

國立彰化師範大學 102 學年度碩士班招生考試試題

系所：數學系

組別：丙組

科目：計算機概論(含資料結構)

☆☆請在答案紙上作答☆☆

共 3 頁，第 1 頁

1. Please present the bit patterns to store +35 and -35 in an 8-bit memory location using three representations, respectively. (10%)
- (1) Sign-and-magnitude representation.
 - (2) One's complement representation.
 - (3) Two's complement representation.

2. The development process in the software lifecycle includes four phases: analysis, design, implementation and testing. Answer the following questions: (10%)
- (1) Modularity means breaking a large project into smaller parts that can be understood and handled easily. What are coupling and cohesion for modularity in the design phase?
 - (2) What are Glass-box testing and Black-box testing?
 - (3) What are α testing and β testing?

3. Please present the executing result for the following C recursive program: (10%)

```
#include <stdio.h>
void fun(int m,int *n)
{
    m=m+10;
    *n=*n+20;
}
main()
{
    int x=10,y=20;
    int m=100, n=200 ;
    fun(x, &y);
    printf("x = %d,y = %d in main\n", x, y);
    fun(m, &n);
    printf("m= %d,n = %d in main\n", m, n);
    fun(y, &n);
    printf("y = %d,n = %d in main\n", y, n);
}
```

4. Please answer the following questions.

- (1) Which data structure is suitable to represent a non-sparse polynomial such as

$$B(X)=X^4+10X^3+3X^2+1? (5\%)$$

- (2) Which data structure is suitable to represent a sparse polynomials such as $A(X)=2X^{1000}+1$? (5%)

Note. You must write the programming codes (in C, C++, or java) of your data structure and briefly explain it. You can also use some illustrations to help me understanding your answers.

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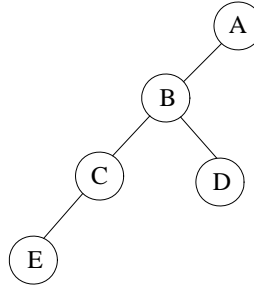
☆☆請在答案紙上作答☆☆

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5. Please draw the internal memory representation of the following binary tree using

(1) Array. (4%)

(2) Linked list. (4%)

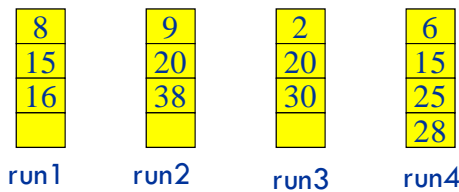


6. Given the 4 ordered sequences as follows. Please draw the

(1) Winner tree. (4%)

(2) Loser tree. (4%)

(3) Compared to a winner tree, what is the advantage of a loser tree? (4%)



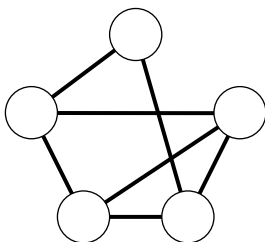
7. Suppose we have the preorder sequence “ABCDEFGHI” and the inorder sequence “BCAEDGHFI” of the same binary tree, please draw this binary tree. (10%)

8. Given the following graph, please write its

(1) Adjacency matrix. (5%)

(2) Adjacency lists. (5%)

(3) Adjacency multilists. (5%)



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共 3 頁，第 3 頁

9. Given the following Activity on Edge Network (AOE network), where the activities to be performed are represented by directed edges a_i and vertices in the network represent events. An event occurs only when all activities entering it have been completed. The value associated with each edge denotes the time required to perform the activity.

- (1) Please use the forward-backward approach to obtain the early and late start times for each activity. (8%)
- (2) What is the earliest time the project can finish? (3%)
- (3) Which activities are critical? (4%)

