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**Question Paper Code: 94C02**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

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)

1. What is an algorithm? CO1- R  
(a) A flowchart (b) A flowchart or pseudocode  
(c) A decision (d) Step by step instructions used to solve a problem
2. In a flowchart, an input or output instruction is represented by \_\_\_\_\_? CO1- R  
(a) A diamond (b) Rectangle (c) Parallelogram (d) A circle
3. The approach of dynamic programming is similar to CO1- R  
(a) Parsing (b) Hash table  
(c) Divide and Conquer algorithm (d) Greedy algorithm
4. 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)  $O(n^2)$
5. 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
6. 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. In how many directions do queens attack each other? CO3- Ana  
 (a) 1 (b) 2 (c) 3 (d) 4

PART – B (5 x 2= 10 Marks)

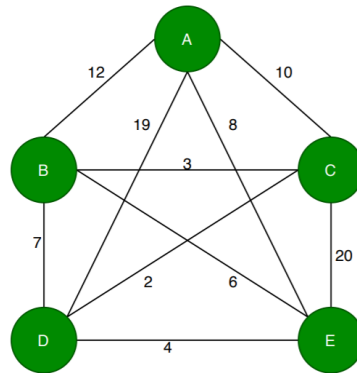
11. Define Little Omega. CO1- U
12. Define brute force method CO1- U
13. Differentiate prim's Algorithm and Kruskal's Algorithm CO2- App
14. Define Stable Marriage Problem CO1- R
15. What is Hamiltonian path? Generalize that Hamiltonian cycle is an undirected graph.. CO1- U

PART – C (5 x 16= 80 Marks)

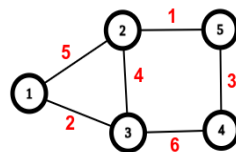
16. (a) (i) Discuss important problem types that you face during Algorithm Analysis. CO2- App (8)  
 (ii) Elaborate Asymptotic analysis of an algorithm with an example CO2- App (8)
- Or
- (b) Illustrate briefly on Big oh Notation, Omega Notation and Theta Notations. Depict the same graphically and explain. CO2- App (16)
17. (a) Explain in detail merge sort. Illustrate the algorithm with a numeric example. Provide complete analysis of the same CO3- Ana (16)

Or

- (b) Determine the shortest route using travelling sales man CO3- Ana (16)  
problem

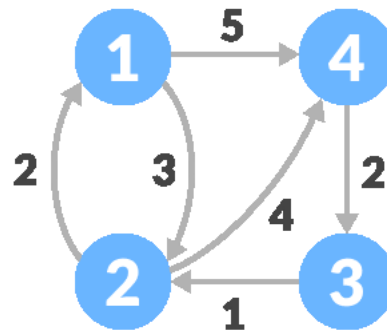


18. (a) Using Prim's algorithm, determine minimum cost spanning CO4- Ana (16)  
tree for the weighted graph shown below.



Or

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



19. (a) Explain the maximum flow problem algorithm and prove the CO2- App (16)  
max Flow min cut theorem

Or

- (b) What is bipartite graph? Is the subset of bipartite graph is CO2- App (16)  
bipartite? Outline with example

20. (a) What is Backtracking? Draw the state – space tree for 4-queens problem. And Write algorithms to check whether kth queen can be placed successfully and to place all N queens on the chessboard. CO3- D (16)
- Or
- (b) Design an algorithm for subset sum and explain with an example. CO3- D (16)