AIPC2002DATA STRUCTURES AND ALGORITHMS FOR AI(3-0-0)

Module –I(12 hrs)
Introduction: Introduction to Algorithms, Time Complexity and Asymptotic Notations, Introduction to data structures, Types of Data Structure, Data Structure Operations: Insertion, deletion, traversal, merging, etc., Strings and Arrays, Operations on Arrays and strings, Concept of Sparse Matrix, Address calculation and Representation of Matrices in Row-Major and Column-Major Order, AI in Problem Solving: Solving complex problems using AI techniques.

Module –II(8 hrs)
Stacks and Queues: ADT Stack and its operations: Algorithms, Applications of Stacks: Conversion from infix to prefix and infix to postfix expressions- corresponding algorithms and their analysis, Recursion using Stack, Queues: Types: Simple Queue, Circular Queue, Priority Queue; Insertion and Deletion algorithms Application of Queues, Array Implementation of Stack and Queue, Dynamic array data structure:

Module-III(8 hrs)
Linked Lists: Concept of Linked Lists, Advantages of Linked Lists over Arrays, Representation in Memory, Types of Linked Lists: Single Linked-Lists, Double Linked-Lists, Maps, HashMaps and Dictionaries in Python
Circular Linked Lists, Operations on Linked Lists: Insertion, Deletion, Merging, Updation; Linked Representation of Stack and Queue, Single Linked-Lists: Operations and algorithms; Double Linked-Lists: Operations and algorithmic analysis, Circular Linked-Lists: Operations and algorithmic analysis

Module-IV(10 hrs)
Trees: Terminologies, types of trees: Binary Trees, Threaded Binary Trees, Binary Search Trees, AVL Trees, Operations on these trees: algorithms and their analysis, Applications of Binary Trees, B-Trees, B+-Trees: Definitions, algorithms and analysis
Graphs: Terminologies and Representations, Types of graphs, Graph Search and Traversal algorithms and their analysis, Heuristic Search: Application in Tic-Tac-Toe, 8-puzzle, Informed search strategies: Greedy best-first search.

Module-V(7 hrs)
Searching and Sorting: Searching: Linear Search and Binary Search Techniques and their complexity analysis. Objective and analysis of different sorting algorithms: Selection Sort, Bubble Sort, Merge Sort, Heap Sort, Quick Sort, Radix Sort, Insertion Sort; Hashing Techniques

Course Outcomes (COs):
CO1: Understand basic data structures such as arrays, strings, and linked lists.
CO2: Study linear data structures such as stacks and queues and understand their difference.
 CO3: Describe the hash function and concepts of collision and its resolution methods.
CO4: Understand the concept of memory management.
CO5: Study tree, heap and graphs along with their basic operations.
CO6: Study different techniques for solving problems like sorting and searching

Text Books:
"Data Structures using C and C++", Tenenbaum, PHI Publication
Reference Books:
"Data Structures using C", ReemaThareja, Oxford Press
"Data Structures using C", Amiya Kumar Rath and Alok Kumar Jagadev, ECT Publications