Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V(New) • EXAMINATION – WINTER 2016

Subject Code:2150703 **Date:24/11/2016**

Subject Name:Analysis and Design of Algorithms

Time:10:30 AM to 01:00 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		**Short Questions**	**14**
	1	Define the term : Algorithm	
	2	What is the average case time complexity of bubble sort?	
	3	State true or false: "Dynamic Programming always leads to an optimal solution."	
	4	Define the term : Directed Graph	
	5	Give any two sorting methods which are based on divide and conquer strategy.	
	6	What is the basic nature of greedy strategy?	
	7	What is meant by dead node in backtracking?	
	8	Write any one application of string matching.	
	9	State true or false: "Hamiltonian Problem is an example of NP-complete."	
	10	Write the objective of making change problem.	
	11	State true or false: "Prim's algorithm is based on greedy strategy."	
	12	What is meant by an optimal solution for a given problem?	
	13	Time complexity of _____ is in linear time. (a) Bubble sort (b) Radix sort (c) Shell sort (d) Selection sort	
	14	Which of the following case does not exist in complexity theory of an algorithm? (a) Average case (b) Worst case (c) Best case (d) Null case	
Q.2	**(a)**	Check the correctness for the following equality. $5n^3 + 2n = O(n^3)$	**03**
	(b)	Briefly explain multiplying large integer problem with suitable example.	**04**
	(c)	Explain binary search with the suitable example.	**07**
		OR	
	(c)	Discuss insertion sort with its time complexity. Support your answer with suitable example.	**07**
Q.3	**(a)**	Enlist various method(s) to solve recurrence equation and explain any one in brief.	**03**
	(b)	Sort the following numbers using heap sort. 20, 10, 50, 40, 30	**04**
	(c)	Elaborate Longest Common Subsequence problem with the help of dynamic programming. Support your answer with proper illustration.	**07**

OR

Q.3 **(a)** Find out time complexity for the following pseudo code using O-notation. **03**

```
for(i = 0; i < n; i++)
{
  for(j = n ; j > 0 ; j--)
  {
     if( i < j )
          c = c + 1;
  }
}
```

(b) Briefly discuss Huffman code. **04**

(c) Discuss knapsack problem using dynamic programming. **07**
Solve the following knapsack problem using dynamic programming. There are three objects, whose weights w(w1,w2,w3)={1, 2, 3} and values v(v1,v2,v3)={2, 3, 4} are given. The knapsack capacity M is 3 units.

Q.4 **(a)** Write brief note on topological sort. **03**

(b) Explain Breadth-First-Search in brief with suitable example. **04**

(c) Discuss Kruskal's algorithm for finding minimum spanning tree. Give proper example. **07**

OR

Q.4 **(a)** Write a brief note on branch and bound strategy. **03**

(b) Apply counting sort for the following numbers to sort in ascending order. **04**

4, 1, 3, 1, 3

(c) Explain job scheduling problem using greedy algorithm. Support your answer by taking proper illustration. **07**

Q.5 **(a)** Briefly discuss principle of optimality in dynamic programming. **03**

(b) Write a short note on NP-Completeness Problem. **04**

(c) What do you mean by backtracking? Explain in brief. Discuss eight queens problem using backtracking. **07**

OR

Q.5 **(a)** State differences between dynamic programming and divide and conquer strategy. **03**

(b) Write a brief note on NP-Hard Problems. **04**

(c) Discuss Rabin-karp algorithm for string matching. **07**

****