

## **DATA STRUCTURE & ALGORITHMS THROUGH C / C++/‘JAVA’**

### ➤ **ARRAYS (1D and 2D)**

- Array Creation and Display
- Array operations (Traversal, Insertion, Deletion, Updating, Merging)
- Arrays and Pointers, Call by value, Call by Reference
- Algorithms in Arrays

### ➤ **STRINGS (Character Array)**

- String Creation and Display
- String Functions (strcmp, strcmpi, strlwr,strupr, strrev, strlen, etc.)
- Working with Strings, Substrings, Characters
- Applications of Strings
- Algorithms in Strings

### ➤ **LINK LIST**

- Dynamic memory allocation and its functions (malloc(), calloc(), realloc(), free(), etc.)
- Structure and Link List, Use of **typedef** and **sizeof** keywords
- Types of Link List (**Singly, Doubly, Circular**)
- Link List operations (Creation, Display, Traversal, Insertion, Deletion, Updation)
- Applications of Link List
- Algorithms in Link List

### ➤ **STACK**

- Introduction of Stack
- **PUSH** and **POP** functions (for inserting and extracting the elements)
- ISEMPTY and ISFULL functions
- Applications of Stack

### ➤ **QUEUES**

- Introduction of Queue
- Types of Queue (**Simple, Circular, Priority, Double Ended**)
- Queue operations (Insertion, Deletion)
- Applications of Queue

### ➤ **POLYNOMIALS**

- Introduction of Polynomials
- Inserting and Storing Equations In Array of Structure
- Adding and Multiplying two Equations
- Simplification and Evaluating the Equations

### ➤ **SPARSE MATRIX**

- Introduction of Sparse Matrix
- Insertion of elements
- Types of Sparse Matrix (**Diagonal, Tri diagonal, Upper Tri diagonal, Lower Tri diagonal**)

## SEARCHING

- **Binary** Search (Array)
- **Linear** Search (Array and Link List)

## ➤ SORTING TECHNIQUES (Array)

- Selection Sort
- Bubble Sort
- Insertion Sort
- Shell Sort
- Quick Sort
- Merge Sort
- Heap Sort
- Radix Sort

## ➤ POLISH NOTATION

- Introduction of Polish Notation (Infix, Prefix, Postfix)
- Conversion of Infix to Postfix, Infix to Prefix
- Evaluation after conversion

## ➤ TREES

- **Binary Tree**
  - Introduction of Binary Tree
  - Creation (with recursion, without recursion)
  - Traversal (Inorder, Preorder, Postorder)
- AVL Tree
  - Introduction of AVL Tree
  - Balancing Factor
  - Types of Rotations
  - Creation of AVL tree and Insertion of new elements
- B-Tree
  - Introduction of B-Tree
  - Order(Degree) in B-Tree
  - Splitting of B-Tree
- B+ Tree
  - Introduction of B+ Tree
  - Threaded Binary Tree
  - Introduction of Threaded Binary Tree

## ➤ GRAPHS

- Introduction of Graph
- Types of Graphs
- **Adjacency Matrix**, Adjacency List
- Traversal (**Breadth First**, **Depth First**)
- Spanning Tree (**Kruskal's Algorithm**, **Prim's Algorithm**, **Dijkstra's Algorithm**)

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| <ul style="list-style-type: none"><li>○ DURATION:</li><li>○ (20-25 Classes X 1.5-2 Hrs.)</li><li>○ 2 Months X Alternate Days</li></ul> |
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