Code No: 135AF

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, December - 2019
DESIGN AND ANALYSIS OF ALGORITHMS
(Common to CSE, IT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B
consists of 5 Units. Answer any one full question from each unit. Each question carries
10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	Define θ-notation.	[2]
b)	Explain "Divide and Conquer Technique".	[3]
c)	State and explain graph coloring problem.	[2]
d)	Differentiate between breadth first search and Depth first search.	[3]
e)	Define minimum spanning tree.	[2]
f)	Write any two characteristics of Greedy Algorithm.	[3]
g)	What are the drawbacks of dynamic programming?	[2]
h)	Write the difference between the Greedy method and Dynamic programming.	[3]
i)	Define NP-Complete.	[2]
j)	Why the search path in a state-space tree of a branch and bound algorithm is terminated?	[3]

PART – B

(50 Marks)

2.   Apply and explain merge sort to sort the following list: 8, 3, 2, 9, 7, 1, 5, 4. How efficient is merge sort?   [10]

OR

3.   Consider the following recurrence
$T(n)=8T(n/2)+ n$
Obtain asymptotic bound using substitution method.   [10]

4.   Consider the following graph 1. If there is ever a decision between multiple neighbor nodes in the BFS or DFS algorithms, assume we always choose the letter closest to the beginning of the alphabet first. In what order will the nodes be visited using a Breadth First Search and Depth First Search with start vertex as 0?   [10]
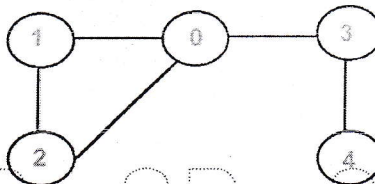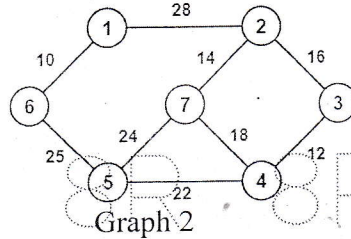

Graph 1

5. Given a *set* of non-negative integers {10, 7, 5, 18, 12, 20, 15}, and a value *sum* 35, determine if there is a subset of the given *set* with *sum* equal to given *sum*. [10]

6. Write down Prim's Algorithm for finding the Minimum Spanning Tree of a connected graph. Execute your algorithm on the following graph 2. [10]

Graph 2

OR

7. Given the jobs(J1...J6), their deadlines (5,3,3,2,4,2 } and associated profits as {200,180,190,300,120,100}.
   a) Write the optimal schedule that gives maximum profit.
   b) Are all the jobs completed in the optimal schedule?
   c) What is the maximum earned profit? [4+4+2]

8. Write down the Floyd Warshall algorithm to solve the all pairs shortest paths problem on a directed graph. Run your algorithm on the following weighted directed graph 3 and show the matrix D_k that results for each iteration of the outer loop. [10]

Graph 3
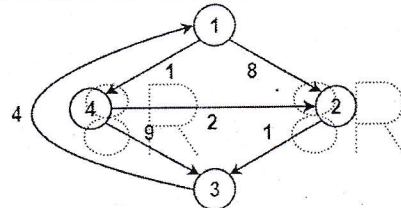
OR

9. Determine the cost and structure of an optimal binary search tree for a set of n = 7 keys with the following probabilities. Where (p1...p7)={ .04 .06 .08 .02 .10 .12 .14} (q0...q7) ={.06 .06 .06 .06 .05 .05 .05 .05} [10]

10.a) Prove, If any NP-complete problem belongs to class P, then is P = NP?
   b) Write a non deterministic algorithm of sorting the list of elements. [5+5]

OR

11. Solve the Travelling Salesman Problem for the following graph 4 by using the Branch and Bound Algorithm. [10]

Graph 4

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