USN

16/17MCA33

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

Time: 3 hrs.   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 $t_2(n) \in 0(g_2(n))$ then $t_1(n) + t_2(n) \in 0(\max\{g_1(x), g_2(x)\})$.
(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.
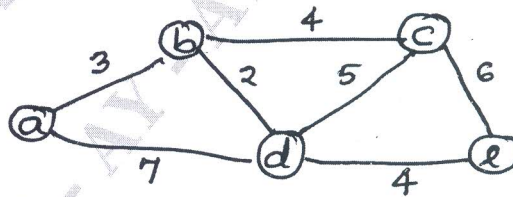

Fig Q5(a)   **(08 Marks)**

   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 100110110111101.   **(08 Marks)**

OR

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

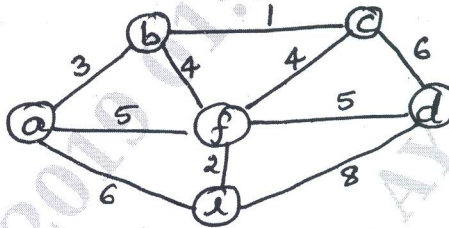

Fig Q6(a)   **(10 Marks)**
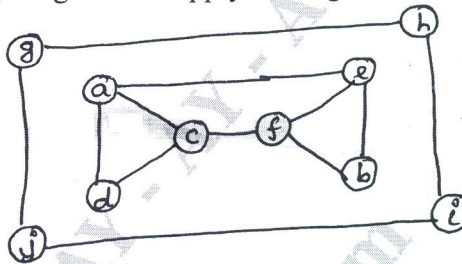
b.   Write the Breadth first search algorithm. Apply this algorithm for the following graph.

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   **(10 Marks)**
Compare Brute force method and Boyer Moore algorithm of string matching.

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

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

(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.
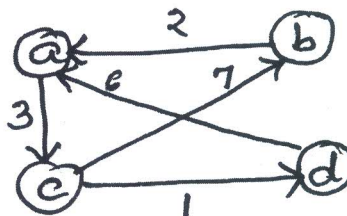

Fig Q8(b)   **(08 Marks)**

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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