

Code No: 155EV

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, January/February - 2023

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to CESE, CSE(CS), CSE(AIML), CSE(DS), CSE(N))

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A**(25 Marks)**

- 1.a) Explain amortized complexity. [2]
- b) How can we measure an algorithm's running time? [3]
- c) What is AND/OR graph? [2]
- d) State graph coloring problem. [3]
- e) Write any two characteristics of a Greedy Algorithm. [2]
- f) What is the importance of knapsack algorithm in our daily life? [3]
- g) What is Hamiltonian cycle? [2]
- h) Define spanning tree. [3]
- i) What is meant by non-deterministic algorithm? [2]
- j) What is NP-hard problem? [3]

PART – B**(50 Marks)**

- 2.a) Sort the records with the following index values in the ascending order using quick sort algorithm. 2, 3, 8, 5, 4, 7, 6, 9, 1 [5+5]
 - b) What is probabilistic analysis? Give example.
- OR**
- 3.a) Give the general plan of divide and conquer algorithms. [5+5]
 - b) What are the different mathematical notations used for algorithm analysis.
4. Given a set of non-negative integers {10, 7, 5, 18, 12, 20, 15}, and a value sum 35. Explain sum of subsets problem illustrating the above example. [10]
- OR**
- 5.a) What is weighting rule for Union(i, j)? How it improves the performance of union operation?
 - b) Give brief note on graph coloring. [5+5]

- 6.a) Discuss about all pairs shortest path problem with suitable example.
b) Discuss briefly about the minimum cost spanning tree. [5+5]

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 the portion of the state space tree generated by LCBB for the knapsack instances: $n=5, (P_1, P_2, \dots, P_5) = (12, 10, 5, 9, 3), (w_1, w_2, \dots, w_5) = (3, 5, 2, 5, 3)$ and $M = 12$. [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.a) Discuss about Cook's theorem.
b) What is the satisfiability problem? Explain. [5+5]

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