Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 710201N **Date: 08-01-2013**

Subject Name: Computer Algorithm

Time: 02.30 pm – 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.**

Q.1	**(a)**	Explain worst case, best case and balanced partitioning of quick sort with example.	**07**
	(b)	Solve the following recurrence using master theorem (if applicable). 1) $T(n) = 2\,T(n/2) + \sqrt{n}$ 2) $T(n) = 3T(n/4) + n \lg n$	**07**
Q.2	**(a)**	State whether the following statements are true or false. Justify. 1) $100\,n + 5 \neq \Omega(n^2)$ 2) $1000\,n^2 + 1000n = O(n^2)$	**07**
	(b)	Explain any one linear time sorting algorithm with example.	**07**
		OR	
	(b)	Explain the recurrence tree method using example.	**07**
Q.3	**(a)**	Answer the following: 1) Show that an n-element heap has height lg n. 2) Is an array that is in sorted order a min-heap? Is the sequence {25, 16, 15, 6, 13, 11, 3, 5, 8, 12} a max-heap?	**07**
	(b)	Differentiate between AVL tree and Red-Black tree. Construct Red-Black tree for given data: 60, 45 ,34, 12, 25, 8	**07**
		OR	
Q.3	**(a)**	Perform chained matrix multiplication for four matrices of dimensions <5, 4, 6, 2, 7> using dynamic programming.	**07**
	(b)	Explain fractional knap-sack using greedy algorithm with example.	**07**
Q.4	**(a)**	Define B-tree. Construct B-tree of order 4 for given data: F, S, Q, K, C, L, H, T, V, W, M, R, N, P, A.	**07**
	(b)	Explain knap sack using backtracking with example.	**07**
		OR	
Q.4	**(a)**	Define Fibonacci heap. Explain decreasing a key algorithm with suitable example.	**07**
Q.4	**(b)**	Explain Kruskal's algorithm with example. Discuss the complexity of Prim's and Kruskal's algorithm.	**07**
Q.5	**(a)**	Write sequential and parallel algorithm to find n!.	**07**
	(b)	Explain Rabin-Karp string matching algorithm using example.	**07**
		OR	
Q.5	**(a)**	Explain bitonic sequence and bitonic parallel sorting network using example.	**07**
	(b)	Explain P and NP-class problems through example.	**07**

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