

GUJARAT TECHNOLOGICAL UNIVERSITY
ME Semester –I Examination Feb. - 2012

Subject code: 710201N**Date: 11/02/2012****Subject Name: Computer Algorithm****Time: 10.30 am – 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.

- Q.1** (a) What is the complexity of merging two sorted array with size **07**
 respectively n and m . Justify your answer using merge sort.
- (b) Solve the following recurrences: **07**
 1) $T(n) = 3T(n/2) + n$, where n is in power of 2.
 2) $T_n = 2T_{n-1} + 3^n$

- Q.2** (a) State the order of growth listed below is true or false for following: **07**
 1) $n^{1.5} + \log_2 n$
 2) $n^3 + 3^n + 1$

$O(n), O(n^2), O(n^3), \Omega(n^{1.5}), \Omega(\log n), \Omega(1), \Theta(1)$

- (b) State and prove master theorem using suitable method. **07**

OR

- (b) Derive the recurrence for Chained Matrix Multiplication (CMM) and **07**
 explain with suitable example. Derive the complexity for the same.

- Q.3** (a) List the difference between Fibonacci heap and binomial heap with **07**
 suitable example of insertion and deletion.
- (b) List out the advantages of Red-Black Tree and how it differs from **07**
 AVL tree. Insert following sequence for both Red-Black Tree and
 AVL Tree: 1,2,3,4,5,6,7.

OR

- Q.3** (a) Explain Splitting a node in a B-tree with suitable example. **07**
 (b) Derive the complexity of searching, insertion and deletion in B-Tree. **07**

- Q.4** (a) Prove that the running time of Kruskal's algorithm is $O(E \lg V)$, Where E **07**
 is no. of edges and V is no. of vertices.
- (b) What is stable sort? Explain any one stable sort with its running time **07**
 complexity.

OR

- Q.4** (a) Prove that the running time of Prim's algorithm is $O(E+V \lg V)$. Where E is **07**
 no. of edges and V is no. of vertices.
- (b) Explain the use of heuristic algorithms. State what is difference of **07**
 solving job assignment problem using both techniques?

- Q.5** (a) Explain any sorting algorithm that can be used for parallel computers. **07**
 (b) Explain sorting networks in detail. **07**

OR

- Q.5** (a) All the problems are cover under ‘P’ class problem and ‘NP’ class problem. Can we convert a problem of NP class to P class? Justify your answer with suitable example. **07**
- (b) Suggest a suitable change in existing data structure to overcome the following situation. **07**
- “In a binary tree we are searching for the element that does not exists in the tree” i.e. the element we are searching is smaller than the smallest element in the tree or greater than the largest element in the tree. Suggest suitable modification to reduce the searching effort. State the complexity of the same.
