

**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.

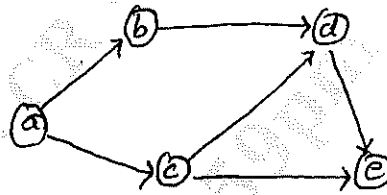


Fig.Q3(b)

(08 Marks)

- 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.

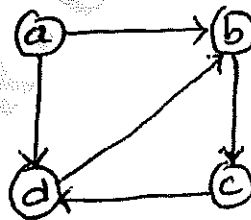


Fig.Q5(a)

(10 Marks)

- 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

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

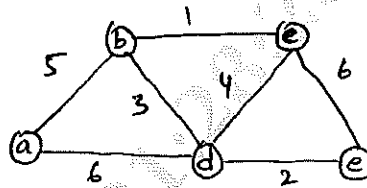


Fig.Q6(a)

(10 Marks)

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

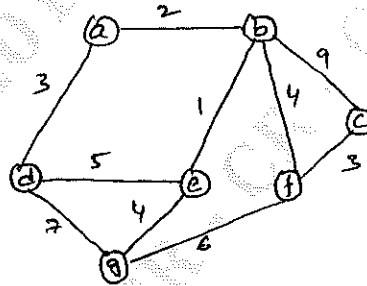


Fig.Q6(b)

(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	
Person a	9	2	7	8	
Person b	6	4	3	7	
Person c	5	8	1	8	
Person d	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)

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