PAPER ID-310635

Subject Code: KCS503

Roll No: | | | | | | | | | | | | | |

B. TECH.
(SEM-V) THEORY EXAMINATION 2020-21
DESIGN AND ANALYSIS OF ALGORITHM

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

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

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

Qno.	Question	Marks	CO
a.	What is recurrence relation? How is a recurrence solved using master's theorem?	2	
b.	What is asymptotic notation? Explain Omega (Ω) notation?	2	
c.	Write down the properties of binomial tree.	2	
d.	Differentiate Backtracking algorithm with branch and bound algorithm.	2	
e.	Solve the recurrence $\mathbf{T(n) = 4T(n/2) + n^2}$	2	
f.	Explain Fast Fourier Transform in brief.	2	
g.	Write an algorithm for naive string matcher?	2	
h.	Explain searching technique using divide and conquer approach.	2	
i.	Explain Skip list in brief.	2	
j.	Explain how algorithms performance is analyzed?	2	

SECTION B

2. Attempt any *three* of the following:

Qno.	Question	Marks	CO
a.	Write an algorithm for counting sort? Illustrate the operation of counting sort on the following array: **A={4, 0, 2, 0, 1, 3, 5, 4, 1, 3, 2, 3}**	10	
b.	Show the results of inserting the keys F, S, Q, K, C, L, H, T, V, W, M, R, N, P, A, B, X, Y, D, Z, E in order into an empty B-tree. Use t=3, where t is the minimum degree of B- tree.	10	
c.	Discuss greedy approach to an activity selection problem of scheduling several competing activities. Solve following activity selection problem S = {A1, A2, A3, A4, A5, A6, A7, A8, A9, A10} S_i = {1, 2, 3, 4, 7, 8, 9, 9, 11, 12} F_i = {3, 5, 4, 7, 10, 9, 11, 13, 12, 14}	10	
d.	What is sum of subset problem? Draw a state space tree for Sum of subset problem using backtracking? Let **n=6, m=30 and w [1:6] = {5, 10, 12, 13, 15, 18}**	10	
e.	Write KMP algorithm for string matching? Perform the KMP algorithm to search the occurrences of the pattern abaab in the text string abbabaabaabab.	10	

SECTION C

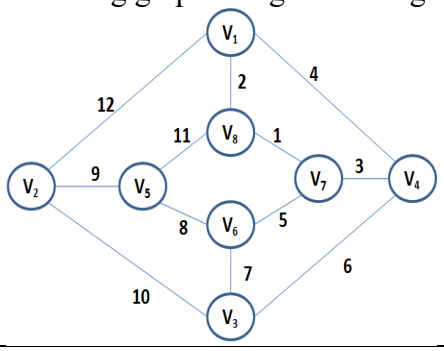
3. Attempt any *one* part of the following:

Qno.	Question	Marks	CO
a.	Solve the following recurrence relation: **i.** $\mathbf{T(n) = T(n-1) + n^4}$ ii. $\mathbf{T(n) = T(n/4) + T(n/2) + n^2}$	10	
b.	Write an algorithm for insertion sort. Find the time complexity of Insertion sort in all cases.	10	

4. Attempt any *one* part of the following:

Qno.	Question	Marks	CO
a.	Write an algorithm for insertion of key in the Red-Black Tree. Discuss the various cases for insertion of key in red-black tree for given sequence of key in an empty red-black tree- **5, 16, 22, 25, 2, 10, 18, 30, 50, 12, 1.**	10	
b.	Explain and write an algorithm for union of two binomial heaps and also write its time complexity?	10	

5. Attempt any *one* part of the following:

Qno.	Question	Marks	CO
a.	Define minimum spanning tree (MST). Write Prim's algorithm to generate a MST for any given weighted graph. Generate MST for the following graph using Prim's algorithm. 	10	
b.	Explain Dijkstra's algorithm to solve single source shortest path problem with suitable example.	10	

6. Attempt any *one* part of the following:

Qno.	Question	Marks	CO
a.	What is travelling salesman problem (TSP)? Find the solution of following TSP using dynamic programming.	10	
b.	Discuss n queen's problem. Solve **4** queen's problem using backtracking method?	10	

0	**1**	**15**	**6**
2	**0**	**7**	**3**
9	**6**	**0**	**12**
10	**4**	**8**	**0**

7. Attempt any *one* part of the following:

Qno.	Question	Marks	CO
a.	Write short notes on following: **(i.)** Randomized algorithm. (ii.) NP- complete and NP hard.	10	
b.	What is approximation algorithm? Explain set cover problem using approximation algorithm.	10	