

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

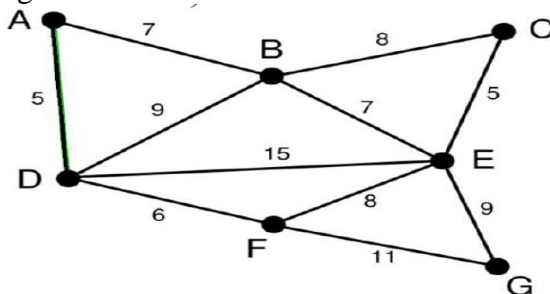


Fig-1

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

(2,12),(1,10),(3,20),(2,15)

- 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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