國立臺北教育大學103學年度碩士班招生入學考試

資訊科學系碩士班　　計算機概論　　科試題

一、填空題：(每格 2 分，必須標明題號及格號才計分，否則該題以零分計，共 20 分)

(一)Suppose a binary tree with depth *k* and the root is at level 1; the maximum number of nodes on level *i* of the binary tree is __(1)__, the maximum number of nodes of the binary tree is __(2)__, and the minimum number of nodes of the binary tree is __(3)__. If the number of leaf nodes of the binary tree is *n*, the number of nodes with degree 2 is __(4)__.

(二)A __(5)__ is an ordered list in which insertions and deletions are made at one end. A __(6)__ is an ordered list in which all insertions take place at one end and all deletions take place at the opposite end.

(三)Device controller informs CPU that it has finished its operation by causing an __(7)__.

(四)What are two fundamental models of inter-process communication (IPC)? __(8)__ and __(9)__.

(五)假設 FF 是一個 8 位元的 16 進位數，若該數以二的補數表示有號數，請寫出其對應的 10 進位數__(10)__。

二、問答題：(共 80 分)

(一) Give a recurrence function for merge sort and discuss its complexity. (10 分)

(二) Draw and explain the possible states and transitions of a process. (10 分)

(三) 請說明一般 Two-Pass 組譯器(Assembler)中各個 Pass 的功能。(10 分)

(四) 下面是一個以 Java 撰寫的程式，請寫出執行後輸出的結果。(5 分)

```
class circle  {
   int radius;
  public circle(int r)      {
    radius = r;
  }
}
public class app  {
   public static void main(String args[])      {
    circle c1 = new circle(50);
    circle c2 = new circle(50);
    if(c1 == c2)       {
      System.out.print("Equal radius");
    }
    else {
      System.out.print("Not equal radius");
    }
  }
}
```

(五) 請比較 Java 中 abstract class 及 interface 的異同。(10 分)

(六) 請說明 UNIX 中如何利用 chmod 將一個檔案(檔名為 test)的存取設定為對擁有者(owner)只可讀寫；對群組(group)只可讀；對其他人(other)完全不可存取。(5 分)

(七) 請說明 WWW 利用 Common Gateway Interface (CGI)顯示網頁的過程。(10 分)

(八) 下面是一個以 C 撰寫的程式，請寫出其編譯完成後執行的過程。(10 分)

```
#include <stdio.h>
void function1( int a );
void function2( int b );
void function3( int c );
int main()
{
   void (*f[ 3 ])( int ) = { function1, function2, function3 };
   int choice;

   printf( "Enter a number between 0 and 2, 3 to end: " );
   scanf( "%d", &choice );
   if ( choice >= 0 && choice < 3 ) {
      (*f[ choice ])( choice );
   }
   return 0;
}
void function1( int a )
{
   printf( "%d", a );
}
void function2( int b )
{
   printf( "%d", b );
}
void function3( int c )
{
   printf( "%d", c );
}
```

(九) 請說明目前大部分處理器如何利用 Pipeline 的概念提高執行程式的速度。(10 分)