

Code No: 135AF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B. Tech III Year I Semester Examinations, May/June - 2019****DESIGN AND ANALYSIS OF ALGORITHMS****(Common to CSE, IT)****Time: 3 hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) In what way a time complexity differs from space complexity. [2]
- b) Give the general plan of divide and conquer algorithms. . [3]
- c) Write an algorithm for collapsing find. [2]
- d) Define Backtracking? List the applications of Backtracking [3]
- e) What is the importance of knapsack algorithm in our daily life? [2]
- f) Write Control Abstraction of Greedy method. [3]
- g) What you mean by dynamic programming. [2]
- h) Define optimal binary search tree with an example. [3]
- i) State the difference between FIFO and LC Branch and Bound algorithms. [2]
- j) Write the Control Abstraction of Least – Cost Branch and Bound. [3]

PART - B**(50 Marks)**

- 2.a) What are the different mathematical notations used for algorithm analysis.
- b) Write Divide – And – Conquer recursive Quick sort algorithm and analyze the algorithm for average time complexity. [10]

OR

3. Write Randomized algorithm of Quicksort. [10]
4. Write an algorithm to determine the Hamiltonian cycle in a given graph using backtracking. [10]

OR

5. Explain the AND/OR graph problem with an example. [10]
- 6.a) Explain the Knapsack problem with an example.
- b) Write a greedy algorithm for sequencing unit time jobs with deadlines and profits. [10]

OR

7. State the Job – Sequencing with deadlines problem. Find an optimal sequence to the $n = 5$ Jobs where profits $(P_1, P_2, P_3, P_4, P_5) = (20, 15, 10, 5, 1)$ and deadlines $(d_1, d_2, d_3, d_4, d_5) = (2, 2, 1, 3, 3)$. [10]

8. Draw an Optimal Binary Search Tree for $n=4$ identifiers $(a_1, a_2, a_3, a_4) = (\text{do, if, read, while})$ $P(1:4)=(3,3,1,1)$ and $Q(0:4)=(2,3,1,1,1)$. [10]

OR

9. Explain how Matrix – chain Multiplication problem can be solved using dynamic programming with suitable example. [10]

10. Solve the Travelling Salesman problem using branch and bound algorithms. [10]

OR

11. Explain the FIFO BB 0/1 Knapsack problem procedure with the knapsack instance for $n=4$, $m=15$, $(p_1, p_2, p_3, p_4)=(10, 10, 12, 18)$, $(w_1, w_2, w_3, w_4) = (2, 4, 6, 9)$. Draw the portion of the state space tree and find optimal solution. [10]

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