

## Certificate in Competitive Coding Using Data Structures - Course Syllabus

### **Module 1: Introduction**

- Analysis of algorithms
- Analysis of loops
- Space complexity

### **Module 2: Mathematics and Bits Manipulation**

- Mathematics for data structures
- Bitwise operators
- Bit manipulation using bitwise operators

### **Module 3: Recursion Magic**

- Introduction
- Applications
- Recursion base cases
- Recursion problem-solving skills

### **Module 4: Arrays**

- Introduction
- Vector in C++
- Operations on arrays
- Multidimensional array in C++
- Matrix manipulation

### **Module 5: Searching and Sorting**

- Binary search
- Sort in C++ STL
- Merge sort
- Quick sort

### **Module 6: Hashing**

- Hashing concepts
- Hashing functions
- Implementation of open addressing

### **Module 7: String**

- Basics of string
- Strings using C++
- Logic building of pattern searching

### **Module 8: Linked List**

- Shortcomings of array data structures
- Introduction to linked list
- Linked list implementation

### **Module 9: Linear Data Structures**

- Introduction to stack
- Implementation of stack
- Introduction to queue data structure
- Implementation of queue

### **Module 10: Non-linear Data Structures**

- Introduction to Tree data structure
- Applications of Tree
- Search in BST using C++
- Graph