

國立中山大學 104 學年度碩士暨碩士專班招生考試試題

科目名稱：計算機概論【電機系碩士班丙組】

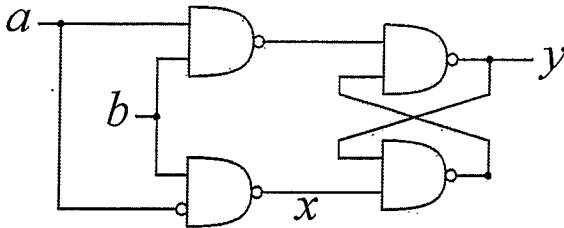
題號：431003

※本科目依簡章規定「可以」使用計算機（廠牌、功能不拘）（選擇題）

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注意：(1) 所有題目皆為「單選」選擇題；每題僅有一個答案為正確；每題五分，答錯不倒扣，共 20 題。(2) 答案不得寫在試題紙上。

1. The following graph shows the circuit, called D-latch, where a small circle means “not.” Then what are the values of x and y when $a = 0$ and $b = 1$?



(A) $x = 0, y = 0$; (B) $x = 0, y = 1$; (C) $x = 1, y = 0$; (D) $x = 1, y = 1$.

2. Given an integer $n \geq 0$, the Fibonacci number $F(n)$ is defined as follows.

$$F(n) = \begin{cases} 1 & \text{if } n = 0 \text{ or } 1 \\ F(n-1) + F(n-2) & \text{if } n \geq 2 \end{cases}$$

Whether the problem of finding a Fibonacci number $F(n)$ is NP-complete? (A) Yes, because there exists a recursive program whose running time (in units of instruction) is at least 1.618^n ; (B) No, because we can use an iterative approach to derive $F(n)$ such that the running time (in units of instruction) is about $n+1$; (C) Yes, because we can use an iterative approach to derive $F(n)$ such that the running time (in units of instruction) is about $n+1$; (D) No, because there exists a recursive program whose running time (in units of instruction) is at least 1.618^n .

3. The following shows a function written by C programming language. Please tell us the returned value of $f(4)$?

```
int f(int n) {
    if (n == 0)
        return 1;
    else
        return 3*n + f(n-1);
}
```

(A) 35; (B) 46; (C) 48; (D) 31.

4. Which two addresses should a computer have in order to access the Internet? (A) DHCP address and IP address; (B) MAC address and IP address; (C) IP address and TCP address; (D) DHCP address and ARP address.
5. Assume that a multi-programming operating system uses the paging scheme to allocate memory. Assume that the available memory is 60 M bytes and divided into 12 frames; besides, each frame size is 5 M bytes. Now, suppose that we want to execute two programs, the first one needs 23 M bytes and the second one needs 11 M bytes. Then how many frames are needed in order to execute these two programs? (A) 6 frames; (B) 7 frames; (C) 8 frames; (D) 9 frames.

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6. Let's continue to consider the above question. How much memory is wasted? In other words, how much memory is not used by those two programs and cannot be used by other programs? (A) 6 M bytes; (B) 1 M bytes; (C) 26 M bytes; (D) 20 M bytes.

7. Assume that a machine cycle consists of three phase: fetch, decode, and execute; besides, the time to execute each phase is T . Then how long do we need to execute n instructions when using the pipelining technique? Note that we assume that these n instructions are independent. (A) $3nT$; (B) nT ; (C) $n + 2T$; (D) $(n + 2)T$.

8. The following shows a program written by C language. Please tell us the value of `sum` when the `for` loop terminates.

```
void main(void) {
    int k, sum = 10;
    int a[5]={5, 4, 3, 2, 1}, b[5]={6, 7, 8, 9, 10};
    for (k = 0; k < 5; k++)
        sum = sum + a[4-k]*b[k];
}
```

(A) 110; (B) 120; (C) 130; (D) 140.

9. Which one is *not* the necessary condition for processes to result in a deadlock in an operating system? (A) hold and wait; (B) circular wait; (C) mutual exclusion; (D) preemption.

10. Which one of the following protocols will be executed when we want to automatically obtain an IP address? (A) DHCP; (B) DNS; (C) ARP; (D) TCP.

11. What is the first high-level programming language in the world? (A) machine language; (B) assembly language; (C) C; (D) FORTRAN.

12. What is the hexadecimal equivalent of the octal number $(4116)_8$? (A) $(2126)_{10}$; (B) $(201032)_4$; (C) $(100001001110)_2$; (D) $(84E)_{16}$.

13. Please tell us the execution result of the following program written by C programming language?

```
#include <stdio.h>
void main(void) {
    int k;

    for (k=1; k<=9 && k!=3 && k!=5; k++)
        printf("%d ", k); // print the value of k
}
```

(A) 1 2; (B) 3 5; (C) 1 2 3 4; (D) 1 2 4 6 7 8 9.

14. What is the task of ARP (Address Resolution Protocol)? (A) The task of ARP is to translate the IP address to its corresponding MAC address; (B) The task of ARP is to translate the IP address to its corresponding binary format; (C) The task of ARP is to find out the device location of a given IP address; (D) The task of ARP is to translate the MAC address to its corresponding binary format.

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15. What is the minimum number of required bits to store an integer that is no less than 0 but no more than 1000? (A) 8; (B) 9; (C) 10; (D) 11.
16. What is the decimal value of the 8-bit two's complement binary number 11100110?
(A) -102; (B) -26; (C) 26; (D) 230.
17. One of the jobs of an operating system is to load a program from the hard disk into the memory. Obviously, an operating system itself can be a program initially stored in the hard disk. Then who loads the operating system into the memory when a computer powers on? (A) virtual machine; (B) bootstrap in ROM (or BIOS); (C) compiler; (D) browser.
18. Let $X = (11011101)_2$ and $Y = (00010100)_2$ be two integers stored in 8-bit two's complement format. What is the two's complement format of $X - Y$?
(A) $(11110001)_2$; (B) $(11001000)_2$; (C) $(11001001)_2$; (D) Error, because of overflow.
19. Let $A(r)$ be the area of a circle with a radius r . Assume that the worst-case time $T(n)$ to execute a given program with input of size n is $T(n) = n \times A(n) = O(f(n))$. What is the function of $f(n)$? (A) n ; (B) n^2 ; (C) n^3 ; (D) n^4 .
20. When you are browsing the webpage of <http://www.mit.edu>, what protocol will be executed to find out the IP address of the web server of MIT? (A) ARP; (B) IP; (C) TCP; (D) DNS.