

GUJARAT TECHNOLOGICAL UNIVERSITYM. E. 1ST Semester Remedial Examination –July- 2011**Subject code: 710201****Subject Name: Computer Algorithm****Date:07/07/2011****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 stable sort and list the stable sort from following options and justify your answer? **07**
(Quick sort, merge sort, counting sort, insertion sort, radix sort)
- (b)** Solve the following recurrences. **07**
1) $T(n) = 4T(n/2) + n^2$, where n is power of two.
2) $T(n) = 2T(n/2) + n$, using recurrence tree method.
- Q.2 (a)** Create a Fibonacci-heap for following list **07**
<20,10,5,30,35,55,25,45,36,32,50,90,70,44,60> After creation, Decrease the key 45 to 19 and 32 to 28 and show above all operation with use of auxiliary Array.
- (b)** Difference between Greedy Approach and dynamic programming? Explain making change problem using both techniques. **07**

OR

- (b)** Greedy Approach is faster than dynamic programming? Justify with example. **07**
- 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)** 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**
A, C, Z, W, Y, F, Q, N, P, L, R

OR

- Q.3 (a)** Find an optimal solution for the knapsack Instances **07**
 $n=7, M=15(P_1, P_2, \dots, P_7)=(12, 3, 18, 20, 4, 1, 3)$ and
 $(W_1, W_2, \dots, W_7)=(2, 3, 5, 7, 1, 4, 1)$

(b) Explain sorting Network Based on Insertion sort and Bitonic Sorting Network. 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 prim's algorithm in detail with analysis of space complexity? 07

OR

Q.4 (a) Derive recurrence for chained matrix multiplication and solve for following sequence:
12 X 20, 20 X 15, 15 X 21, 21 X 9 07

(b) Explain Dijkstra's algorithm in detail with its complexity. 07

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

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

OR

Q.5 (a) Cricket world cup is organized and organizer wants to create a star team from all the teams. 07

A set of countries $C = \{C_1, C_2 \dots C_n\}$ and each set have a relation with set of players $P = \{P_1, P_2 \dots P_m\}$. (Each country is having a set of players). Each Player has a relation in set Efficiency of Batting $B = \{0 \text{ to } 1\}$ and Efficiency of Bowling $B = \{0 \text{ to } 1\}$. Design the star team in such a manner that it would have all highest efficiency average than any other team.(Using Disjoint Set or Dynamic programming)

(b) Explain fractional 0/1 Knapsack problem? Derive recurrence for the same. 07
