TE670

Total No. of Printed Pages:03

T.E. (Computer) Semester- VI (Revised Course 2007-08)
EXAMINATION NOV/DEC 2019
Modern Algorithm Design Foundation

[Duration : Three Hours] **[Total Marks : 100]**

Instructions:
1) Assume Data wherever necessary.
2) Answer any five full questions atleast one from each module.

MODULE I

1.
a) Explain the two major phases of evaluating the performance of any algorithm. **(6 marks)**
b) Write an algorithm to determine whether the given number N is the sum of all its divisors. **(6 marks)**
c) Write an algorithm to print the nth Fibonacci number and analyze the time complexity of the algorithm. **(8 marks)**

2.
a) Write short notes on the following **(6 marks)**
i) Randomized algorithm
ii) Little 'oh' and little "omega" notations
iii) Algorithm Design Techniques
b) Demonstrate the Merge sort on the following data set A={50,10,25,30,15,70,35,55,12,60} Draw the tree of calls for Merge Sort and Merge algorithm. **(8 marks)**
c) Given an array A[1…..n] containing n distinct elements, write an algorithm to find K^{th} smallest element. **(6 marks)**

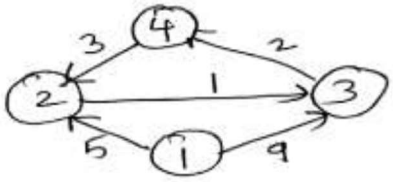
MODULE II

3.
a) Find the optimal solution using greedy technique for the following job sequencing problem n=7, profits (p1….p7)=(18,4,6,21,7,40,3) and deadlines (d1….d7)= (3,1,3,4,1,1,2) **(5 marks)**
b) Let $G = (V, \epsilon)$ be an undirected connected and weighted graph, write the algorithm to find the minimum spanning tree of G using greedy strategy. Also state the time complexity of the algorithm. **(5 marks)**
c) Consider the weighted directed graph $G = (V, \epsilon, W)$ where V=(1,2,3,4,5) the set E and W are defined by the table given below: **(10 marks)**

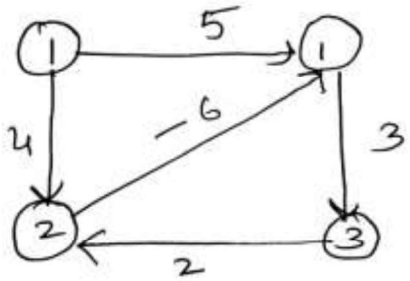
	1	2	3	4	5
1	0	2	3	5	4
2	5	0	6	6	2
3	3	5	0	2	3
4	9	6	8	0	3
5	6	4	7	10	0

Find the optimal tour of the graph using dynamic programming technique.

4. a) Write the algorithm to determine the shortest path from every vertex to every other vertex in weighted graph. Based on the algorithm, solve the given instance. **(10 marks)**



b) Using Bellman Ford algorithm, obtain the shortest path from the source vertex 'O' to all other vertices in the following graph. **(10 marks)**



MODULE III

5. a) Explain the implicit and explicit constraints for the 8 Queens problem and sum of subsets problem. **(4 marks)**

b) Explain LC search strategy in Branch and Bound with the help of an example. **(8 marks)**

c) Derive the algorithm for m coloring problem for graph using backtracking techniques. **(8 marks)**

6. a) With the help of an example explain the concept of Hamiltonian cycle in a graph. Develop a backtracking algorithm which finds all possible Hamiltonian cycle in a graph. **(8 marks)**

b) Use backtracking technique to solve sum of subset problem. Given S={5,10,10,25} and M=25. Draw the search tree for variable sized tuple formation. **(8 marks)**

c) Explain the concept of FIFO Branch and Bound with the help of an example. **(4 marks)**

MODULE IV

7. a) Write Boyer Moore pattern matching algorithm. **(5 marks)**

b) Illustrate standard Trie for the following set of strings. **(5 marks)**
{bear, bell, bid, bull , buy, sell , stock, stop}

c) Write a short note on Center Based Tree Method. **(5 marks)**

d) Explain flooding algorithm for Broadcast Routing. **(5 marks)**

8.

a) What are the complexity measures for network algorithm. **(5 marks)**

b) Compute a table representing the KMP failure function for the pattern string "cgtacgttcgtac" **(7 marks)**

c) Explain synchronous and asynchronous algorithms for computing a leader in a tree of processors. **(8marks)**