Helsinki University of Technology
Laboratory of Information Processing Science
T-106.253 Data Structures and Algorithms Y

EXAMINATION
28.8.2003

Write in each paper your name, student number *with checking letter*, study program, and the course code and name "T-106.253 Data Structures and Algorithms Y". Write also date, hall, the number of papers you return, and your *signature*.

1) **Terminology** (2p + 2p + 2p + 2p)

Define the following concepts. *Give an example* of each.

a) Deque
b) Stable sorting algorithm
c) Hash function
d) Abstract Data Type

2) **Priority Queues** (4p + 6p)

a) *Describe* an algorithm that employs a priority queue in its function (e.g., Huffman coding, priority queues for sorting, or Dijkstra's algorithm, but address yourself to a certain application). Describe the function of the application in such a detailed level that the usage of the priority queue becomes clear.

b) *Analyse the running time* of the chosen algorithm with two different implementations of priority queues that are the linked list in priority order, and the binary heap.

3) **Dictionaries** (8p)

Classify the *dictionaries* discribed in this course. Characterize the different types of dictionaries. Describe briefly how the groups differ from each other. *Name two examples* of each group.

4) **Graphs** (4p + 4p)

a) *Describe* the *principle* of the depth first search and the breath first search algorithms. What is common to both of them? How do they differ from each other?

b) *Compare the traversing order* of the algorithms in the following two types of graphs. It is unnecessary, however, to give a detailed explanation of the algorithms.

1) Undirected cyclic graph
2) Ordered tree