(Please write your Exam Roll No.)

END TERM EXAMINATION

FORTH SEMESTER [B.TECH/M.TECH] MAY-2010

Paper Code: IT 206
Paper ID: 15206
Time: 3 Hours

Subject: Algorithm Analysis & Design
(Batch 2002 – 2005)
Maximum Marks: 60

Note: Attempt any five questions.

Q.1

(a) Explain Divide and Conquer Approach of designing an algorithm using Merge Sort algorithm as an example. **(6)**

(b) Find out time-complexity of Merge Sort algorithm using recurrence relation. **(6)**

Q.2 (a) How ith smallest number can be found in worst case of linear time from an array of size n? **(8)**

(b) Show how quick sort can be made to run in O (nlogn) time in the worst case. **(4)**

Q.3 (a) Write an algorithm for deletion of a node from a binary search time. **(6)**

(b) In an open-address hash table with load factor $\alpha = \frac{n}{m} < 1$, Prove that expected number of probes in an unsuccessful search is at most 1/(1-α), assuming uniform hashing. **(6)**

Q.4 *Explain the algorithm* to find out strongly connected components of a directed graph and *prove its correctness.* **(12)**

Q.5 Explain complete implementation of Kruskal's algorithm (including data structures being used for representation of graph, disjoint set union and find operation) to find minimum cost spanning tree in a graph. **(12)**

Q.6 (a) Explain Knuth-Morris-Pratt string matching algorithm. **(8)**

(b) Complete the prefix function IT for the pattern. **(4)**

ababba bbaba bbababbabb

When the alphabet is $\sum$ = { a,b }.

Q.7 (a) Define P, NP-Complete and NP-Hard problem. **(5)**

(b) Define Hamiltonian-cycle problem and also prove that it is NP-complete. **(7)**

Q.8 (a) Find the upper bound in $\sum_{k=1}^{n} \frac{1}{k}$. **(3)**

(b) Define order statistics tree. **(3)**

(C) Define finite Automata. **(3)**

(d) Define O (g (n)), Ω (g (n)), and θ (g (n)). **(3)**

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