招生學年度	103	招生類別	碩士班
系所班別	資訊工程學系碩士班（資工甲組、資工乙組）		
科目名稱	資料結構		
注意事項	本考科禁止使用掌上型計算機		

1. (15%) Questions about the implementation of one queue using stacks
(a) (5%) What many stacks are necessary for this implementation?
(b) (5%) Use an example to show the enqueue operation using stacks. What is the time complexity of this operation?
(c) (5%) Use an example to show the dequeue operation using stacks. What is the time complexity of the operation?

2. (20%) Questions about the different notations of an arithmetic expression.
(a) (5%) Convert the infix expression **((A * (B + C)) / D)** to the postfix one.
(b) (5%) Convert the prefix expression **(* A (+ B (/ C D)))** to the infix one.
(c) (5%) For which notations (infix, postfix, and prefix) are the parentheses (括號) **not** necessary?
(d) (5%) Explain how to evaluate the result of a postfix expression **10 2 8 * + 3 –** using the stack.

3. (15%) Questions about the bubble sort.
(a) (5%) Show the steps how the bubble sort (sorting numbers from smallest to largest) work on the input numbers **5, 1, 3, 6, 2.**
(b) (5%) What is the best-case complexity of this algorithm? Show the best-case example.
(c) (5%) What is the worst-case complexity of this algorithm? Show the worst-case example.

4. (15%) Write a procedure (or function) **Copy_Binary_Tree(treeNode** *btr) that can be used to copy a given binary tree. (treeNode is a user-defined structure of a node)

5. (20%) Given preorder and inorder for a binary tree.
preorder: **C A D E H B F G I**
Inorder: **D A H E B C F I G**
(a) Reconstruct the binary tree (10%)
(b) Print the result of postorder traversal (10%)

6. (15%) When overflow is occurred in a hash, please explain how to implement Linear Open Addressing and Chaining to resolve overflows. (algorithm or draw a graph is ok.)