Polar and Cartesian representations of complex number, Conjugate of complex number, Geometric representation of complex numbers and their operations, Modules and Amplitude form, De Moivre's Theorem, Root of Complex Number, Use of De Moivre's Theorem to simplify mathematical expressions.	**20%**	**9**
4	**Function and Limit** Definition and concept of function, Concept of limits and standard forms of limits, Standard formulae of Limit and related simple examples.	**17%**	**8**
5	**Differentiation** Definition of derivative, differentiation of standard function by first principle, Rule of Differentiation, Differentiation of algebraic, trigonometric, Exponential, Logarithmic, Implicit functions and Composite functions, Higher order derivatives.	**23%**	**11**

i. Text Book and Reference Book:

1. Advanced Mathematics for Polytechnic By Pandya N R | Macmillan Publishers India Ltd.,2012
2. Mathematics-I By Deepak Singh | Khanna Book Publishing Co
3. Mathematics II By Garima Singh | Khanna Book Publishing Co.
4. A text book of Engineering Mathematics By N.P. Bali and Manish Goyal | Laxmi Publications
5. Polytechnic Mathematics By S P Deshpande | Pune Vidyarthi Gruh Prakashan
6. Applied Mathematics By H.K.Das | S.Chand Publication

Calculus and Analytic Geometry By G. B. Thomas, R. L. Finney | Addison Wesley

j. Tutorial List

Sr. NO.	Experiment List
1	**Logarithms and Partial** Fractions Examples using working rules of logarithm, Types of partial fraction with different examples
2	**Trigonometry** Trigonometric ratios with examples, Formulae of trigonometric functions with examples, Graph of Sine and Cosine
3	**Complex Numbers** Examples to find real and imaginary part, conjugate, addition, square root, product, Polar form of complex number and De Moiver's Theorem with examples
4	**Function and Limit** Concept of function with examples, Standard formulae of limit to solve different examples
5	**Differentiation** Differentiation of functions by using standard formulae with examples. Working rules of differentiation with examples, Higher order derivatives of function with examples

a. **Course Name:** Basic Physics

b. **Course Code:** 03069202BS01

c. **Prerequisite:** High School Level Physics.

d. **Rationale:** Applied Physics aims to give an understanding of this world both by observation and by prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content. The course will help the diploma engineers to apply the basic concepts and principles to solve broad-based engineering problems and to understand different technology-based applications.

e. **Course Learning Objective:**

CLOBJ 1	Develop understanding of fundamental physics concepts including measurements, electricity, magnetism, semiconductors, and modern physics relevant to engineering applications.
CLOBJ 2	Apply principles of electrical and electronic physics to analyze basic circuits, semiconductor devices, and electromagnetic systems used in information technology and engineering fields.
CLOBJ 3	Build scientific and analytical skills through practical experiments, measurements, error analysis, and interpretation of physical phenomena for technological problem solving.
CLOBJ 4	Understand the working principles and applications of modern technologies such as lasers, optical fibers, solar cells, and nanotechnology used in communication and electronic systems.
CLOBJ 5	Develop competency in conducting physics laboratory experiments, interpreting observations, and presenting results systematically using scientific methods and engineering practices.

f. **Course Learning Outcomes:**

CLO 1	Apply concepts of units, measurements, and error analysis to perform accurate physical measurements and validate results using dimensional analysis
CLO 2	Analyze basic electric and magnetic phenomena, including electrostatics, current electricity, and electromagnetic induction, and solve related numerical problems
CLO 3	Interpret the characteristics and functioning of semiconductor devices such as diodes and transistors, and apply them in basic electronic circuits.
CLO 4	Explain the working principles and applications of modern physics tools including lasers, optical fibers, and nanotechnology based devices.
CLO 5	Demonstrate the ability to relate theoretical physics concepts to practical engineering applications across electrical, electronics, and communication fields.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
3	**-**			**20**	**20**	**2**	**4**	**00**	**150**

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Physical world, Units and Measurements** Physical quantities; fundamental and derived, Units and systems of units (FPS, CGS and SI units), Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications (conversion from one system of units to other, checking of dimensional equations and derivation of simple equations), Limitations of dimensional analysis. Measurements: Need, measuring instruments, least count, types of measurement (direct, indirect), Errors in measurements (systematic and random), absolute error, relative error, error propagation, error estimation and significant figures	**15%**	**08**
2	**Electrostatics Current Electricity** Coulombs law, unit of charge, Electric field, Electric lines of force and their properties, Electric flux, Electric potential and potential difference, Gauss law. Capacitor and its working, Types of capacitors, Capacitance and its units. Capacitance of a parallel plate capacitor, Series and parallel combination of capacitors (related numerical), dielectric and its effect on capacitance, dielectric break down. Electric Current and its units, Direct and alternating current, Resistance and its units, Specific resistance, Conductance, Specific conductance, Series and parallel combination of resistances. Factors affecting resistance of a wire, carbon resistances and color coding. Ohm's law and its verification, Kirchhoff's laws, Wheatstone bridge and its applications (slide wire bridge only), Concept of terminal potential difference and Electro motive force (EMF) Heating effect of current, Electric power, Electric energy and its units (related numerical problems), Advantages of Electric Energy over other forms of energy	**25%**	**10**
3	**Electromagnetism and Magnetic materials** Types of magnetic materials; dia, para and ferromagnetic with their properties, Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and units, magnetization. Concept of electromagnetic induction, Faraday's Laws, Lorentz force (force on moving charge in magnetic field). Force on current carrying conductor, force on rectangular coil placed in magnetic field. Moving coil galvanometer; principle, construction and working, Conversion of a galvanometer into ammeter and voltmeter.	**20%**	**8**

4	**Semiconductor Physics** Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction, junction diode and V-I characteristics, types of junction diodes. Diode as rectifier – half wave and full wave rectifier (center taped). Transistor; description and three terminals, Types- pnp and npn, some electronic applications (list only). Photocells, Solar cells; working principle and engineering applications	**20%**	**10**
5	**Modern Physics Lasers:** Energy levels, ionization and excitation potentials; spontaneous and stimulated emission; population inversion, pumping methods, optical feedback, Types of lasers; Ruby, He-Ne and semiconductor, laser characteristics, engineering and medical applications of lasers. Fiber Optics: Introduction to optical fibers, light propagation, acceptance angle and numerical aperture, fiber types, applications in; telecommunication, medical and sensors. Nanoscience and Nanotechnology: Introduction, nanoparticles and nanomaterials, properties at nanoscale, nanotechnology, and nanotechnology-based devices and applications.	**20%**	**9**

i. Text Book and Reference Book:

1. 1. Comprehensive Practical Physics - Volume I and II By by IN Jaiswal | Laxmi Publishers
2. 2. Text Book of Physics for Class XI& XII (Part-I, Part-II) By N.C.E.R.T., Delhi

j. Experiment List:

Sr. NO.	Experiment List
1	To measure length, radius of a given cylinder, a test tube and a beaker using a Vernier calliper and find volume of each object.
2	To determine diameter of a wire, a solid ball and thickness of cardboard using a screw gauge.
3	To verify Ohm's law by plotting graph between current and potential difference.
4	To verify laws of resistances in series and parallel combination.
5	To draw V-I characteristics of a semiconductor diode (Ge, Si) and determine its knee voltage.
6	To verify Kirchhoff's law using electric circuits
7	To determine A.C. frequency with the help of sonometer.
8	To calculate SA/V ratio of simple objects to understand nanotechnology.

a. **Course Name:** Fundamentals of Computer Applications and Web Technologies
b. **Course Code:** 03062001ES01
c. **Prerequisite:** Basic computer literacy, logical reasoning, and fundamental knowledge of file management and the internet.
d. **Rationale:** Fundamental computer knowledge and web development skills are essential for engineering students. This course introduces the basics of computer systems, operating systems, file management, and web development using HTML5 & CSS. By understanding these concepts, students can efficiently manage computing tasks and build simple websites, enhancing their technical proficiency in the modern IT landscape.

e. Course Learning Objective:

CLOBJ 1	To understand the fundamentals of computer systems, including hardware, software, operating systems, and input/output devices.
CLOBJ 2	To develop practical knowledge of operating systems, file management, Linux commands, system utilities, and basic troubleshooting techniques.
CLOBJ 3	To learn the structure and syntax of HTML and HTML5 for creating and organizing web pages using semantic elements.
CLOBJ 4	To design interactive web pages using links, images, tables, forms, multimedia, and HTML5 form features.
CLOBJ 5	To apply CSS styling and HTML5 APIs in developing responsive and user-friendly web applications and mini web projects.

f. Course Learning Outcomes:

CLO 1	Understand the fundamental concepts of computers, operating systems, and file management.
CLO 2	Develop structured web pages using HTML5 elements and formatting techniques.
CLO 3	Implement links, images, tables, and forms to create interactive web pages.
CLO 4	Apply CSS styling techniques to enhance the visual presentation of web pages.
CLO 5	Utilize HTML5 APIs and multimedia elements to develop modern, responsive web pages

g. Teaching & Examination Scheme:

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	**Total**
2	**-**	**4**	**4**	**20**	**20**	**100**	**60**	**00**	**200**

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Introduction to Computers** History and Evolution of Computers, Basic Components of a Computer System (Hardware & Software), Types of Computers (Supercomputers, Mainframes, PCs, And Embedded Systems), Operating System Basics (Windows, Linux), Input and Output Devices.	**15%**	**4**
2	**Operating System and File Management** Introduction to Operating Systems and Their Functions, Windows OS: File and Folder Management, Control Panel, Task Manager, Linux OS: Basic Commands and File Handling, System Utilities: Disk Clean-up, Task Scheduler, System Restore, Basic Troubleshooting Techniques.	**20%**	**6**
3	**Introduction to HTML & HTML5** Basics of Web Development and Introduction to HTML, Structure of an HTML Document (HTML, Head, Body), HTML Elements and Attributes, Formatting Text (Headings, Paragraphs, Line Breaks, Bold, Italic, Underline), HTML Lists (Ordered List, Unordered List, Definition List), HTML5 Semantic Elements (Header, Footer, Article, Section, Aside, Nav).	**20%**	**6**
4	**Working with Links, Images, Tables, and Forms** Creating Hyperlinks (Internal Links, External Links, Email Links), Adding and Formatting Images, Image Maps and Image Links, HTML Tables (Rows, Columns, Merging Cells, Borders, Styling), Creating Forms (Text Input, Radio Buttons, Checkboxes, Drop-downs, Validation), HTML5 Form Elements (Placeholder, Required, Autofocus, Date, Range, Color), Embedding Multimedia (HTML5 Audio, Video, Canvas, SVG).	**25%**	**8**
5	**CSS Basics, HTML5 APIs** Introduction to CSS (Inline, Internal, External CSS), Styling Text (Font Size, Color, and Alignment), CSS Box Model (Margin, Padding, and Border), Introduction to HTML5 APIs (Geolocation API, Local Storage, Web Workers), Mini Project: Create a Simple Portfolio, Resume Website, or Personal Blog.	**20%**	**6**

i. Text Book and Reference Book:

1. Computer Fundamentals by P.K. Sinha | BPB Publications
2. HTML5: the missing manual By Matthew Macdonald
3. Operating System Concepts (TextBook) By Abraham Siberschatz | Wiley | Fifth
4. Pro HTML5 and CSS3 Design Patterns (Expert's Voice in Web Development By Michale Bowers & Victor Sumner | , Kindle Edition
5. Web Technologies (TextBook) By Uttam Kumar Roy, Debarshi Kumar Sanya.

j. Experiment List:

Sr. NO.	Experiment List
1.	Identify and explain computer hardware components.
2.	Perform basic computer operations (booting, using the Start Menu, shortcuts).
3.	Install and uninstall software and device drivers.
4.	Work with input and output devices (printer, scanner, USB, storage devices).
5.	Perform file and folder management in Windows (create, rename, copy, delete).
6.	Execute basic Linux commands (ls, cd, mkdir, rm, cp, mv, chmod).
7.	Use system utilities like Disk Cleanup, Task Scheduler, and System Restore.
8.	Troubleshoot basic system errors and network connectivity issues.
9.	Create a basic HTML webpage with headings and paragraphs.
10.	Use text formatting tags (bold, italic, underline, subscript, superscript).
11.	Create ordered, unordered, and definition lists in HTML.
12.	Structure a webpage using semantic HTML5 elements (header, footer, section).
13.	Add comments and special characters in an HTML document.
14.	Develop a simple resume webpage using HTML.
15.	Create hyperlinks (internal, external, email, and image links).
16.	Add and format images using the img tag.
17.	Implement an image map using map and area tags.
18.	Design a table using table, tr, td, merging cells, and styling.
19.	Create a form using text fields, radio buttons, checkboxes, and submit/reset buttons.
20.	Use HTML5 form elements (placeholder, autofocus, date picker, color picker).
21.	Embed multimedia using audio and video tags.
22.	Develop a simple online registration form using HTML.
23.	Apply inline, internal, and external CSS to an HTML page.
24.	Style text using CSS (font, color, alignment, text-shadow, line-height).
25.	Implement CSS Box Model properties (margin, padding, border, width, height).
26.	Demonstrate the use of HTML5 APIs (Local Storage, Session Storage, Geolocation API).
27.	Create a simple portfolio website using HTML5 and CSS.

a. **Course Name:** Fundamentals of Communication Skills
b. **Course Code:** 03060001HM01
c. **Prerequisite:** Knowledge of English Language till 10th standard.
d. **Rationale:** Basic Communication Skills are essential for all Engineers.
e. **Course Learning Objective:**

CLOBJ 1	Develop basic interpersonal communication skills through effective listening, structured self and peer introductions, ice-breaker activities, and role plays in everyday contexts.
CLOBJ 2	Understand and apply fundamental grammatical structures including parts of speech, tenses, and voice for accurate sentence construction.
CLOBJ 3	Enhance pronunciation and vocabulary usage through basic phonetics, IPA symbols, one-word substitutions, synonyms, antonyms, and contextual application.
CLOBJ 4	Develop reading and writing skills by applying reading strategies and constructing coherent narratives, picture-based descriptions, and functional written texts such as applications.
CLOBJ 5	Improve personal and academic development through goal-setting using SMARTER principles and reflective language use.

f. **Course Learning Outcomes:**

CLO 1	Remember and identify correct pronunciation patterns using basic phonetic symbols, and recall appropriate vocabulary—including one-word substitutions, synonyms, and antonyms—for accurate spoken and written communication.
CLO 2	Understand written texts using basic reading strategies and explain the concept of SMARTER goals for personal and academic development.
CLO 3	Demonstrate understanding of basic interpersonal communication skills through effective listening, structured self and peer introductions, ice-breaker activities, and simple role-plays in everyday contexts.
CLO 4	Apply fundamental grammatical structures including parts of speech, basic tenses, articles and determiners to construct grammatically correct sentences.
CLO 5	Analyse and organize information to produce coherent written texts such as short narratives, and formal or informal applications.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
0	**0**	**2**	**1**	**0**	**0**	**20**	**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. No.	Content	Weightage	Teaching Hours
1	**Ice Breaker + Introducing your Friend** • Fun Fact Exchange (e.g., Two Truths and a Lie) • Describing Personality and Hobbies • Using Adjectives to Talk About People (Link to Parts of Speech) • Structured Self and Peer Introduction (Name, Interests, Goals)	**8%**	**5**
2	**Parts of Speech & Tenses** • Identification of Parts of Speech in Simple Sentences • Sentence Formation Using Basic Parts of Speech • Concept of time and verb forms • Sentence Construction and Error Correction Using Tenses	**12%**	**6**
3	**Introduction to Phonetics- symbols and pronunciation** • Basics of Phonetics • Introduction to IPA (International Phonetic Alphabet) • English Vowel & Consonant Sounds • Pronunciation Practice	**10%**	**4**
4	**Articles & Determiners** • Definite, Indefinite Articles and Zero Articles • Demonstrative & Possessive Determiners • Quantifiers & Numerals • Common errors of Articles & Determiners	**10%**	**2**
5	**Vocabulary Building** : One-word Substitution, Synonyms, and Antonyms • List and Practice Common One-word Substitutions • Synonym-Antonym Match-Up Games • Use New Words in Sentences/Short Paragraphs	**10%**	**2**
6	**Listening Skills** • Introduction and Importance of Good Listening • Difference Between Listening and Hearing • Types of listening • Barriers to effective Listening • Traits of a good listener	**8%**	**2**
7	**Types of Application** • Formal vs Informal Applications • Structure and Format of an Application (Salutation, Body, Closing) • Writing Leave Applications	**10%**	**2**
8	**Role Play** • Generic Situations (Buying, Asking for Directions, At a doctor, etc.) • Customer Service and Complaint Handling	**12%**	**6**
9	**Goal Setting** • SMARTER Goals (Specific, Measurable, Achievable, Relevant, Time-bound, Evaluate, Revise) • Short-term vs. Long-term Goals • Overcoming Obstacles to Goals	**10%**	**2**
10	**Reading Skills –Basic Level** • Types of reading • Strategies of reading • Reading comprehension	**10%**	**2**

i. Text Book and Reference Book:

1. Murphy, Raymond. English Grammar in Use. Cambridge University Press, 2019
2. Mohan, Krishna, and Meera Banerji. Developing Communication Skills. Macmillan Publishers India, 2009.
3. Lewis, Norman. Word Power Made Easy. Goyal Publishers, 2014.
4. Rizvi, M. Ashraf. Soft Skills: Enhancing Employability and Career Development. McGraw Hill Education, 2010.
5. Wren, P. C., and H. Martin. High School English Grammar and Composition. S. Chand Publishing, 2017.

a. **Course Name:** Environmental Science
b. **Course Code:** 03061501MC01
c. **Prerequisite:** Basic knowledge of science (biology, chemistry, physics), environmental awareness, geography, data interpretation, and ethical responsibility towards sustainability.
d. **Rationale:** Sustainable development is essential for a nation's progress, making environmental conservation and hazard management crucial for every Indian citizen. The country has endured numerous natural disasters, and significant energy wastage remains a challenge. Saving energy is as valuable as producing it. Industrial mismanagement and lack of discipline have led to rising environmental pollution. Embracing renewable energy is a key solution to both the energy crisis and pollution control. This course aims to raise awareness of these pressing issues, inspiring students to act responsibly and contribute to a cleaner, more sustainable future for the country and the world.
e. **Course Learning Objective:**

CLOBJ 1	To understand the structure and functioning of ecosystems, including biotic and abiotic components, food chains, food webs, and biogeochemical cycles.
CLOBJ 2	To analyze the causes, effects, and control methods of air, water, soil, and noise pollution using modern environmental engineering techniques.
CLOBJ 3	To develop knowledge of renewable and alternative energy sources such as solar, biomass, wind, geothermal, tidal, and hydrogen energy for sustainable development.
CLOBJ 4	To understand solid waste management practices, including collection, treatment, recycling, disposal, and hazardous waste management.
CLOBJ 5	To gain awareness about seismic engineering, disaster management, and mitigation strategies for natural and man-made disasters to ensure environmental and public safety.

f. **Course Learning Outcomes:**

CLO 1	Explain the ecosystem structure, biotic and abiotic components, food chains, food webs, and major biogeochemical cycles.
CLO 2	Identify sources, types, effects, and control measures of air and noise pollution, including relevant regulations.
CLO 3	Analyze water and soil pollution sources, characteristics, treatment methods, and preventive measures.
CLO 4	Describe various renewable energy sources, their working principles, applications, and environmental impacts.
CLO 5	Classify solid waste types, sources, characteristics, and management techniques, including recycling and disposal.
CLO 6	Explain seismic engineering principles and disaster management strategies for natural and human-made hazards.

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	20	20	0	0	0	40

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Ecosystem** Structure of ecosystem, Biotic & Abiotic components, Food chain and food web Carbon, Nitrogen, Sulphur, Phosphorus cycle.	**10%**	**2**
2	**Air and Noise Pollution** Definition of pollution and pollutant, Natural and manmade sources of air pollution (Refrigerants, I.C., Boiler). Air Pollutants: Types, Particulate Pollutants: Effects and control (Bag filter, Cyclone separator, Electrostatic Precipitator). Gaseous Pollution Control: Absorber, Catalytic Converter, and Effects of air pollution due to Refrigerants, I.C., Boiler, Noise pollution: sources of pollution, measurement of pollution level, Effects of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000.	**25%**	**3**
3	**Water and Soil Pollution** Sources of water pollution, Types of water pollutants, Characteristics of water pollutants Turbidity, pH, total suspended solids, total solids BOD and COD: Definition, calculation. Waste Water Treatment: Primary methods: sedimentation, froth floatation, Secondary methods: Activated sludge treatment, Trickling filter, Bioreactor, Tertiary Method: Membrane separation technology, RO (reverse osmosis), Causes, Effects and Preventive measures of Soil Pollution: Causes-Excessive use of Fertilizers, Pesticides and Insecticides, Irrigation, E-Waste.	**25%**	**3**
4	**Renewable Sources of Energy** Solar Energy: Basics of Solar energy. Flat plate collector (Liquid & Air). Theory of flat plate collector. Importance of coating. Advanced collector. Solar pond. Solar water heater, solar dryer. Solar stills. Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel. Anaerobic digestion. Biogas production mechanism. Utilization and storage of biogas. Wind energy: Current status and future prospects of wind energy. Wind energy in India. Environmental benefits and problem of wind energy. New Energy Sources: Need of new sources. Different types new energy sources. Applications of (Hydrogen energy, Ocean	**25%**	**3**

	energy resources, Tidal energy conversion.) Concept, origin and power plants of geothermal energy.		
5	**Solid Waste** Management Solid waste generation- Sources and characteristics of: Municipal solid waste, E- waste, biomedical waste. Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries. Collection and disposal: MSW (3R, principles, energy recovery, sanitary landfill), Hazardous waste.	**10%**	**2**
6	**Seismic Engineering and Disaster Management** Introduction of seismic engineering and its application civil engineering designs, Features of disasters such as Floods, Earthquakes, Fires, Epidemics, Gas/radioactive leaks etc. Management and mitigation of above disasters.	**5%**	**2**

i. Text Book and Reference Book:

1. Basics of Environmental Studies By U K Khare | Tata McGraw Hill "Engineering Mechanics – Dynamics", by JL Meriam
2. Environmental Sciences By Daniel B Botkin & Edward A Keller | John Wiley & Sons "University Physics", by Sears and Zemansky, Pearson
3. Environmental Pollution Control Engineering, By Rao C.S. | New Age International
4. Environmental Studies By Dr. Suresh K Dhameja | S.K Kataria & Sons New Delhi
5. Air Pollution By M. N. Rao and H. V. N. Rao; | Tata McGraw-Hill Publishing Company
6. Solid Waste Treatment and Disposal By G. Tchabanoglous | McGraw Hill Pub.

a. **Course Name:** Energy Conservation
b. **Course Code:** 03061701UE01
c. **Prerequisite:** A basic understanding of science and environmental studies at the 10th-grade level. No prior technical knowledge is required, but awareness of energy sources, electricity usage, and environmental impact will be beneficial.
d. **Rationale:** Energy conservation is essential for reducing waste, lowering costs, and minimizing environmental harm by optimizing energy use, decreasing dependence on non-renewable resources, and mitigating greenhouse gas emissions. It also enhances sustainability, strengthens energy security, and promotes economic growth through innovation in energy-efficient technologies and job creation.

e. **Course Learning Objective:**

CLOBJ 1	Explains basic concepts of energy, types of energy sources, importance of energy conservation, energy problems in India, and concepts of energy efficiency and energy intensity.
CLOBJ 2	Covers the Energy Conservation Act, 2001, role of the Bureau of Energy Efficiency and Gujarat Energy Development Agency, energy conservation programs, star labelling, and energy audits.
CLOBJ 3	Focuses on energy-saving methods in lighting systems, motors, pumps, HVAC systems, compressed air systems, and household electrical appliances.
CLOBJ 4	Explains energy conservation techniques used in industries, homes, buildings, and IT systems including green computing and e-waste management.
CLOBJ 5	Covers fuel-efficient transportation methods, electric and hybrid vehicles, renewable energy in transport, and future trends in energy conservation.

f. **Course Learning Outcomes:**

CLO 1	Students will define energy, its various forms, energy resources (renewable and non-renewable), the need for energy conservation, and the environmental impacts of energy usage
CLO 2	Students will recall the Energy Conservation Act, 2001, the role of the Bureau of Energy Efficiency (BEE), energy labelling and star rating programs, and government schemes for energy conservation.
CLO 3	Students will explain the energy scenario in India, challenges in conventional energy sources, energy problems, the demand- supply gap, and future energy innovations and emerging technologies.
CLO 4	Students will describe energy conservation techniques in industries, energy-efficient building designs, energy-saving practices in households, and the role of automation and sensors in energy conservation.
CLO 5	Students will describe energy conservation techniques in industries, energy-efficient building designs, energy-saving practices in households, and the role of automation and sensors in energy conservation.

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

SEE - Semester End Examination, T - Theory, P – Practical

h. course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Introduction to Energy and Its Conservation** Basics of energy: Types and sources (renewable & non-renewable), Need for energy conservation: Environmental and economic aspects, Energy problems in India: Demand-supply gap, dependency on fossil fuels, power shortages, Energy intensity and energy efficiency.	20%	9
2	**Energy Conservation Act, Policies & Key Organizations** Energy Conservation Act, 2001 – Key provisions, Bureau of Energy Efficiency (BEE) and its role, Flagship programs of BEE (PAT, S&L, ECBC, DSM), Gujarat Energy Development Agency (GEDA) – Roles and responsibilities, Star labelling of appliances, Energy audit types: Preliminary & detailed.	20%	9
3	**Energy Conservation in Electrical & Mechanical Systems** Energy-efficient lighting systems: LED, CFL, and automation, Energy conservation in motors, pumps, and HVAC systems, Energy-saving techniques in compressed air systems, Energy Conservation in Household Electrical Appliances.	22%	10
4	**Energy Conservation in Industrial, Domestic & IT Applications** Energy-saving measures in industries: Boilers, furnaces, and refrigeration, Case studies on energy-efficient buildings, Simple Energy Conservation Techniques for Homes and Small Businesses, Energy Conservation in Computers & IT (Power management in computers, green data centers, Energy-efficient software and hardware, Cloud computing for energy reduction, E-waste management and recycling).	20%	9
5	**Energy Conservation in Transportation and Emerging Technologies** Fuel-efficient driving techniques and electric vehicles, Energy efficiency in railways and aviation, Hybrid and renewable energy in transport systems, Future trends in	18%	8

	energy conservation.		

i. Text Book and Reference Book:

1. Energy Conservation and Management By S. K. Kataria | S. K. Kataria & Sons
2. Energy Management Handbook By Wayne C. Turner | The Fairmont Press, Inc
3. Non-Conventional Energy Resources by G. D. Rai | Khanna Publishers
4. Guide to Energy Management by Barney L Capehart, William J Kennedy and Wayne C Turner | The Fairmount Press and CRC Press.

Semester 2

a. **Course Name:** Problem Solving using C
b. **Course Code:** 03061602PC01
c. **Prerequisite:** Ability to read and understand programming documentation
d. **Rationale:** C is a powerful and efficient programming language that provides a solid foundation for learning other languages. It offers low-level memory access, making it ideal for system programming. C encourages structured programming, helping students write clear, maintainable code. It's portable across different platforms and widely used in fields like embedded systems, game development, and operating systems. Learning C enhances understanding of memory management and prepares students for diverse careers in software development.
e. **Course Learning Objective:**

CLOBJ 1	Understand the fundamentals of programming concepts, algorithms, flowcharts, and the structure of C programming language.
CLOBJ 2	Apply C language syntax, data types, operators, and input/output functions to develop simple programs.
CLOBJ 3	Develop problem-solving skills using decision-making statements, looping constructs, functions, arrays, and strings in C.
CLOBJ 4	Demonstrate the use of structures, unions, pointers, and dynamic memory allocation for efficient data handling.
CLOBJ 5	Implement file handling operations and command-line arguments to create efficient and real-world C programming applications.

f. **Course Learning Outcomes:**

CLO 1	Understand the fundamentals and importance of innovation and design thinking in problem-solving.
CLO 2	Develop the ability to identify user needs and define real-world problems effectively.
CLO 3	Apply creative thinking techniques to generate innovative ideas and solutions.
CLO 4	Design and develop prototypes using the stages of the design thinking process.
CLO 5	Analyse and evaluate innovative solutions for educational, social, and industrial applications.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
3	**-**	**4**	**5**	**20**	**20**	**100**	**60**	**-**	**200**

SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

h. Course Content:

Sr.	Topics	W	T
1	**INTRODUCTION TO C PROGRAMMING LANGUAGE -** Overview of programming, Understanding Algorithms and Flowcharts, History C programming language , Features of C , Structure of a C program, Compilation and execution process , Applications of C	11	5
2	**C FUNDAMENTALS, INPUT/OUTPUT AND OPERATORS** - Constants, Variables, Identifiers, Keywords, Data types , Storage classes, Unformatted and formatted input/output functions ,Arithmetic, Relational, Logical, Assignment, and Special operators, Increment/Decrement and Bitwise operators , Associativity and precedence of operators	16	7
3	**CONTROL STRUCTURES-DECISION MAKING AND LOOPING -** Conditional statements: if, if-else, if-else-if, and switch-case, continue, goto, break, Looping statements: for, while, do-while, Nested loops, Jumping inside loops: break, continue	18	8
4	**FUNCTIONS,ARRAYS AND STRINGS - Overview Functions ,** Defining and declaring functions, standard library and user-defined, ,Nesting functions and recursion ,Parameter passing methods , Arrays, Array initialization and accessing element, Single-dimensional arrays ,Multi-dimensional arrays ,Array operations, Strings ,String handling functions ,String manipulation operations ,Dynamic memory allocation for strings.	22	10
5	**STRUCTURE, UNION AND POINTERS -** Defining structures and unions, accessing structure members, Structures and arrays, Pointers to structures, differences between structures and unions, Introduction to Pointers, Declaring and Initializing Pointers , Pointer operations , Pointers and arrays, Dynamic memory allocation **.**	22	10
6	**FILE MANAGEMENT** - Introduction to Files in C, File Operations, File Input/output Functions, Command-line arguments	11	5

i. Text Book and Reference Book:

1. C Programming Language,Brian W. Kernighan and Dennis M. Ritchie
2. Let Us C Yashavant P. Kanetkar
3. Programming in C , by Stephen G. Kochan
4. ANSI C Programming,, Balaguruswamy

j. Course Learning Objective:

Sr. No.	Experiment List
1.	Write a simple program that displays "Hello, World!" on the screen.
2.	Write a program to input two numbers and display their sum.
3.	Write a program to implement a simple calculator that performs addition, subtraction, multiplication, and division using arithmetic operators.
4.	Write a program that takes two numbers as input and outputs the largest number using if-else.
5.	Write a program to determine if the given input is even or odd using the modulo operator %.
6.	Write a program to convert temperature from Celsius to Fahrenheit.
7.	Write a program to calculate the factorial of a number using a for loop.
8.	Write a program to calculate the sum of the first n natural numbers using a while loop.
9.	Write a program to calculate simple interest: SI = (P * R * T) / 100 using arithmetic operators.
10.	Write a program to reverse a number using a while loop.
11.	Write a program to count the number of digits in a given number using a loop.
12.	Write a program that prints the multiplication table for a given number using a for loop.
13.	Write a program to reverse a string without using built-in functions.
14.	Write a program to concatenate two strings entered by the user using string operations.
15.	Write a program to find the length of a string without using the built-in strlen() function.
16.	Write a program to create a structure for a student's roll number and name, then display the records.
17.	Write a simple calculator program to perform addition, subtraction, multiplication, and division using the switch-case operator.
18.	Write a program to perform insertion operation in a 1D array.
19.	Write a program to check if a number is prime using loops.
20.	Write a program to find the largest element in an array.
21.	Write a program to perform merging operation in a 1D array.
22.	Write programs to demonstrate the use of common math functions like sqrt(), pow(), round(), sin(), cos(), tan(), div(), abs().
23.	Write a program that swaps two numbers using a temporary variable and functions.
24.	Write programs to demonstrate the use of pointers.
25.	Write a program to check whether a given year is a leap year or not.
26.	Write a program to display the result of student with following details using if-else if conditional structure: Student_name, three subjects marks, conditions for percentage (>=75% =distinction, >=60 and <75 = first class, <60 and >=50 = Second class and below 50 Fail)
27.	Write a program that writes data to a text file and reads it back to display on the screen using file handling operations.

28.	Write a Program for following pattern: * * * * * * * * * * * * * * *
29.	Write a program to find the GCD (Greatest Common Divisor) of two numbers using recursion.
30.	Write a program to check whether a given string is a palindrome or not.

a. **Course Name:** Mathematics - II
b. **Course Code:** 03069102B S01
c. **Prerequisite:** Knowledge of Basic concept of mathematics studied till first semester.
d. **Rationale:** This course is an extension of the course Mathematics-I of first semester namely Mathematics II. Using the methods of differentiation, integration, differential equations, matrix theory, geometry, and differential equations, the course aims to instill its applications in pertinent engineering and technological fields
e. **Course Learning Objective:**

CLOBJ 1	Understand the concept of determinant and matrix with examples
CLOBJ 2	Analyze engineering related problems based on concepts of vectors with examples
CLOBJ 3	Understand basic engineering problems under given conditions of straight lines and circle.
CLOBJ 4	Understand the concept of functions and limits with examples.
CLOBJ 5	Understand differential equations to significant applied problems.

f. **Course Learning Outcomes:**

CLO 1	Solve engineering related problems based on determinant and matrices.
CLO 2	Solve engineering related problems based on concepts of vectors with examples
CLO 3	Analyze basic engineering problems under given conditions of straight lines and circle
CLO 4	Apply integral calculus to engineering related problems
CLO 5	Obtain solution of differential equations to significant applied problems

g. **Teaching & Examination Scheme:**

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

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Determinants and Matrices:** Elementary properties of determinants up to 3rd order, consistency of equations, Crammer's rule. Algebra of matrices, Inverse of a matrix, matrix inversion method to solve a system of linear equations in 3 variables.	**23%**	**10**
2	**Vector Algebra:** Definition notation and rectangular resolution of a vector. Addition and subtraction of vectors. Scalar and vector products of 2 vectors. Simple problems related to work, moment and angular velocity.	**20%**	**9**
3	**Co-Ordinate Geometry:** Straight line Inclination and slope of a line, different forms of equations to a straight line, Slope-intercept form, Point slope form, Two-point form , Intercept form. General equation of a Straight line, Family of lines. Conditions for concurrency of lines. Circle Definition, Equation of a circle with given center and radius, General form of equation of circle, Equation of a circle when intercepts are given, circle passing through three points, Equation of chord, Equations of tangents and normal at a point on a circle	**17%**	**8**
4	**Integral Calculus:** Integration as inverse operation of differentiation, Integration of simple functions, Integration by substitution, by parts and by partial fractions (for linear factors only). Definite integral: Definition, Properties of Definite integral, Odd and Even functions, Use of formulas, and for solving problems Where m and n are positive integers. Applications of integration for i. Simple problem on evaluation of area bounded by a curve and axes. ii. Calculation of Volume of a solid formed by revolution of an area about axes. (Simple problems).	**23%**	**10**
5	**Differential Equations:** Solution of first order and first degree differential equation by variable separation method (simple problems), Exact differential equations (simple problems), Linear differential equations (simple problems), MATLAB – Simple Introduction.	**17%**	**8**

i. Text Book and Reference Book:

1. "Advanced Mathematics for Polytechnic" By Pandya N R | Macmillan Publishers India Ltd.,2012
2. "Mathematics-I" By Deepak Singh | Khanna Book Publishing Co.
3. "Mathematics II", By Garima Singh | Khanna Book Publishing Co.
4. "A text book of Engineering Mathematics" By N.P. Bali and Manish Goyal | Laxmi Publications

5. “Polytechnic Mathematics” By S P Deshpande | Pune Vidyarthi Gruh Prakashan.
6. “Applied Mathematics” By H.K.Das | S.Chand Publication
7. “Calculus and Analytic Geometry” By G. B. Thomas, R. L. Finney | Addison Wesley | 9th Edition.
8. “Engineering Mathematics (Third edition)” By Croft, Anthony | Pearson Education, New Delhi.
9. “Advanced Engineering Mathematics (9th Edition), By Erwin Kreyszig, Wiley India (13).

a. **Course Name:** Basics of Web Programming using PHP
b. **Course Code:** 03062002ES01
c. **Prerequisite:** Basic knowledge of HTML, CSS, and fundamental programming concepts.
d. **Rationale:** The Web Development Using PHP course is designed to introduce students to server-side programming and dynamic web development. PHP, being a widely used scripting language, enables developers to build interactive and secure web applications. This course provides hands-on experience with PHP syntax, functions, file handling, form processing, and session management, preparing students for careers in web development.
e. **Course Learning Objective:**

CLOBJ 1	Understand the fundamentals of PHP programming including syntax, variables, operators, loops, and conditional statements for dynamic web development.
CLOBJ 2	Develop PHP programs using functions, arrays, and string handling techniques to solve basic web programming problems.
CLOBJ 3	Perform file handling and directory operations including file creation, reading, writing, uploading, and downloading using PHP.
CLOBJ 4	Design and validate interactive web forms using GET, POST, and PHP super global variables for secure data processing.
CLOBJ 5	Implement cookies, sessions, and error handling mechanisms to develop secure and reliable PHP web applications.

f. **Course Learning Outcomes:**

CLO 1	Understand the installation and basic syntax of PHP.
CLO 2	Implement user-defined functions, arrays, and string manipulations.
CLO 3	Perform file handling operations, including reading, writing, and directory management.
CLO 4	Develop interactive web forms with data validation and processing techniques.
CLO 5	Apply cookies, sessions, and error handling techniques to manage user data securely.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
3	**0**	**4**	**5**	**20**	**20**	**100**	**60**	**-**	**200**

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Introduction to PHP** Configuration and Installation of PHP, Apache Web Server, and MySQL, Installing WAMP/XAMPP Server, PHP Structure and Syntax, Rules of PHP Syntax, PHP Echo and Print Statements, PHP Constants, Variables, and Data Types, Scope of Variables: Static, Local, and Global, PHP Operators, Looping Structures: for, while, do…while, foreach, break, and continue, Conditional Structures: if...else, else if, switch.	**15%**	**7**
2	**PHP Functions and Arrays** User-Defined Functions: Argument Function, Variable Function, Return Function, Default Argument, Passing Arguments by Reference, Recursive Functions, Include() and require() Functions, Creating and Accessing Index-Based, Associative, and Multidimensional Arrays, Array Library Functions: count, list, in_array, current, next, previous, end, each, sort, array_merge, array_reverse.	**20%**	**9**
3	**String Handling and File Operations** String Manipulation: Creating and Accessing Strings, Searching & Replacing Strings, Formatting Strings, String Library Functions: chr, ord, strtolower, strtoupper, strlen, ltrim, rtrim, trim, substr, strcmp, strcasecmp, strpos, strrpos, stristr, str_replace, strrev, Creating, Opening, Reading, and Writing Files, Working with Directories, File Uploading and Downloading.	**20%**	**9**
4	**Form Handling and Data Processing** Submitting Form Values using GET and POST Methods, Reading Data from Forms using Super Globals: $_GET, $_POST, $_REQUEST, Validating User Input using preg_match() (Name Validation), Validating Email and URL using filter() Function, Sending Emails: Plain Text Emails, HTML Emails, and Attachments.	**25%**	**11**
5	**Cookies, Sessions, and Error Handling** Creating, Setting, and Destroying Cookies, Creating, Setting, and Destroying Sessions, Handling Exceptions in PHP using die(), Custom Error Handling using try and catch..	**15%**	**7**

i. Text Book and Reference Book:

1. "Head First PHP & MySQL" By Lynn Beighley, Michael Morrison | o'reilly Media
2. "Learning PHP, MySQL, JavaScript, and CSS: A Step-by-Step Guide to Creating Dynamic Websites" By Robin Nixon.
3. "PHP and MySQL Web Development (TextBook)" By Luke Welling
4. "Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5"
5. "PHP: The Complete Reference" By Steven Holzner | McGraw-Hill Osborne.

j. Experiment List:

Sr. NO.	Experiment List
1	Install and configure XAMPP/WAMP and run a simple PHP script to display "Hello, World!".
2	Write a PHP script to display "Welcome to PHP" using echo and print.
3	Write a PHP script to declare variables, constants, and display different data types.
4	Write a PHP script demonstrating arithmetic, comparison, logical, and assignment operators.
5	Write a PHP script to display numbers 1-10 using for, while, do…while, and foreach loops
6	Write a PHP script to check if a number is even or odd using if...else and switch.
7	Write a function to calculate the factorial of a given number
8	Write a recursive function to calculate the Fibonacci series.
9	Write a PHP script demonstrating include() and require() functions.
10	Write a PHP script to create an indexed and associative array and display the values
11	Write a PHP script to create a 3x3 matrix using a multidimensional array.
12	Write a PHP script using built-in array functions like sort(), array_merge(), and array_reverse().
13	Write a PHP script to demonstrate str_replace(), substr(), strlen(), and strrev() functions.
14	Write a PHP script to replace occurrences of a word in a given string.
15	Write a PHP script to format strings using strtoupper(), strtolower(), and ucwords().
16	Write a PHP script to create, open, write, read, and delete a text file.
17	Write a PHP script to create and delete directories using PHP.
18	Write a PHP script to upload an image file using an HTML form and PHP.
19	Write a PHP script to allow users to download a file from the server.
20	Create a PHP form to collect a user's name and age and display it on the next page using GET and POST methods.
21	Write a PHP script to display form values using $_GET, $_POST, and $_REQUEST.
22	Write a PHP script to validate name using preg_match() and email using filter_var().
23	Write a PHP script to send an email using PHP’s mail() function.
24	Write a PHP script to send an HTML email.
25	Write a PHP script to send an email with an attached file.
26	Write a PHP script to create, retrieve, and delete cookies.
27	Write a PHP script to start a session, store user data, and destroy the session.
28	Write a PHP script to handle errors using try and catch.
29	Create a user registration form with validation, store user data in a session, and display user details.

a. **Course Name:** Basic Electronics
b. **Course Code:** 03061801ES01
c. **Prerequisite:** Knowledge of Basic science and physics.
d. **Rationale:** Basic Electrical Engineering knowledge is fundamental as it provides a strong foundation for various engineering disciplines, promotes problem-solving skills, supports innovation, and opens doors to diverse career opportunities.
e. **Course Learning Objective:**

CLOBJ 1	To develop understanding of basic electronic components, signals and their role in electronic circuits.
CLOBJ 2	To explain the working and applications of semiconductor devices such as PN junction diodes, rectifiers and filters.
CLOBJ 3	To study the operation and characteristics of transistors and apply them in amplifier and switching circuits.
CLOBJ 4	To build fundamental knowledge of digital electronics including number systems, logic gates and combinational circuits.
CLOBJ 5	To familiarize students with different cables, connectors and electronic measuring instruments used in practical applications.

f. **Course Learning Outcomes:**

CLO 1	Identify basic electronic components, including active and passive components and different types of signals
CLO 2	Explain the properties of semiconductors, PN junction diodes and their applications in rectifiers and filters.
CLO 3	Design and implement transistor-based amplifier and switching circuits using appropriate biasing techniques
CLO 4	Analyse and simplify digital logic circuits using Boolean algebra, number systems and combinational logic design techniques.
CLO 5	Classify different types of cables, connectors and measuring instruments based on their construction and applications.
CLO 6	Identify basic electronic components, including active and passive components and different types of signals

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**	**50**	**60**	**-**	**150**

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Basic Electronic Components** Introduction to electronics, active and passive components explanation with example, Active components: voltage source, current source, Signal Processing components. Passive components: Resistors: Concept of resistors, Capacitors: Concept of capacitor, Inductors: Concept of Inductor. Types of Signals: Periodic signal & non periodic signal with example.	**15%**	**7**
2	**Semiconductor Components and its application** Review of basic atomic structure and energy levels, concept of insulators, conductors and semiconductors, atomic structure of Germanium (Ge) and Silicon (Si), covalent bonds, Concept of intrinsic and extrinsic semiconductor, Process of doping, P and N type semiconductors, PN junction diode, forward and reverse biased PN junction, V-I characteristics of P-N junction diode, Zener diode, Application of diode as half-wave, full wave and bridge rectifiers. C, L, LC, π filters.	**22%**	**10**
3	**Transistor and amplifiers** Introduction of Transistor, PNP and NPN transistors. Working of Transistor, Transistor configuration & Characteristics. Biasing methods of Transistor. Relation between current gain, alpha and beta. CE Transistor as Amplifier, Transistor as switch.	**20%**	**8**
4	**Digital logic and circuits Number System:** Decimal number, binary number, octal and Hexadecimal number and Conversion: Binary, Octal, Decimal and Hexadecimal number systems. Perform binary arithmetic operations: Binary addition, subtraction. Complements: 1's, 2's, 9's and 10's complement. Symbol, operation and truth-table: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR. Universal gates. Laws and theorems of Boolean algebra. Combinational logic Circuit: Half Adder, Full Adder, Half subtractor, Full subtractor, Multiplexer (2 to 1, 4 to 1), Demultiplexer (1 to 2, 1 to 4).	**30%**	**14**
5	**Cable, connectors and Measuring Instruments** Analog and Digital display. Cables: coaxial cable, twisted pair cable and fiber optic cable. Connectors: coaxial cable connectors, RJ45, RS-232, HDMI connectors. Multimeters: Analog and digital multimeter. CRO: front panel controls and application.	**13%**	**6**

i. Text Book and Reference Book:

1. “Principles of Electronics”, by V.K. Mehta ,S. Chand and Company.
2. “Digital Electronics” By Anand Kumar
3. “Electronics devices and circuits” by J.B.Gupta , S.K.kataria & Sons, 2013
4. “Basic Electronics and Linear Circuits” By N.N. Bhargava, D.C. Kulshreshtha, S.C. Gupta, | McGraw Hill Education

j. Experiment List:

Sr. NO.	Experiment List
1	To identify and understand the characteristics of passive components.
2	Perform the V-I Characteristics of PN Junction Diode.
3	Measure voltage and frequency of any given signal using oscilloscope.
4	Test performance of Half-wave rectifier using CRO.
5	Test performance of full wave and bridge rectifier using CRO.
6	Test the performance of V-I characteristics of Zener diode.
7	Perform the characteristics of CE NPN Transistor.
8	Realize the basic logic gates.
9	Realize the NAND gate as a universal building block.
10	Realize the NOR gate as a universal building block.

a. **Course Name:** Verbal Ability
b. **Course Code:** 03060002HM01
c. **Prerequisite:** Knowledge of Fundamentals of Communication Skills.
d. **Rationale:** Practical language proficiency and essential soft skills for academic and professional success.
e. **Course Learning Objective:**

CLOBJ 1	Develop effective listening and speaking skills by understanding listening processes, overcoming barriers, and applying basic public speaking techniques.
CLOBJ 2	Strengthen grammatical accuracy by applying rules of subject–verb agreement, direct–indirect speech and active passive voice in spoken and written communication.
CLOBJ 3	Expand advanced vocabulary knowledge including homophones, homonyms, homographs, phrasal verbs, and idioms for contextual and practical usage..
CLOBJ 4	Enhance analytical and creative thinking skills through activities such as SWOT analysis, problem-solving exercises, and guided story writing.
CLOBJ 5	Apply professional written communication skills by producing well- structured letters, emails and presentations with appropriate tone and format.

f. **Course Learning Outcomes:**

CLO 1	Understand the use of vocabulary including homonyms, idioms, and phrasal verbs in spoken and written communication.
CLO 2	Apply grammatical structures related to subject–verb agreement, direct– indirect speech and active passive voice in sentences and short texts.
CLO 3	Apply formal and informal letters, professional emails, and simple product presentations using appropriate structure, tone, and language conventions.
CLO 4	Analyse personal SWOT charts, simple problem-solving responses, and guided stories by organizing ideas logically.
CLO 5	Create a logical and grammatically correct oral or written narrative based on a given picture, organizing ideas clearly and coherently.

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**	**-**	**20**	**60**	**30**	**150**

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Active – Passive Voice** Rules of Active and Passive Structures of Passive Voice Conversion from Active to Passive and Vice Versa	**10%**	**1**
2	**Crazy Scientist:** Invent a product Presentation of a product	**10%**	**1**
3	**Vocabulary Building: Homophones,** Homonyms, Homographs, Phrasal Verbs & Idioms Homophones and Their Confusing Pairs Homographs and Contextual Meaning Homonyms: Words with Multiple Meanings Common Phrasal Verbs in Conversation Popular Idioms and Their Real-Life Application	**12%**	**2**
4	**Subject–Verb Agreement** Basic Rules and Exceptions Spot the Error & Correction Exercises	**10%**	**2**
5	**SWOT Analysis** Introduction to SWOT Creating a Personal SWOT Chart Applying SWOT for Goal Setting	**8%**	**1**
6	**Letter Writing & E-mail Writing** Letter Writing & E-mail Writing Formal vs Informal Letter Format Structure of a Professional Email (Subject, Greeting, Body, Sign-off) Tone and Language Appropriateness Common Mistakes in Letters/Emails	**12%**	**2**
7	**Direct-Indirect Speech** Rules for Changing Tenses, Pronouns, and Time Expressions Reporting Statements, Questions, Commands, and Requests Reporting Modal Verbs	**8%**	**2**
9	**Picture Perception** Sequencing ideas – Beginning-Middle - End Description Creating short narratives based on Pictures	**8%**	**1**
10	**Story Writing Using Hints** Elements of a Story (Characters, Setting, Plot, Conflict, Resolution Types of Stories (Narrative, descriptive, imaginative, moral-based, fables)	**10%**	**1**

11	**Self-Introduction** Overcoming Stage Fear and Speaking Anxiety Voice Modulation and Pronunciation Tips Organizing Thoughts Before Speaking Basic Public Speaking Formats (Self-Intro, Small Speeches)	**12%**	**2**

i. Experiment List:

Exp. No.	Name of the Experiment
1	Active – Passive Voice Identifying active and passive sentences from audio clips Oral transformation drills (Active → Passive, Passive → Active) Pair activity: One student speaks in active, partner converts to passive
2	Crazy Scientist Presentation of a product.
3	Vocabulary Building: Homophones, Homonyms, Homographs, Phrasal Verbs & Idioms Matching words with correct meanings Fill-in-the-blanks exercises Sentence construction using homophones Dialogue creation using phrasal verbs Error correction exercises
4	Subject–Verb Agreement Error spotting exercises Creating sentences using tricky subjects Fill-in-the-blanks practice
5	SWOT Analysis SWOT Presentation by students Action plan preparation based on SWOT Peer feedback session.
6	Letter Writing & E-mail Writing Letter & E-mail writing practice Peer review activity Editing poorly written letter & E-mails Writing reply emails
7	Direct-Indirect Speech Converting direct speech to Indirect speech exercises Dialogue transformation activity Error correction exercises
8	Picture Perception Visual Observation Practice Listing visible elements Identifying emotions and setting Formation and discussion of the story
9	Story Writing Using Hints Story presentation Twist ending activity
10	Self-Introduction – Practice Pronunciation practice Confidence building activity

j. Text Book and Reference Book:

1. “Murphy, Raymond. English Grammar in Use” Cambridge University Press, 2019.
2. Aggarwal, “R. S. A Modern Approach to Logical Reasoning” S. Chand Publishing, 2018.
3. Lewis, Norman ”Word Power Made Easy” Goyal Publishers, 2014.
4. Maxwell, John C. “Developing the Leader Within You” Thomas Nelson, 2013.
5. “Cambridge Listening and Speaking Skills Series (B1–B2 Level)” Cambridge University Press, various editions, 2017–2020.
6. Covey, Stephen R. “The 7 Habits of Highly Effective People” Simon & Schuster, 2020.

a. **Course Name:** - Universal Human Values
b. **Course Code**03060002MC01
c. **Prerequisite:** Zeal to Learn the Subject.
d. **Rationale:** The Universal Human Values (UHV) course aims to develop a holistic understanding of life, fostering ethical behaviour, responsible decision-making, and harmonious living. It helps students align their personal and professional actions with core human values, ensuring happiness, well-being, and sustainable development in society.

e. **Course Learning Objective:**

CLOBJ 1	Understanding of the concept and significance of value education in achieving holistic human development. It focuses on building clarity about right understanding, relationships, and physical facilities while introducing self-exploration as a key process for value education. It also enables learners to analyse the ideas of continuous happiness and prosperity as basic human aspirations and to identify appropriate methods for fulfilling these aspirations in the present scenario.
CLOBJ 2	The human being as a co-existence of the self and the body. It emphasizes distinguishing between the needs of the self and the body and recognizing the body as an instrument of the self. The chapter further develops an understanding of harmony within the self and between the self and the body, along with practices to ensure self-regulation and maintain good health.
CLOBJ 3	Harmony in the family and society, considering the family as the basic unit of human interaction. It develops clarity about foundational values such as trust and respect in relationships and explores the concept of justice in human-to-human interactions. It also helps learners understand harmony at the societal level while encouraging the development of a vision for a universal human order based on values.
CLOBJ 4	Build an understanding of harmony in nature and existence by highlighting the interconnectedness and mutual fulfilment among the different orders of nature. It enables learners to realize existence as co-existence at all levels while developing a holistic perception of harmony in nature and the environment.
CLOBJ 5	Implications of holistic understanding in professional ethics. It helps learners understand the natural acceptance of human values and the definitiveness of ethical human conduct. The chapter also emphasizes the importance of humanistic education and constitution, analyzes professional ethics through case studies, and develops competence in value-based decision-making and ethical practices in professional life.

f. **Course Learning Outcomes:**

CLO 1	Understand the importance of value education and develop clarity about human aspirations, self-exploration, and holistic development.
CLO 2	Comprehend the co-existence of self and body while developing harmony, self-regulation, and health awareness.
CLO 3	Understand values in relationships and develop harmony within family and society with a vision of universal human order.
CLO	Analyse interconnectedness in nature and develop a holistic understanding of

4	harmony at all levels of existence.
CLO 5	Apply holistic understanding to professional ethics and develop competence in value-based decision-making in profession.

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	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 No.	Content	Weightage	Teaching Hours
1.	**Introduction to Value Education** Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations.	20%	03
2.	**Harmony in the Human Being** Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health	20%	03
3.	**Harmony in the Family and Society** Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order	25%	03
4.	**Harmony in the Nature/Existence** Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence.	15%	03
5.	**Implications of the Holistic Understanding – a Look at Professional Ethics** Natural Acceptance of Human Values, Definitiveness of	20%	03

	(Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession		

i. Text Book and Reference Book:

Reference Books:

1. A. Nagraj, 1998, Jeevan Vidyaek Parichay, Divya Path Sansthan, Amarkantak.
2. A.N. Tripathy, 2003, Human Values, New Age International Publishers
3. The Story of My Experiments with Truth By M K Gandhi
4. Small is Beautiful By E. F Schumacher
5. Rediscovering Indi

a. **Course Name:** E-Waste Management
b. **Course Code:** 03061802UE01
c. **Prerequisite:** Basic understanding of environmental science and general waste management concepts is recommended for this subject
d. **Rationale:** E-waste management is critical for environmental sustainability and public health. With the increasing consumption of electronic devices, understanding the impact of e-waste and implementing proper disposal and recycling methods is essential. This subject equips students with the knowledge to contribute to sustainable e-waste management practices, ensuring minimal harm to the environment and human health.
e. **Course Learning Objective:**

CLOBJ 1	To explain the fundamental characteristics of electronic waste and the critical necessity for systematic disposal practices.
CLOBJ 2	To examine specific instances of contamination and toxic exposure to determine the long-term effects on ecosystems and communities.
CLOBJ 3	To describe the technical lifecycle of e-waste, from gathering mechanisms to advanced material recovery technologies.
CLOBJ 4	To critically appraise the effectiveness of regulations like the E-Waste Rules 2016 and judge the responsibilities of producers and consumers.
CLOBJ 5	To investigate emerging green technologies and formulate strategies for a circular economy in the electronics industry.

f. **Course Learning Outcomes:**

CLO 1	Understand the sources, types, and environmental significance of e-waste and the need for proper management.
CLO 2	Analyze the environmental and health impacts caused by improper e-waste disposal through case studies.
CLO 3	Explain the collection, dismantling, and recycling processes along with technological challenges.
CLO 4	Evaluate national and international e-waste policies, frameworks, and the roles of various stakeholders.
CLO 5	Explore innovations, sustainable practices, and the role of consumers in minimizing future impact.

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Introduction to E-Waste Management Overview of E-Waste:** Definition of e-waste and its components, Sources and types of e-waste: Consumer electronics, computers, mobile phones, etc. Importance of E-Waste Management: Environmental and health impacts of improper disposal of e-waste, Global statistics on e-waste production and recycling rates. E-Waste Disposal Methods: Common disposal practices and their environmental effects, The importance of recycling and proper disposal. Key Regulations and Policies for E-Waste: International regulations and agreements, Indian E Waste Management Rules and their implications.	20%	9
2	**Environmental and Health Impacts of E-Waste** Environmental Impact of E-Waste: Contamination of soil, water, and air from hazardous substances, E-Waste dumping in landfills and illegal exports to developing countries. Health Risks from E-Waste: Exposure to toxic chemicals from e-waste and its effects on human health, Long-term consequences for workers and communities involved in e-waste recycling. Case Studies of E-Waste Disposal and Impact: Case studies of e-waste disposal in various countries and its effects, Local examples of e-waste impact in India.	20%	9
3	**E-Waste Collection and Recycling Processes** E-Waste Collection Mechanisms: Methods for collecting e-waste from households, industries, and institutions, Role of take-back programs, collection centres, and awareness campaigns. E-Waste Recycling Techniques: Dismantling of electronic devices: Manual and automated methods, Extraction and recycling of valuable materials. E-Waste Recycling Technologies: Introduction to mechanical, chemical, and biological recycling technologies, Advanced recycling processes like shredding, thermal processes, and material recovery. Challenges in E-Waste Recycling: Technical and financial barriers in the e-waste recycling process, Lack of awareness, illegal recycling, and improper handling of toxic materials.	20%	9

4	**E-Waste Management Strategies and Policies** E-Waste Management Framework: Understanding a circular economy model in relation to e-waste, Effective e waste management strategies. E-Waste Policy and Regulations: National and international policies regarding e waste, India's E-Waste Management Rules 2016 and Extended Producer Responsibility (EPR). Role of Stakeholders in E-Waste Management: Roles of government, industry, manufacturers, and consumers in managing e-waste, Importance of public-private partnerships and collaborations for sustainable e-waste management.	**20%**	**9**
5	**Future of E-Waste Management and Sustainable Solutions** Innovations in E-Waste Management: Emerging technologies for safer e-waste recycling, Development of eco-friendly alternatives to hazardous materials in electronics. Role of Consumers in E-Waste Management: Importance of consumer awareness in e-waste management (e.g., responsible disposal, repair, and reuse), Programs like take-back schemes and drop-off locations for consumers to recycle their electronics. The Future Outlook of E-Waste Management: Predictions for e-waste growth in the coming years and solutions to address this issue, the potential role of global collaboration and new technologies in reducing the environmental impact of e-waste.	**20%**	**9**

i. Text Book and Reference Book:

1. E-Waste Management: From Waste to Resource S. K. Agarwal
2. Environmental Impact of E-Waste Recycling R. K. Gupta
3. Handbook of E-Waste Management: From Waste to Resources B. D. Agrawal