

# 淡江大學 102 學年度碩士班招生考試試題 44-1

系別：資訊工程學系

科目：資料結構

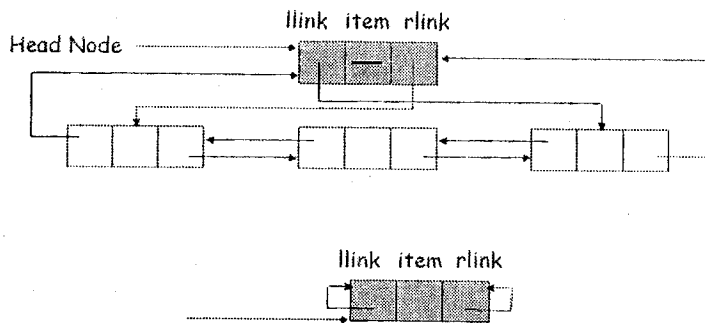
考試日期：3月10日(星期日)第2節

本試題共 10 大題， 2 頁

一、What are the major difference of the definition between Tree and Binary Tree?  
(5%)

二、Demonstrate the insertion of the keys 15, 18, 29, 13, 21, 35, 11, 12, 10 into a hash table with collisions resolved by chaining. Let the table have 9 slots (0-8), and let the hash function be  $h(k) = k \bmod 9$ . (5%)

三、Please complete the definition of *Double\_List* class in C++ as follows:(Insert: 10%, Delete: 10%, ~List: 5% for three functions)



```
class Double_List; // forward declaration
class ListNode {
    friend class Double_List;
private:
    int data;
    ListNode *L_link;
    ListNode *R_link;
};
```

```
class Double_List {
public:
    List() {head = new ListNode(0, head, head);} //Constructor
    boolean Insert(int); /*Insert one node with new indicated data into a proper position of
                           the original list in ascendant sequence*/
    boolean Delete(int); /*Delete one node with the indicated data from the original list. If
                           it doesn't exist, please return false. If it is existed, save the data
                           of node to argument and then release this node, return true*/
    ~List(); //Destructor, release all nodes in this List
private:
    ListNode *head;
};
```

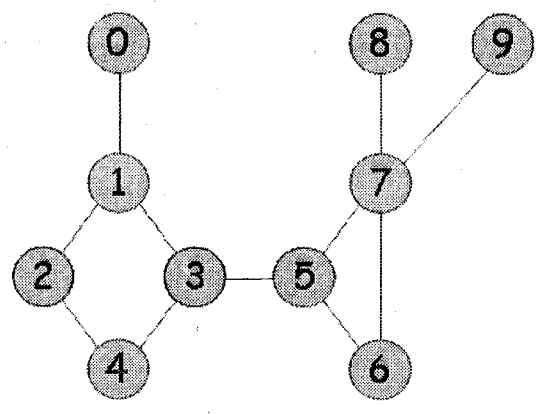
每個 function 的邏輯必須全對才給分

背面尚有試題

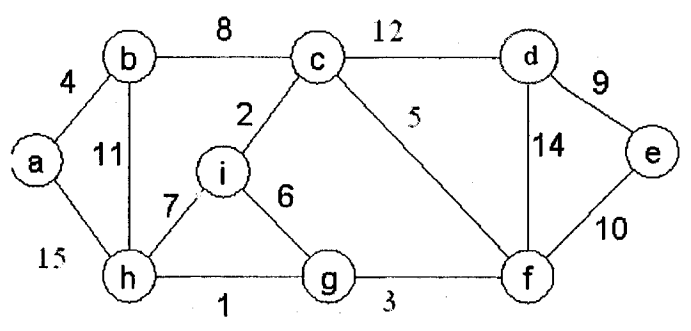
本試題雙面印刷

四、What means that an algorithm is said “stable” or “unstable”? (5%)

五、Please find out all of the Biconnected components from following Figure. (5%)



六、As the following figure, consider the weight on the edges, please draw the minimal cost spanning tree by Kruskal’s method step by step, respectively. (15%) (一個動作一個圖，全對才給分)



七、Please calculate the constant number  $c_1$ ,  $c_2$  and  $n_0$  of the following  $f(n)$  functions and their “Theta” functions,  $\Theta(g(n))$ :

- (a).  $f(n) = 2n^2 2^n + n \log n$  (5%)
- (b).  $f(n) = 10n^2 + 4n + 2$  (5%)

八、If the Preorder sequence is “ABDGHCE” and the Postorder sequence is “GHDBFCA”, do you make sure it is from an unique binary tree. If your answer is “Yes”, please draw the unique binary tree. If “No”, please draw two binary trees can generate the same Preorder and Postorder sequences as above. (10%)

九、(a). Please design a PolyNode class for polynomial with multiple variables and (b). draw the linked list figure of the polynomial  $P(x, y, z) = 6x^{12}y^3z^2 + 4x^{10}y^3z^2 - 4x^6y^2z^2 + 5x^4y^3z - 7x^2z + 9y^3z$ . (5% for a, 10% for b)

十、A is a 2-dimensional array  $A(m,n)$ , the location of  $A(3,2)$  is 1110 and  $A(2,3)$  is 1115. Assume that each element occupies one address, then what is the location of  $A(1,4)$ . (5%)