Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2021

Subject Code:2150703 Date:15/12/2021

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Write the precise definition of Algorithm. Explain time and space complexity of algorithm in brief.	**03**
	(b)	Find the maximum number from the following using divide and conquer strategy.	**04**
	(c)	Write algorithm for bubble sort. Apply bubble sort on the following data: 64, 12, 80, 34, 56, 17, 47, 73	**07**

Q.2	**(a)**	Find out time complexity for the following pseudo code using O-notation.
		`for(i = 0; i < n; i++)`
		`{`
		`  for(j = 0 ; j < n ; j++)`
		`  {`
		`  if( i != j )`
		`  x = x + 1;`
		`  }`
		`}`
			03

	(b)	Briefly discuss Huffman code.	**04**
	(c)	Sort the following data in ascending order using heap sort. Write all the necessary steps. 43, 34, 11, 56, 23, 90	**07**
		OR	
	(c)	Write the Master theorem and explain the same in brief. Solve the following recurrence using it. $T(n) = 9T(n/3) + n$	**07**
Q.3	**(a)**	Write down the characteristics of Greedy Algorithm.	**03**
	(b)	Explain counting sort in brief.	**04**
	(c)	Discuss binary search with divide-and-conquer strategy.	**07**
		OR	
Q.3	**(a)**	Write differences between dynamic programming and greedy strategy.	**03**
	(b)	Multiply 1456 by 1024 by divide and conquer method.	**04**
	(c)	Explain 0/1 knapsack using suitable example.	**07**
Q.4	**(a)**	Briefly explain assembly line scheduling problem.	**03**
	(b)	What is making change problem? Support your answer by taking small example.	**04**
	(c)	Determine Longest Common Subsequence of {N,E,E,L,A,M} and {E,N,G,I,N,E,E,R,I,N,G}.	**07**

OR

Q.4	**(a)**	Explain the following terms with brief discussion: - articulation point - directed graph	**03**
	(b)	Explain naïve string matching algorithm with example.	**04**
	(c)	Find an optimal parenthesization of a matrix-chain product whose sequence of dimensions is {5, 2, 4, 5}	**07**
Q.5	**(a)**	State pros and cons of breadth-first search.	**03**
	(b)	Explain 4-queens problem with backtracking.	**04**
	(c)	Discuss Kruskal's algorithm for minimum spanning tree.	**07**

OR

Q.5	**(a)**	Discuss NP-hard and NP-complete problems in brief.	**03**
	(b)	Write a brief note on topological sort.	**04**
	(c)	Explain Rabin-Karp algorithm.	**07**

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