

Fourth Semester MCA Degree Examination, Dec.2019/Jan.2020
Analysis and Design of Algorithms

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

1. a. Briefly discuss the steps used in design and analysis of algorithm. (06 Marks)
 b. Define asymptotic Notations. (04 Marks)
 c. Give general plan for non-recursive algorithm. Design and analysis an algorithm to find maximum element in an array. (10 Marks)
2. a. Explain in general Brute force strategy. Write an algorithm for bubble sort and analyze. (10 Marks)
 b. Give the general framework of divide and conquer technique. Write an algorithm and analyze merge sort. (10 Marks)
3. a. Differentiate between BFS and DFS. (04 Marks)
 b. Define topological sorting problem and find the topological ordering for the following graph using source removal technique.

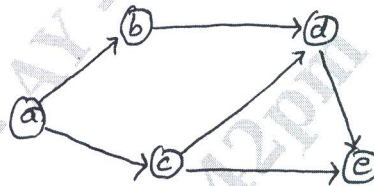


Fig.Q3(b)

- c. Explain Johnson Trotter algorithm. Apply the algorithm to generate permutations for $n = 3$. (08 Marks)
4. a. Explain Horspool string matching algorithm. Trace the algorithm to find the pattern BARBER in the string JIM-SAW-ME-IN-BARBER. (10 Marks)
 b. Write an algorithm to sort numbers using comparison counting sort and sort the following numbers in ascending order 62, 25, 91, 98, 12, 32. (10 Marks)
5. a. Define transitive closure of a digraph and explain Warshall's algorithm to find the transitive closure of the following graph.

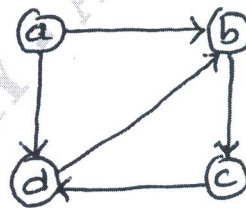


Fig.Q5(a)

- b. Apply dynamic programming algorithm to the following knapsack and find maximum profit. Given capacity of knapsack $W = 4$. (10 Marks)

Items	Weight	Value
1	3	25
2	1	20
3	2	40

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 6 a. Using Kruskal's algorithm find the minimum spanning tree of the following graph.

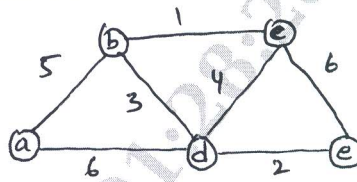


Fig.Q6(a)

(10 Marks)

- b. Apply Dijkstra's algorithm and solve the single source shortest path problem for the given graph consider as a source node.

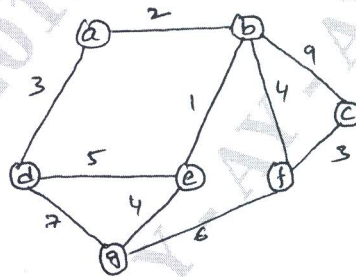


Fig.Q6(b)

(10 Marks)

- 7 a. Explain branch and bond technique. Solve the following assignment problem and draw the complete state space tree.

Job1	Job2	Job3	Job4	
9	2	7	8	Person a Person b Person c Person d
6	4	3	7	
5	8	1	8	
7	6	9	4	

(10 Marks)

- b. Solve the following knapsack problem using branch and bound technique knapsack capacity $w = 10$.

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

(10 Marks)

- 8 Write short notes on :

- Differentiate between divide and conquer and dynamic programming
- Strassen's matrix multiplication
- Decision trees
- P and NP complete problems.

(20 Marks)
