考　試　科　目	計算機概論	系　　別	資訊管理學系	考　試　時　間	07 月 08 日（五）第二節

提醒： 時間有限，請先填答佔分比例高以及較有把握的題目。
（選擇題請在答案卡上作答，否則不予計分。）

I. Multiple Choice: Basic Computer Concepts (30%, 2% each)

1. Which component controls the communications and interactions between the CPU and other components on the motherboard?
   (A) RAM　　　　(B) CMOS　　　　(C) chipset　　　　(D) BIOS

2. How does an inline UPS protect computer equipment against electrical power brownouts and blackouts?
   (A) by stopping the flow of voltage to the computer
   (B) by grounding excess electrical voltage
   (C) by switching from main power to a standby power source
   (D) by using a battery to supply a constant level of voltage

3. A technician has been asked to install a second optical drive in a computer. The technician will need to configure the drive as slave. How can the technician accomplish this desired configuration?
   (A) Use jumpers on the drive to configure the drive as slave.
   (B) Use jumpers on the motherboard to configure the drive as slave.
   (C) List the drive as slave in the CMOS.
   (D) Connect the drive after the twist in the PATA cable.

4. A customer reports that recently several files cannot be accessed. The service technician decides to check the hard disk status and the file system structure. The technician asks the customer if a backup has been performed on the disk and the customer replies that the backup was done a week ago to a different logical partition on the disk. What should the technician do before performing diagnostic procedures on the disk?
   (A) Install a new hard disk as the primary disk, then make the current disk a slave.
   (B) Perform file restore from the existing backup copy at the logical partition.
   (C) Run the CHKDSK utility.
   (D) Back up the user data to a removable drive.

5. A user notices that a PC is running slowly and exhibits a delayed response to keyboard commands. What is a probable cause of this symptom?
   (A) The video card does not support the resolution that is being used.
   (B) A process is using most of the CPU resources.
   (C) A recently installed device driver is incompatible with the boot controller.
   (D) One or more program files have been deleted.

6. Which two characteristics describe Ethernet technology?
   (A) It is supported by IEEE 802.3 standards.
   (B) It is supported by IEEE 802.5 standards.
   (C) It typically uses an average of 16 Mb/s for data transfer rates.
   (D) It uses a ring topology.

7. What is identified by the 100 in the 100BASE-TX standard?
   (A) the maximum cable distance in meters

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(B) the series number of the standard
(C) the maximum number of network nodes
(D) the maximum bandwidth in Mb/s

8. **What is a definition for CPU throttling?**
(A)Overclocking
(B)upgrading the CPU without changing the motherboard
(C)the ability to modify CPU clock speed to reduce the amount of heat generated
(D)the sharing of processing between two or more cores

9. **What are two potential user benefits of rooting or jailbreaking a mobile device?**
(A) A custom OS may reduce sandboxing features.
(B) The user interface can be extensively customized.
(C) The operation of the carrier cellular network may be affected.
(D) The root directory of the device is blocked.

10. **In the context of mobile devices, what does the term tethering involve?**
(A)connecting a mobile device to a USB port on a computer in order to charge the mobile device
(B) connecting a mobile device to a hands-free headset
(C)connecting a mobile device to another mobile device or computer to share a network connection
(D)connecting a mobile device to a 4G cellular network

11. **A technician recorded that a new fuser roller unit was installed in a laser printer to solve a printing problem. Which step in the troubleshooting process did the technician just perform?**
(A)verifying the solution and system functionality
(B)testing a theory to determine the cause of the problem
(C)identifying the problem
(D)documenting findings, actions, and outcomes

12. **What is the primary goal of a DoS attack?**
(A) to facilitate access to external networks
(B) to prevent the target server from being able to handle additional requests
(C) to scan the data on the target server
(D) to obtain all addresses in the address book within the server

13. **What is the most effective way of securing wireless traffic?**
(A) WPA2
(B) SSID hiding
(C) WEP
(D) wireless MAC filtering

14. **When performing computer forensics, what can be prevented with a properly and carefully documented chain of custody?**
(A) identity theft
(B) copying of copyrighted materials
(C) evidence tampering
(D) cyber crime

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15. A freshly installed Windows 7 laptop is plugged into the network and configured with an IP address. The technician then attempts to ping the laptop from another computer. While the laptop is able to connect to other devices, the ping requests fail. What is the likely cause?
   (A) The network drivers for the NIC are out of date.
   (B) The port speed for the NIC is incorrect.
   (C) TPM must be enabled.
   (D) The Windows Firewall is blocking ping requests.

II. Multiple Choice: Basic Programming Concepts (20%, 2% each)

```java
public class Test {
    public static void main(String[] args){
        int a = 5;
        int b = 2;
        int c = a / b;
        double d = 5.0;
        double e = d / c;
        System.out.println(e);
    }
}
```

16. What will be the output when you compile and run the above code?
   (A) 2.5   (B) 2.0   (C) 2   (D) Compile error!!

```java
public class Test {
    public static void main(String[] args) {
        int a = 1;
        int b = 1;
        //b++ => b = b + 1
        if (a == 1 || b++ == 2) {
            System.out.print("true ");
        }
        System.out.println(b);
    }
}
```

17. What will be the output when you compile and run the above code?
   (A) 1
   (B) true 1
   (C) 2
   (D) true 2

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```java
public class Test{
    public static void main(String[] args){
        int x = 5;
        boolean b1 = true;
        boolean b2 = false;
        if((x==4) && !b2)
            System.out.print("1 ");
        System.out.print("2 ");
        if ((b2=true) && b1)
            System.out.print("3 ");
    }
}
```

18. What is the result of running the above code?

    (A) 2
    (B) 3
    (C) 1 2
    (D) 2 3
    (E) 1 2 3

```java
public void go(){
    String o = "";
    z:
    for(int x=0; x<3; x++){
        for(int y=0; y<2; y++){
            if(x == 1) break;
            if(x==2 && y==1) break z;
            o = o + x + y;
        }
    }
    System.out.println(o);
}
```

19. What is the result when the go() method is invoked?

    (A) 00
    (B) 0001
    (C) 000120
    (D) 00012021
    (E) Compilation fails.

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```java
public class Test {
    public static void main(String[] args) {
        int sum = 0;
        for (int i = 0; i > 10; i++) {
            sum = sum + 1;
        }
        System.out.println(sum);
    }
}
```

20. **What will be the output when you compile and run the above code?**
    (A) 0
    (B) 9
    (C) 10
    (D) infinite loop

```java
public class Test {
    public static void main(String[] args){
        int[] arr = {5,6,7,8};
        int sum = 0;
        for(int i = 0; i < arr.length - 1; i++){
            sum = sum + arr[i] + arr[i + 1];
        }
        System.out.println(sum);
    }
}
```

21. **What will be the output when you compile and run the above code?**
    (A) ArrayIndexOutOfBoundsException
    (B) 18
    (C) 26
    (D) 39

```java
public class Test{
    public static void main(String args[]){
        byte [][] big = new byte[7][7];
        byte b [][] = new byte[2][1];
        byte b3 = 5;
        byte b2 [][][][] = new byte[2][3][1][2];
        b2[0][1] = b; //(A)
        System.out.println(b2[0][1]);
        b[0][0] = b3; //(B)
        System.out.println(b[0][0]);
        b2[1][1][0] = b[0][0]; //(C)
        System.out.println(b2[1][1][0]);
        b2[1][2][0] = b[0]; //(D)
        System.out.println(b2[1][2][0]);
        b2[0][1][0][0] = b[0][0]; //(E)
        System.out.println(b2[0][1][0][0]);
        b2[0][1] = big; //(F)
        System.out.println(b2[0][1]);
    }
}
```

22. **In the above code, what would cause a compilation error ?**
    (A) b2[0][1] = b;
    (B) b[0][0] = b3;
    (C) b2[1][1][0] = b[0][0];
    (D) b2[1][2][0] = b[0];
    (E) b2[0][1][0][0] = b[0][0];

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```
30. interface Jumper{public void jump();}
...
40. class Animal{}
...
50. class Dog extends Animal{
51.     Tail tail;
52. }
...
60. class Beagle extends Dog implements Jumper{
61.     public void jump(){}
62. }
...
70. class Cat implements Jumper{
71.     public void jump(){}
72. }
```

23. Which is false?
  (A) Cat is-a Animal
  (B) Cat is-a Jumper
  (C) Dog is-a Animal
  (D) Beagle is-a Jumper
  (E) Beagle has-a Tail

Given:
```
30. class Line{
31.     public static class Point{}
32. }
33.
34. class Triangle{
35.     //insert code here
36. }
```
24. Which code, inserted at line 35, creates an instance of the Point class defined in Line 31?
  (A) Point p = new Point();
  (B) Line.Point p = new Line.Point();
  (C) The Point class cannot be instantiated at line 35.
  (D) Line l = new Line(); l.Point p = new l.Point();

```
public class Test {
    private int field = 1;
    public void printField(String field){
        System.out.print(field);
        System.out.print(this.field);
    }
    public static void main(String[] args) {
        new Test().printField("field");
    }
}
```
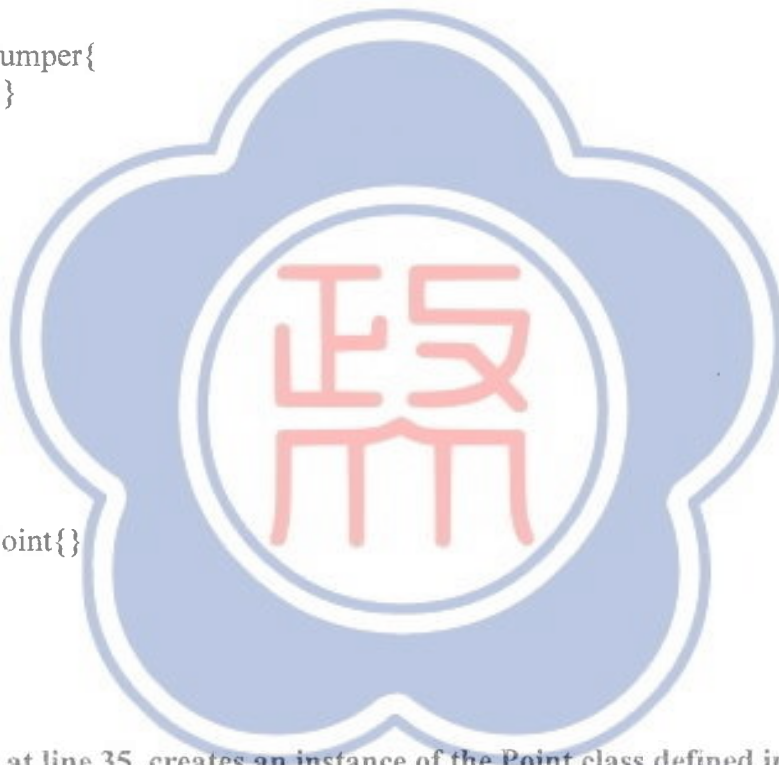
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25. What will be the output when you compile and run the above code?
(A) field1
(B) 1field
(C) fieldfield
(D) 11

III. Fill-In the Blanks or Answer the Questions (2% each except some marked as 5%)

```java
public class Test {
    public static void main(String[] arg){
        int decVal = 246;
        System.out.println("hexString="+ Integer.toHexString(decVal)
                    +"   binaryString="+ Integer.toBinaryString(decVal));
    }
}
```

1. **What will be the output when you compile and run the above code?**
    Output: hexString=_____(Ans.1-1), binaryString=_____(Ans.1-2)

```java
public class Test{
    public static void main(String arg[]){
        int bitmask = 0x000F; //hexadecimal
        int val = 0x0222;         //hexadecimal
        System.out.println(val | bitmask); //decimal
    }
}
```

2. **What will be the output when you compile and run the above code?**   Output: _____(Ans.2)

```java
public class Test{
    public static void main(String[] args){
    //UnaryOperators - Prefix and Postfix Operators
        int k=0,m=0;
        int a=k++ + 3;
        int b=++m + 3;
        System.out.println("a= "+a+" b="+b);
    }
}
```

3. **What will be the output when you compile and run the above code?**
    Output: a=_____(Ans.3-1), b=_____(Ans.3-2)

```java
public class Test{
    public static void main(String[] args){
        Test t = new Test();
        t.soundOff(3);
    }
    public void soundOff(int x){
```

```java
switch(x){
    case 1: System.out.print("One");
    case 2: System.out.print("Two"); break;
    case 3: System.out.print("Three ");
    default: System.out.print("Do What?");
}
```

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```
}
```

4. What will be the output of running the above code?   Output: _____ (Ans.4)

```java
public class Test {
    public static void main(String[] args) {
        int a = 4;
        if (a > 4) {
            a = a + 1;
        } else if (a > 3) {
            a = a + 4;
        } else if (a > 7) {
            a = a + 1;
        } else {
            a = a + 1;
        }
        System.out.println(a);
    }
}
```

5.What will be the output when you compile and run the above code?   Output: _____ (Ans.5-1)
  Draw a program flowchart for the above code using the following symbols.(Ans.5-2, 5%)

Symbol	Name	Function
	Strat/End	An oval represents a start or end point of method invokation or function call.
→	Arrows	A line is a connector that shows the control flow between the representative shapes.
	Input/Output	A parallelogram represents input or output (such as keyboard or screen monitor).
	Process	A rectangle represents a process (computation, assignment, etc.)
	Decision	A diamond indicates a decision (logical branch).

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```java
public class Test {
    public static void main(String[] args) {
        int sum = 0;
        int i = 0;
        while (i < 5) {
            sum = sum + i;
            i++;
        }
    System.out.println(sum+i);
    }
}
```

6. **What will be the output when you compile and run the above code?** Output:＿＿＿＿＿(Ans.6-1),
Draw a program flowchart for the above code using the above symbols.(Ans.6-2, 5%)

```java
public class Mutate{                          //concepts: pass by value/reference
    public String value = "value";
}
public class Question {
    private static void change(Mutate m){
        m.value = "mutate";
    }
    public static void main(String[] args) {
        Mutate mu = new Mutate();
        change(mu);
        System.out.print(mu.value);
    }
}
```

7. **What will be the output when you compile and run the above code?** Output:＿＿＿＿＿＿ (Ans.7)

```java
public class Mutate{                 //concepts: pass by value/reference
    public String value = "value";
}
public class Question {
    private static void change(Mutate m){
        m = new Mutate();
        m.value = "mutate";
    }
    public static void main(String[] args) {
        Mutate mu = new Mutate();
        change(mu);
        System.out.print(mu.value);
    }
}
```

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8. **What will be the output when you compile and run the above code? Output:_____(Ans.8-1), Draw a memory allocation diagram for the above code.(Ans.8-2, 5%)**

```
Giving the following ,
class B extends A {
    int getID() {
        return id;
    }
}
class C {
    public int name;
}
class A {
    C c = new C();
    public int id;
}
```

9. **Draw a class diagram for the above code and mark the "is-a", "has-a" relationships on the diagram, and explain whether B has-a C? (Ans.9, 5%)**

10. **The machine cycle of computer includes 4 steps:**

   Store, _____(Ans.10-1), Decode, _____(Ans.10-2).

11. **Describe some characteristics of Object-Oriented Programming.**

   _____(Ans.11-1), Inheritance, _____(Ans.11-2)

12. **A security threat that uses email that appears to be from a legitimate sender and asks the email recipient to visit a website to enter confidential information is called: _____(Ans.12).**
    (Hint: You can choose form one of the following: worm, phishing, adware, stealth virus)

備　　　註	一、作答於試題上者，不予計分。
	二、試題請隨卷繳交。

考試科目 微積分　所別 商學院共同科（統計系、金管系、資管系）　考試時間 7月 8 日（五）第 4 節

1. (20pts). For each of the following statements, determine whether it is true or false. Explanation is not required.

   (a) Let f be a function defined on $\mathcal{R}$ and a is a real number. If both the left-hand limit at a, $\lim_{x \to a^-} f(x)$, and the right-hand limit at a, $\lim_{x \to a^+} f(x)$, exist, then f is continuous at a.

   (b) Let $f : \mathcal{R}^2 \longrightarrow \mathcal{R}$ be a continuous function and $(x_0, y_0) \in \mathcal{R}^2$. If the partial derivatives of f at (x_0, y_0), $f_x(x_0, y_0)$ and $f_y(x_0, y_0)$, both exist, then the directional derivative of f at (x_0, y_0) in the direction of a unit vector $u = (u_1, u_2)$ exists as well and $D_u f(x_0, y_0) = u_1 f_x(x_0, y_0) + u_2 f_y(x_0, y_0)$.

   (c) If function f is monotonic on $[a, b]$ for $a \le b \in \mathcal{R}$, then f is integrable on $[a, b]$; that is the Riemann integral $\int_a^b f(x)\mathrm{d}x$ exists.

   (d) If f and g are both integrable on $[a, b]$, then so is fg and $\int_a^b f(x)g(x)\mathrm{d}x = \left(\int_a^b f(x)\mathrm{d}x\right)\left(\int_a^b g(x)\mathrm{d}x\right)$.

   (e) The improper integral $\int_0^\infty x^{\frac{2}{5}} e^{-\frac{x^2}{2}}\,\mathrm{d}x$ is convergent.

2. (20pts) At what numbers is the following function f differentiable?
$$f(x) = \begin{cases} -\frac{\pi}{2}\left(\frac{1}{x} + 1\right) & \text{if } x < -1 \\ \cos\frac{\pi}{2}x & \text{if } -1 \le x \le 1 \\ \ln\frac{1}{x} & \text{if } 1 < x \end{cases}.$$

Please also give a formula for f'. Show your work.

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. Suppose the series $\sum_{n=1}^{\infty} a_n 3^n$ is convergent.

   (a) (10pts). Is the series $\sum_{n=1}^{\infty} a_n (-3)^n$ convergent? Justify your answer.

   (b) (10pts). Is the series $\sum_{n=1}^{\infty} a_n (2)^n$ convergent? Justify your answer.

4. (20pts). Let $A(t)$ be the area under the curve $f(x) = \sqrt{x} e^{-\frac{x^2}{2}}$ from 0 to $t > 0$ and $B(t)$ be the area of the triangle with vertices $(0,0)$, $(t,0)$, and $(t, f(t))$. Please find $\lim_{t \to 0^+} \frac{A(t)}{B(t)}$. Show your work.

5. (20pts). A lamina occupies the part of the disk $x^2 + y^2 \le 1$ in the first quadrant with density $p(x,y) = x\sqrt{x^2 + y^2}$. Please find the mass of the lamina. Show your work.

備	註	一、作答於試題上者,不予計分。 二、試題請隨卷繳交。