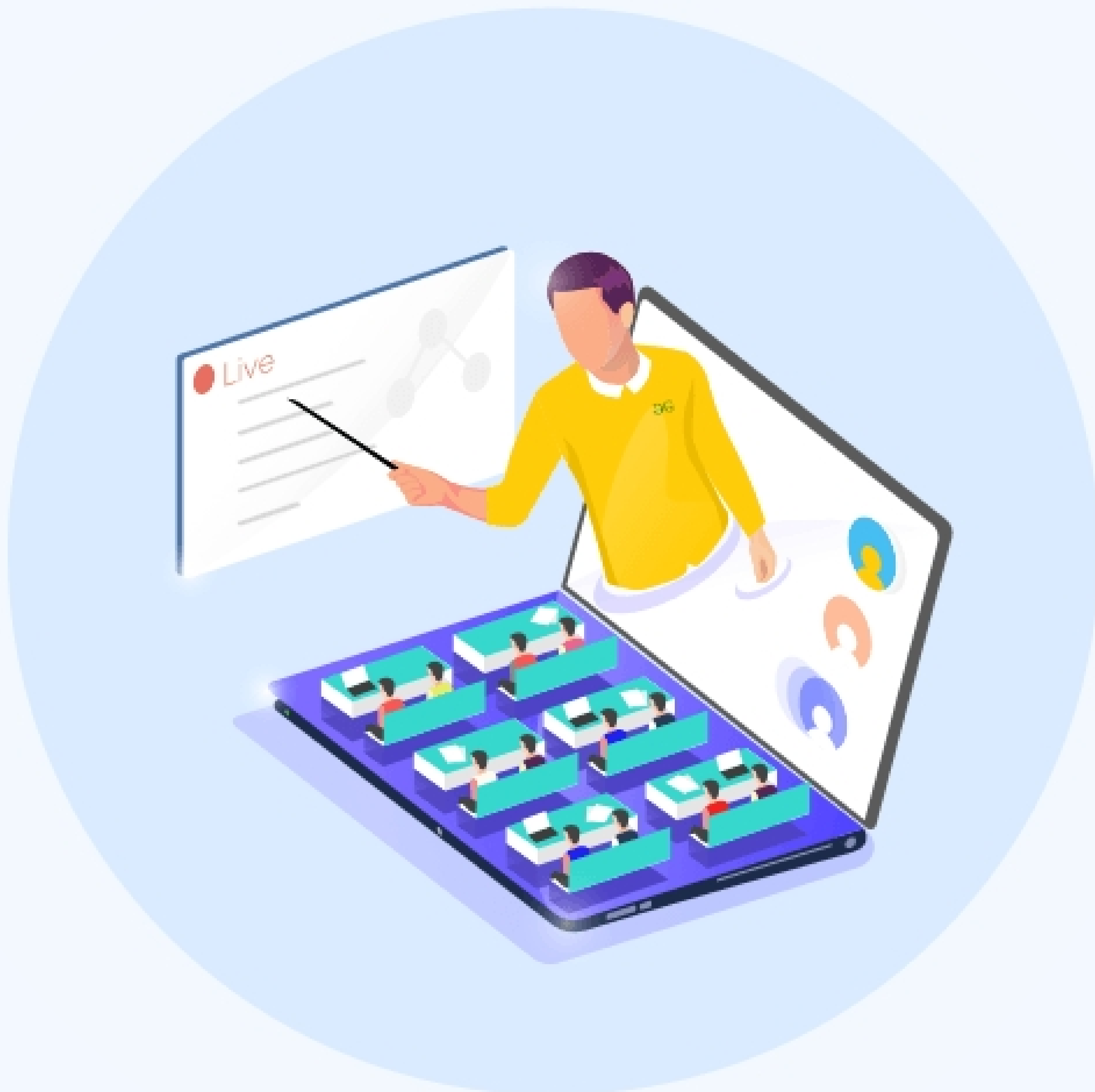


DSA LIVE

FOR
WORKING PROFESSIONAL



WEEK 01

- **ANALYSIS OF ALGORITHM**
 - Background analysis through a Program and its functions.
- **ASYMPTOTIC NOTATIONS**
 - Best, Average and Worst case explanation through a program.
- **ARRAYS**
- **INTRODUCTION AND ADVANTAGES**
- **TYPES OF ARRAYS**
 - Fixed-sized array
 - Dynamic-sized array
- **OPERATIONS ON ARRAYS**
 - Searching
 - Insertions
 - Deletion
 - Arrays vs other DS
 - Reversing-Explanation with complexity
- **IMPORTANT PROBLEMS IN ARRAYS**
- **BASIC RECURSION**

WEEK 02

- **BASIC BIT MANIPULATION**
- **BITWISE OPERATORS IN C++**
 - Operation of AND, OR, XOR operators
 - Operation of Left Shift, Right Shift and Bitwise Not
- **BITWISE OPERATORS IN JAVA**
 - Operation of AND, OR
 - Operation of Bitwise Not, Left Shift
 - Operation of Right Shift and unsigned Right Shift

- PROBLEM: CHECK KTH BIT IS SET OR NOT
- PROBLEM: COUNT SET BITS
- PROBLEM: TO CHECK WHETHER A NUMBER IS A POWER OF 2 OR NOT
- PROBLEM: ODD OCCURRENCES IN AN ARRAY.
- PROBLEM: TWO NUMBERS HAVING ODD OCCURRENCES IN AN ARRAY.
- PROBLEM: GENERATE POWER SET USING BITWISE OPERATORS.
- HASHING
- INTRODUCTION AND TIME COMPLEXITY ANALYSIS
- APPLICATION OF HASHING
- DISCUSSION ON DIRECT ADDRESS TABLE
- WORKING AND EXAMPLES ON VARIOUS HASH FUNCTIONS
- INTRODUCTION AND VARIOUS TECHNIQUES ON COLLISION HANDLING
- CHAINING AND ITS IMPLEMENTATION
- OPEN ADDRESSING AND ITS IMPLEMENTATION
- CHAINING V/S OPEN ADDRESSING
- DOUBLE HASHING
- C++
 - Unordered Set
 - Unordered Map
- JAVA
 - HashSet
 - HashMap
- IMPORTANT PROBLEMS IN BASIC BIT MANIPULATION

WEEK 03

- DISCUSSION OF STRING DS
- IMPORTANT PROBLEMS IN STRINGS
- LINKED LISTS
- INTRODUCTION
 - Implementation in CPP
 - Implementation in Java
 - Comparison with Array DS
- DOUBLY LINKED LIST
- CIRCULAR LINKED LIST
- LOOP PROBLEMS

WEEK 04

- LINKED LIST
- PROBLEMS
- MIDDLE OF LINKED LIST
- NTH NODE FROM THE END OF LINKED LIST
- DELETING A NODE WITHOUT ACCESSING HEAD POINTER OF LINKED LIST
- AN ITERATIVE METHOD TO REVERSE A LINKED LIST
- RECURSIVE METHOD TO REVERSE A LINKED LIST

- SEGREGATING EVEN-ODD NODES OF LINKED LIST
- THE INTERSECTION OF TWO LINKED LIST
- PAIRWISE SWAP NODES OF LINKED LIST
- CLONE A LINKED LIST USING A RANDOM POINTER
- LRU CACHE DESIGN
- STACKS
- UNDERSTANDING THE STACK DATA STRUCTURE
- APPLICATIONS OF STACK
- IMPLEMENTATION OF STACK IN ARRAY AND LINKED LIST
 - In C++
 - In Java
- IMPORTANT PROBLEM IN LINKED LISTS
- QUEUES
- INTRODUCTION AND APPLICATION
- IMPLEMENTATION OF THE QUEUE USING ARRAY AND LINKEDLIST
 - In C++ STL
 - In Java
 - Stack using queue
- IMPORTANT PROBLEM IN LINKED LISTS

WEEK 05

- BINARY TREE

- **INTRODUCTION**

- Tree
- Application
- Binary Tree
- Tree Traversal

- **IMPLEMENTATION OF:**

- Inorder Traversal
- Preorder Traversal
- Postorder Traversal
- Level Order Traversal (Line by Line)
- Tree Traversal in Spiral Form

- **IMPORTANT PROBLEMS IN BINARY TREE**

- **BINARY SEARCH TREE**

- **BACKGROUND, INTRODUCTION AND APPLICATION**

- **IMPLEMENTATION OF SEARCH IN BST**

- In CPP
- In Java

- **INSERTION IN BST**

- In CPP
- In Java

- **DELETION IN BST**

- In CPP
- In Java

- **FLOOR IN BST**

- In CPP
- In Java

- **SELF BALANCING BST**

- **AVL TREE**

- **RED BLACK TREE**

- **SET IN C++ STL**

- **MAP IN C++ STL**
- **TREESET IN JAVA**
- **TREEMAP IN JAVA**
- **IMPORTANT PROBLEMS IN BINARY TREE**

WEEK 06 WEEK 06

- **HEAPS**
- **INTRODUCTION & IMPLEMENTATION**
- **BINARY HEAP**
 - Insertion
 - Heapify and Extract
 - Decrease Key, Delete and Build Heap
- **HEAP SORT**
- **PRIORITY QUEUE IN C++**
- **PRIORITY QUEUE IN JAVA**
- **IMPORTANT PROBLEMS IN HEAPS**
- **GRAPH ALGORITHMS**
- **INTRODUCTION TO GRAPH**
- **GRAPH REPRESENTATION**
 - Adjacency Matrix
 - Adjacency List in CPP and Java
 - Adjacency Matrix VS List
- **BREADTH-FIRST SEARCH**
 - Applications
- **DEPTH FIRST SEARCH**
 - Applications

WEEK 07

- GRAPH ALGORITHMS
- IMPORTANT PROBLEMS IN GRAPH ALGORITHMS
- SHORTEST PATH IN DIRECTED ACYCLIC GRAPH
- GREEDY ALGORITHMS
- INTRODUCTION
- ACTIVITY SELECTION PROBLEM
- FRACTIONAL KNAPSACK
- JOB SEQUENCING PROBLEM

WEEK 08

- DYNAMIC PROGRAMMING
- INTRODUCTION
- DYNAMIC PROGRAMMING
 - Memoization
 - Tabulation
- IMPORTANT PROBLEMS IN DYNAMIC PROGRAMMING