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GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V (NEW) EXAMINATION – WINTER 2020

Subject Code:3150703 **Date:29/01/2021**

Subject Name:Analysis & Design of Algorithms

Time:10:30 AM TO 12:30 PM **Total Marks: 56**

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	What is an algorithm? Why analysis of algorithm is required?	**03**
	(b)	What is asymptotic notation? Find out big-oh notation of the $f(n)= 3n^2+5n+10$	**04**
	(c)	Write an algorithm for insertion sort. Analyze insertion sort algorithm for best case and worst case.	**07**
Q.2	**(a)**	What is the difference between selection sort and bubble sort?	**03**
	(b)	Write iterative and recursive algorithm for finding the factorial of N. Derive the time complexity of both algorithms.	**04**
	(c)	Solve following recurrence relation using iterative method $T(n)=2T(n / 2) + n$	**07**
Q.3	**(a)**	How divide and conquer approach work?	**03**
	(b)	Trace the quick sort for data A = {6,5,3,11,10,4,7,9}	**04**
	(c)	Explain master theorem and solve the recurrence $T(n)=9T(n/3)+n$ with master method	**07**
Q.4	**(a)**	Write the characteristics of greedy algorithm.	**03**
	(b)	Trace the merge sort for data A = {6,5,3,11,10,4,7,9}	**04**
	(c)	Find minimum spanning tree for the given graph in fig-1 using prim's algorithm	**07**

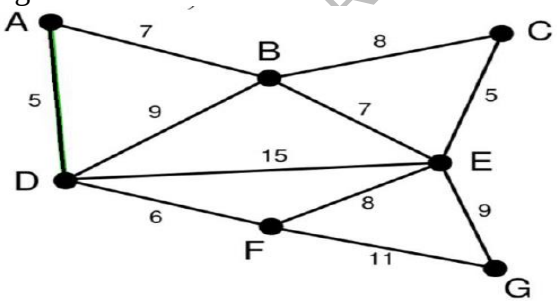


Fig-1

Q.5	**(a)**	How huffman code is memory efficient compare to fixed length code?	**03**
	(b)	Give difference between greedy approach and dynamic programming.	**04**
	(c)	Find the Huffman code for each symbol in following text ABCCDEBABFFBACBEBDFAAAABCDEEDCCBFEBFCAE	**07**
Q.6	**(a)**	What is principal of optimality? Explain its use in Dynamic Programming Method.	**03**
	(b)	Find out minimum number of multiplications required for multiplying: A[1 × 5], B[5 × 4], C[4 × 3], D[3 × 2], and E[2 × 1].	**04**
	(c)	Solve following knapsack problem using dynamic programming algorithm with given capacity W=5, Weight and Value are as follows :	**07**

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(2,12),(1,10),(3,20),(2,15).
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Q.7	**(a)**	What is finite automata? How it can be used in string matching?	**03**
	(b)	Differentiate BFS and DFS	**04**
	(c)	Explain Backtracking Method. What is N-Queens Problem? Give solution of 4-Queens Problem using Backtracking Method.	**07**
Q.8	**(a)**	Explain Minimax principal.	**03**
	(b)	Define P, NP, NP-complete, NP-Hard problems.	**04**
	(c)	Explain rabin-karp string matching algorithm.	**07**

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