

# 國立彰化師範大學 101 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)

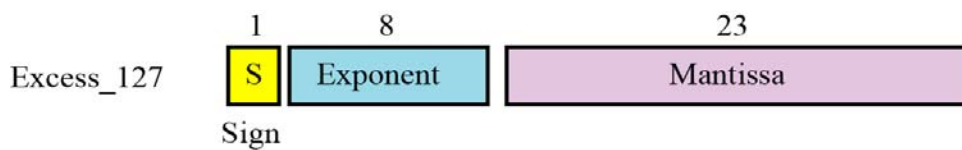
☆☆請在答案卷上作答☆☆

共 3 頁，第 1 頁

1. Answer the following questions about representations: (10%)

(a) In two's complement representation using 8 bits, please compute the result of  $(10001110)_2 - (10100110)_2$ . (Note that the result must be presented in two's complement representation using 8 bits.)

(b) Present the decimal number (-60.5) using IEEE standards (the Excess\_127) for single precision floating-point representation. (Note that please use 32-bit binary representation.)



a. Single precision (32 bits)

2. In memory management of multiprogramming, several programs may be stayed in main memory at the same time, and they are executed with the CPU switching rapidly between the programs. Please present concepts or principles for the following items. (10%)

(a) Paging

(b) Segmentation

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

```
#include <stdio.h>
int recval (int n)
{
    if (n <= 0)
        return (1);
    else{
        return (recval(n-2)+recval(n-3));
    }
}
int main()
{
    int x, y;
    x=recval(6);
    printf("x=%d \n", x);
    y=recval(10);
    printf("y=%d \n", y);
}
```

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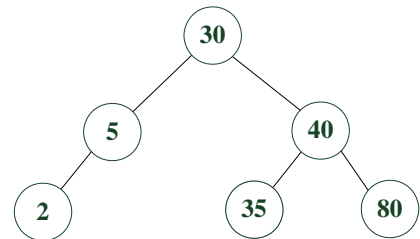
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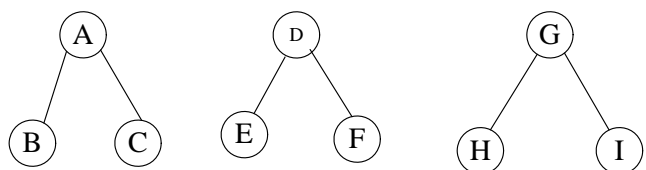
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4. Please write a data structure which is suitable to represent the sparse polynomials such as  $A(X)=3X^{100}+5X+6$ . You must write the programming codes (in C, C++, or java) of your data structure and briefly explain it. You can also use some illustrations to help me understand your answers. **(10%)**
5. You are asked to develop a program that runs a maze. In each position of this maze, there are eight possible moves. Your program must output the successful path if there is one. Please answer the following problem.
- (a) What data structure is suitable to represent the maze? **(5%)**
  - (b) What data structure is suitable to represent the eight possible directions to move? **(5%)**
  - (c) Since not every position in this maze has eight neighbors, checking the border conditions will become complicated. Please describe a method to overcome this problem. **(5%)**
  - (d) What data structure is suitable to record the traversal path? **(5%)**
6. Please write the code (in C, C++, or java) of the iterative inorder traversal. **(10%)**
7. (a) What is a binary search tree? **(5%)**  
(b) Given the following graph, please show how the elements 30 in the graph are taken out. (Note: You have to draw the immediate steps or briefly explain your reason for Question (b).) **(5%)**



8. Given the following forest, please transform it into a binary tree. **(10%)**



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共 3 頁，第 3 頁

9. Given the following graph and assume we start the search in vertex 0, please draw the

(a) Depth-first search spanning tree; (5%)

(b) Breadth-first search spanning tree. (5%)

