Seat No: _____ **Enrollment No: _____**

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. Winter 2021 - 22 Examination

Semester: 5 **Date: 18/10/2021**
Subject Code: 203105301 **Time:10:30 AM TO 01:00 PM**
Subject Name: Design and Analysis of Algorithms **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 **Objective Type Questions** - (Fill in the blanks, one word answer, MCQ-not more than Five in case of MCQ) (All are compulsory) (Each of one mark) **(15)**

1. Consider the following sequences : X = < B, C, D, C, A, B, C >, and Y = < C, A, D, B, C, B > The length of longest common subsequence of X and Y is
   (a) 2 (b) 3 (c) 4 (d) 5
2. Given two vertices a and b in a graph, which of the traversals can be used to find if there is path between a and b?
   (a) DFS (b) BFS
   (c) Both BFS and DFS (d) None of these
3. Which of the following algorithms is/are good to use for sorting, an array having more than 1 million elements?
   (a) Quick sort (b) Bubble sort (c) Selection sort (d) All of these
4. What does it mean when we say that an algorithm A_1 is asymptotically more efficient than A_2?
   (a) A_1 will always be a better choice for small inputs
   (b) A_1 will always be a better choice for large inputs
   (c) A_2 will always be a better choice for small inputs
   (d) A_2 will always be a better choice for large inputs
5. The worst case time complexity of sorting n numbers using randomized quicksort is.
   (a) O(n) (b) $O(n^2)$
   (c) O(n logn) (d) O(logn)
6. Find Upper bound and Lower bound for $f(n)=83n^3 + 84n$.
7. Define Space complexity of algorithm?
8. List out the criteria that a good algorithm must satisfy.
9. List out important characteristics of Dynamic Programming algorithm?
10. What is directed acyclic graph?
11. What is feasible solution?
12. How many edges are possible in a complete undirected graph having N vertices?
13. What is purpose of Master's theorem?
14. Consider three matrices of size 10 x 20, 20 x 30 and 30 x 40 respectively. What is the minimum number of multiplications required to multiply the three matrices?
15. Which type of algorithm is used to solve the 0/1 knapsack problem?

Q.2 Answer the following questions. (Attempt any three) **(15)**

a) What is an amortized analysis?
b) What is Strassen's Matrix Multiplication?
c) Differentiate between Optimization Problem and Decision Problem.
d) Explain 2-Satisfiability (2-SAT) Problem.

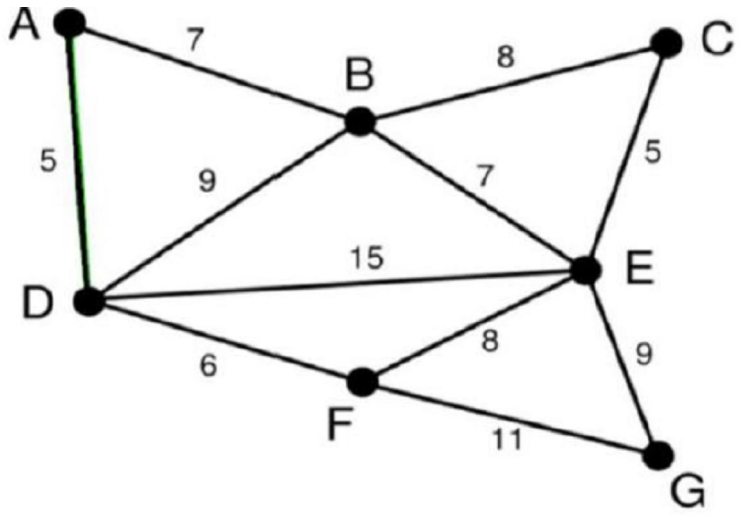
Q.3 A) Apply longest common sub – sequence (LCS) for the following: **(07)**

TEXT (T)	**a b c a b a a b c a b a c**
PATTERN (P)	**a b a a**

B) Find out minimum number of coins required to make change of RS. 9 using Dynamic Programming. Denominations are D_1=1, D_2=4, D_3=6. **(08)**

OR

B) Find out minimum spanning tree for the following graph. **(08)**



Q.4 A) What is backtracking? Explain the solution of 8-queen's problem using backtracking. **(07)**

OR

B) Solve the following recurrence relation **(07)**

T(n) = 3T(n-1) + logn; if n > 0

= 1 ; Otherwise

B) Explain divide and conquer concept with any suitable algorithm as an example. **(08)**