SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
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MODEL QUESTION BANK(DESCRIPTIVE)

Subject with Code : Design and Analysis of Algorithms(18MC9122) **Course & Branch**: MCA

Year & Sem: II-MCA& II-Sem **Regulation:** R18

UNIT –I

Introduction& Divide and Conquer

1. a. Explain the properties of an algorithm with an example. [4M]

b. Give the algorithm for matrix multiplication and find the time complexity of the algorithm using step count method. [8M]

2.Write Divide – And – Conquer recursive Merge sort algorithm and derive the time complexity of this algorithm. [6M]

3.a. Differentiate between Bigoh and omega notation with example. [6M]

b.Distinguish between Algorithm and Psuedocode. [6M]

4.a.Define time complexity and space complexity. Write an algorithm for adding n natural numbers and find the space required by that algorithm. [7M]

b.What are the different mathematical notations used for algorithm analysis. [5M]

5. List out the steps that need to design an algorithm. [5M]

6.Explain how many algorithms can you write for solving find the prime numbers. Compare which is the simplest and the most efficient. [8M]

7.a. Differentiate between Best, average and worst case efficiency. [6M]

b.Explain Strassen's algorithm for matrix multiplication with the help of an example. [6M]

8.a. Discuss the concepts of asymptotic notations and its properties. [7M]

b.What do you mean by randomization? [5M]

9.Discuss the General plan for analyzing efficiency of Non recursive & Recursive algorithms Understand and Selection Sort with example? [12M]

10. a. What do you mean by dynamic programming? [5M]

b. Describe asymptotic notation. [7M]

11. Define Merge sort with example. [8M]

12. Describe Quick Sort with suitable example. [8M]

UNIT –II

Greedy Method and Dynamic Programming

1.What is a Minimum Cost Spanning tree? Explain Kruskal's Minimum cost spanning tree algorithm with suitable example. [8M]

2. Explain how Matrix – chain Multiplication problem can be solved using dynamic programming with suitable example. [12M]

3. a. Why do we perform topological sorts only on DAGs? Explain [8M]

b.Explain the applications of depth first search algorithm. [5M]

4. a. State the Greedy Knapsack Problem. [6M]

b.Find an optimal solution to the knapsack instance n=4 objects and the capacity of knapsack m=15, profits (10, 5, 7, 11) and weight are (3, 4, 3, 5). [6M]

5. a. Explain Recursive Binary search algorithm with suitable examples. [5M]

b.Write Control Abstraction of Greedy method. [7M]

6. a. Explain partition exchange sort algorithm and trace this algorithm for n =8 elements: 24,12, 35, 23,45,34,20,48. [6M]

b. Differentiate between greedy method and dynamic programming. [6M]

7. a. Explain the general principle of Greedy method and also list the applications of Greedy method.[6M]

b. Explain the Travelling sales man problem. [6M]

8. a. Explain the greedy technique for solving the Job Sequencing problem. [6M]

b.What is Minimum cost spanning tree? Explain an algorithm for generating minimum cost spanning tree and list some applications of it. [6M]

9. a. Write the algorithm to compute 0/1 Knapsack problem using dynamic programming and explain it. [7M]

b. Explain the Single source shortest path problem with an example. [5M]

10. a.What is the time complexity of the Job sequencing with deadlines using greedy algorithm? [6M]

b.State the principle of optimality. Find two problems for which the principle does not hold.[6M]

11. Briefly explain Multistage graphs with suitable examples? [5M]

12. Describe job scheduling with deadlines? [5M]

UNIT –III

Basic Traversal and Search Techniques , Back Tracking

1. Explain any one application back tracking with example? [8M]
2. Describe in detail 8-queens problem using back tracking? [8M]
3.Explain 0/1 knapsack problem by using backtracking with an examples? [7M]
4.Briefly explain the optimal binary search trees with example? [7M]
5. Describe in detail graph coloring using back tracking? [8M]
6. Explain 0/1 knapsack problem by using dynamic programming with an examples? [8M]
7. Explain DFS with suitable example? [5M]
8. What is Spanning trees explain with suitable examples? [6M]
9. Describe Bi-connected components. [6M]
10. Determine Sum of subsets problem? [5M]
11. Explain techniques for binary trees? [7M]
12. Discuss about Connected Components. [5M]
13. What are the Techniques about Graphs explain it? [5M]
14. Explain Hamiltonian cycles with examples. [8M]

UNIT –IV

Branch and Bound, Lower Bound Theory

1.Explain the general method of branch and bound?[12M]

2.Apply branch and bound to 0/1 knapsack problem and elaborate it?[8M]

3.3.Explain the method of reduction to solve TSP problem using branch and bound? [12M]

4.Explain the principles of FIFO branch and bound? [8M]

5. a. Explain the properties of LC-search? [6M]

   b. Explain control abstraction of LC-branch and bound?[6M]

6. Briefly explain the FIFO brach and bound solution with example? [12M]

7. Briefly explain the LC brach and bound solution with example? [12M]

8. State 0/1 knapsack problem and design an algorithm of LC Branch and Bound and find the solution for the knapsack instance with any example? [12M]

9.Explain any one application of branch and bound? [12M]

10. Apply the branch-and- bound technique in solving the travelling salesman problem? [12M]

UNIT –V

NP – Hard and NP – Complete Problems, Reductions

1.a. How are P and NP problems related? [6M]

b. Differentiate Time Efficiency and Space Efficiency.[6M]

2.Compare NP-hard and NP-completeness?[7M]

3.Write the non-deterministic sorting algorithm and also analyze its complexity? [12M]

4. Explain the class of P and NP with example? [12M]

5. Differentiate between NP- complete and NP-hard problems? [12M]

6. State and explain cook's theorem? [12M]

7. Explain the strategy to prove that a problem is NP-hard? [12M]

8. Explain the satisifiability problem and write the algorithm? [12M]

9. What is halting problem explain with an example? [12M]

10. Briefly explain the classes NP-hard and NP-complete? [12M]

11. .Discuss the general plan for analyzing Time efficiency of recursive algorithm.[8M]

12. Explain Reduction Source Problems.[7M]

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