



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

Max. Marks: 80

Note: Answer FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the steps involved in algorithm design and analysis process with neat diagram. (10 Marks)
- b. Prove the following theorem if $t_1(n) \in o(g_1(n))$ and $t_2(n) \in o(g_2(n))$ then $t_1(n) + t_2(n) \in o(\max\{g_1(x), g_2(x)\})$. (06 Marks)

OR

- 2 a. Write the matrix multiplication algorithm and analyze its efficiency. (10 Marks)
- b. List all the important problem types and explain any two. (06 Marks)

Module-2

- 3 a. Write an algorithm for selection sort and obtain an expression for number of times basic operation is executed. (06 Marks)
- b. Write an algorithm for quick sort and analyze its efficiency. (10 Marks)

OR

- 4 a. Write an algorithm for merge sort. Find the time complexity of merge sort. (10 Marks)
- b. Define Exhaustive Search. Discuss assignment problem and find the solution using exhaustive technique for the following :

	Job1	Job2	Job3
Person 1	9	2	7
Person 2	6	1	3
Person 3	5	3	7

(06 Marks)

Module-3

- 5 a. Write the Dijkstra's algorithm. Apply this algorithm to the following graph to find the single sources shortest paths.

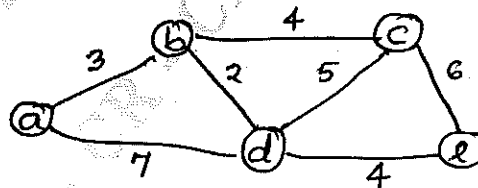


Fig Q5(a)

(08 Marks)

- b. Construct Huffman coding tree for the following data :

Character	A	B	C	D	-
Probability	0.35	0.1	0.2	0.2	0.15

Obtain the Huffman code and encode the test DAD. Decode the string whose encoding is 10011011011101. (08 Marks)

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.

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OR

- 6 a. Write the Kruskal's algorithm. Apply the algorithm to the following graph for constructing minimum spanning tree.

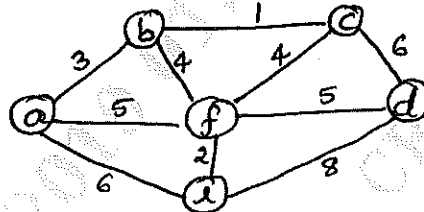


Fig Q6(a)

(10 Marks)

- b. Write the Breadth first search algorithm. Apply this algorithm for the following graph.

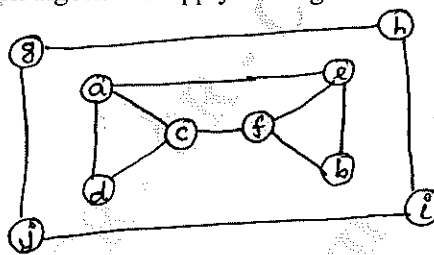


Fig Q6(b)

(06 Marks)

Module-4

- 7 a. Apply Boyer – Moore algorithm to search a pattern BAOBAB in the text. BESS_KNEW_ABOUT_BAOBABS
Compare Brute force method and Boyer Moore algorithm of string matching. (10 Marks)

- b. Write the Warshall's algorithm and find the transitive closure for the given adjacency matrix

$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 \end{bmatrix}$$

(06 Marks)

OR

- 8 a. Write the algorithm for distribution counting method. Sort 62, 31, 84, 96, 19, 47 by comparison counting method. (08 Marks)
- b. Write the Floyd's algorithm. Find the all pairs shortest paths for the given graph using Floyd's algorithm.

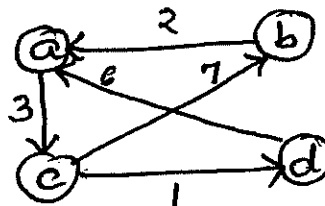


Fig Q8(b)

(08 Marks)

Module-5

- 9 a. What is state space tree? Draw the state space tree for solving the 4 queen's problem by back tracking method. (08 Marks)
- b. What are lower bound arguments? Describe different methods for obtaining lower bound. (08 Marks)

OR

- 10 a. Explain P, NP and NP complete problems with examples. (06 Marks)
- b. Explain Branch and Bound technique. Solve the assignment problem using the Branch and Bound technique.

	Job1	Job2	Job3	Job4
Person 1	9	2	7	8
Person 2	6	4	3	7
Person 3	5	8	1	8
Person 4	7	6	9	4

(10 Marks)

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