

國立高雄科技大學 108 學年度碩士班 招生考試 試題紙

系 所 別： 資訊工程系碩士班

組 別： 不分組

考科代碼： 1081

考 科： 資料結構

=====

注意事項：

- 1、各考科一律可使用本校提供之電子計算器，**考生不得使用自備計算器**，違者該科不予計分。
- 2、請於答案卷上規定之範圍作答，違者該題不予計分。

多選題（每題 10%；完全正確才能得分）

1. Which statement(s) is/are correct for a binary search tree? (A) If a new element is equal to the middle of the elements already in the tree, then the new element is inserted into the root. (B) If we traverse the tree nodes with the in-order sequence, the sequence is sorted. (C) If a node is to be deleted, it must be a leaf node. (D) The elements smaller than the element in the root are stored in the left sub-tree.
2. Which statement(s) is/are correct for the hashing method? (A) Hashing is a fast sorting method. (B) Let's assume the linear probing method is used. If element x is smaller than element y, the position index for storing x must be smaller than that for y in the hash table. (C) If the linear probing method is used, an element in the hash table can be deleted directly. (D) The linear probing method can resolve hash collisions.
3. Which statement(s) is/are correct for a red-black tree? (A) The color of the root node is red. (B) All leaf nodes are on the same level. (C) In the path from the root node to each leaf node, there are no two consecutive red nodes. (D) If a new node is inserted into the tree, its color is set to be red.
4. Which statement(s) is/are correct for an AVL tree? (A) If we traverse the tree nodes with the pre-order sequence, the values stored in these nodes are sorted. (B) The LL rebalancing rotation is symmetric to the RR rebalancing rotation. (C) In the LR rebalancing rotation, one of the tree nodes is moved up 2 levels. (D) The level difference of every two nodes is at most 1.

問答題（每題 10%）

1. Transform the prefix expression ++A-**BCD/+EF*GHI to infix and postfix expressions.
2. A upper triangular array a is an n-by-n array in which $a[i][j] = 0$, if $i > j$. Suppose that array a is stored in one-dimensional array b sequentially. Therefore, the sequence for storing in array b is $a[0][0]$, $a[0][1]$, ..., $a[0][n-1]$, $a[1][1]$, $a[1][2]$, ..., $a[1][n-1]$, $a[2][2]$, $a[2][3]$, ..., $a[2][n-1]$, Please

produce the addressing formula for the element $a[i][j]$ stored in $b[k]$ in the upper triangular part.

3. Suppose that a complete binary tree is stored in an array $a[]$, and the root node is stored in $a[1]$. Please find the parent node of $a[i]$ and the children nodes of $a[i]$.

4. Please create a max heap according to the input order of data: 38, 78, 10, 65, 19, 86, 33, 72, 20.

程式設計 (每題 10%)

1. Write a pseudo code function to perform the insertion sort, assuming the sorted values are in non-decreasing order.

2. Write a pseudo code function to reverse a singly linked list. For example, the given list $X=(x_1, x_2, \dots, x_{n-1}, x_n)$. After the reversing process, the list will become $(x_n, x_{n-1}, \dots, x_2, x_1)$.