

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2019****Subject Code: 2150703****Date: 06/06/2019****Subject Name: Analysis and Design of Algorithms****Time: 02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) What is an algorithm? How it differ from flowchart?	03
	(b) Give difference of dynamic programming and divide-and-conquer method.	04
	(c) Explain Asymptotic notation. Arrange the growth rate of $2^n$ , $n^2$ , $1$ , $\log n$ , $n \log n$ , $3^n$ and $n$ in increasing order of growth.	07
Q.2	(a) Differentiate greedy and dynamic programming.	03
	(b) Find out the $\Theta$ -notation for the function: $f(n)=27n^2+16n$ .	04
	(c) What is recurrence? Explain recursion-tree method with suitable example.	07
<b>OR</b>		
Q.3	(c) Write the Master theorem. Solve following recurrence using it. (i) $T(n)=9T(n/3) + n$ (ii) $T(n)=3T(n/4) + n \lg n$	07
	(a) Use Iteration method to solve recurrence $T(n) = T(n-1) + 1$ , here $T(1)= \Theta(1)$ .	03
	(b) Explain general characteristics of greedy algorithms.	04
	(c) Using dynamic programming find out the optimal sequence for the matrix chain multiplication of $A_{4 \times 10}$ , $B_{10 \times 3}$ , $C_{3 \times 12}$ , $D_{12 \times 20}$ and $E_{20 \times 7}$ matrices.	07
<b>OR</b>		
Q.3	(a) Write the best and worst running time of Insertion sort algorithm. Why it differ?	03
	(b) What are the steps for dynamic programming? Explain principal of optimality.	04
	(c) Determine LCS of $\{1,0,0,1,0,1,0,1\}$ and $\{0,1,0,1,1,0,1,1,0\}$	07
Q.4	(a) What is string-matching problem? Define valid shift and invalid shift.	03
	(b) Define P, NP, NP-complete and NP-hard problems.	04
	(c) Explain 0/1 knapsack using suitable example.	07
<b>OR</b>		
Q.4	(a) Write pseudo-code for Naïve-String-Matching algorithm.	03
	(b) Define spanning tree and MST. How Krushkal's algorithm is different from Prim's algorithm.	04
	(c) Explain fractional knapsack problem with example.	07
Q.5	(a) Define graph, complete graph and connected graph.	03
	(b) Differentiate BFS and DFS.	04
	(c) Write and explain Dijkstra algorithm with example.	07
<b>OR</b>		
Q.5	(a) Explain "P = NP ?" problem.	03
	(b) Write just steps for Backtracking and Branch-and-Bound algorithms.	04
	(c) Explain travelling salesman problem. Prove that it is NP complete problem.	07

\*\*\*\*\*