First Midterm Test

I. Please identify the single choice that best answers the question. (20%)

1. The _____ algebra is concerned with the logic of the operators AND, OR, and NOT.
   a. Linear   b. Modern   c. Boolean   d. Fibonacci

2. The _____ operator works with a single input, and its purpose is to reverse the input.
   a. XOR   b. NOT   c. AND   d. OR

3. The _____ gates are the basic building blocks of the CPU.
   a. XOR, AND, and NOT   b. NAND and NOR
   c. NOR, NAND, and NOT   d. AND, OR, and NOT

4. The truth table for the _____ gate indicates that the output is 1 only when the inputs are different.
   a. OR   b. XOR   c. AND   d. NAND

5. One of the main functions of the _____ of the computer's CPU is to add numbers.
   a. controller   b. ALU   c. memory   d. register

6. Most computers today are still based on the _____ architecture.
   a. Hilbert   b. Turing   c. Von Neumann   d. Wang

7. The portion of the CPU responsible for mathematical operations is the _____.
   a. control unit   b. registers   c. cache   d. ALU

8. The term "_____" refers to the family of components used to store programs and data.
   a. registers   b. cache   c. RAM   d. storage

9. RAM is called "_____" because it doesn't have to be read sequentially.
   a. relative   b. random   c. remedial   d. rapid

10. Factors such as memory type, bus speed, and even hard drive speed can affect overall speed far more than the _____ clock.
    a. CPU   b. master   c. ALU   d. OS

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

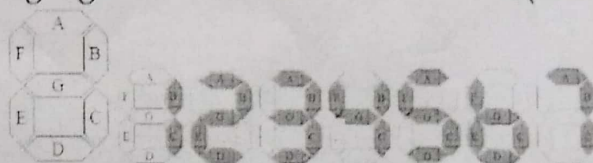| _____ 1. attenuation | _____ 2. interrupt handling |
_____ 3. twisted pair	_____ 4. coaxial cable
_____ 5. RAID	_____ 6. bandwidth
_____ 7. protocol	_____ 8. time-sharing
_____ 9. fiber optic	_____ 10. polling

1. A reduction in the strength of an electrical signal as it travels along a medium.
2. A measure of how much information can be carried in a given period over a communication medium.
3. Communication cable that consists of a center wire surrounded by insulation and then a grounded foil shield wrapped in steel or copper braid.
4. Guided network cable consisting of thin glass strands surrounded by a protective plastic sheath.
5. A set of rules to facilitate communication, heavily used in networking.
6. A pair of insulated wires twisted together and used as a transmission medium in networking.
7. A computer process which signals CPU to excute a special program designed to deal with events such as I/O requests.
8. A CPU periodically interrogates I/O devices to see whether they require attention.
9. A collection of connected hard drives arranged for increased access speed or high reliability.
10. A computer's capability to share its computing time with many users at the same time.

III. Please draw a graph to show a complete computer architecture with correct buses connections between components. (10%)
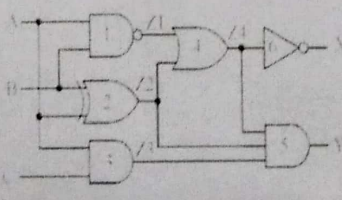
IV. Please explanation in detail the five steps of an instruction cycle? (10%)

V. Seven-segment display is widely used in digital clocks, electronic meters, and other devices for displaying decimal numerals. Please design a circuit to light up the corresponding segments as shown below for a three input lines for floor 1 to 7 in a 7-story building. For example, floor 1 will light up B, C segments, Floor 5 will light up A, F, G, C, D segments, and etc. A segment lights up when it receives signal 1, else when it receives signal 0. Assume the input control lines are b_1, b_2, and b_3, simplify all the output functions for the control lines to (A to G) and draw the final logic gates circuit. (20%)

Note: use less gates get more score!

VI. A circuit is shown as below. Please write down the output function of X and Y like X= A'B'C etc, and complete the truth table in the right. (10%)

ABC	Z1 Z2 Z3 Z4	X Y
0 0 0		
0 0 1		
0 1 0		
0 1 1		
1 0 0		
1 0 1		
1 1 0		
1 1 1		

VII. Please explanation the terms. (10%)
1. NIC   2. Repeater   3. Switch   4. Gateway
2. Router