**DAA-Teaching plan- JAN 2025**

**Module-1- Introduction to time and space complexity,**

Algorithm definition, insertion sort running time calculation, Notations Theta, big O, big Omega, little o notations with examples. Space complexity definition and examples like matrix multiplication, bubble sort, factorial computation recursive and iterative version. Recurrence relations and finding time complexity using substitution method, recursion tree and master theorem. Proof of correctness of algorithms.

**Module 2- Divide and conquer**

General strategy of divide and conquer examples binary search, quick sort-best case, worst case and average case time complexities, merge sort and analysis, finding majority element and analysis, Order statistics- finding simultaneous maximum and minimum, selection problem.

**Module 3:- Dynamic programming**

General strategy, Fibonacci sequence example dynamic and recursive with comparison. Travelling salesman problem by dynamic programming. And 0-1 knapsack problem using dynamic programming.

**Module 4:- Greedy strategy**

General approach, fractional knapsack problem using greedy method, Job scheduling/sequencing using greedy approach examples, Huffman coding, minimum spanning tree-Kruskal’s and Prim’s algorithm

**Module 5:- Backtracking strategy**

General approach, N-queens problem using backtracking, graph coloring problem with examples

**Module 6:- Complexity classes and Randomized algorithms**

Introduction to P, NP, NPC and NP-Hard problems and their interrelations, Randomized algorithms- Las Vegas and Monte Carlo simple examples

**List of Lab assignments DAA**

1. **Implementation and timing analysis of matrix multiplication for square matrices**
2. **Implementation and analysis of quick sort**
3. Finding out majority element from an array
4. **: Compare dynamic programming and divide and conquer using Fibonacci sequence**
5. **Huffman coding**
6. **Knapsack using dynamic programming**