PAPER ID-410061

Subject Code: KCS503

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

B. TECH.
(SEM V) THEORY EXAMINATION 2021-22
DESIGN AND ANALYSIS OF ALGORITHM

Time: 3 Hours *Total Marks: 100*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.
2. Any special paper specific instruction.

SECTION A

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

a. How analyze the performance of an algorithm in different cases?
b. Derive the time complexity of Merge sort.
c. Explain left rotation in RB tree.
d. Write down the properties of Fibonacci Heap.
e. Explain Greedy programming in brief.
f. What do you mean by convex hull?
g. Write down the Floyd Warshal algorithm.
h. Explain Branch and Bound method in brief.
i. Explain Randomized algorithm in brief.
j. Explain NP-complete and NP-Hard.

SECTION B

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

a. Solve the recurrence
   i) $T(n) = 3T(n/4) + cn^2$ using recursion tree method.
   ii) $T(n) = n + 2T(n/2)$ using Iteration method. (Given $T(1)=1$)
b. What is Binomial Heap? Write down the algorithm for Decrease key operation in Binomial Heap also write its time complexity.
c. Write and explain the Kruskal algorithm to find the Minimum Spanning Tree of a graph with suitable example.
d. What is N queens problem? Draw a state space tree for 4 queens problem using backtracking.
e. Write Rabin Karp string matching algorithm. Working modulo **q=11**, how many spurious hits does the Rabin karp matcher in the text **T= 3141592653589793**, when looking for the pattern **P=26**.

SECTION C

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

(a) Write Merge sort algorithm and sort the following sequence {23, 11, 5, 15, 68, 31, 4, 17} using merge sort.
(b) What do you understand by stable and unstable sorting? Sort the following sequence {25, 57, 48, 36, 12, 91, 86, 32} using heap sort.

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

(a) Discuss the various cases for insertion of key in red-black tree for given sequence of key in an empty red-black tree- **{15, 13, 12, 16, 19, 23, 5, 8}.**
(b) What is skip list? Explain the Search operation in Skip list with suitable

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example also write its algorithm.

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

(a) What is Knapsack problem? Solve Fractional knapsack problem using greedy programming for the following four items with their weights w = {3, 5, 9, 5} and values P = {45, 30, 45, 10} with knapsack capacity is 16.

(b) Write down the Bellman Ford algorithm to solve the single source shortest path problem also write its time complexity.

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

(a) What is travelling salesman problem (TSP)? Find the solution of following TSP using Branch & Bound method

0	20	30	10	11
15	0	16	4	2
3	5	0	2	4
19	6	18	0	3
16	4	7	16	0

(b) Explain the method of finding Hamiltonian cycles in a graph using backtracking method with suitable example.

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

(a) Write and explain the algorithm to solve vertex cover problem using approximation algorithm.

(b) Explain and Write the Knuth-Morris-Pratt algorithm for pattern matching also write its time complexity.