

國立臺北科技大學九十九學年度碩士班招生考試

系所組別：2150 電機工程系碩士班戊組

第一節 計算機概論 試題

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注意事項：

1. 本試題共 9 題，配分共 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. (a) Show the truth table of a 4x1 multiplexer (MUX), in which the input, output, and select signals are named I0~I3, O, and S0~S1, respectively. (5%)
(b) Assume that we have an arithmetic/logic unit that can carry out 20 distinct operations and we will use a MUX to select operation. Describe exactly what kind of MUX circuit would be needed to select one of those 20 operations. (5%)
2. Video codecs employ two types of compression: temporal and spatial. Separately explain how these two types of video compression work. (10%)
3. Intractable problems are sometimes approached via approximation algorithms.
(a) What is an intractable problem? (5%)
(b) What is an approximation algorithm? (5%)
4. Assume that any individual program on an embedded system spends about 50% of its time waiting for I/O operations to be completed.
(a) What percentage of time is the processor doing useful work (called processor utilization) if there are three programs loaded into memory? (5%)
(b) How many programs should we keep in memory if we want processor utilization to be at least 95%? (5%)

5. SQL works with relational databases. What does SQL stand for? (2%) How does relational database store its data? (3%) Write an SQL query that retrieves first and last names, ordered by age, from the following Employees table. (5%)

Employees

| ID | LastName | FirstName | Age |
|-----|----------|-----------|-----|
| 116 | Kay | Wang | 34 |
| 123 | Honou | Liu | 33 |
| 145 | Carsen | Chang | 24 |
| 165 | Paul | Lee | 56 |
| 124 | Jay | Lin | 28 |

6. Assuming that we use the following function to obtain the factorial of an integer.

```
int factorial(int num);
```


(a) Write the entire function in an iterative style. (5%)
(b) Write the entire function in a recursive style. (5%)
7. (a) Using C++ language, write a function (odd_even) that takes an integer parameter (num) and returns 1 if that integer is an odd number, otherwise returns 0. (5%)
(b) In C++ language, if originally x, y, z are 1, 2, 3, respectively, what is the result of executing the following code? (5%)

```
if (z = 1) { y++; z--; } else --x; cout << x << y << z << endl;
```
8. Write an algorithm to obtain the value of a postfix expression using stack and use the following expression to explain how your algorithm works. (10%)

3 6 2 / - 1 4 x +

注意：背面尚有試題

9. Given the following class tv_show,

```
class tv_show
{private:
    char title[30];
    int length; // 30 or 60 minutes
    char kind; // c - comedy, d - drama, i - infomercial
public:
    tv_show(char s[],int l, char k)
    {strcpy(title, s); length = l; kind = k;}
};
```

- (a) Explain ADT in terms of class tv_show. (5%)
- (b) Explain the usage of constructor in terms of class tv_show. (5%)
- (c) If the main function is written as shown below, what code should be added into the class declaration of tv_show to ensure a successful compilation? (10%)

```
int main()
{
    tv_show one("One Day to Live", 60, 'd');
    tv_show two;
    return 0;
}
```