

國立清華大學 105 學年度碩士班考試入學試題

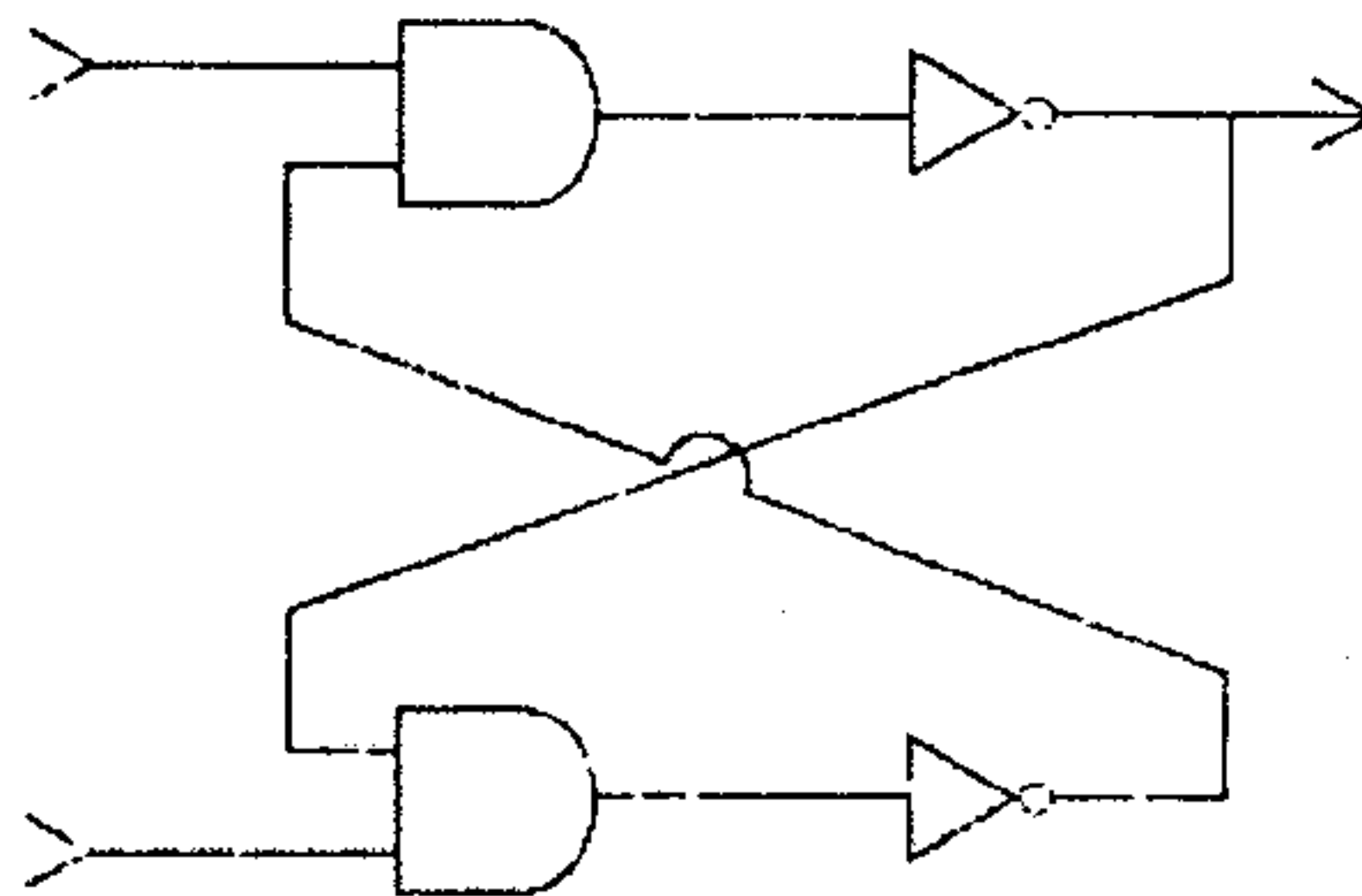
系所班組別：資訊系統與應用研究所

考試科目（代碼）：計算機概論（2001）

共__2__頁，第__1__頁 *請在【答案卷、卡】作答

1. (6%) A number 0201 is a four digit ternary number, which means it is
$$0 \times 3^3 + 2 \times 3^2 + 0 \times 3^1 + 1 \times 3^0 = 0 \times 27 + 2 \times 9 + 0 \times 3 + 1 \times 1 = 19.$$

What is its negative number representation using 3's complement in the four digit ternary number system.
2. (6%) Assume that both of the inputs in the following circuit are 1. Describe what would happen if the upper input were temporarily changed to 0.



3. (6%) Inside CPU, instructions are usually executed using pipeline. Explain one advantage and one disadvantage of using pipeline execution.
4. (15%) The C code implements the computation of the n-th Fibonacci number.

```
int Fib(int n) {  
    int array[n], i;  
    array[0] = 1; array[1] = 1;  
    for(i=2; i<n; i++)  
        array[i] = array[i-1]+array[i-2];  
    return array[n-1];  
}
```

- (1) What is the time complexity of Fib(n)?
- (2) Rewrite the code using recursion (without any loop).
- (3) What is the time complexity of the recursive version?

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共__2__頁，第__2__頁 *請在【答案卷、卡】作答

5. (6%) What are the functions of the boot loader?
6. (12%) Describe how the CSMA/CD protocol transmits a message.
7. (8%) What are the differences between the TCP and UDP protocols?
8. (6%) Messages are to be delivered from a server to multiple clients. What are the advantages of using multicast over N-unicast to send the messages to multiple clients?
9. (15%) In software engineering,
 - (1) What is a module?
 - (2) What is meant by modularization?
 - (3) What techniques would you propose using to identify the modules within a large program that should receive more thorough testing than others?
10. (10%) What is Equivalence Class testing? Suppose the input space of a program covers a set of input values: $\{(12, 13, 14, 15), (C, D, E, F), (75, 105)\}$. Please list the test cases and explain your answer.
11. (10%) Why might a binary search tree work poorly as an implementation of a priority queue? Please explain and illustrate your answer.