IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.) [Computer Science & Engineering(IoT)]

III Semester

S.No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1.	BSC-CIOT301	BSC	Numerical Methods, Statistics, Fourier & Fuzzy theory	70	20	10	–	–	100	3	1	–	4
2.	ESC-CIOT301	ESC	Digital System	70	20	10	60	40	200	2	1	2	4
3.	PCC-CIOT301	PCC	Data Structure & Algorithm	70	20	10	60	40	200	2	1	2	4
4.	PCC-CIOT302	PCC	Introduction to IoT	70	20	10	60	40	200	2	1	2	4
5.	PCC-CIOT303	PCC	Programming Practices (C++)	–	–	–	60	40	100	–	–	6	3
6.	HSMC-CIOT301	HSMC	Principles of Mgt & Managerial Economics	70	20	10	–	–	100	3	–	–	3
7.	MC-III	MC	Energy, Environment, Ecology	–	–	–	–	–	–	2	–	–	0
			Total	350	100	50	240	160	900	14	4	12	22

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	1 Credit	1 Credit

IPS Academy
Institute of Engineering & Science
Department of Computer Science & Engineering
III-Semester

BSC-CIOT301	**Numerical Methods, Statistics, Fourier & Fuzzy theory**	**3L : 1T : 0P (04 Hrs)**	**Credits:04**

Course Objective: Mathematics is the basic necessity for the foundation of engineering and technology. The main objective of this course is to teach mathematical method, develop mathematical skills and increase students' thinking power.

Module- 1: **Numerical Methods** **(10 Hours)**
Solution of algebraic and transcendental equations – Newton-Raphson method and Regula-Falsi method, Finite differences, Interpolation using Newton's forward and backward difference formulae, Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae, Inverse interpolation by Lagrange's method.

Module- 2: Statistics **(8 Hours)**
Mean, Median, Mode, Standard deviation, Variance, Correlation, Regression, Curve fitting: Fitting of straight line, Fitting of second degree parabola.

Module-3 : Probability **(8 Hours)**
Introduction to probability, Conditional probability, Baye's theorem, Probability mass function, Probability density function, Probability distribution: Binomial distribution, Poisson distribution, Normal distribution.

Module-4: Fourier Transformations **(9 Hours)**
Fourier transform: Definition and properties, Convolution of Fourier transformation, Fourier transformation on function spaces, Solution of ordinary and partial differential equation by Fourier transformation.

Module-5: Fuzzy Set Theory **(10 Hours)**
Definition of a fuzzy set, Classical sets vs. Fuzzy sets, Types of fuzzy sets, Operations on fuzzy sets, Fuzzy relations, Relations including operations: Reflexivity, Symmetry and Transitivity, Pattern classification based on fuzzy relations, Fuzzy analysis including metric spaces, Distances between fuzzy sets, Area, Perimeter, Height, Width of fuzzy subsets, Applications.

Course Outcomes:

CO1: To explain and apply the numerical methods in engineering problems.
CO2: To explain the basic concepts of statistics and apply in engineering fields.
CO3: To explain and apply the concepts of probability distribution in evaluation of engineering problems.
CO4: To define Fourier Transform and apply in different engineering problems.

CO5: To describe and apply the concepts of fuzzy sets.

List of Text Book/Reference Book:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2018.
2. B. V. Ramanna, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 2017.
3. Chandrika Prasad & Reena Garg, Advanced Engineering Mathematics, Khanna Book Publishing Co. (P) Ltd., Delhi, 2018.
4. Sudhir K. Kumar and Rimple Pundir, Fuzzy sets and their Applications, Pragati Prakashan, 9th Edition, 2018.
5. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
6. R. W. Hamming, Numerical Methods for Scientist and Engineers, Dover Publications,2nd Edition , New York.
7. T. Veerarajan, Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2017.
8. D. C. Montgomery and G. C. Runjer, Applied Statistics & Probability for Engineers, Wiley Publication, 6th Edition.
9. T.T. Soong, Fundamental of Probability & Statistics for Engineers, John Wiley & Sons Ltd, 2004.
10. M. Ganesh, Introduction to Fuzzy Sets and Fuzzy Logic, PHI Learning, 2009.
11. **NPTEL Course Link : https://nptel.ac.in/courses/127/106/127106019/**

ESC-CIOT301	Digital Systems	2L: 1T: 2P (04 Hrs.)	04 Credit

Prerequisite: - Engineering Physics, Electronic Devices

Course Objective: The course is designed to acquire the basic knowledge of digital logic levels and application of digital electronics circuits and different types of memories. To impart how to design Digital Circuits. To understand the basic software tools for the design and implementation of digital circuits and systems.

Module 1 **(8 Hrs.)**

Review of Number Systems, Codes-BCD, Excess- 3, Gray Reflected ASCII,EBCDIC, review of Logic gates and binary operations, Implementations of Logic Functions using gates, NAND–NOR implementations. Boolean postulates and laws – De-Morgan's Theorem - Principle of Duality, Boolean function, Canonical and standard forms,Minimization of Boolean functions, Sum of Products (SOP), Product of Sums (POS), Karnaugh map Minimization, Quine-McCluskey method of minimization.

Module 2 **(8 Hrs.)**

Combinational logic circuits: Adder, subtractor, Carry Look Ahead adder, BCD adder, Binary Multiplier, Multiplexer/De-multiplexer, decoder/encoder, code-converters, designing of combinational Circuits, Introduction to Races and Hazards.

Module 3 **(8 Hrs.)**

Sequential logic: flip flops, D, T, S-R, J-K, race around condition and its remedies, Edge & Level triggered circuits, Shift registers, Asynchronous and synchronous counters, their types and state diagrams.

Module 4 **(8 Hrs.)**

Logic Families and its Specifications: RTL, DTL, TTL, ECL, CMOS, Concept of Programmable logic devices like FPGA, Logic implementation using Programmable Devices, PLDs, Semiconductor memories and classification of ROM, RAM and storage devices.

Module 5 **(8 Hrs.)**

Digital-to-analog conversion (DAC) - R-2R ladder Type, Weighted converter using Op-amp and transistor. Analog-to-digital Conversion (ADC) -Counter type, Successive Approximations Register, Flash type, Digital hardware description methodology, HDL, different modeling in VHDL, VHDL construct and codes for combinational circuit.

Course Outcomes:

Students earned credits will develop ability to

1. Illustrate basic postulates of Boolean algebra. To design Boolean functions by applying the methods for simplifying Boolean expressions.
2. Illustrate fundamental concepts and design of digital combinational circuits.
3. Illustrate the basic methods for the design of sequential circuits.
4. Illustrate the operation of Logic families and Analyze and design of programmable logic devices.
5. Design and simulate the Logic circuits using HDL and appropriate EDA tool.

List of Text Books/ Reference Books:

1. R. P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. W. H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition, 2006.
3. D. V. Hall, "Digital Circuit and System", Tata McGraw Hill, 1989.
4. S. Salivahanan & S. Arivazhagan, "Digital Circuits and Design", VikasPublishing.
5. M. Morris Mano, "Digital Logic and Computer Design", Pearson India Education, 1st edition, 2012
6. Douglas Perry, "VHDL Programming by example", McGraw Hill, 1st edition, 2002.
7. J. Bhaskar, "VHDL: Primer", P T R Prentice Hall, 3rd edition, 1999.
8. **NPTEL Course Link : https://nptel.ac.in/courses/106/108/106108099/**

List of Experiment:

1. Verification and interpretation of truth table for AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates.
2. Design and Implement Half Adder and Half subtractor.
3. Design and Implement Multiplexer, De-multiplexer.
4. Design and Implement BCD to Gray Code Converters.
5. Design and Implement Encoder, Decoder.
6. Verify the truth table of RS, JK, T and D flip-flops using NAND & NOR gates
7. Design and Implement a modulo-4 asynchronous counter.
8. Analysis of Analog to Digital Converter.
9. Design and simulate half adder and full adder using xilinx tool (VHDL)
10. Design and simulate Multiplexer using xilinx tool (VHDL)
11. Design and simulate D flip flop using xilinx tool (VHDL)
12. Design and simulate ALU using xilinx tool (VHDL)

PCC -CIOT301	Data Structure & Algorithm	2L : 1T : 2P (5 hrs.)	4 credits

Prerequisite:

Course Objective:

The objective of this course is to understand different types of data structures and algorithms used in program.

Course Contents: (48 hrs.)

Module 1: (10 hrs.)

Introduction to Data Structure: Classification of Data structures, Abstract Data Types, Implementation aspects: Memory representation. Algorithms: Designing algorithms, analyzing algorithms, asymptotic notations. Data structures operations and its cost estimation, Introduction to linear data structures- Arrays, String, representation & Operations, Linked List: Representation of linked list in memory, different implementation of linked list. Circular linked list, doubly linked list, etc.

Module 2: (8 hrs.)

Stacks: Stacks as ADT, Different implementation of stack, multiple stacks. Application of Stack: Conversion of infix to postfix notation using stack, evaluation of postfix expression, Recursion. Queues: Queues as ADT, Different implementation of queue, Circular queue, Concept of Dqueue and Priority Queue, Queue simulation, Application of queues.

Module 3: (10 hrs.)

Tree: Definitions - Height, depth, order, degree etc. Binary Search Tree - Operations, Traversal, Search, AVL Tree, Heap, Applications and comparison of various types of tree; Introduction to B tree, B+ tree. Graphs: Introduction, Classification of graph: Directed and Undirected graphs, etc, Representation, Graph Traversal: Depth First Search (DFS), Breadth First Search (BFS), Graph algorithm: Minimum Spanning Tree (MST)- Kruskal, Prim's algorithms. Dijkstra's shortest path algorithm; Application of graphs.

Module 4: (10 hrs.)

Sorting: Introduction, Classification of sorting method, Sort methods like: Bubble Sort, Quick sort. Selection sort, Heap sort, Insertion sort, Shell sort and Merge sort; comparison of various sorting techniques. Searching: Basic Search Techniques: Sequential search, Binary search, Comparison of search methods. Introduction to divide and conquer technique, analysis, design and comparison of various algorithms based on this technique, example binary search, merge sort, quick sort.

Module 5: (10 hrs.)

Concept of Greedy strategy: examples of greedy method like optimal merge patterns, Huffman coding, knapsack problem. Concept of dynamic programming: problems based on this approach such as 0/1 knapsack, multistage graph. Backtracking concept and its example like 8 queen's problem. Introduction to branch & bound method: example of branch and

bound method like traveling salesman problem. Non Deterministic algorithms, the classes: P, NP, NP Complete, NP Hard.

Course Outcome:

1. Understand basic data structures such as arrays, linked lists and analyze the performance of recursive and non recursive algorithms.
2. Introduce the concept of data structures through ADT including Stack, Queues.
3. Understand the basic operations of trees & graph and implement their different types of algorithms.
4. Demonstrate and implement searching sorting algorithms and analyze them using Divide & Conquer technique.
5. Identify and analyze different algorithm design techniques (Greedy method, dynamic programming, Backtracking, Branch & bound) for problem solving and identify different NP, NP-Hard, NP-Complete problems.

List of Text / Reference Books:

1. Ellis Horowitz, Sartaj Sahni, " Fundamentals of Data Structures" Computer Science Press.
2. Mark Allen Weiss "Algorithms, Data Structures, and Problem Solving with C++" , Pearson Education (US) 1996
3. AM Tanenbaum, Y Langsam& MJ Augustein, "Data structure using C and C++", 2nd Ed., 2006 , Prentice Hall India.
4. Robert Kruse, Bruse Leung, "Data structures & Program Design in C", 2nd Ed., 1997, Pearson Education.
5. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education.
6. Coremen Thomas, Leiserson CE, Rivest RL, "Introduction to Algorithms" 3rd Ed,2009 PHI.
7. Horowitz & Sahani, "Analysis & Design of Algorithm" Computer Science Press
8. Ullmann, "Design & Analysis of Computer Algorithms" Pearson

9. NPTEL Course Link : https://nptel.ac.in/courses/106/102/106102064/

List of Experiments:

1. To perform insertion and deletion operations on array.
2. To calculate factorial of number using recursion.
3. To demonstrate static & dynamic implementation of stack.
4. To demonstrate static & dynamic implementation of Linear queue.
5. To implement circular queue.
6. To implement single linked list.
7. To implement doubly linked list.
8. To implement binary search tree.
9. To perform BFS and DFS operations on graph.
10. To perform sorting operation using bubble sort.
11. To perform sorting operation using insertion sort.
12. Iterative and Recursive Binary Search.
13. Merge Sort using divide & conquer
14. Quick Sort using divide & conquer
15. Optimal merge patterns.
16. Huffman coding.
17. Minimum spanning trees using Kruskal's algorithm.
18. Minimum spanning trees using Prim's algorithm.
19. Traveling salesman problem.
20. A small project using C++.

PCC-CIOT302	Introduction to IoT	2L : 1T : 2P (5 hrs.)	4 credits

Prerequisite:

Course Objective: The objective of this course is to understand what is Internet of things, how it's different from other systems, and components of IoT.

Course Contents: (46 hrs.)

Module 1: **(8 hrs.)**

Definition and Characteristics of IoT, embedded system vs IoT, Overview of Governance, Privacy and Security Issues, Applications of IoT

Module 2: **(10 hrs.)**

Introduction to Microprocessors, 32-bit vs 64-bit processors, Memory: Primary vs Secondary, principles of cache memory, virtual memory

Module 3: **(10 hrs.)**

Organization: Types of Operands, Types of Operations, Addressing Modes, Instruction Formats, Registers.

Module 4: **(8 hrs.)**

Instruction cycles of control unit, Importance of Clock and its speed, I/O ports, Transmission: serial vs parallel, asynchronous vs synchronous.

Module 5: **(10 hrs.)**

Microcontroller, Features, Microcontrollers vs Microprocessors, GPIO, Study of ATmega328P microcontroller, UART, USB ports and connectors: Types, Standards and Speeds

Course Outcome:

1. Understand basic of Internet of Things, its governance and applications.
2. Introduce the concept of processors and importance of memory.
3. Understand the basic of computer organization.
4. Understand the concept of control unit.
5. Introduce the concept of microcontrollers and its features.

List of Text / Reference Books:

1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach"
2. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015 3. Editors Ovidiu Vermesan
3. Morris Mano: Computer System Architecture, PHI.
4. William Stallings: Computer Organization and Architecture, PHI
5. The 8051 Microcontroller and Embedded Systems – using assembly and C", Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; PHI, 2006 / Pearson, 2006.

6. **NPTEL Course Link: https://nptel.ac.in/courses/106/105/106105166/**

List of Experiments:

1. Study of Arduino Uno Board, Installation of Arduino IDE
2. Study of basic sketch program inbuilt: variables, datatypes, structure, functions
3. Program for sending and receiving data displayed as text, decimal values, hexadecimal, or binary using serial monitor.
4. Program consist of 4 functions performing addition, subtraction, multiplication and division operations and taking input from serial monitor.
5. Program for blinking LED with delay of Arduino Uno Board.
6. Program that reads the blink rate (0 to 9) from the serial monitor and blink function decide the delay (blink rate*100) of inbuilt LED of Arduino Uno Board
7. Program for blinking a series of LEDs with different sequence and pattern taking input from serial monitor.
8. Program for glowing RGB LED a) with delay b) taking input from serial monitor.
9. Program that buzzing a buzzer if the value read from serial monitor is less than 5.
10. Program that reads an analog value from a potentiometer and display it to serial monitor.

PCC-CIOT303	Programming Practices (C++)	1L : 0T : 4P (5 hrs.)	3 credits

Prerequisite: C language

Course Objective:

Interpret good knowledge in C++ programming language and enable them to build Programs.

Course Contents: (42 hrs.)

Module 1: **(10 hrs.)**

Introduction of C++, Programming paradigms, Language translator, Structure of C++ program. Declaration, Expression and statements: Data types, Variables, Constants, Operator and expression, Operator precedence and associativity & Control statements.

Module 2: **(08 hrs.)**

Array: Declaration & Initialization, 2-D Array & Multidimensional Array. Function: Declaration, Definition and call, Inline function, Main function argument, Reference variable, Function overloading, Default argument, Parameter passing, Recursion, Scope of variable, Return-by-value and Return-by-reference.

Module 3: **(08 hrs.)**

Class: Class, Members, Constructor and destructor, Copy constructor, parameterized constructor, Static member, Scope of class names. Dynamic memory management: Operators new and delete.

Module 4: **(08 hrs.)**

Introduction, Polymorphism, Overloading, Parametric and inclusion polymorphism Inheritance: inheritance and Types of inheritance, Virtual base class, Virtual function, Abstract class, Overriding and hiding, Dynamic binding of functions.

Module 5: **(08 hrs.)**

Class template, Member function inclusion, Function template, Specialization, Inheritance, Namespace. Concept of exception handling, Catch block, Nested try-catch block, Condition expression in throw expression, Constructor & destructor, Runtime standard exception. Standard library function, Input and output, Iostream class hierarchy, Class ios, Other stream classes, Basics of file handling.

Course Outcome:

1. Understand expression and statements and apply them in solving Problems.
2. Explain and be able to use array and function in writing programs.
3. Explain and be able to use class in writing programs.
4. Explain and be able to use Polymorphism and Inheritance in writing programs.
5. Explain and be able to use template and exception handling in writing programs

List of Text / Reference Books:

1. B. Stroutstrup “The C++ Programming Language”, 3rd Edition, 2002, Pearson Education.
2. Josée Lajoie and Stanley B. Lippman “C++ Primer”, 3rd Edition, Addison Wesley
3. E.Balagurusamy “Object Oriented Programming with C++ “, 7e, TMH
4. Rajesh K.Shukla “Object Oriented Programming in C++”, Wiley India
5. **NPTEL Course Link : https://nptel.ac.in/courses/106/101/106101208/**

List of Experiments:

Write a C++ Program:

1. To display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.
2. To declare Struct. Initialize and display contents of member variables.
3. To declare a class. Declare pointer to class. Initialize and display the contents of the class member.
4. Given that an EMPLOYEE classcontains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members.
5. To read the data of N employee and compute Net salary of each employee (DA=52% of Basic andIncome Tax (IT) =30% of the gross salary).
6. To illustrate the concepts of console I/O operations.
7. To use scope resolution operator. Display the various values of the same
8. To allocate memory using new operator.
9. To create multilevel inheritance. (Hint: Classes A1, A2, A3)
10. To create an array of pointers. Invoke functions using array objects.
11. To use pointer for both base and derived classes and call the member function. Use Virtual keyword.
12. To implement a file handling program for demonstration of database connectivity.
13. To make a small project using C++.

HSMC-CIOT301	Principles of Management and Managerial Economics	3L: 0T: 0P (3 hrs.)	Credits:03

Prerequisite: Nil

Course Objectives:

- Explain management, organization and the roles of managers & Explain different theories of management.
- Describe the importance of planning and organization Structure.
- Discuss the control process and its elements
- Explain the term Managerial Economics & its importance.
- Explain productivity & factors that affect productivity.

Module- 1 **(08 hrs.)**

Introduction:

Definition, Functions, Process, Scope and Significance of Management. Nature of Management, Managerial Roles, Managerial Skills and Activities, Difference between Management and Administration. Significance of Values and Ethics in Management.

Evolution of Management:

Thought Approaches of Management Thought, Functions of Management. Different theories of Management.

Module- 2 **(10 hrs.)**

Planning and Organizing:

Nature, Scope, Objective and Significance of Planning, Elements and Steps of Planning, Decision Making Organizing Principles, Span of Control, Line and Staff Relationship, Authority, Delegation and Decentralization. Effective Organizing, Organizational Structures, Formal and Informal Organizations, Staffing.

Module- 3 **(08 hrs.)**

Directing:

Effective Directing, Supervision, Motivation, Different Theories of Motivation, Concept of Leadership- Theories and Styles. Communication Process, Channels and Barriers, Effective Communication.

Controlling and Coordinating:

Elements of Managerial Control, Control Systems, Management Control Techniques, Effective Control Systems. Coordination Concept, Importance, Principles and Techniques of Coordination, Concept of Managerial Effectiveness

Module- 4 **(08 hrs.)**

Managerial Economics:

Introduction, Factors Influencing Manager, Micro and Macro-economics, Theory of the Cost, Theory of the Firm, Theory of Production Function.

Module- 5 **(10 hrs.)**

Productivity:

Input-Output Analysis, Micro-economics Applied to Plants and Industrial Undertakings, Production and Production system, Productivity, Factors affecting Productivity, Increasing Productivity of Resources.

Case Studies.

Course Outcomes:

After completion of the course student will be able to:

- Understanding of basic concepts, principles and practices of management
- Understanding the planning and organizing & organization Structures.
- Importance of Management Control Techniques
- Understand the term Managerial Economics & its importance.
- Understand productivity & factors that affect productivity.

List of Text Books :

1. Chhabra T.N., Principles and Practice of Management. 10th ed Year 2018.
2. Murton- Gulab, Management Today. 3th ed.1998
3. KoontzH. and O"DonnelH., Essential of Management, 8th ed., McGraw-Hill, New Delhi, 2009.
4. Robbins, S.Fundamentals of Management. 5th ed., Pearson Education, Canada, 2008.

List of Reference Book:

1. Prasad L M, Principles and Practices of Management, S. Chand and Sons, New Delhi ,2018
2. Terry & Francklin, Principles of Management, Richard– Erwin.18th Ed. 1982

MC-3	Energy & Environmental Engineering	L-2, T-0, P-0	00 Credit

Course Objective:

To provide an introduction to energy resources and an emphasis on alternative energy sources and their application. To study the interrelationship between the living organism and environment. To understand the transformation and degradation of organic pollutants in the environment

MODULE 1: (6 hrs.)

Energy: Introduction, conventional and non-conventional energy resources - coal, oil, gas, solar energy, wind energy, geothermal energy, Hydropower, Bio-energy, Nuclear energy. Energy survey in India. Current and future energy requirements in India and across the world including associated environmental problems.

MODULE 2: (8 hrs.)

Ecosystem and Biodiversity: Introduction of an ecosystem, Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, rivers, oceans),Biodiversity at global, national and local levels. Threats to biodiversity, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values; Endangered and endemic species of India. Conservation of biodiversity: In-Situ and Ex-Situ.

MODULE 3: (8 hrs.)

Air pollution and Water Pollution: Definition, Cause, effects and control measures of Air pollution; Mobile and stationary sources of air pollutants, effective stack height concept, CO, CO_2, H_2S, SO_x, NO_x emissions, and its control. Definition, Classification, Cause, effects and control measures of water pollution, Measurement of levels of pollution such as DO, BOD, COD.

MODULE 4: (6 hrs.)

E-Waste: Definition, Classification, Cause, effects and control measures of e-waste, global trade issues of e-waste, Recycling method of e-waste & its benefit.

MODULE 5: (8 hrs.)

Environment Impact & Protection Act Environment: Protection Act; Air (Prevention and Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation; Public awareness. Environmental Impact Assessment. Measuring environmental impacts and policies for the regulation of environmental impacts.

Course outcome-

CO1: Ability to understand basic concepts conventional and non-conventional energy resources.
CO2: Ability to understand Ecosystem& Biodiversity.
CO3: To provide knowledge about Air pollution & Water Pollution.
CO4: To provide knowledge & reuse of E-Waste.
CO5: Ability to understand basic concepts of Environment Impact & Protection Act.

List of Text/Reference Book:

1. Environmental Engineering - H.S. Peavy & D.R. Rowe-Mc Graw Hill Book Company, New Delhi
2. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
3. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc.
5. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards', Vol I and II, Enviro Media (R)