大同大學 九十 學年度 轉學考試 試題

考試科目：資料結構　系別：資訊工程學系　級別：三年級　第 1 頁，共 1 頁

註：本次考試不可以參考自己的書籍及筆記；　不可以使用字典；　不可以使用計算器。

1. (a) What are the differences between a list and an array? (6%)

   (b) What are the differences between a queue and a stack? (6%)

   (c) What are the differences between a binary search tree and an AVL(height balance) tree? (6%)

2. Consider the function f(n) defined as follows, where n is a nonnegative integer :

$$f(n)=\begin{cases} n & \text{if } n<=1 ; \\ n+f(n/2) & \text{if } n \text{ is even and } n>1 ; \\ f((n+1)/2)+f((n-1)/2) & \text{if } n \text{ is odd and } n>1 \end{cases}$$

   (a) Write a recursive C function to compute f(n). (8%)

   (b) Draw the recursion tree and calculate the value of f(6). How many calls of f(n) and how many additions are required in order to calculate f(6). (10%)

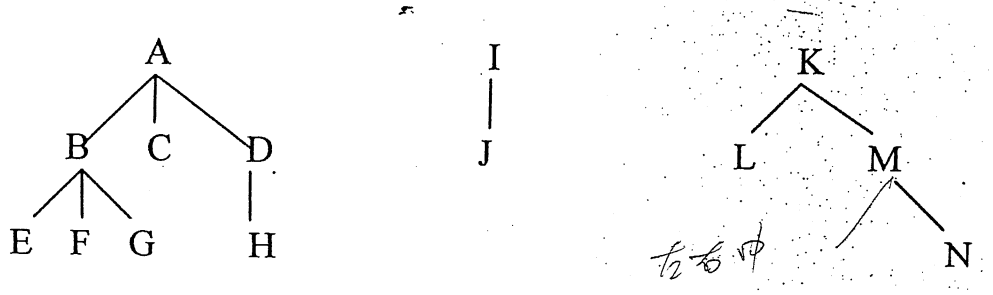
3. Applying the preorder traversal algorithm to a certain binary search tree produces the node ordering : 50, 20, 10, 40, 30, 70, 60, 80, 90

   (a) Construct and draw the binary search tree. (6%)

   (b) List the node ordering under postorder traversal. (6%)

   (c) Add threads to the tree of (a) and draw the resulting threaded binary search tree. (6%)

4. For the forest shown below :



   (a) Find its binary tree representation under natural correspondence. (6%)

   (b) List the node ordering under postorder traversal. (8%)

5. (a) Explain the term "Heap". (6%)

   (b) Use an example to explain the idea of heapsort. (10%)

6. (a) Draw an example diagram for the circular doubly linked list structure. (6%)

   (b) Give an application example of circular doubly linked list. (You should state why this structure is used.) (10%)