

# CBCS SCHEME

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16/17MCA33

## Third Semester MCA Degree Examination, Dec.2018/Jan.2019 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

- a. Which are the different ways of computing GCD of two numbers? Write any 2 algorithm to find it and apply for the given input  $m = 6, n = 10$ . (08 Marks)  
b. With a neat flowchart, explain the fundamentals of algorithmic problem solving. (08 Marks)

OR

- a. List out importance problem types. Explain any two of them. (08 Marks)  
b. What is asymptotic notation? List and explain the asymptotic notations. (08 Marks)

### Module-2

- a. Write an algorithm to sort given  $n$  elements using bubble sort and find its time efficiency. (08 Marks)  
b. Write an algorithm to implement Brute Force's string matching process and apply the same for the given input.  
Text string = [NOBODY NOTICE\_HIM]  
Pattern string = [NOT]. (08 Marks)

OR

- a. Write an algorithm to sort  $n$  elements using merge sort. Apply the same to sort the given list [E, L, E, M, E, N, T, S] in alphabetical ordering. (08 Marks)  
b. Design and analyze the binary search algorithm to find the key element in a given sorted  $n$  elements. (08 Marks)

### Module-3

- a. Define BFS and DFS. Obtain the differences and similarities between these. Traverse the given graph using BFS and DFS method (Refer Fig.5(a)). (12 Marks)

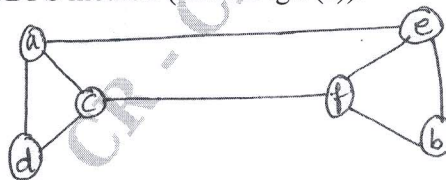


Fig.Q.5(a)

- b. Obtain the topological ordering for the following graph Fig.Q.5(b) using source removal method. (04 Marks)

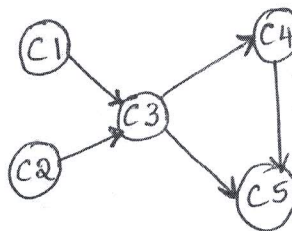
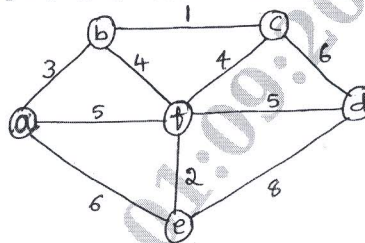


Fig.Q.5(b)

OR

- 6 a. Find the MST for the given graph (Fig.Q.6(a)) using Kruskal's algorithm. (05 Marks)

Fig.Q.6(a)



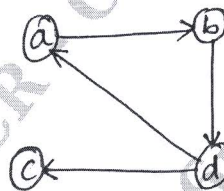
- b. Write an algorithm to find the single-source shortest path using Dijkstra's algorithm. (05 Marks)
- c. Find the Huffman code for the following data by obtaining Huffman tree: (06 Marks)

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

**Module-4**

- 7 a. Write an algorithm to compute transitive closure / path matrix for the given graph. And obtain the transitive closure for the given graph shown in Fig.Q.7(a) using Warshall's algorithm. (08 Marks)

Fig.Q.7(a)



- b. Find the optimal solution for the given Knapsack instance using 0/1 Knapsack method with capacity  $M = 5$ . (08 Marks)

Item	1	2	3	4
Weight	2	1	3	2
Value/profit	12	10	20	15

OR

- 8 a. Write an algorithm to sort given  $n$  elements using distribution counting method. Apply the same for the following input: [13, 11, 12, 13, 12, 12]. (08 Marks)
- b. Explain Horspool's string matching algorithm with a suitable example. (08 Marks)

**Module-5**

- 9 a. What is decision tree? Obtain the decision tree to find minimum of 3 numbers. (08 Marks)
- b. Explain N-Queens problem using back-tracking method. (08 Marks)

OR

- 10 a. Construct the state-space tree for the sum of subset problem for the given data:  $W = \{5, 10, 12, 13, 15, 18\}$ , and  $M = 30$  (08 Marks)
- b. Find the optimal solution for the given assignment problem which is represented as a matrix as show below:

	J1	J2	J3	J4
a	9	2	7	8
b	6	4	3	7
c	5	8	1	8
d	7	6	9	4

(08 Marks)

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