

參考用

- (1) 以一年之12個月的英文名稱 (JAN, FEB, ..., DEC) 來建立一個 AVL Tree (15%)
- (2) Hashing 中處理 Collision 的方式有一種為 Linear Open Addressing，試說明在這種結構下要如何處理 (a)Search, (b)Insert, (c)Delete 一筆資料的演算法。 (15%)
- (3) Character Strings 一般分為 Fixed Length, Variable Length to a Declared Bound, Unbound Length 三類，試分別說明它們的資料結構是如何建構的。 (10%)
- (4) 試寫出 Bubble Sort 的演算法，並計算其 Best Case 與 Worst Case 之 Time Complexity 為何？ (10%)

(5) (10%) Infix-prefix-postfix transformation: showing your step-by-step procedure is necessary.

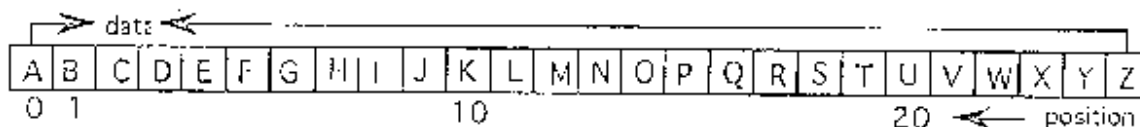
- a) (5%) Transform the following infix expression to prefix:  $A \cdot B + C - D + E / F / (G - H)$   
 b) (5%) Transform the following postfix expression to infix:  $AB - C + DEF + \&$

(6) (16%) Towers of Hanoi Problem: assume that the total number of disks on Peg A is  $n$ , and we want to move the  $n$  disks from Peg A to Peg C using Peg B as auxiliary: The recursive algorithm is as follows:

1. If  $n=1$ , move the single disk from A to C and stop.
2. Move the top  $n-1$  disks from A to B, using C as auxiliary.
3. Move the remaining disk from A to C.
4. Move the  $n-1$  disks from B to C, using A as auxiliary.

- a) (8%) Prove that the number of moves performed by the algorithm above is  $2^n - 1$ . Can you find a method of solving the problem in fewer moves?  
 b) (8%) Assume that we can move Disks 1 and at one time due to their smaller size, but we can move only one disk at one time for the larger disks: 3,4,...,  $n$ . Write a recursive procedure to solve the problem

(7) (14%) Assume that a binary tree represented by the implicit array is



- a) (6%) Find parent(W) and rightson(brother(J)). (Show ALL STEPS which drive you to the answer.)  
 b) (8%) In the worst case, how many number of elements can be inserted in a binary tree represented by the implicit array? Your answer should be an EXACT NUMBER, assuming that the size of the array is 1000. Discuss your answer.
- (8) (10%) What is the average number of nodes accessed in searching for a particular element in an unordered list? In an ordered list? In an unordered array? In an ordered array?