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Question Paper Code	12511
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B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023

Fourth Semester

Information Technology

(Common to Computer Science and Engineering & M.Tech - Computer science and Engineering)

20ITPC401 - DESIGN AND ANALYSIS OF ALGORITHMS

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | <i>Marks,
K-Level, CO</i> |
|---|-------------------------------|
| 1. State Algorithm and Pseudocode. | 2,K1,CO1 |
| 2. Differentiate time complexity and space complexity | 2,K2,CO1 |
| 3. What do you mean by Algorithm Visualization? | 2,K1,CO2 |
| 4. Define Closest Pair Problem. | 2,K1,CO2 |
| 5. Show the recurrence relation of divide and conquer. | 2,K1,CO3 |
| 6. What are the advantages and disadvantages of brute force approach? | 2,K2,CO3 |
| 7. State articulation point in graph. | 2,K1,CO4 |
| 8. Define Network Flow and Cut. | 2,K1,CO4 |
| 9. What is backtracking and Branch and bound algorithm? | 2,K1,CO6 |
| 10. Define subset sum. | 2,K1,CO6 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) (i) Describe the mathematical analysis and its efficiency of non recursive matrix multiplication algorithm. 7,K2,CO1
(ii) Illustrate the efficiency of finding the element with maximum value in a given Array. 6,K2,CO1
- OR**
- b) Describe the steps that need to be followed while designing and analyzing an algorithm. 13,K2,CO1
12. a) Explain in detail about Travelling Salesman Problem using exhaustive search. 13,K2,CO2
- OR**
- b) Solve 2138×4967 by applying the Divide and Conquer method and give the time and space complexity of Divide and conquer methodology. 13,K3,CO2

13. a) Explain multistage graph and explain memory functions problem in detail. 13,K2,CO3

OR

- b) Solve the all-pairs shortest-path problem for the digraph with the following weight matrix: 13,K3,CO3

$$\begin{bmatrix} 0 & 2 & \infty & 1 & 8 \\ 6 & 0 & 3 & 2 & \infty \\ \infty & \infty & 0 & 4 & \infty \\ \infty & \infty & 2 & 0 & 3 \\ 3 & \infty & \infty & \infty & 0 \end{bmatrix}$$

14. a) Explain in detail about Maximum Flow Problem with suitable examples. 13,K2,CO4

OR

- b) Explain a stable marriage matching for the instance defined by the following ranking matrix : 13,K3,CO4

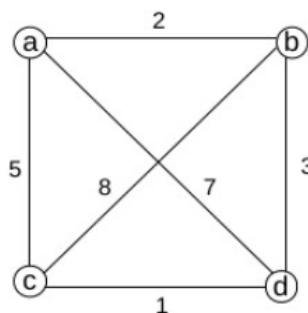
	A	B	C	D
α	1, 3	2, 3	3, 2	4, 3
β	1, 4	4, 1	3, 4	2, 2
γ	2, 2	1, 4	3, 3	4, 1
δ	4, 1	2, 2	3, 1	1, 4

15. a) Find the instance of the knapsack problem using the branch and bound algorithm. Knapsack capacity $W=10$. 13,K3,CO6

Item	Weight	Value
1	4	\$40
2	7	\$42
3	5	\$25
4	3	\$12

OR

- b) Apply Branch and Bound algorithm to solve the travelling salesman problem for



PART - C (1 × 15 = 15 Marks)

16. a) Let $w = \{5, 7, 10, 12, 15, 18, 20\}$ and $m = 35$. Compute all possible subset of w whose sum is equivalent to m . Draw the portion of state space tree. *15, K3, CO5*

OR

b) Apply backtracking to solve the following instance of the subset sum *15, K3, CO5* problem : $A = \{1, 3, 4, 5\}$ and $d = 11$.