

國立彰化師範大學 102 學年度碩士班招生考試試題

系所：資訊工程學系

科目：資料結構及程式設計

☆☆請在答案紙上作答☆☆

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1. Multiple-choice (more than one answer)

(1) Choose the valid variable names in C. (6%)

(A) _ab? (B) c_a+b (C) NCUE (D) 3Car (E) a23b (F) avg-score (G) _2cad

(2) Choose the valid Keywords in C. (6%)

(A) float (B) then (C) sizeof (D) until (E) signed (F) when

2. Write the outputs of the following programs.

(1) (6%)

```
int i, j;
for (i=0; i<5; i++) {
    for (j=0; j<=i; j+=2)
        printf("*");
    printf("\n");
}
```

(2) (6%)

```
int i = 100;
if (i > 200)
    if (i < 300)
        printf("not bad\n");
else
    printf("not good\n");
printf("over\n");
```

(3) (6%)

```
#include <stdio.h>
void func(int n)
{
    int i;
    if (n == 1)
        printf("%d", n);
    else {
        func(n-1);
        for (i=0; i<n; i++)
            printf("%d", n);
    }
    printf("\n");
}
int main(void)
{
    int i;
    func(6);
    return 0;
}
```

3.

(1) Write a program that asks the user to input a three-digit number, then prints the number with its digits reversed. A program execution example is shown below. (The text with underline is user input) (10%)

Enter a three-digit number: 283

The reversal number is: 382

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(2) The recursive formula for binomial coefficient is $C_k^n = C_{k-1}^{n-1} + C_k^{n-1}$, for all integers $n, k > 0$, with boundary values:

$$C_0^n = 1, \text{ for all integers } n \geq 0,$$

$$C_k^0 = 0, \text{ for all integers } k > 0,$$

$$C_n^n = 1, \text{ for all integers } n \geq 0$$

Write a **recursive** function `int cnk(int n, int k)`, which computes and returns the binomial coefficient C_k^n . (10%)

4. How many different binary trees are there with n nodes? Why? (20%)

5. Read the following data in the given order, and show the corresponding trees. (10%)

17, 15, 13, 22, 6, 19, 25, 37, 8, 31, 2, 28, 21

(1) Binary search tree

(2) AVL tree

6. Fibonacci number $F_0 = 0$, $F_1 = 1$, and $F_n = F_{n-1} + F_{n-2}$ for every $n \geq 2$,
Please solve the recurrence equation for F_n . (20%)