

國立臺北科技大學 107 學年度碩士班招生考試

系所組別：1504 自動化科技研究所

第二節 程式設計 試題 (選考)

第一頁 共二頁

注意事項：

1. 本試題共 5 題，共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. What are the outputs of the following code? (15%)

```
void substitute(int *a, int b) {
    *a = b;
}

int main(void) {
    int x[]={10, 12, 5, 8, 2, 15, 14};
    int i;
    substitute (&x[0], 5);
    substitute (&x[2], x[5]);
    substitute (&x[5], x[2]);
    for(i=0; i<7; i++)
        printf("x[%d]=%3d\n", i, x[i]);
    return(0);
}
```

2. State the differences between an Assembly Language and a high level language, e.g., Java. (10%)

3. An algorithm shown below converts a decimal number to its binary representation. The operator, mod, finds the remainder after division of the first number by the second one. The operator, div, does the integer division.

```
input a decimal number
while number>0 do
    digit = number mod 2
    push digit to stack
    number = number div 2
end-while
```

Given an input value of 30, what are the contents of the stack after the algorithm is executed? Mark the top and bottom of the stack clearly on your answer sheet. (15%)

4. How many times is function mystery() called including the one called in the main() function? (10%) What are the values of the variable, result, before and after the function, mystery(), is called? (20%)

```
int mystery( int a, int b )
{
    if ( b == 1 )
        return a;
    else
        return a + mystery( a, b - 1 );
}

int main() {
    int result;
    .
    result = mystery(5, 5);
    .
    .
}
```

注意：背面尚有試題

5. In mathematics, the Fibonacci numbers are the numbers in the following integer sequence, called the Fibonacci sequence, and characterized by the fact that every number after the first two is the sum of the two preceding ones:

0,1,1,2,3,5,8,13,21,34,55,89,144, ...

By definition, the first two numbers in the modern Fibonacci sequence are 0 and 1, and each subsequent number is the sum of the previous two. The sequence F_n of Fibonacci numbers is defined by the recurrence relation:

$$F_n = F_{n-1} + F_{n-2}$$

with seed values $F_0 = 0$ and $F_1 = 1$.

The recurrent form of the Fibonacci can be implemented in C as follow:

```
int fibonacci(int n)
{
    if ( n == 0 )
        return ( ① );
    else if ( n == 1 )
        return ( ② );
    else
        return ( ③ );
}
```

What are the contents in ①, ② and ③? (30%)