I. In the stored program computer architecture, machine code programs (instructions) are stored in the main memory of a computer, please describe in detail the five-step cycle that the CPU executes an instruction. (please give the name of the cycle first and then describe all the phases) (20%)

II. Please close the sentences. (20%)
1. The six key logical units of a computer are the **input**, ____, ____, ____, ____ and the ____.
2. The three levels of languages are **machine language**, ____, and ____.
3. The programs that translate high-level language programs into machine language are called ____ and ____.
4. ____ are the smallest physical units in the computer.
5. The ____ Boolean operator returns a true value if either operand is true.
6. Fundamental circuits called logic ____ implement the Boolean operators.
7. A(n) ____ in a computer is formed by a set of wires and protocols.
8. The CPU consists of a control unit, an ALU, and ____.
9. A(n) ____ is a set of rules designed to facilitate communication.
10. The ____ communication reference model consists of seven discrete layers.
11. The ____ topology connects all the computers in a loop.
12. A(n) ____ is a network in which computer devices are physically distant from each other, typically spanning cities, states, or even continents.
13. An ____ address is a number assigned to every node that is part of the Internet.
14. A networking device called a(n) ____ delivers messages like the postal system.

III. True or False (10%)
1. Integrated circuits have made the transistor obsolete.
2. The computer is actually just the central processing unit (CPU) inside the case on the main board.
3. Adder circuits can be used to subtract, multiply, and divide.
4. Memory is not a component of the Von Neumann architecture.
5. Random access memory (RAM) retains information after the power is turned off.
6. Static RAM is a type of high-speed memory constructed with flip-flop circuits.
7. Impedance strengthens electrical signals as they travel along the wire.
8. The network layer provides connectivity and path selection between two end systems.
9. The Internet is the largest example of a WAN.

10. TCP is responsible for assigning addresses to data packets.

**IV.** Just complete the truth table of a one-bit full subtractor shown as below. (10%)

Inputs			Outputs	
B_{in}	A	B	D	B_{out}
0	0	0	0	0
0	0	1	1	1
0	1	0	1	0
0	1	1	0	0
1	0	0	1	1
1	0	1	0	1
1	1	0	0	0
1	1	1	1	1
$A - B - B_{in}$			Difference	Borrow out

V. In digital communications, transferring binary data may get noise added to the data bits and make it error. An extra bit can be added to the binary data to make the 'logic 1' count even or odd, which is known as parity bit and used for error detections. Please complete the truth table of a 4-bit ODD-parity generator shown as below; please design the circuit from the truth table using OR, AND, NOT, and XOR gates. (20%)

Inputs				Parity Outputs
B_1	B_2	B_3	B_4	P_{out}
0	0	0	0	
0	0	0	1	
0	0	1	0	
....				
1	1	0	0	
1	1	0	1	
1	1	1	0	
1	1	1	1	

Note: use less gates, get more score!

VI. A multiplexer (mux) is a device which selects one of several signals and pass it into a single output. A multiplexer of 2n inputs has n select lines. Please establish the truth table for the 4X1 mux as shown below. (just truth table) (10%)
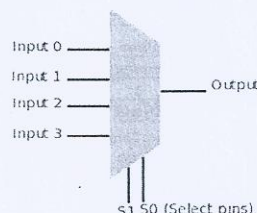
VII. Please give the full name and the full explanation of following terms: (10%)
    a. **BIOS**.
    b. **DSL** and **ADSL**
    c. **XOR gate**.
    d. **FDM** and **TDM**.
    e. **LAN**

寫到這，放鬆一下：
夫妻吵架老公生氣摔門就走，
太太從窗戶問他幾點回來？
老公說：再回來就是孫子！
太太就很生氣就把門鎖上了…
兩小時後老公在門口一邊敲門
一邊喊：「阿嬤我回来了！」