UID No:-_____ Paper ID:

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Course: BE-CSE/IT	Semester: 5th
Sub. : Design and Analysis of Algorithm	Sub. Code: CST & ITT-302
Time Allowed: 3 Hours	Maximum Marks : 60

Note: 1. Attempt six questions only. All questions carry 10 marks.

2. **Question no. 1 is compulsory** with 5 short questions.
(Answer to each part should be between 50-60 words)

3. Attempt **five** questions from **Sections- B, C & D,** but not more than **two** questions from each sections.
(Each Answer should be between 250-300 words)

Section – A (Compulsory) (5X2=10)

Q. 1 (a) What is the basic operation of an algorithm and how is it identified?

(b) What is the formula to calculate optimal solution in 0/1 knapsack problem?

(c) Why does Breadth First Search use "Queue" data structure instead of "stack" data structure?

(d) State Cook's Theorem in computational complexity theory.

(e) What is the formula used in Euclid's algorithm for finding the greatest common divisor of two numbers?

Section – B (10 Marks Each)

Q. 2 Write an algorithm to perform the following operations on queues using arrays and linked lists with time complexity analysis.

a. En-queue **b.** De-queue **c.** Is Full **d.** Is Empty

Q. 3 What is open and closed Hashing? Discuss various types of hashing techniques in detail. Also discuss advantages and disadvantages of each technique.

Q. 4 Write an algorithm to find the union of the following sets:

A[]= {1,5,6,3,2}

B[]={1,2,4,7,9,8}

Section – C (10 Marks Each)

Q. 5 **a.** Apply Quick sort on the given list and sort it in ascending order 38 81 22 48 13 69 93 14 45 58 79 72

b. Derive best and worst case of 2-way Merge sort algorithm using divide and conquer technique

Q. 6 What is Backtracking technique? Describe the steps involved in solving a sum of subsets problem and explain it with an example.

Q. 7 **a.** Sort the given list of numbers 20, 15, 10, 18, 17, 30, 25, 40, 35, 38, 50 using selection sort.

b. Write short note on Optimal merge patterns.

Section – D (10 Marks Each)

Q. 8 Write short notes on the following:
a. Accounting Method
b. Aggregate Analysis
c. Potential Method

Q. 9 What is Amortized Analysis? Discuss various methods of analyzing amortized efficiency of an algorithm in detail with suitable example for each method.

Q. 10 Given two arrays num [0...k-1] and rem [0...k-1]. In num [0...k-1], every pair is co-prime (gcd for every pair is 1).Find the minimum positive number x for the following inputs with the help of Chinese Remainder Theorem.

a. num[] = {5, 7}, rem[] = {1, 3}

b. num[] = {3, 4, 5}, rem[] = {2, 3, 1}