A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 94C02

B.E. / B.Tech. DEGREE EXAMINATION, MAY 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)

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(n2)

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)

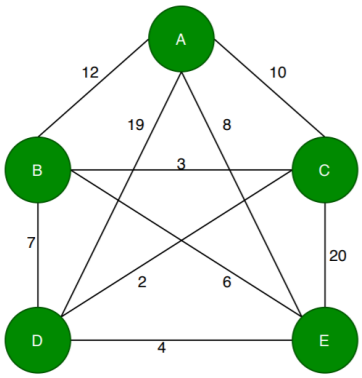
Or

(b) Illustrate briefly on Big oh Notation, Omega Notation and Theta Notations. Depict the same graphically and explain. CO2- App (16)

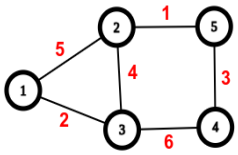
17. (a) Explain in detail merge sort. Illustrate the algorithm with a numeric example. Provide complete analysis of the same CO3- Ana (16)

Or

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

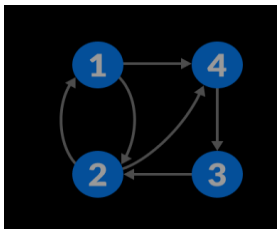


18. (a) Using Prim's algorithm, determine minimum cost spanning tree for the weighted graph shown below. — CO4- Ana — (16)



Or

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



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

Or

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

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)