國立成功大學

113學年度碩士班招生考試試題

編　號：110

系　所：工程科學系

科　目：資料結構

日　期：0202

節　次：第 1 節

備　註：不可使用計算機

編號： 110

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※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (15%) Briefly describe three basic programming structures?

Let T_1 be a general tree and T_2 be a complete binary tree, consider the following problems.

2. (5 %) If T_1 contains 101 nodes, proof the height of the tree T_1? If there are multiple answers, write down all of them.
3. (5 %) If T_2 contains 101 nodes, proof the height of the tree T_2? If there are multiple answers, write down all of them.
4. (20 %) Suppose that we have the following key values: 12, 1, 5, 3, 7, 6, 4, 16, 13. Please write out the result after each value is inserted into the AVL tree.
5. (10 %) Complete the following C code for bubble sort.

```
void bubble_sort(int a[], int len){
    int i, j, temp;
    for (i=0; i<len-1; i++) {
        for (j=0; j<len-1-i; j++)
            // Write down on the answer sheet.
    }
}
```

6. (10 %) Complete the following C code for insertion sort.

```
void insertion_sort(int a[], int len){
    int i, j, key;
    for (i=1; i<len; i++) {
        j=i;
        key=a[i];
        // Write down on the answer sheet.
        a[j]=key;
    }
}
```

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7. (20%) Determine the topological sort for the activity on vertex network depicted in Figure 1. If there are multiple answers, write down the smallest one in lexicographically order.

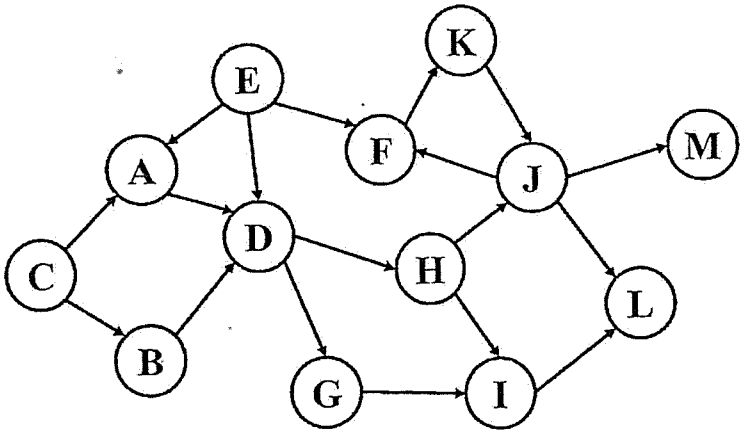

Figure 1

Given the following weighted depicted in Figure 2, consider the following problems.

8. (15%) Using Prim's algorithm to find the minimum spanning tree.

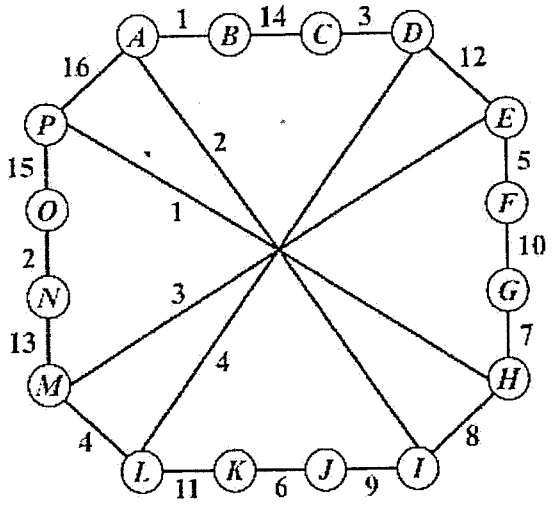

Figure 2