

**JYOTI NIVAS COLLEGE AUTONOMOUS
SYLLABUS FOR 2018 BATCH AND THEREAFTER**

Programme: B.C.A

Semester: II

DATA STRUCTURES

Course Code: 18BCAII2

No. of Hours: 60

COURSE OBJECTIVES:

- To understand concepts of complexity in terms of time, space and the various notations involved.
- To understand the concepts of arrays and linked lists and its use in creating complex data structures like stacks, queues, trees, graphs, heaps etc.
- The applications of each data structures including efficient ways in sorting and searching huge data sets.
- To introduce various techniques for representation and manipulation of the data in the real world.

LEARNING OUTCOMES:

- The ability to visualize the problem and the data involved and to appropriately select the right data structure.
- To understand the operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
- To analyze the complexity in terms of time and space and determine the best approach in solving the problem.

UNIT I

08 HRS

Introduction to Data Structures: Definition- Classification of Data Structures: Primitive and Non-Primitive Data Structures -Operations on Data Structures-Applications of Data Structures- Algorithms–Specification-Complexity of Algorithm - Asymptotic Notations for complexity of Algorithms.

UNIT II

13 HRS

Arrays: Introduction- Representation for one dimensional and two dimensional arrays in Memory- Advantages and Disadvantages of Arrays- Operations: Traversing Linear Array, Inserting and Deleting Linear Array.

Sorting: Bubble Sort - Insertion Sort- Merge Sort- Quick Sort.

Searching: Linear Search - Binary Search.

Hashing: Hash Functions: Division Method-Mid-Square Method- Folding Method.

UNIT III

14 HRS

Linked Lists: Introduction-Representation of Singly Linked List in Memory–Memory Allocation- Garbage Collection-Traversing a Singly Linked List-Searching a Singly Linked List – Insertion into a Singly Linked List- Deletion from a Singly Linked List–Representation of a Polynomial - Polynomial Addition- Doubly Linked List: Operations of Doubly Linked List-Circular Linked List.

UNIT IV**14 HRS**

Stacks: Definition-Array Representation of Stacks-Linked List Representation of Stacks–Arithmetic Expressions: Polish Notation- Evaluation of Postfix Expression- Transforming Infix Expressions into Postfix Expressions-Applications: Recursion-Towers of Hanoi- Implementation of Recursive procedures by Stack.

Queues: Definition-Representation of Queues- Linked Representation of Queues- Deques-Priority Queues.

UNIT V**11 HRS**

Trees: Definition-Binary Trees: Terminology - Complete Binary Tree- Extended Binary Trees, Representing Binary Tree in Memory-Traversing Binary Trees- Binary Search Trees- Searching and Inserting in a Binary Search Tree-Deleting in a Binary Search Tree- Heaps: Properties- Heap Sort: Min Heap & Max Heap.

Graphs: Graph theory terminology - Sequential representation of Graphs: Adjacency matrix-Linked Representation of a Graph.

REFERENCES:

1. Seymour Lipschutz. Theory and Problems of Data Structures (Schaum's Outline Series). Tata McGraw-Hill. 2014. First Edition.
2. Ellis Horowitz & Sartaj Sahni. Fundamentals of Data Structures. Galgotia Book Source.
3. J P Tremblay & P G Sorenson. An Introduction to Data Structures with Applications. Tata McGraw-Hill. Second Edition.