Reg. No. : E N G G T R E E . C O M

Question Paper Code : 20012

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Third Semester

Artificial Intelligence and Data Science

AD 3351 — DESIGN AND ANALYSIS OF ALGORITHMS

(Common to : Computer Science and Business Systems)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define algorithm.
2. Distinguish sequential and parallel algorithms.
3. What is brute force approach?
4. List the major variations of decrease-and-conquer technique.
5. Define principle of optimality.
6. Write the pseudo code of Floyd's algorithm.
7. List the requirements of standard form.
8. Infer when a pair (m, w) is said to be a blocking pair.
9. Write about information-theoretic lower bound.
10. State Heuristic with an example.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Write the pseudocode for Euclid's algorithm. (5)

(ii) Describe graph problems and combinatorial problems in detail. (8)

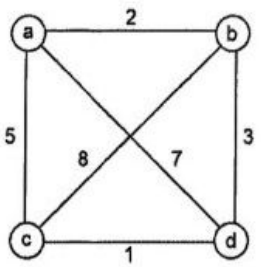
Or

(b) (i) Indicate the steps for analyzing the efficiency of the algorithm with examples. (8)

(ii) Infer how asymptotic notations are used to express the complexity of an algorithm. (5)

12. (a) (i) Reproduce an algorithm to implement brute-force string matching problem with an example and specify its worst case, average-case complexity. (5)

(ii) Describe Traveling sales person problem using exhaustive search technique and find the optimal tour for the following graph. (8)



Or

(b) (i) State the strategy of divide and conquer technique to compute the product of two n * n matrices using Strassen's method. (5)

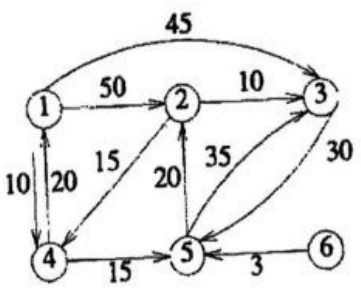
(ii) Draw step by step successive key insertions for the list 2, 9, 7, 6, 5, 8 by bottom-up heap. Construct an algorithm for the same and specify its complexity. (8)

13. (a) (i) Discuss how coin changing problem can be solved by dynamic programming with an example. (6)

(ii) Indicate the algorithm to find the optimal feasible subset of first i entries by memory function for the knapsack problem. (7)

Or

(b) (i) Write Dijkstra's algorithm to find the shortest path for the following graph using greedy technique. (7)



(ii) Explain how Huffman trees are constructed for assigning shorter bit strings to high-frequency symbols and longer ones to low-frequency symbols. (6)

14. (a) (i) List the steps of the simplex method. (5)

(ii) State the shortest-augmenting-path algorithm to find a maximum flow and a minimum cut in the networks. (8)

Or

(b) (i) Outline the pseudo code for Maximum Matching Bipartite graph. (8)

(ii) Describe how you will find a stable marriage matching for men's and women's preferences. (5)

15. (a) (i) Summerize P, NP and NP-Complete problems. (6)

(ii) Discuss how N-Queen's problem can be solved by back tracking technique. (7)

Or

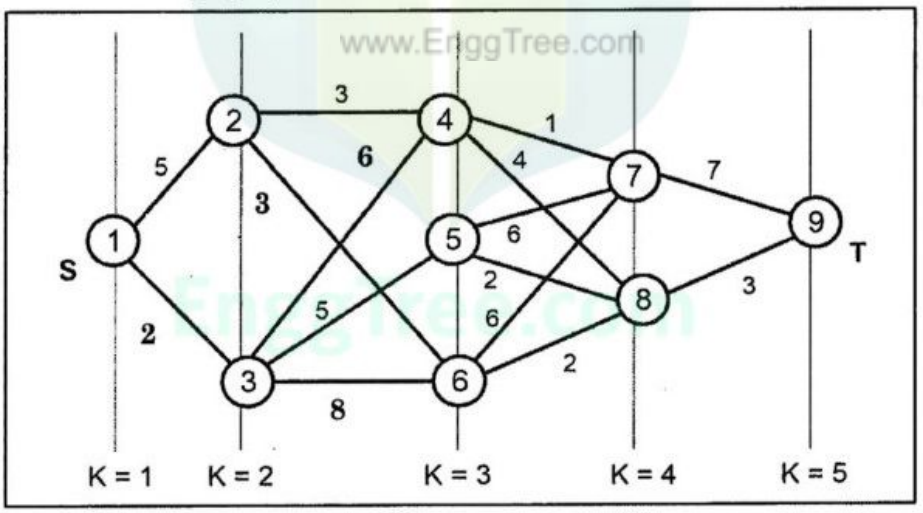
(b) (i) Describe Traveling sales person problem using Branch and Bound technique with an example. (7)

(ii) Infer the steps of greedy algorithm for discrete and continuous knapsack problem with an example. (6)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Devise an algorithm for the multistage graph problem using dynamic programming design technique. (10)

(ii) Compute the minimum cost and path from s to t for the following multistage graph. (5)



Or

(b) (i) Justify how backtracking technique is used to solve sum of subsets problem with its pseudo code and complexity. (10)

(ii) Construct all possible subsets of weights that sum to M for the given instance $n = 6$. $M = 30$ and Weights (1:6) = (5, 10, 12, 13, 15, 18). (5)

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