Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: 173205 **Date: 28/12/2012**

Subject Name: Design and Analysis of Algorithm

Time: 10.30 am - 01.00 pm **Total Marks: 70**

Instructions:

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

Q.1 **(a)** Define algorithm. Write and explain insertion sort algorithm. Also state its complexity. **07**

(b) Solve the following recurrences:- **07**

(i) $T(n) = 4T(n/2) + n^2$, where n is power of two.

(ii) The number of rings required for the tower of Hanoi problem can be given as:-

$$T(m) = \begin{cases} 0 & \text{, if } m = 0 \\ 2T(m-1) + 1 & \text{, otherwise} \end{cases}$$

Q.2 **(a)** Write and explain briefly the divide and conquer strategy for merge sort algorithm. Also, explain briefly the worst-case analysis for the same. **07**

(b) Explain binary search using the concept of divide and conquer. Also search for 14 from the given array A=<2,7,9,12,14,22,23>. Show each step and the value of each variable at each step. **07**

OR

(b) Explain quick sort using the concept of divide and conquer. Also sort the given array A=<3,6,1,4,5,2>. Show pivot element and the sub-array at each step. **07**

Q.3 **(a)** Briefly explain the activity selection problem with example using greedy approach. **07**

(b) Briefly explain the Kruskal's algorithm with example. **07**

OR

Q.3 **(a)** Compare the 0-1 knapsack problem with the fractional knapsack problem for greedy approach. Justify your answer with example. **07**

(b) Briefly explain the Prim's algorithm with example. **07**

Q.4	**(a)**	Derive all the equations for finding the longest common subsequence using dynamic approach. Also, find the longest common subsequence for the following:- X = <A,B,C,D> and Y = <C,B,D>	**07**
	(b)	Compare dynamic and greedy approach using knapsack problem.	**07**

OR

Q.4	**(a)**	Derive all the equations for matrix chain multiplication using dynamic approach and solve for the following sequence:- 5 X 10 , 10 X 4 , 4 X 8	**07**
	(b)	Compare dynamic and greedy approach using making change problem.	**07**

Q.5	**(a)**	Explain the concept of backtracking using the knapsack problem.	**07**
	(b)	Write and explain the Rabin-Karp algorithm for string matching.	**07**

OR

Q.5	**(a)**	Explain the concept of backtracking using the 8 queen's problem.	**07**
	(b)	Explain class P and NP. Also, briefly explain the NP-Completeness problem.	**07**

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