ST. ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY, CHIRALA
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Frequently Asked Questions

Subject: DESIGN & ANALYSIS OF ALGORITHMS **Academic Year : 2017-18**
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UNIT –I

1. Give the algorithm for matrix multiplication and find the time complexity of the algorithm using step – count method.
2. What are the Asymptotic notations? And give its properties.
3. What are the features of an efficient algorithm? Explain with an example.
4. Compare time complexity with space complexity?
5. Write the pseudo code for expressing algorithms.
6. What is Amortized analysis and explain with an example.
7. What is space complexity? Illustrate with an example for fixed and variable part in space complexity?
8. Explain recursive functions algorithm analysis with an example.
9. Define i) Profiling ii) Time Complexity iii) Space Complexity.
10. Give the algorithm for transpose of a matrix m x n and determine the time complexity of the algorithm by frequency – count method.

UNIT –II

1. Explain the basic methodology of divide and conquer algorithm. List the advantages of divide and conquer algorithm.
2. Write Divide – And – Conquer recursive Merge sort algorithm and derive the time complexity of this algorithm.
3. Write recursive Quick sort algorithm and analyze the algorithm for average time complexity.
4. Explain Recursive Binary search algorithm with suitable examples.
5. Explain partition exchange sort algorithm and trace this algorithm for n =8 elements: 24,12, 35, 23,45,34,20,48
6. Describe the Algorithm Analysis of Binary Search.
7. In how many passes does the Merge sort technique sorts the following sequence 3,27,4,11,45, 39, 2,16,56?
8. Derive the worst case complexity of the Quick sort algorithm.
9. What is stable sorting method? Is Merge sort a stable sorting method? Explain.

UNIT –III

1. What is a Spanning tree? Explain Prim's Minimum cost spanning tree algorithm with suitable example.
2. State the Job – Sequencing with deadlines problem. Find an optimal sequence to the n=5 Jobs where profits (P1,P2,P3,P4,P5) = (20,15,10,5,1)and deadlines (d1,d2,d3,d4,d5)=(2,2, 1,3,3).
3. What is a Minimum Cost Spanning tree? Explain Kruskal's Minimum cost spanning tree algorithm with suitable example.
4. Find an optimal solution to the knapsack instance n=7 objects and the capacity of knapsack m=15. The profits and weights of the objects are (P1,P2,P3, P4, P5, P6, P7)= (10, 5,15,7,6,18, 3) (W1,W2,W3,W4,W5,W6,W7)= (2,3,5,7,1,4,1).
5. Discuss the single – source shortest paths algorithm with suitable example.
6. Explain the general principle of Greedy method and also list the applications of Greedy method.
7. What is the need for generating a spanning tree? Explain an algorithm for generating spanning tree.

8. Distinguish between Prim's and Kruskal's Spanning tree algorithm.
9. State the Job – Sequencing with deadlines problem. Find an optimal sequence to the n=5 Jobs where profits (P1,P2,P3,P4,P5) = (20,15,10,5,1)and deadlines(d1,d2,d3,d4,d5)=(2,2, 1,3,3).
10. What is the time complexity of the Job sequencing with deadlines using greedy algorithm?

UNIT –IV

1) Define i) Principles of optimality ii) Feasible solution iii) Optimal solution.
2) Draw an Optimal Binary Search Tree for n=4 identifiers (a1,a2,a3,a4) = (do,if, read, while) P(1:4)=(3,3,1,1) and Q(0:4)=(2,3,1,1,1).
3) Explain how Matrix – chain Multiplication problem can be solved using dynamic programming with suitable example.
4) Draw all possible binary search trees for the identifier set (do, if, stop).
5) Explain Reliability Design Problem with suitable example.
6) Describe the Dynamic 0/1 Knapsack Problem. Find an optimal solution for the dynamic programming 0/1 knapsack instance for n=3, m=6, profits are (p1, p2, p3) = (1,2,5), weights are (w1,w2,w3)=(2,3,4)
7) Distinguish between Dynamic Programming and Greedy method.
8) What is All – Pair Shortest Path problem (APSP)? Discuss the Floyd's APSP algorithm and discuss the analysis of this algorithm.
9) What is principle's of optimality? Explain how travelling sales person problem uses the dynamic programming technique with example.
10) Construct an optimal travelling sales person tour using Dynamic Programming.

0 10 9 3
5 0 6 2
9 6 0 7
7 3 5 0

UNIT –V

1. Write the Control Abstraction of iterative Backtracking method.
2. What is a Hamiltonian Cycle? Explain how to find Hamiltonian path and cycle using backtracking algorithm.
3. Discuss the 4 – queen's problem. Draw the portion of the state space tree for n = 4 queens using backtracking algorithm.
4. Give the statement of sum –of subsets problem. Find all sum of subsets for n=4, (w1, w2, w3, w4) = (11, 13, 24, 7) and M=31.Draw the portion of the state space tree using fixed – tuple sized approach.
5. Explain the Graph – coloring problem. And draw the state space tree for m= 3 colors n=4 vertices graph. Discuss the time and space complexity.
6. Write an algorithm to determine the Hamiltonian cycle in a give graph using backtracking.
7. Write an algorithm for N – queen's problem. Give time and space complexity for 8 – queen's problem.
8. Using backtracking technique solve the following instance for the subset problem s=(1,3,4,5) and d=11.
9. Compare the time complexities of solving the All Pairs Shortest Path problem using Floyds algorithm and using the Dijkstra's algorithm by varying the source node. Justify your answer.

UNIT –VI

1. Give the 0/1 Knapsack LCBB algorithm. Explain how to find optimal solution using variable – tuple sized approach.
2. Distinguish between backtracking and branch – and bound techniques.
3. What is LC – Search? Discuss LC – Search algorithm.
4. Explain Travelling sales person person problem LCBB procedure with the following instance and draw the portion of the state space tree and find an optimal tour.

_ 20 30 10 11

15 _ 16 4 2
3 5 _ 2 4
19 6 18 _ 3
16 4 7 16 _

5. Explain the FIFO BB 0/1 Knapsack problem procedure with the knapsack instance for n=4.m=15, (p1,p2,p3,p4)=(10,10,12,18) (w1,w2,w3,w4) =(2, 4, 6,9). Draw the portion of the state space tree and find optimal solution.
6. State the concept of branch and bound method and also list its applications.
7. What are the differences between backtracking and branch and bound solutions?
8. Explain the LC branch and bound algorithm.