Design and Analysis of Algorithms (DAA-432)

1. **Introduction**
   Basic definitions, Asymptotic notations, Indicator random variables

2. **Recursion**
   Substitution method, Recursive tree method, Master method

3. **Heaps**
   Heap operations, priority queues

4. **Sorting algorithms**
   Bucketsort, Lower bound for simple sorting, Linear time sorting (counting sort)

   Quicksort, Mergesort, Heapsort, Radixsort

5. **Search and selection**
   Linear search, binary search, order statistics

6. **Hashing**
   Direct Address Table, Open hashing

7. **Greedy algorithm**
   Huffman coding, Fractional knapsack

   Prims and Kruskal MSTs, Dijkstra's shortest path

8. **Dynamic programming**
   Concept, Matrix chain multiplication

   Longest common subsequence, 0-1 knapsack, Floyd-Warshall

9. **Divide and conquer algorithms**
   Closest pair of points, Convex hull

10. **Backtracking algorithms**
    DFS search, Turnpike reconstruction problem

11. **NP problems**
    Reduction of Hamiltonian path to travelling salesman

12. **Amortized algorithms**
    Splay trees

13. **Graph algorithms**
    Strongly connected components

14. **String algorithms**
    Knuth-Morris-Pratt algorithm

List of labs
1. Elapsed time, gnuplot, graphviz
2. Heapsort vs Mergesort vs QS
3. Priority queues
4. Bucketsort
5. Order statistics
6. Open hashing
7. Huffman coding
8. Dijkstra's algorithm
9. Matrix chain multiplication
10. Longest common sequence
11. Closest pair of points
12. Turnpike reconstruction
13. Splay trees

Suggested books
1. **Introduction to Algorithms** (Ed 3, MIT Press) by *TH Cormen, CE Leiserson, RL Rivest and C Stein*

2. **Data Structures & Algorithms Analysis In C++** (Ed 3, Pearson) by *MA Weiss*