

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

- 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)
 - With a neat flowchart, explain the fundamentals of algorithmic problem solving. (08 Marks)

OR

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

Module-2

- Write an algorithm to sort given n elements using bubble sort and find its time efficiency. (08 Marks)
 - 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

- 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)
 - Design and analyze the binary search algorithm to find the key element in a given sorted n elements. (08 Marks)

Module-3

- 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)

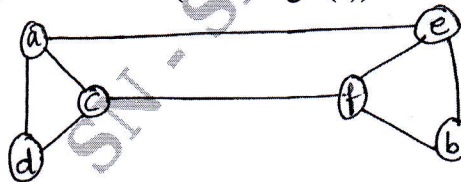


Fig.Q.5(a)

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

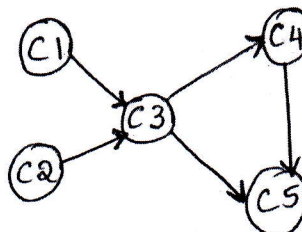
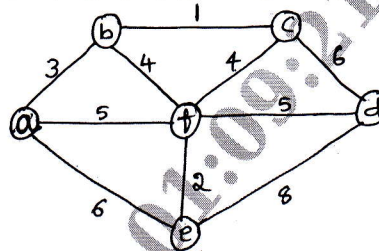


Fig.Q.5(b)

OR

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

Fig.Q.6(a)



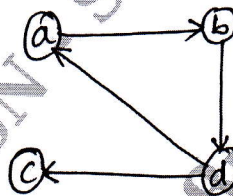
- b. Write an algorithm to find the single-source shortest path using Dijkstra's algorithm. (05 Marks)
- c. Find the Huffman code for the following data by obtaining Huffman tree: (06 Marks)

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)
