

考試科目	計算機概論 A8211	系所別	資訊科學系碩士在職專班	考試時間	2月19日(日) 第四節
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You can write your answers either in English or in Chinese. 可用中文或英文作答。

1. (10%) Print out the output of the following program written in C language.

```

-----
#include <stdio.h>
#define N 10
void main(void)
{
    static struct girl {
        char *name;
        int year;
    } *t, *p[N], a[] = {"Ann",18, "Rolla",19, "Nancy",16, "Eluza",17, "Juliet",18, "Machilda",20, "Emy",15,
                        "Candy",16, "Ema",17, "Mari",18};

    char *min;
    int s, i, j;
    for (i=0; i<N; i++)
        p[i]=&a[i];
    for (i=0; i<N-1; i++){
        min=p[i] ->name;
        s=i;
        for (j=i+1; j<N; j++){
            if (strcmp(p[j] -> name, min) < 0 {
                min=p[j] -> name;
                s=j;
            }
        }
        t=p[i]; p[i]=p[s]; p[s]=t;
    }
    for (i=0; i<N; i++)
        printf("%10s%4d\n", p[i]-> name, p[i]->year);
}
-----

```

2. (10%) Suppose a machine programmed with the insertion sort algorithm requires an average of one second to sort a list of 100 names. How long do you estimate it to sort a list of 1000 names? How about 10,000 names? Explain your answers.

備註

- 一、作答於試題上者，不予計分。
二、試題請隨卷繳交。

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3. (10%) Draw the search tree that would be generated by a breadth-first (寬度優先) search when solving the eight-puzzle from the starting configuration below.

1	2	3
4	8	5
7	6	

4. (10%) What is a public key cryptography such as RSA? What is its advantage and disadvantage comparing with a symmetric key cryptography such as AES or DES?

5. (10%) Given the relation X below

X:

A	B	C
2	5	7
3	3	6
4	4	2
5	2	2

(a) (5%) what value will be retrieved by the following query?

```
TEMP ← SELECT from X where B < C
RESULT ← PROJECT B from TEMP
```

(b) (5%) what values will be retrieved by the following SQL query?

```
select A, B
from X
where X.B = X.C
```

6. (10%) What are some differences between a transport layer based on the TCP protocol and another based on the UDP protocol?

7. (10%) An organization has a class B network 10110111 11001110 10110000 00101111, and wants to form subnets for four departments. Each department has "at most" the following number of hosts:

A: 220, B: 256, C: 500, D: 544.

Please determine the "optimal" subnet mask of each subnet. The optimal subnet mask means that we can have the least number of host part in each subnet.

8. (10%) Transfer (a) (5%) the decimal number 89 to its binary expression, and (b) (5%) the hexadecimal number AE to its binary expression.

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9. (10%) What is a social engineering attack? Give an example about social engineering attacks.
10. (10%)
- (a) (5%) What are the largest and the smallest values in two's complement notation using 8 bits. Show your answers in both bit pattern (ie., bit representation) and decimal representation.
- (b) (5%) Express the decimal number 1001010.0011 in single-precision IEEE 754 floating point standard.



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