 DESIGN ANALYSIS & ALGORITHMS (C22)

# UNIT-I

1. Define an algorithm? Write its characteristics in detail.

2. Define and explain the terms “Time complexity” and “Space complexity” of algorithms.

3. What is meant by recursion? Explain with example,

3. Explain the asymptotic notations with an example for each.

4. Write the algorithm for sum of n number and find the time and space complexity of the algorithm using the step–count method.

5. Give the algorithm for matrix multiplication and find the time complexity of the algorithm using table form method

6. Write recursive algorithm for towers of Hanoi and analyze its time complexity

7. Discuss about Graph traversal techniques with examples?

8. Compare and contrast BFS and DFS

9. Discuss various tree traversal techniques with examples

10. What is bi-connected graph? How to determine bi-connected components of graph?

# UNIT-II

1. Define Control Abstraction divide and conquer and write the computing time of divide and conquer
2. Draw the tree of calls of merge sort for the following set. (35, 25,15,10,45, 75, 85, 65, 55, 5, 20, 18)?
3. Derive the time complexity of Quick sort algorithm for all cases
4. Illustrate Defective Chess Board in detail ?
5. Explain Finding the maximum and minimum elements ?
6. Write and explain the control abstraction for Greedy Method
7. Solve the following instance of the knapsack problem using a greedy method. n=7(objects), m=15,profits are (P1,P2,P3,P4,P5,P6,P7) =(10,5,15,7,6,18,3) and its corresponding weights are (W1,W2,W3,W4,W5,W6,W7) = (2,3,5,7,1,4,1).
8. Differentiate between Prim’s algorithm and Kruskal’s algorithm for finding the minimum cost spanning tree
9. Write the Dijkstra’s algorithm for finding the single source shortest path problem with a suitable example
10. Explain Optimal Merge Patterns with example?

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# UNIT-III

1. Explain the General method of dynamic programming ?

2. Explain about multistage graph with example?

3. Explain about All Pairs Shortest Paths with example?

4. Illustrate the working principle of dynamic programming with all pairs shortest path problem.

5.Define OBST. How will you construct an optimal binary search tree?

6.Use the function OBST to compute w(i,j), r(i,j), and c(i,j), 0 <=i < j <= 4, for the identifier set (a1,a2,a3,a4)=(do, if, int, while) with p(1:4)=(3,3,1,1) and q(0:4)=(2,3,1,1,1). Using the r(i,j)’s construct the optimal binary search tree

7. Illustrate 0/1 Knapsack problem of dynamic program with example?

8. Solve the following 0/1 Knapsack problem using dynamic programming (p1, p2,…,p4) =(1,2,5,6), ( w1, w2, …, w4) =(2,3,4,5), m=8, n=4.

9.Describe the Traveling salesman problem & discuss how to solve it using Dynamic Programming.

10.Explain how dynamic programming is applied to solve travelling sales person problem.

# UNIT-IV

1. What is Back Tracking? Explain the general method of Back Tracking.

2. Briefly explain n-queen problem using Backtracking. Explain its applications.

3.Define Graph coloring and Explain in detail?

4. Explain the 4-Queen problem using backtracking? Draw the permutation tree by taking implicit constraint, explicit constraint and bounding functions

5. Describe the Backtracking technique to m-coloring graph. Explain with an example.

6. Explain subset-sum problem and discuss the possible solution strategies using backtracking.

7. Discuss about Hamiltonian cycles. Take a graph and draw the Hamiltonian cycle forit

8. Evaluate Knapsack problem of backtracking?

9. Briefly explain sum of subsets problem using backtracking. Explain its applications

10. Draw the state space tree for m coloring when n=3 and m=3.

# UNIT-V

1. Explain basic concepts of NP-Hard & NP-complete problems ?

2. Explain non deterministic algorithms? Give some examples

3. Explain NP-Hard & NP-complete classes ?

4. Explain about the cook's Theorem ?

5. How are P and NP problems related? Give the relation between NP-hard and NP problems

6. Write short notes on Cook’s theorem.

7. Explain about different types of NP problem.

8. Explain the P, NP, NP-Hard and NP-complete classes? Give relationship between them