Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Regular Examination January / February 2011

Subject code: 710201N Subject Name: Computer Algorithm

Date: 31 /01 /2011 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)** Prove that worst case complexity of quick sort and insertion sort is O (n^2). **07**

(b) Solve the following recurrences. **07**

1) T (n) = 4T (n/2) + nlog n, where n is power of two.

2) T(n) = T(n-1) + T(n-2) , when n is greater than 1 , else T(n) = n, when n is 0,1

Q.2 **(a)** How is heuristic Algorithm more efficient than dynamic programming? Explain with example. **07**

(b) Greedy Approach is faster than dynamic programming? Justify with example. **07**

OR

(b) Explain interval tree and its searching complexity? **07**

Q.3 **(a)** Show the B-tree that results when inserting R,Y,F,X,A,M,C,D,E,T,H,V,L,W,G(in that order) branching factor of $t = 3$. You need only draw the trees just before and after each split. Show the B-tree the results when deleting A, then deleting V and then deleting P from the following B-tree with a minimum branching factor of $t = 2$. **07**

(b) Difference between AVL tree and Red-black tree (In terms of height and complexity). Insert the following sequence in AVL tree and Red-black tree: **07**
12, 4, 19, 16, 21, 1, 4, 7,9

OR

Q.3 **(a)** What is the complexity of deleting and inserting an element from binomial heap? Specify any example where binomial heap is preferred than normal heap? **07**

(b) Explain Traveling sales man problem? It is a NP class problem? Justify your answer with proof. **07**

Q.4 **(a)** Let G = (V, E) be a simple graph which is weighted, undirected, and connected. Suppose G contains a unique edge having the largest weight. Let e_{max} be this edge. Suppose removing e_{max} in G does not disconnect G. Prove that any minimum spanning tree of G must not contain the edge e_{max}. **07**

(b) Explain kruskal's algorithm in detail with analysis of space complexity? **07**

OR

Q.4 **(a)** Create a Fibonacci-heap for following list **07**
<23,15,10,35,40,60,30,47,3,33,51,90,70,44> After creation, Decrease the key 47 to 19 and 33 to 2 and show above all operation with use of auxiliary Array.

(b) Find the longest common subsequence from the given two sequence of characters, **07**

1) P = (A,BC,D,B,C,D,C,D,D); Q= (C,B,A,F)

2) P = (1,0,0,1,0,1,1,0,1,1,0,1); Q= (0,1,1,0)

Q.5 **(a)** Explain Insertion sort in Parallel Environment and Calculate Complexity. **07**

(b) Explain radix sort in Parallel Environment and Calculate Complexity. **07**

OR

Q.5 **(a)** Find an optimal solution for the knapsack Instances **07**
n=7, M=15(P_1,P_2,…,P_7)=(10,5,15,7,6,18,3) and
(W_1,W_2,…,W_7)=(2,3,5,7,1,4,1)

(b) Derive recurrence for chained matrix multiplication and solve for following sequence: 10 X 15, 15 X 25, 25 X 30, 30 X 35 **07**

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