PAPER ID-310677

Subject Code: KCS503

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

BTECH
(SEM V) THEORY EXAMINATION 2024-25
DESIGN AND ANALYSIS OF ALGORITHM

TIME: 3 HRS **M.MARKS: 100**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

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

Q no.	Question	CO	Level
a.	With example define algorithm. List few algorithm design techniques.	1	K1
b.	Briefly discuss the basic steps taken to design an algorithm.	1	K1
c.	Derive the time complexity of Heap Sort.	2	K2
d.	List the properties of Binomial Heap	2	K1
e.	With a suitable example explain the concept of Convex –Hull Problem	3	K1
f.	With example explain Greedy method	3	K1
g.	Define principle of "Optimality". Give suitable example.	4	K1
h.	With a suitable example explain "Branch and Bound".	4	K1
i.	Describe "Randomized algorithms". List few randomized algorithms.	5	K2
j.	Write steps to solve Travelling Salesman Problem using approximation algorithm.	5	K1

SECTION B

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

a.	Illustrate the operation of Merge –Sort on array A= (38, 27, 43, 3, 9, 82, 10). Also drive the time complexity of Merge Sort.	1	K3
b.	Insert the following given sequence of keys in an empty Red-Black tree. {10, 18, 5, 4, 15, 17, 25, 60, 1, 9, 0}	2	K3
c.	Apply divide and conquer approach to solve matrix multiplication of two matrices of order more than 2X2.Also briefly explain how Strassen's Matrix Multiplication procedure reduced the time complexity of overall procedure.	3	K3
d.	Write Floyd's and Warshal's algorithm to find all pair shortest path in a graph. Discuss its time complexity.	4	K2
e.	Explain Vertex Cover Problem. Solve vertex cover problem using approximation algorithm	5	K2

SECTION C

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

a.	Demonstrate the concept of Heapify procedure. Also Write Its Algorithm.	1	K3
b.	Write Quick –Sort partition algorithm. Drive best and worst case time complexity of quick sort.	1	K2

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

a.	Insert the following string in the initially empty tries: DOG, DONE, CAT, CAN, RIGHT, DO, JUG, DAA, CA, CAME. Also make a compress tries of it.	2	K3
b.	Design a Binomial Heap for the following A. A= {7, 2, 4, 17, 1, 11, 6, 8, 15, 10, 20}	2	K3

PAPER ID-310677

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

BTECH
(SEM V) THEORY EXAMINATION 2024-25
DESIGN AND ANALYSIS OF ALGORITHM

TIME: 3 HRS **M.MARKS: 100**

5.	**Attempt any *one* part of the following:**	**10 x 1 = 10**	
a.	Write and explain the Kruskal's algorithm to find Minimum Spanning Tree of a graph with a suitable example.	3	K3
b.	Find the optimal solution of the fractional Knapsack problem with n=7 and the knapsack capacity of m=15. The profits and weights of the items are given below. Objects: 1 2 3 4 5 6 7 Profit (P): 5 10 15 7 8 9 4 Weight (w): 1 3 5 4 1 3 2	3	K3

6.	**Attempt any *one* part of the following:**	**10 x 1 = 10**	
a.	Find the optimal solution to the 0/1 Knapsack instances with n=4 and Knapsack capacity m=8 where profits and weights as follows : P={1, 2, 5,6} and W={2, 3, 4, 5}	4	K3
b.	Illustrate the N-queens problem? Draw "State Space Tree" for 4 queen's problem using backtracking.	4	K3

7.	**Attempt any *one* part of the following:**	**10 x 1 = 10**	
a.	Explain P, NP, NP –Complete and NP-Hard complexity classes. How they are related to each other.	5	K2
b.	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.	5	K2