

國立臺北大學 106 學年度碩士班一般入學考試試題

系（所）組別：資訊工程學系

科目：資料結構與演算法

第 1 頁 共 2 頁

☐可 ☒不可使用計算機

1. (10%)使用以下 inorder 敘述來呈現 preorder, postorder, and level order:

$A*(B+C)/E*F$

2. (20%)使用 linked list 完成以下 stack 程式

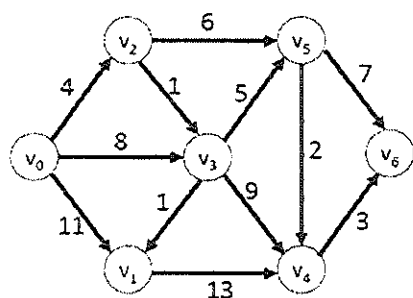
```
typedef struct node { int value; node *next; }  
void push (node **top, int new_value) { // assume top is not null  
    node *new_node = (node *) malloc (sizeof (node));  
    // Your answer starting here  
    // add new_node to stack by top  
}  
  
int pop (node **top) { // assume top is not null  
    int value;  
    node *deleting_node = *top;  
    // Your answer starts here  
    // remove the deleting node from stack, get the value of deleting node  
    free(deleting_node);  
    return value;  
}
```

3. (20%)使用 queue 完成以下二元樹 level order traversal

```
void level_order (tree *root) { //assume root is not null  
    node *front, *rear;  
    enqueue (&rear, root);  
    // Your answer starts here  
    // visit tree nodes based on level order by using queue  
    // use queue by front, rear, enqueue(&rear, root), root = dequeue(&front)  
    // print the values of tree nodes  
    // describe the ending condition
```

4. (10%) Construct a set of Huffman codewords for the eight symbols ($S_1, S_2, \dots, S_8$) with frequencies ($q_1, q_2, \dots, q_8$) = (6, 10, 2, 7, 3, 8, 12, 14). Draw the coding tree for your constructed code.

5. (10%) Use Dijkstra's algorithm to find shortest paths from the vertex V_0 for the following graph.



試題隨卷繳交

接背面

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6. (20%) The following procedure is an algorithm for finding a longest common subsequence.

LCS-Length(*X*, *Y*)

```
1  m ← length[X]
2  n ← length[Y]
3  for i ← 1 to m
4      do c[i, 0] ← 0
5  for j ← 0 to n
6      do c[0, j] ← 0
7  for i ← 1 to m
8      do for j ← 1 to n
9          do if  $x_i = y_j$ 
10             then c[i, j] ← c[i - 1, j - 1] + 1
11                 b[i, j] ← “\”
12             else if c[i - 1, j] ≥ c[i, j - 1]
13                 then c[i, j] ← c[i - 1, j]
14                     b[i, j] ← “↑”
15                 else c[i, j] ← c[i, j - 1]
16                     b[i, j] ← “←”
17  return c and b
```

- (i) (16%) Given input *X*=ABCB~~D~~AB and *Y*=BDCABA. What are *c* and *b*?

- (ii) (4%) Find a longest common subsequence according to *c* and *b*. You should describe your procedure step by step.

7. (10%) Use Prim's algorithm to find a minimum spanning tree for the following graph where the start vertex should be V_0 .

