I.   Matching: choose the correct meaning.   (20%)

___ 1. register   ___ 2. interrupt handling
___ 3. ALU   ___ 4. control unit
___ 5. attenuation   ___ 6. coaxial
___ 7. Cat 5   ___ 8. DRAM
___ 9.RAID   ___ 10. twisted pair
___ 11.ROM   ___ 12. bandwidth
___ 13. protocol   ___ 14.time-sharing
___ 15. fiber optic   ___ 16. bit error rate
___ 17.polling   ___ 18. guided media
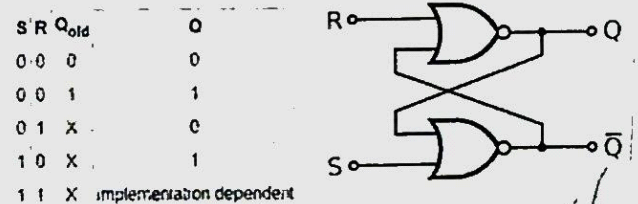___ 19.port   ___ 20. signal-to-noise ratio

1. A reduction in the strength of an electrical signal as it travels along a medium.
2. A measurement of how much information can be carried in a given period over a communication medium.
3. The percentage of bits that have errors in relation to the total number of bits received in a transmission.
4. Communication cable that consists of a center wire surrounded by insulation and then a grounded foil shield wrapped in steel or copper braid.
5. Guided network cable consisting of bundles of thin glass strands surrounded by a protective plastic sheath.
6. Physical transmission media, such as wire or cable.
7. A set of rules designed to facilitate communication; protocols are heavily used in networking.
8. A measure of the quality of a communication channel.
9. A pair of insulated wires twisted together and used as a transmission medium in networking.
10. A popular Ethernet twisted pair communication cable capable of carrying data at rates up to 100 Mbps.
11. The portion of the CPU responsible for mathematical operations, specifically addition.
12. The part of the CPU that controls the flow of data and instructions into and out of the CPU.
13. Dynamic RAM, a generic term for a type of RAM that requires constant refreshing to maintain its information.
14. A small unit of very high-speed memory located on the CPU
15. A computer process which signals CPU to excute a special program designed to deal with events such as I/O requests.
16. A technique in which the CPU periodically interrogates I/O devices to see whether they require attention.
17. A collection of connected hard drives arranged for increased access speed or high reliability.
18. A type of memory that retains its information without power.
19. A computer's capability to share its computing time with many users at the same time.
20. In the context of I/O devices, the physical connection on the computer that allows an I/O device to be plugged in.

II. Complete the truth table of a one-bit full subtractor shown as below; please design and draw the circuit from the truth table by using OR, AND, NOT, and XOR gates.   (20%)

Inputs			Outputs	
B_{in}	X	Y	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
$X - Y - B_{in}$			Difference	Borrow out

Note: use less gates, get more score!

III. A basic **flip-flop** circuit is implemented using NOR gates shown as in the right of the figure below. Please describe its **major function** and how the circuit works according to the table in the left of the figure.   (15%)

S	R	Q_{old}	Q
0	0	0	0
0	0	1	1
0	1	X	0
1	0	X	1
1	1	X	implementation dependent

IV. A stored-program machine,   (25%)
1. is also called a _____ machine and why is it called such a name?
2. Why is it called a stored-program machine?
3. Please draw a graph to show the architecture details of such a machine. Please include as many compontents as possible.
4. In such a machine, the CPU executes the machine codes as machine cycles. Please give a descriptions of the phases of such machine cycles in detail.
5. Normally such a machine will have several signal buses. Please identify their names and describe their functions.

V. In digital communications, transfering binary data may get noise added to the data 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 design an **even parity** and an **odd parity** bit generator for a **four bits** binary data by using truth tables and logic gates.   SCSI   (20%)

1 李白家的月餅
  床前明月光，有餅沒包裝。舉頭望明月，低頭聞餅香！
2 蘇軾家的月餅
  明月幾時有？舉餅問青天。不知天上宮闕，月餅幾多錢。