國立中央大學99學年度碩士班考試入學試題卷

所別：資訊管理學系碩士班 丙組(一般生)　科目：資料結構　共 2 頁 第 1 頁

本科考試禁用計算器　　＊請在試卷答案卷（卡）內作答

1. (17 points) The binary tree is shown in Figure 1.
(a) Express the tree in array form. 3. (8 points)
(b) Express the tree in linked list form. (9 points)
You have to explain your answer in detail.

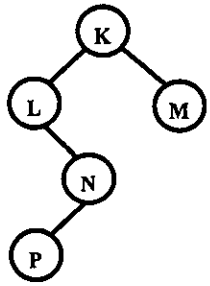


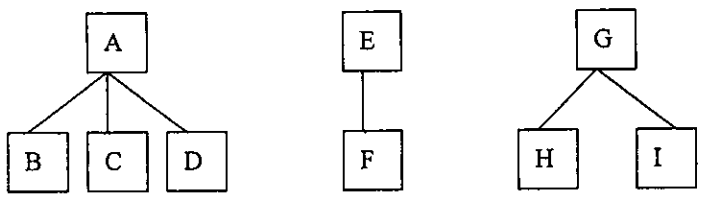
Figure 1.

2. (18 points)
(a) The expression, **P*(Q+R)*S**, is given. With a stack, show the transformation from infix to postfix. (9 points)
(b) You are given the expression in postfix, **PQ*RS+–T/**. With a stack, show the transformation from postfix to infix. (9 points)
You have to explain your answer in detail.

3. (5 points) What is the maximum number of nodes in a k-ary tree of height h?

4. (15 points) If $T_1, \ldots, Tn$ is a forest of trees, then the binary tree corresponding to this forest, denoted as $B(T_1, \ldots, Tn)$, is defined as follow:
   - *is empty, if n=0*
   - *has root equal to root (T_1); has left subtree equal to $B(T_{11}, T_{12}, \ldots, T_{1m})$, where $T_{11}, T_{12}, \ldots, T_{1m}$ are the subtrees of root (T_1); and has right subtree $B(T_2, \ldots, Tn)$.*

   (1) Draw binary tree representation of the following forest (5 points)



   (2) Define the inverse transformation of the one that creates the associated binary tree from a forest. Are these transformations unique? If not, use the example in (1) to show it.(10 points)

注意:背面有試題

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5. (15 points) You need to sort a file that does not fit into memory. Suggest a way, using algorithms you know, to sort this file using only O(n log n) read/write operations. (You need to proof your answer indeed only use O(n log n) read/write operations, and better illustrate it by picture for ease of understanding)

6. (a) What are the purpose and principle of Huffman tree? (5 points)
   (b) Are the leading bits of each code unique?
   Please explain your answer. (5 points)

7. (a) What is the definition of a double-ended priority queue? (3 points)
   (b) Is the min-max heap a kind of double-ended priority queues? Please give reasons to support your answer. (7 points)

8. (10 points) The following questions are about hashing.
   (a) What is a uniform hashing function? (2 points)
   (b) What is a perfect hashing function? (2 points)
   (c) For the following keys 62, 26, 35, 53, 17, 8, 44, design a perfect hashing function which is also a uniform function by using the minimum hash table. (6 points)

注意：背面有試題