國立中央大學　資訊工程學系
106 學年度 碩士在職專班 招生入學考試命題紙

科目：　計算機概論(含資料結構)　　共 7 頁

請在＿＿＿＿中作答。
第 **1~20** 題，每題 **3** 分

1. _____ Which one of the following is true? (Choose the best answer!)
   a. In a computer, the ALU subsystem stores data and program.
   b. The idea of a universal computational device was first described (描述) by von Neuman.
   c. Bill Gates (比爾蓋茲) is the first one to propose (提出) that, since program and data are logically (邏輯上) the same, programs should also be stored in the memory of a computer.
   d. A step-by-step solution to a problem is called an operating system.
   e. None of the above.

2. _____ Given a binary number $(0.3)_{10}$, please calculate its corresponding binary (二進位的) value. (Choose the best answer!)
   a. 0.01001…
   b. 0.11
   c. 0.101
   d. 0.11011…
   e. 0.0111…

3. _____ Find the minimum number of binary digits required to store positive decimal integers (including 0) with a maximum of 2 digits. (Choose the best answer!)
   a. 5
   b. 6
   c. 7
   d. 8
   e. None of the above.

4. _____ Assume that we are given a 4-bit integer, of which the 2's complement representation is 1110. Then what is its decimal value?
   a. 14　　*b.* -2　　*c.* -14　　*d.* 2　　*e*. None of the above.

5. _____ Let's consider an 8-bit hexadecimal integer $x = (88)_{16}$
Then x XOR $(FF)_{16}$ XOR $(00)_{16}$ XOR $(0F)_{16}$ XOR $(F0)_{16}$ = ?
a. $(44)_{16}$ *b.* $(88)_{16}$ *c.* $(FF)_{16}$ *d.* $(00)_{16}$ *e.* None of the above

6. _____ Which of the following explains the concept of "programmed I/O?" (Choose the best answer!)
a. The CPU waits for the I/O device.
b. The I/O device informs the CPU of its status via an interrupt.
c. The CPU sends its I/O requests to a hardware controller which manages the entire transaction
d. It is a parallel interface that provides a daisy chain connection between devices and the buses.
e. None of the above

7. _____ Which of the following is **wrong**? (Choose the best answer!)
a. Pipelining can increase the throughput of executed instructions in a computer.
b. Programming in CISC-based computers is usually easier than in other designs because there is a single instruction for both simple and complex tasks.
c. In a RISC-based computer, complex instructions are simulated using a subset of simple instructions.
d. Intel x86 CPU series adopts (採用) the CISC architecture.
e. A single instruction-stream, multiple data-stream (SIMD) is a technique used in pipelining.

8. _____ A computer has 64 GB of memory. Each word (the smallest memory access unit) in this computer is 4 bytes. How many bits are needed to address any single word in memory? (Choose the best answer!)
a. 31
b. 32
c. 33
d. 34
e. None of the above

9. _____ Which layer of the TCP/IP protocol suite defines the Internet Protocol?
a. Application *b.* Transport *c.* Network *d.* Data link *e.* Physical

10. _____ Which of the following is not a necessary condition for deadlock?
a. Circular waiting *b.* Mutual exclusion. *c.* Preemption.
d. Resource holding

11. _____ Which of the following refers to the method, by which a program is divided into equal-sized pages, and the pages can be loaded into memory one by one, executed, **and replaced by another page**.
a. Segmentation *b.* Demand Paging *c.* Divide-and-Conquer.
d. Mono-Programming e. Virtual memory

12. _____Which of the following is usually considered as a functional language?
a. C *b.* Java *c.* Scheme
d. R e. x86 instruction set

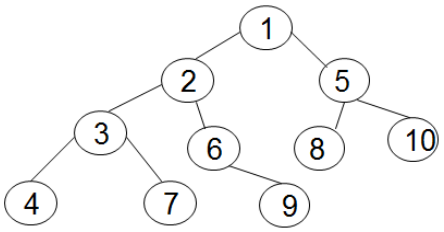
13. _____Which of the following regarding system testing is true? (Choose the best answer!)
a. Regression test usually adopts a black-testing method.
b. Unit test is usually done by the testing team.
c. Software testability is very important in transferability measurements.
d. Software reliability is important in maintainability measurements.
e. None of the above.

14. _____What element(s) does an empty linked list consist of?
a. a node *b.* a data cell and a link *c.* a pointer to a node
d. a null head pointer e. None of the above

15. _____ Assume a computer uses pipelining of 6 stages. Each stage demands 1 clock cycle to finish its task. How many clock cycles are need to execute 12 independent (不相關的) instructions (指令)?
a. 6 *b.* 12 *c.* 17 *d.* 18 *e.* 72

16. _____ Which of the following is the most efficient in complexity measure if the input size of an algorithm is N?
a. $O(N)$ *b.* $O(100^{10000})$ *c.* $O(\log_2 N)$ *d.* $O(N^N)$ e. $O(1/N)$

17. _____ Consider the figure on the right side. Visit all vertices using **the in-order traversal algorithm.** Which of the following is the correct result? (Choose the best answer!)



a. 1 2 3 4 5 6 7 8 9 10
b. 1 2 5 3 6 8 10 4 7 9
c. 1 2 3 4 7 6 9 5 8 10
d. 4 3 7 2 6 9 1 8 5 10
e. None of the above

18. _____ Which of the following **is true** about data structure? (Choose the best answer!)
a. A binary search tree is a tree in which no node can have more than two subtrees.
b. All the members of an array must be of the same type.
c. A queue is a First-In-First-Out data structure.
d. While removing an element from a stack, the latest element in the stack is removed.
e. All of the above.

19. _____ Which of the following is wrong regarding computer security.
a. DES is a symmetric crytographic method
b. Watermarking is one of the crytographic techniques.
c. Denail of service (DoS) is a type of attack that threatens availability.
d. Digital signature needs an asymmetric cryptographic system.
e. Steganography is the technique of concealing a message, image, or file within another message, image, or file.

20. _____ Which of the following technique is used in LZ encoding?
a. Quantization　*b.* DCT transformation　*c.* Dictionary
d. Registration　e. Antifragility

第 21~30 題，每題 4 分

21. _____ What is a "dangling pointer?" (Choose the best answer!)
a. A pointer to an invalid object/cell that was already destructed.
b. A memory location in which no pointer refers to it. Thus it cannot be reused by the system.
c. A null pointer initialized by the programmers.
d. A pointer passed to a remote computer host.
e. None of the above.

22. _____ Consider the code piece in C/C++ on the right side. What will be printed on the standard output?

a. 1　　*b*. 7　　*c*. 8

d. 2　　*e*. 3

```
int z=1;

if (6 == 7 )
   if ( 8 == 8 )
          z=2;
else     z=3;

std::cout << z << std::endl;
```

23._____ Assume that the size of an int variable and the size of a pointer are both 4. Now consider the right figure. What value will be printed on the screen after the C/C++ program finishes? (Choose the best answer!)

a. 4 4　　*b*. 4 400　　*c*. 400 4

d. 400 400　　*e*. None of the above

```
void foo(int *);

int main() {
int a[100];
   foo(a);
   std::cout << sizeof(a) << std::endl;
   return 0;
}

void foo(int * a) {
   std::cout << sizeof(a) << " ";
}
```

24. ____ Which of the following is true regarding Java Interface? (Choose the best answer!)

a. A Java interface can be initialized to an object.

b. A Java interface can only inherit one interface.

c. A java class can only implement one interface.

d. A variable can be declared as an interface type.

e. None of the above

25. _____ Consider the C/C++ program on the right side. There could be a bug that causes a segmentation fault. Which line is it? (Choose the best answer!)

a. 4 *b.* 5

c. 6 *d.* 7

e. None of the above

```
1   int main() {
2       int x=0;
3       int* y=0;
4       int* ptr = &x ;
5       ptr = y;
6       x=1 ;
7        *ptr = x;
8       std ::cout << ptr;
9       return 0;
10  }
```

26. _____ The C++ program on the right side could have a bug in it. Where is it?

a. Lines 8

b. Line 13

c. Line 14

d .Line 15

e. Line 16

```
...
1.    template<class T> T f(T x, T y) {return x+y;};
2.    template<class T>
3.    class Complex {
4.      public:
5.        T x,y;
6.        Complex(T a, T b) {x=a;y=b;}
7.        Complex operator+(Complex c) {
8.           return *(new Complex(x+c.x,y+c.y));
9.        }
10.   };
11.
12.   int main ( ) {
13.      Complex<double> a(1,1), b(0.1,0.1);
14.      f(1, 2);
15.      f(a, b);
16.      f(0.1, 1);
17.      return 0;
18.   }
```

27. _____What is the output of the Java program on the right side? (Choose the best answer!)

a. 8

b. 13

c. 21

d . 3

e. None of the above

```
public class Test {
  public static void main(String[] arg
    System.out.println(rec(6));
  }

  public static int rec(int n) {
    if (n <= 1)
      return 1;
    else
      return n + rec(n - 2);
  }
}
```

28. _____What is the output of the Java program on the right side when called with an argument of 1? (Choose the best answer!)

a. 8

b. 5

c. 4

d .1

e. None of the above

```
int rec( int i){
   if ( i < 4 ){
      return (rec(++i) + rec(i++));
   } else {
      return 1;
   }
}
```

29. ____Find how many times the "statement" in the following code segment (in pseudocode that is similar to C/C++) is executed? (Choose the best answer!)

a. 1

b. 2

c. the value < 5 and >= 2

d. the value < 10 and >= 5

e. None of the above

```
…
int a=5;
while(a<7) {
   statement;
   a=a-2;
}
…
```

30._____ Consider the code piece in C/C++ on the right side. What will be printed on the standard output? (Choose the best answer!)

a. a is 1 and b is 2

b. a is 1 and b is 1

c. a is 2 and b is 1

d. a is 2 and b is 2

e. None of the above

```
void foo(int* x, int* y) {
    int *t = x; y = x; x = t;
}

int main(void) {
    int a = 1;    int b = 2;
    foo( &a, &b );
    printf("a is %d and b is %d\n", a, b);
    return 0;
}
```