

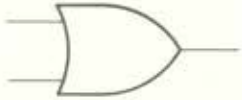


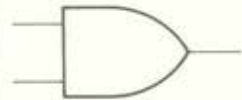
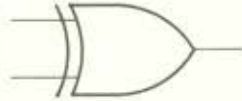
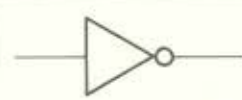
# Logic and Hardware Basics

## MODULE TEST

You may wish to review the exercises or audio-visual material before taking this module test. Once you have begun the test, do not refer to the course materials.

There are seven questions.

1. Match each of these logic symbols with the function it represents by writing the correct letter in the space provided.

Logic Symbol	Function
	
	
	
	
	
	

### Functions

- a. XOR
- b. NOR
- c. AND
- d. OR
- e. NAND
- f. NOT

2. Determine the mathematical expression that illustrates the logical relationships between the inputs and output of the six logic gates listed below. Write the *number* of the mathematical expression in the space provided.

Gate	Inputs	Output	Mathematical Expression
AND	A,B	C	_____
OR	A,B	C	_____
NOR	A,B	C	_____
NOT	A	C	_____
NAND	A,B	C	_____
XOR	A,B	C	_____

#### Mathematical Expressions

- |    |                                       |    |                    |
|----|---------------------------------------|----|--------------------|
| 1. | $C = \overline{A} \cdot \overline{B}$ | 4. | $C = A \oplus B$   |
| 2. | $C = A \cdot B$                       | 5. | $C = \overline{C}$ |
| 3. | $C = \overline{A} + \overline{B}$     | 6. | $C = A + B$        |

3. Six truth tables and six logic functions are given below. Match each truth table with the logic function it represents.

a.

Inputs		Output
A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

b.

Inputs		Output
A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

c.

Inputs		Output
A	B	C
0	0	0
0	1	1
1	0	1
1	1	1

d.

Inputs		Output
A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

e.

Inputs		Output
A	B	C
0	0	0
0	1	0
1	0	0
1	1	1

f.

Input	Output
0	1
1	0

Logic Function

Truth Table

AND

\_\_\_\_\_

OR

\_\_\_\_\_

NOR

\_\_\_\_\_

NOT

\_\_\_\_\_

NAND

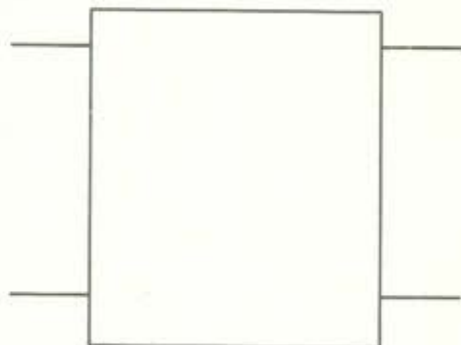
\_\_\_\_\_

XOR

\_\_\_\_\_

4. Blank diagrams and truth tables for both set-reset and D-type flip-flops are given below. Label the input and output lines on the diagrams, and then complete the truth tables. (Note: Be sure to write in *headings* for the truth tables.)

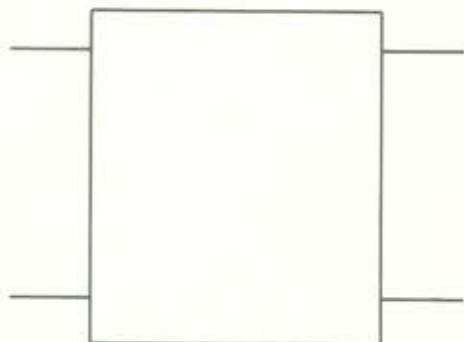
SET-RESET  
FLIP-FLOP  
DIAGRAM



TRUTH TABLE

INPUT		OUTPUT	

D-TYPE FLIP-FLOP  
DIAGRAM



TRUTH TABLE

INPUT		OUTPUT	

5. Circle the function of each of the following mechanisms.

**Buffer Register**

- a. Permanently retains information for use in later programming.
- b. Momentarily slows down high-speed devices to allow lower-speed devices to handle output.
- c. Temporarily retains information until the selected unit is ready for it.
- d. Temporarily increases the speed of lower-speed devices to handle the output of faster devices.

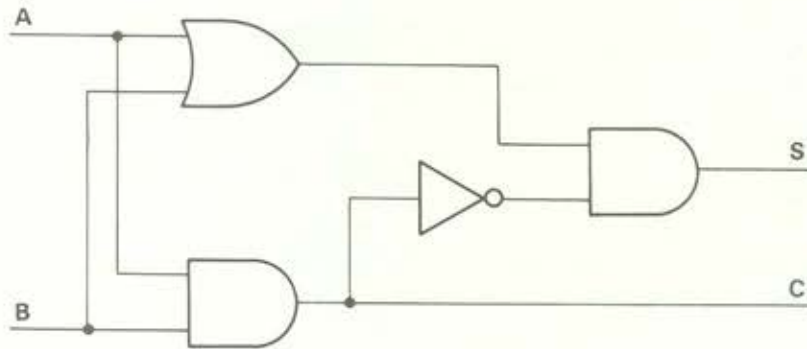
**Shift Register**

- a. Can multiply by shifting contents to the left.
- b. Can multiply by shifting contents to the right.
- c. Can divide by shifting contents to the left.
- d. Can divide by shifting contents to the right.
- e. Both A and D are correct.
- f. Both B and C are correct.

**Counter**

- a. Keeps track of the number of binary 0 inputs.
- b. Keeps track of the number of binary 1 inputs.
- c. Keeps track of the number of binary 0 and 1 inputs.
- d. Keeps track of the number of binary 0 and 1 outputs.

6. For the logic circuits below, indicate the outputs for both Input A and Input B.



**Input A**

**Input B**

A = 1

A = 1

B = 0

B = 1

C = \_\_\_

C = \_\_\_

S = \_\_\_

S = \_\_\_

7. Match each of the terms below with its definition.

Term	Definition
Truth Table	_____
Don't Care	_____
Enable	_____
Disable	_____
Chip	_____
Integrated Circuit	_____

**Definitions**

- a. Preventing data from passing through a particular gate.
- b. A means of expressing the input and output relationships of a logic circuit in tabular form.
- c. Miniaturized component used in the construction of computers.
- d. A silicon wafer that contains an entire logic circuit.
- e. Allowing data to pass through a particular AND gate.
- f. A particular output for a given set of inputs that is irrelevant.