IPS Academy, Institute of Engineering & Science

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Bachelor of Technology (B.Tech.)

Department of Computer Science & Engineering (AIML)

Semester-III

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme			Credits
				L	T	P	
1.	BSC	MA03	Probability & Statistics	2	1	-	3
2.	PCC	CL01	Computer Organization& Architecture	2	1	-	3
3.	PCC	CL02	Data Structure & Algorithm	2	1	-	3
4.	PCC	CL03	Object Oriented Programming & Methodology	2	1	-	3
5.	PCC	CL04	Introduction to Artificial Intelligence	2	-	-	2
6.	HSMC	HS04	Entrepreneurship and Principles of Management	1	-	-	1
7.	LC	CL01 (P)	Computer Organization & Architecture Lab	-	-	2	1
8.	LC	CL02 (P)	Data Structure & Algorithm Lab	-	-	2	1
9.	LC	CL03 (P)	Object Oriented Programming & Methodology Lab	-	-	2	1
10.	LC	CL04 (P)	Artificial Intelligence Lab	-	-	2	1
11.	LC	CL05(P)	Programming in Python Lab	-	-	2	1
12	PROJ	CL01	Seminar	-	-	2	1
13.	MLC	MLC01	Professional Laws, Ethics, Gender, Human Values and Harmony	1	-	-	Audit
14.	LLC	LLC02	Liberal Learning Course –II (NCC/NSO/NCA)	Credit to be added in fourth Semester.			
Total Academic Credits							21

- **Liberal Learning Course-III, LLC02 (Any One Course from NCC/NSO/NCA)**
  - **Note:** The pool of choices will be the same as in LLC01.

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PCC-CL01	Computer Organization & Architecture	2L:1T:0P (4hrs.)	Credits:03

Pre requisite: Nil

Course Objective: Students to be familiarize the basic principles of computer architecture, Design and Multiprocessing, Types of data transfer, Concept of semiconductor memories which is useful for research work in field Computer System.

Course Contents: (45 hrs.)

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

Basic Structure of Computer: Structure of Desktop Computers, CPU: General Register Organization-Memory Register, Instruction Register, Control Word, Stack Organization, Instruction Format, ALU, I/O System, bus, CPU and Memory Program Counter, Bus Structure, Register Transfer Language-Bus and Memory Transfer, addressing modes. Control Unit Organization: Basic Concept of Instruction, Instruction Types, Micro Instruction Formats, Fetch and Execution cycle, Hardwired control unit, Micro- programmed Control unit micro program sequencer Control Memory, Sequencing and Execution of Micro Instruction.

Module 2: **(8hrs.)**

Computer Arithmetic: Addition and Subtraction, Tools Compliment Representation, Signed Addition and Subtraction, Multiplication and division, Booths Algorithm, Division Operation, Floating Point Arithmetic Operation, Number concept 1's and 2's complement representation, addition and subtraction using 2's complement.

Module 3: **(9hrs.)**

I/O Organization: I/O Interface–PCI Bus, SCSI Bus, USB, Data Transfer: Serial, Parallel, Synchronous, Asynchronous Modes of Data Transfer, Direct Memory Access (DMA), I/O Processor.

Module 4: **(10 hrs.)**

Memory Organization: Main memory-RAM, ROM, SecondaryMemory –Magnetic Tape, Disk, Optical Storage, Cache Memory: Cache Structure and Design, Mapping Scheme, Replacement Algorithm, Improving Cache Performance, Virtual Memory, memory management hardware.

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

Multiprocessors: Characteristics of Multiprocessor, Inter-Processor Communication and Synchronization. Memory in Multiprocessor System, Concept of Pipelining, Vector Processing, ArrayProcessing, RISC And CISC, StudyofMulticore Processor –Intel, AMD.

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Course Outcomes:

After completion of the course the student will be able to:

1. Explain the basic structure & components of the computer system, Micro programmed Control Unit.
2. Demonstrate the concepts of computer arithmetic.
3. Explain the input output organization of the computer system.
4. Illustrate memory organization and memory management techniques.
5. State the core concepts of multiprocessor and pipelining.

List of Text / Reference Books:

1. Morris Mano, “Computer System Architecture”3rdEd., PHI
2. Alan Clements: “Computer Organization and Architecture”, Cengage Learning.
3. Subrata Ghosal: “Computer Architecture and Organization”, Pearson Education.
4. William Stalling, “Computer Organization and Architecture”10thEd., Pearson Education.
5. M. Usha, T.S. Shrikant: “Computer System Architecture & Organization”, Willey India.
6. Chaudhuri, P. Pal: “Computer Organization and Design”,3rdEd. PHI.

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PCC-CL02	Data Structure & Algorithm	2L: 1T:0P (4hrs.)	Credits:03

Prerequisite: Nil

Course Objective:

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

Course Contents: (46 hrs.)

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

Review of C++ programming language. Introduction to Data Structure: Concepts of Data and Information, Classification of Data structures, Abstract Data Types, Implementation aspects: Memory representation. Analysis of algorithm: Time Complexity and Space Complexity, Data structures operations and its cost estimation, Basic of Asymptotic notation. 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. Application of linked list: polynomial manipulation using linked list, etc.

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

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 Dequeue and Priority Queue, Queue simulation, Application of queues.

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

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 forest, multi-way Tree, BTree, B+ tree, B*tree and red-black tree.

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

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; Comparison between different graph algorithms. Application of graphs.

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

Sorting: Introduction, Classification of sorting method, Sort methods like: Bubble Sort, Quick sort. Selection sort, Heap sort, Insertion sort, Shell sort, Merge sort and Radix sort; comparison of various sorting techniques. Searching: Basic Search Techniques: Sequential search, Binary search, Comparison of search methods.

Course Outcomes:

After completion of the course the student will be able to:

1. Understand basic data structures such as arrays, linked lists, stacks and queues.
2. Introduce the concept of data structures through ADT including List, Stack, Queues.
3. Understand the basic operations of trees and its types.
4. Understand the basic concept of graph and its operations.
5. Demonstrate and implement searching sorting algorithms.

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. R.G. Dromey "How to Solve it by Computer",2nd Impression by, PHI.
4. A M Tanenbaum, Y Langsam & M J Augustein, "Data structure using C and C++", 2ndEd., 2006, Prentice Hall India.
5. Robert Kruse, Bruse Leung, "Data structures & Program Design in C", 2nd Ed., 1997, Pearson Education.
6. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education.
7. Richard, Gilberg Behrouz, Forouzan, "Data structure–A Pseudo code Approach with C", 2ndEd., Thomson press.

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PCC-CL03	Object Oriented Programming & Methodology	2L: 1T:0P (4hrs.)	Credits:03

Prerequisite: Programming for Problem Solving

Course Objective:

The course is designed to provide complete knowledge of Object-Oriented Programming through and to enhance the programming skills of the students by giving practical assignments to be done in labs. Its main objective is to teach the basic concepts and techniques which form the object oriented programming paradigm.

Course Contents: (42 hrs.)

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

Introduction to Object Oriented Programming, Comparison with Procedural Programming, features of Object-oriented paradigm, merits and demerits of OO methodology; Introduction to Java Development Kit (JDK) & Java virtual machine (JVM); Linker &Loader; Data Encapsulation: Concept of Classes & Objects; State, Behavior & Identity of an object.

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

Data Abstraction and Message Passing: Methods, calling of constructors, Decision making constructs, Control loops, Keywords: this, static; Access modifiers, Arrays within a class, String Class.

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

Relationship between classes: Generalization- Inheritance, Types of Inheritance, Ambiguity in multiple inheritances, Concept of interfaces; Specialization- Association, Aggregation and Composition; Static and Dynamic Binding: Polymorphism, Method Overriding & Overloading; Keywords: super, abstract, final.

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

Concept of Packages, Need of package; Basic idea of exception handling, stack-based execution and exception propagation, Exception types: Exception Handling Try, Catch, Finally, Throw statement, Assertions.

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

Overview of Simple threads, Basic idea of Multithreaded Programming, Thread synchronization: Locks, synchronized methods, synchronized block, thread scheduling, Producer-consumer relationship, Daemon thread, Case Study: Chabot implementation etc.

Course Outcomes:

After completion of the course the student will be able to

1. Understand object-oriented programming concepts, core JAVA, and apply them in solving Problems.
2. Develop skill in data abstraction and message passing. .
3. Understand fundamentals of relationship amongst objects.
4. Learn about the need of exception and errors.
5. Develop ability to write a computer program to solve specified problems.

List of Text / Reference Books:

1. G. Booch, “Object Oriented Analysis & Design”, Pearson.
2. Barbara Liskov, “Program Development in Java”, Addison-Wesley, 2001.
3. James Martin, “Principles of Object-Oriented Analysis and Design”, Prentice Hall/PTR.
4. Peter Coad and Edward Yourdon, “Object Oriented Design”, Prentice Hall/PTR.
5. Herbert Schildt, “Java2: The Complete Reference”, 7thEdition, McGraw-Hill.

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PCC-CL04	Introduction to Artificial Intelligence	2L:0T:0P (2hrs.)	Credits:02

Prerequisite: Preliminary knowledge of Elementary Statistics.

Course Objective:

The course is designed to demonstrate fundamental understanding of Artificial Intelligence (AI) and its basic principles. Course will cover foundational concepts of AI that require problem solving, inference, perception, knowledge representation, and learning. Students will be able understand the application of Artificial Intelligence techniques for problem solving.

Course Contents: (43 hrs.)

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

Introduction: Meaning and definition of artificial intelligence, Physical Symbol System Hypothesis, production systems, Characteristics of production systems; Breadth first search and depth first search techniques. Heuristic search Techniques: Hill Climbing, Iterative deepening DFS, bidirectional search. Analysis of search methods. A* algorithm, and their analysis.

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

Introduction to Genetic Algorithms: Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, logical consequences, syntax and semantics of an expression, semantic Tableau. Forward and backward reasoning. Proof methods, substitution and unification, conversion to clausal form, normal forms, resolution, refutation, deduction, theorem proving, inferencing, monotonic and nonmonotonic reasoning.

Module 3: **(09hrs.)**

Introduction to prolog: Network-based representation and reasoning, Semantic networks, Conceptual Graphs, frames. Description logic (DL), concept language, reasoning using DL. Conceptual dependencies (CD), scripts, reasoning using CD.

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

Introduction to natural language processing: Adversarial search and Game theory, classification of games, game playing strategies, prisoner's Dilemma. Game playing techniques, mini max procedure, alpha-beta cut- offs. Complexity of alpha-beta search. Automated planning, classical planning problem, forward planning, partial order planning, planning with proposal logic, hierarchical task planning, multi agent planning.

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

Reasoning in uncertain environments, Fuzzy logic, fuzzy composition relation, operations on fuzzy sets. Probabilistic reasoning, Bayes theorem, construction of Bayesian networks, belief propagation. Markov processes and Hidden Markov models.

Course Outcomes:

After completion of the course the student will be able to:

1. State the core concepts of Artificial Intelligence, It's foundation and principles.
2. Examine the useful search techniques; learn their advantages and disadvantages and be able to develop intelligent systems.
3. Learn the practical applicability of intelligent systems, specifically its applications.
4. Understand AI in different areas like NLP, Pattern Recognition, game planning etc.
5. Understand important concepts like Expert Systems, AI applications.

List of Text / Reference Books:

1. "Artificial Intelligence": Elaine Rich, Kevin Knight, Mc-Graw Hill.
2. "Introduction to AI & Expert System": Dan W. Patterson, PHI.
3. "Artificial Intelligence" by Luger (Pearson Education).
4. Russel & Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education

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PCC-LC-CL01 (P)	Computer System Organization Lab	0L: 0T:02P (2hrs.)	Credits: 1

Prerequisite: Nil

Course Objective:

Students to be familiarize the basic principles of computer architecture, Design and Multiprocessing, Types of data transfer, Concept of semiconductor memories which is useful for research work in field Computer System.

Course Contents:

Module1:
Introduction to Desktop Computers, Introduction to 8085 microprocessor, 8085 Instruction set, Flags, Logic Gates, Combinational circuits, Multiplexer, Demultiplexer.

Module 2:

Introduction to Binary number systems, 1's & 2's Complement, Arithmetic Operations, Half adder, Half subtractor, Full Adder and Full Subtractor.

Module 3:

Introduction to Assembly Language, Programming Arithmetic and Logic Operations, Shift Operations, Program Loops.

Module 4:

Memory Hierarchy, Main Memory, Types of Memory, Memory Allocation Methods, Virtual Memory, Page Replacement Algorithms.

Module 5:

Characteristics of Multiprocessor, RISC And CISC, Study of Multicore Processor–Intel, AMD.

Course Outcomes:

After completion of the course the student will be able to

1. Explain the basic structure & components of the computer system, 8085 Micro Processor.
2. Demonstrate the concepts of computer arithmetic.
3. Demonstrate the concepts of Assembly Language.
4. Illustrate memory organization and memory management techniques.
5. State the core concepts of multiprocessor.

List of Practical's:

1. Case study of Desktop Computers.
2. Study of Multiplexer and Demultiplexer.
3. Write Program to demonstrate Flags in microprocessor 8085.
4. Study of Half Adder and Half Subtractor.
5. Study of Full Adder and Full Subtractor.
6. Write a program to add the contents of memory locations 4000H and 4001H and place the result in memory location 4002H.
7. Write a program to multiply two 8-bit numbers stored in memory locations 2200H and 2201H byre petitive addition and store the result in memory locations 2300H and 2301H.
8. Program for simulate memory allocation strategies (First fit, Best fit, Worst fit).
9. Programs for page replacement algorithms.
10. Case study of RISC And CISC.

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PCC-LC-CL02 (P)	Data Structure & Algorithm Lab	0L: 0T:02P (2hrs.)	Credits:01

Prerequisite: Nil

Course Objective:

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

Course Contents:

Module 1:
Arrays, String, & their representation & Operations. Linked List: Representation of linked list in memory, different implementation of linked list. Circular linked list, doubly linked list, etc.

Module 2:

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, Example of recursion.

Module 3:

Queues: Queues as ADT, Different implementation of queue, Circular queue, Concept of Dequeue and Priority Queue, Queue simulation, Application of queues.

Module 4:

Tree: Definitions - Height, depth, order, degree etc. Binary Search Tree - Operations, Traversal, Search. Graphs: Introduction, Classification of graph: Directed and Undirected graphs, etc., Representation, Graph Traversal: Depth First Search (DFS), Breadth First Search (BFS).

Module 5:

Sorting: Introduction, Classification of sorting method, Sort methods like: Bubble Sort, Quick sort. Selection sort, Heap sort, Insertion sort. Searching: Basic Search Techniques: Sequential search, Binary search, Comparison of search methods.

Course Outcomes:

After completion of the course the student will be able to:

1. Understand basic data structures such as arrays, linked lists.
2. Introduce the concept of data structures through ADT including stack.
3. Understand the basic operations of Queues.
4. Understand the basic concept of Tree and Graph and their operations.
5. Demonstrate and implement searching sorting algorithms.

List of Text / Reference Books:

1. To perform insertion and deletion operations on array. (CO1)
2. To perform multiplication operation on matrix. (CO1)
3. To implement single linked list. (CO1)
4. To implement doubly linked list. (CO1)
5. To calculate factorial of number using recursion. (CO1)
6. To demonstrate static implementation of stack. (CO2)
7. To demonstrate dynamic implementation of stack. (CO2)
8. To demonstrate static implementation of Linear queue. (CO3)
9. To demonstrate dynamic implementation of Linear queue. (CO3)
10. To implement circular queue. (CO3)
11. To implement binary search tree. (CO4)
12. To perform BFS and DFS operations on graph. (CO4)
13. To perform binary search operation. (CO5)
14. To perform sorting operation using bubble sort. (CO5)
15. To perform sorting operation using insertion sort. (CO5)

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PCC-LC-CL03 (P)	Object Oriented Programming & Methodology Lab	0L: 0T:02P (2hrs.)	Credits:01

Prerequisite: Programming for Problem Solving

Course Objective:

This course designed to provide knowledge of Object-Oriented Programming. It introduces object-oriented programming using the Java programming language. The course is designed to enhance the programming skills of the students by giving practical assignments to be done in labs. Its main objective is to teach the basic concepts and techniques of object-oriented programming paradigm. Students will learn how to program in Java and use some of its most important APIs.

Course Contents:

Module 1:

Introduction to Object Oriented Programming, Basics of Java programming, Data types, Variables, Operators, Control structures, looping; Introduction to Java Development Kit (JDK) & Java virtual machine (JVM); Linker & Loader; Data Encapsulation: Concept of Classes & Objects.

Module 2:

Data Abstraction and Message Passing: Methods, constructors, Keywords: this, static; Access modifiers, Arrays within a class, String Class.

Module 3:

Relationship between classes: Inheritance, Types of Inheritance, Ambiguity inmultiple inheritances, Concept of interfaces; Specialization- Association, Aggregation and Composition; Static and Dynamic Binding: Polymorphism, Method Overriding & Overloading; Keywords: super, abstract, final.

Module 4:

Concept of Packages, Need of package; Basic idea of exception handling, Exception types: Exception Handling Try, Catch, Finally, Throw statement, Assertions.

Module 5:

Overview of Simple threads, thread life cycle and methods, Runnable interface, Thread synchronization, Basic idea of Multithreaded Programming.

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Course Outcomes:

After completion of the course the student will be able to:

1. Understand object-oriented programming principles and apply them in solving Problems.
2. Develop skill in data abstraction and message passing.
3. Understand fundamentals of relationship amongst objects.
4. Learn about the need of exception and errors.
5. Understand the concept of threads.

List of Practical's:

1. Write a program to show Concept of CLASS in JAVA. (CO1)
2. Write a program to show Concept of Constructor in JAVA. (CO2)
3. Write a program to show Concept of Arrays in JAVA. (CO2)
4. Write a Program to show Inheritance. (CO3)
5. Write a program to show Polymorphism (method overloading and overriding). (CO3)
6. Write a program to show Interfacing between two classes. (CO4)
7. Write a program to show Exception handling. (CO4)
8. Write a program to Add a Class to a Package. (CO4)
9. Write a program to show Life Cycle of a Thread. (CO5)
10. Write a program to demonstrate multithreading using Java. (CO5)

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PCC-LC-CL04(P)	Artificial Intelligence Lab	0L: 0T:02P (2hrs.)	Credits:01

Prerequisite: Nil

Course Objective:

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

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

Introduction to Prolog and AI Concepts: Overview of Prolog, Introduction to Prolog, Applications and uses of Prolog, Basic AI Concepts, Introduction to Expert Systems, AI applications in various fields

Module 2: **(8hrs.)**

Syntax, Meaning of Prolog Programs, and Basic Problem Solving: Syntax and Meaning of Prolog Programs, Basic syntax and structure of Prolog programs, Data objects in Prolog, Matching in Prolog, Declarative meaning of Prolog programs, Procedural meaning of Prolog programs, Basic AI Problem Solving, Monkey and banana problem

Module 3: **(9hrs.)**

Lists and Operations: Lists in Prolog, Introduction to lists, Representation of lists in Prolog, Operations on Lists, Common list operations, Example programs using lists

Module 4: **(10 hrs.)**

Advanced Prolog Concepts and Real-World Applications: Operators and Arithmetic, Operator notation in Prolog, Arithmetic operations in Prolog, Using Structures, Retrieving structured information from a database, Doing data abstraction, Simulating a non-deterministic automaton, Travel planning

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

Problem Solving and Control Techniques in Prolog: Complex Problems in Prolog, The eight queens' problem, Controlling Backtracking, Techniques to control backtracking in Prolog programs, Example programs illustrating backtracking control.

Course Outcomes:

After completion of the course the student will be able to:

1. Understand important concepts like Expert Systems, AI applications.
2. Solve basic AI based problems.
3. Define the concept of Artificial Intelligence.
4. Apply AI techniques to real-world problems to develop intelligent systems.
5. Select appropriately from a range of techniques when implementing intelligent systems.

List of Text / Reference Books:

1. Installation of gnu-prolog, Study of Prolog (gnu-prolog), its facts, and rules.
2. Write simple facts for the statements and querying it.
3. Write a program for Family-tree.
4. Write Program for Monkey-banana Problem.
5. Write a program which behaves a small expert for medical Diagnosis.
6. Write programs for computation of recursive functions like factorial Fibonacci numbers, etc.
7. Write program to solve 5-queens problem.
8. Write a Program for water jug problem.
9. Write a program for travelling salesman program.
10. Case study of standard AI programs like Mycin and AI Shell.

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PCC-LC-CL05 (P)	Programming in Python	0L: 0T:02P (2hrs.)	Credits:01

Prerequisite: Nil

Course Objective:

The course is designed to provide Basic knowledge of Python. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language. Learning Outcomes: Problem solving and programming capability.

Course Contents:

Module1:
Introduction History, Features, Python –Environment Setup Local Environment Setup, Getting Python, Installation of Python, Use of IDE.

Module 2:

Python – Basic Syntax Python Identifiers, Reserved Words, Lines & Indentation, Multiline Statements, Quotation in Python, Comments & other useful constructs, Python –Variables Assigning Values to Variables, Multiple Assignment, Standard Data Types.

Module 3:

Python – Variables, Assigning Values to Variables, Multiple Assignment, Standard Data Types; Python Numbers, Python Strings, Python Lists, Python Tuples, Dictionary, Data Type Conversion.

Module 4:

Python– Basic Operators, Types of Operators, Arithmetic Operators, Comparison Operators, Assignment Operators, Bitwise Operators, Logical Operators, Operator Precedence, Python– Decision Making & Loops, Flowchart, If statement Syntax. Python - Functions, Syntax for defining a function, Calling a Function, Function Arguments, Anonymous Functions PythonApplications & Further Extensions, Data analysis packages.

Module 5:

Python File Operations: Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(). Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming, using file operations. Database Programming: Connecting to a database, Creating Tables, INSERT, UPDATE, DELETE and READ operations, Transaction Control, Disconnecting from a database, and Exception Handling in Databases.

Course Outcomes:

After completion of the course the student will be able to:

1. Install Python and have knowledge of syntax of Python.
2. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python.
3. Express different Decision-Making statements and Functions.
4. Develop code in Python using functions, loops, etc.
5. Design GUI Applications in Python and evaluate different database operations.

List of Text / Reference Books:

1. Design GUI Applications in Python and evaluate different database operations.
2. Python program to find the union of two lists. (CO1)
3. Python program to find the intersection of two lists. (CO1)
4. Python program to remove the “i” th occurrence of the given word in a list where words repeat. (CO2)
5. Python program to count the occurrences of each word in a given string sentence. (CO2)
6. Python program to check if a substring is present in a given string. (CO2)
7. Python program to map two lists into a dictionary. (CO3)
8. Python program to count the frequency of words appearing in a string using a dictionary. (CO3)
9. Python program to create a dictionary with key as first character and value as words starting with that character. (CO4)
10. Python program to find the length of a list using recursion. (CO4)
11. Python program to read a file and capitalize the first letter of every word in the file. (CO5)
12. Python program to read the contents of a file in reverse order. (CO5)