# 朝陽科技大學 97 學年度碩士班招生考試試題

系（所）別：資訊與通訊系
組　　別：一般生甲組
科　　目：計算機概論

總分：100 分



1. **(a).** (3%) Convert the excess 16 representation 01111 to its equivalent base ten form.
   **(b).** (3%) Convert the two's complement representation 10011 to its equivalent base ten form.

2. (10%) Summarize the booting process.

3. (6%) Please write down the difference between lossless data compression and lossy data compression.

4. (8%) Please write down the difference between TCP and UDP.

5. Define each of the following:
   **(a).** (5%) Pipelining
   **(b).** (5%) Bridge
   **(c).** (5%) Name Server
   **(d).** (5%) Switch

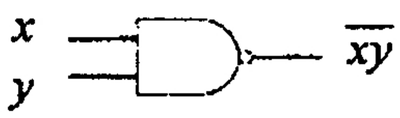
6. (7%) Let $x$, $y$, and $z$ be integers. The relation $x>y$ is true if $x$ is a multiple of $y$. Show if $x>y$ and $y>z$, then $x>z$.

7. A function $f(n)$, where $n$ is a positive integer, is defined as

$$f(n)=\begin{cases}0 & \text{if } n=0\\ 1 & \text{if } n=1\\ 2f(n-1)+3f(n-2) & \text{otherwise}\end{cases}$$

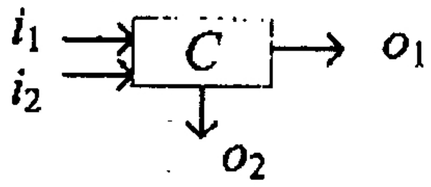
   **(a).** (7%) Write a recursive function, in pseudo code, for function $f(n)$.
   **(b).** (7%) Write an iterative function, in pseudo code, for function $f(n)$.

8. (7%) A NAND gate is defined as:




   Please use NAND gate(s) only to show $x\bar{y}+yz$.

**9.** A component $C$, shown as:

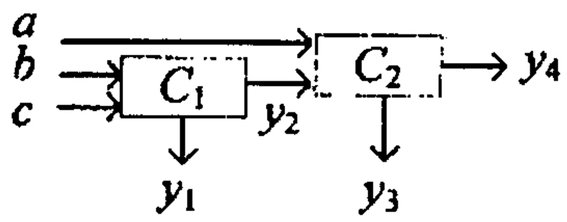



In the component $C$, $i_1$, $i_2$ are the inputs and $o_1$, $o_2$ are the outputs. The outputs and inputs are defined as:

$$\begin{cases} o_1 = i_1 \quad \text{and} \quad o_2 = i_2, & \text{if} \quad i_1 > i_2 \\ o_1 = i_2 \quad \text{and} \quad o_2 = i_1, & \text{otherwise} \end{cases}$$

Moreover, an output of a component can be the input of the other component.

**(a).** (5%) Shown as:




The output $y_2$ of $C_1$ is one of inputs of $C_2$. If $a$=3, $b$=2, $c$=1, please show the output values of $y_1$, $y_2$, $y_3$, and $y_4$.

**(b).** (5%) Use $C$ components only to sort 3 values: $a$, $b$, and $c$. (Hint: Need 3 components)

**(c).** (6%) Show the number of components that are necessary to sort $n$ values, where $n \geq 2$.

**(d).** (6%) Use induction to confirm your answer of **(c)**.