Assignment 5

Computer Architecture

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**Assignment # 5: Chapter 11**

**Name:**

**TRUE OR FALSE**

**T** 1. The operation of the digital computer is based on the storage and

processing of binary data.

**F** 2. Claude Shannon, a research assistant in the Electrical Engineering

Department at M.I.T., proposed the basic principles of Boolean

algebra.

**T** 3. In the absence of parentheses, the AND operation takes precedence

over the OR operation.

**F** 4. Logical functions are implemented by the interconnection of

decoders.

**T** 5. The delay by the propagation time of signals through the gate is

known as the *gate delay.*

**T** 6. A combinational circuit consists of *n* binary inputs and *m*  binary

outputs.

**T** 7. Any Boolean function can be implemented in electronic form as a

network of gates.

**F** 8. A Boolean function can be realized in the sum of products (SOP)

form but not in the product of sums (POS) form.

**T** 9. “Don’t care” conditions are when certain combinations of values of

variables never occur, and therefore the corresponding output

never occurs.

**T** 10. The value to be loaded into the program counter can come from a

binary counter, the instruction register, or the output of the ALU.

**MULTIPLE CHOICE**

1. The operand \_\_\_\_\_\_\_\_ yields true if and only if both of its operands are true.

A. XOR B. OR

**C. AND** D. NOT

1. The operation \_\_\_\_\_\_\_\_\_ yields true if either or both of its operands are true.

A. NOT B. AND

C. NAND **D. OR**

1. The unary operation \_\_\_\_\_\_\_\_\_ inverts the value of its operand.

A. OR **B. NOT**

C. NAND D. XOR

1. A \_\_\_\_\_\_\_ is an electronic circuit that produces an output signal that is a simple Boolean operation on its input signals.

**A. gate** B. decoder

C. counter D. flip-flop

1. Which of the following is a functionally complete set?

A. AND, NOT B. NOR

C. AND, OR, NOT **D. all of the above**

1. For more than four variables an alternative approach is a tabular technique referred to as the \_\_\_\_\_\_\_\_\_ method.

A. DeMorgan **B. Quine-McCluskey**

C. Karnaugh map D. Boole-Shannon

1. \_\_\_\_\_\_\_\_ are used in digital circuits to control signal and data routing.

**A. Multiplexers** B. Program counters

C. Flip-flops D. Gates

1. \_\_\_\_\_\_\_\_ is implemented with combinational circuits.

A. Nano memory B. Random access memory

**C. Read only memory** D. No memory

1. The \_\_\_\_\_\_\_\_ exists in one of two states and, in the absence of input, remains in that state.

A. assert B. complex PLD

C. decoder **D. flip-flop**

1. The \_\_\_\_\_\_\_\_ flip-flop has two inputs and all possible combinations of input values are valid.

**A. J-K** B. D

C. S-R D. clocked S-R

1. A \_\_\_\_\_\_\_\_\_ accepts and/or transfers information serially.

A. S-R latch **B. shift register**

C. FPGA D. parallel register

1. Counters can be designated as \_\_\_\_\_\_\_\_\_.

A. asynchronous

B. synchronous

**C. both asynchronous and synchronous**

D. neither asynchronous or synchronous

**SHORT ANSWER**

1. The digital circuitry in digital computers and other digital systems is designed, and its behavior is analyzed, with the use of a mathematical discipline known as **Boolean algebra**.
2. The basic logical operations of Boolean algebra are AND, OR, and **NOT**.
3. A **combinational circuit** is an interconnected set of gates whose output at any time is a function only of the input at that time.
4. Consisting of an array of 2” squares representing all possible combinations of values of *n* binary variables, the **Karnaugh map** is a convenient way of representing a Boolean function of a small number (up to four) of variables.
5. The **multiplexer** connects multiple inputs to a single output.
6. A **decoder** is a combinational circuit with a number of output lines, only one of which is asserted at any time.
7. The simplest form of sequential circuit is the **flip-flop**.
8. A **counter** is a register whose value is easily incremented by 1 modulo the capacity of the register.
9. An asynchronous counter is also referred to as a **ripple counter** because the change that occurs to increment the counter starts at one end and “ripples” through to the other end.
10. A **programmable logic device (PLD)** is a relatively small PLD that contains two levels of logic, an AND-plane and an OR-plane, where both levels are programmable.