Sub Code:ECS502

Paper Id: 110512 Roll No: | | | | | | | | | | | | | |

B. TECH
(SEM-V) THEORY EXAMINATION 2019-20
DESIGN ANALYSIS OF ALGORITHM

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION – A

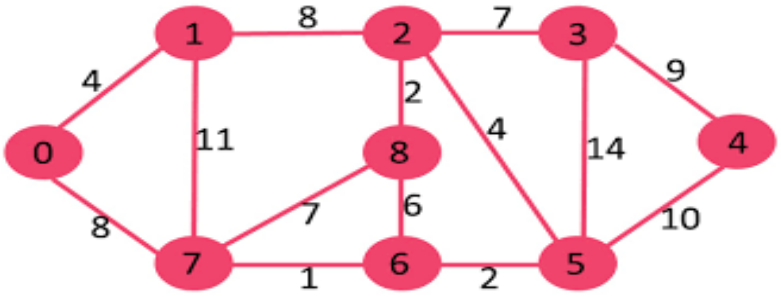
1. Attempt *all* questions in brief. 2 x 10 = 20

a) **What** do you mean by best case, average case, and worst case time complexity of an algorithm?
b) **W**hy do we use asymptotic notation in the study of algorithm? Explain in brief various asymptotic notations.
c) **Solve** the recurrence: $T(n)=16T(n/4)+n^2$ by using Master method.
d) **D**escribe the properties of Red-Black tree.
e) Differentiate between Dynamic programming and Greedy approach.
f) Explain binomial heap with properties.
g) Define travelling salesman problem in detail.
h) Differentiate between Backtracking and Branch & Bound approach.
i) What is the running time of heap sort on an array A of length n that is already sorted in increasing order?
j) Explain Fast Fourier Transform (FTT).

SECTION – B

2. Attempt any *three* of the following: 10 x 3 = 30

a) Illustrate the function of Heapsort on the following array: A={25,57,48,37,12,92,86,33}.
b) How B-tree differs with other tree structures. Insert the following information F,S,Q,K,C,L,H,T,V,W,M,R,N into an empty B-tree with minimum degree 2.
c) Explain and write partitioning algorithm for Quick Sort.
d) Use single source shortest path algorithm for find the optimal solution for given graph.



e) Explain any one minimum cost spanning tree algorithm with example.

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SECTION – C

3. Attempt any one part of the following: 10 x 1 = 10

a) **E**xplain the Floyd Warshall algorithm with example. Which design strategy the algorithm uses?

b) **W**rite an algorithm for Sum Subset problem using backtracking approach. Find all possible solution for the following instances using same if m=30, S=<1,2,5,7,8,10,15,20,25>.

4. Attempt any one part of the following: 10 x 1 = 10

a) Explain Approximation algorithm with suitable examples.

b) **Explain** insertion in Red-Black tree. Show steps for inserting 1,2,3,4,5,6,7,8&9 into empty RB tree.

5. Attempt any one part of the following: 10 x 1 = 10

a) **D**escribe in detail the Strassen's Matrix Multiplication algorithm based on divide & conquer strategies with suitable example.

b) Write short notes on the following: i) Graph Coloring ii) Hamiltonian Cycles.

6. Attempt any one part of the following: 10 x 1 = 10

a) Write algorithm for union of two binomial heaps. What is complexity?

b) **C**onsider 5 items along their respective weights and values
$I=<I_1,I_2,I_3,I_4,I_5>$
W=<5,10,20,30,40,>
V=<30,20,100,90,160>
The capacity of Knapsack w=60. Find the solution to the fractional knapsack problem.

7. Attempt any one part of the following: 10 x 1 = 10

a) **D**iscuss RMP string matching algorithm and also find the prefix function for the following pattern: ababbabaa.

b) Define approximation algorithms. What is approximation ratio? Approximate the travelling salesman problem with triangle inequality.