

2004 Paper 11 Question 4

Data Structures and Algorithms

- (a) Describe the structure of splay trees used to represent a set of key–value pairs. [5 marks]
- (b) Describe how new key–value pairs are added to the tree, how the value associated with a given key can be looked up, and how to delete a pair with a given key. [5 marks]
- (c) State without proof the attractive properties of splay trees. [4 marks]
- (d) Describe the ternary tree structure used to hold a dictionary of key–value pairs where the keys are variable-length strings. Illustrate the mechanism by showing the structure after items with keys MIT, SAD, MAN, APT, MUD, ADD, MAG, MINE, MIKE, MINT, AT, MATE and MINES have been added in that order to an initially empty ternary tree. [6 marks]