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**Question Paper Code: 94C02**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2022

Fourth Semester

Computer Science and Business Systems

19UCB403 - Introduction To Design And Analysis Of Algorithms

(Regulations 2019)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- Which is the formal way to express the upper bound of an algorithm's running time. CO1- U  
(a) Big Oh Notation    (b) Omega Notation    (c) Theta Notation    (d) None of the above
- In a flowchart, an input or output instruction is represented by \_\_\_\_\_. CO1- R  
(a) A diamond    (b) Rectangle    (c) Parallelogram    (d) A circle
- The approach of dynamic programming is similar to CO1- R  
(a) Parsing    (b) Hash table  
(c) Divide and Conquer algorithm    (d) Greedy algorithm
- What is the time complexity of the brute force algorithm used to solve the Knapsack problem CO1- R  
(a)  $O(n)$     (b)  $O(n!)$     (c)  $O(2n)$     (d)  $O(n^2)$
- Which of the following methods can be used to solve the Knapsack problem CO1- R  
(a) Brute force algorithm    (b) Recursion  
(c) Dynamic Programming    (d) Brute force, Recursion and Dynamic Programming
- The Knapsack problem is an example of \_\_\_\_\_. CO1- R  
(a) Divide and conquer algorithm    (b) Greedy algorithm  
(c) 1D Dynamic Programming    (d) 2D Dynamic Programming

7. In simplex method, the feasible basic solution must satisfy the CO1- R  
 (a) non negativity constraint (b) Negativity constraint  
 (c) Basic constraint (d) Common constraint
8. How many constraints does flow have? CO1- R  
 (a) One (b) Two (c) Three (d) Four
9. Which of the problems cannot be solved by backtracking method? CO3- Ana  
 (a) n-queen problem (b) subset sum problem  
 (c) Hamiltonian circuit problem (d) travelling salesman problem
10. Branch and bound is a \_\_\_\_\_ CO1- U  
 (a) problem solving technique (b) data structure  
 (c) sorting algorithm (d) type of tree

PART – B (5 x 2= 10 Marks)

11. Define Big Omega Notations. CO1- U
12. Define brute force method CO1- U
13. Differentiate prim's Algorithm and Kruskal's Algorithm CO2- App
14. Define Stable Marriage Problem CO1- R
15. What are the additional items required for branch and bound? compare CO3- Ana  
 backtracking technique

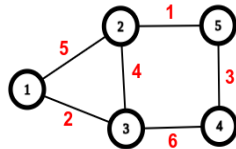
PART – C (5 x 16= 80 Marks)

16. (a) (i) Discuss important problem types that you face during CO2- App (8)  
 Algorithm Analysis.  
 (ii) Write short note on Fundamentals of Algorithmic Problem CO2- App (8)  
 Solving
- Or
- (b) Illustrate briefly on Big oh Notation, Omega Notation and CO2- App (16)  
 Theta Notations. Depict the same graphically and explain.
17. (a) Explain in detail quick sorting method. Provide a complete CO3- Ana (16)  
 analysis of quick sort with example.

Or

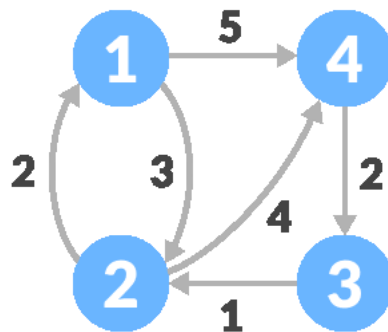
- (b) Explain how the merge sort can be viewed as a recursive application of the Divide and conquer methodology. Suggest a pseudo code for merge sort and analyze its complexities. Trace its application to the following data set 9,4,3,8,6,2,1,5,7. CO3- Ana (16)

18. (a) Using Prim's algorithm, determine minimum cost spanning tree for the weighted graph shown below. CO4- Ana (16)



Or

- (b) Using Floyd Warshall Algorithm, find the shortest path distance between every pair of vertices. CO4- Ana (16)



19. (a) Explain geometric interpretation of Linear programming with example CO1- U (16)

Or

- (b) What is bipartite graph? Outline with example CO1- U (16)

20. (a) Explain the traveling salesman problem using branch & bound and backtracking. CO1- U (16)

Or

- (b) Explain elaborately on backtracking algorithm. CO1- U (16)

