淡江大學九十學年度碩士班招生考試試題

系別:資訊工程學系

科目:計算機概論(含資料結構、程式語言結構)

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計算機	字典
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- 1. Give three different computer network topologies. Draw the diagrams and explain the differences between them. (10 pts)
- 2. Describe the difference between a client/server model and a peer-to-peer model. (10 pts)
- 3. Based on the object-oriented developing environment, describe the concepts of encapsulation, dynamic polymorphism, and inheritance. (10 pts)
- 4. Suppose we are comparing implementations of insertion sort and merge sort on the same machine. For inputs of size n, insertion sort runs in 8n² steps while merge sort runs in 64n lg n steps (lg is the logarithm base 2). For which values of n does insertion sort beat merge sort? Briefly explain how might one modify the merge sort pseudocode to make it even faster on small inputs? (10 pts)
- 5. Explain the concept of divide-and-conquer in algorithm. From the following list, write down the algorithms that are using the concept of divide-and-conquer. (10 pts)
- 6. Explain the concept of greedy in algorithm. From the following list, write down the algorithms that are using the concept of greedy. (10 pts)

For problems 5 and 6:

Kruskal's_algorithm Prim's_algorithm binary_tree_search breadth_first_search bubble sort quick_sort insertion_sort linear_sort

7. Consider the following blocks of C program, what are the printed values after the program being executed? (10 pts)

```
main ()
{    int a = 0;
    int b = 0;
    {       int b = 1;
            {       int a = 2; printf (" %d %d\n", a, b);       }
            {       int b = 3; printf (" %d %d\n", a, b);       }
            printf (" %d %d\n", a, b);
        }
        printf (" %d %d\n", a, b);
}
```

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本試題共 2 頁

```
8. Consider the following: (10 pts)

int Fib (int n)
{

if (n == 0) return (1);

if (n == 1) return (1);

if (n > 1) return (Fib (n - 1) + Fib (n - 2));
```

What is Fib(5)? How many times that the function Fib will be executed in order to evaluate Fib(5)? Explain your answer.

- 9. Suppose that during a preorder traversal of a complete binary tree T, we write down a 1 for each internal vertex and a 0 for each leaf in the traversal, building a sequence of 1's and 0's. We call this sequence the characteristic sequence of T. Find the complete binary tree with the characteristic sequence 110100110100100. (10 pts)
- 10. Use the DFS (depth_first_search) algorithm to determine whether the graph represented by the following set of adjacency list is connected. Show the tree constructed according to DFS. (Assume vertices are ordered as 1, 2, ..., 12, and the selection of vertices is according to smaller number whenever possible.)
 (10 pts)

1	2	3	4	5	6	7	8	9	10	11	12
2	1	4	3	1	3	1	4	5	3	5	1
5	7	6	8	9	8	2	6	12	· 6/	12	2
7	12	10		11			10			• • •	9
12											11