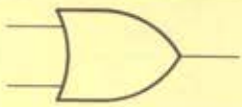
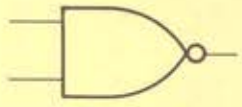
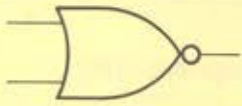
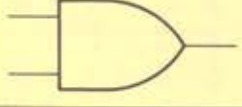

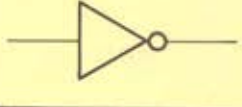


Logic and Hardware Basics

EVALUATION SHEET

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

Logic Symbol	Function
	d
	e
	b
	c
	a
	f

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	<u>2</u>
OR	A,B	C	<u>6</u>
NOR	A,B	C	<u>1</u>
NOT	A	C	<u>5</u>
NAND	A,B	C	<u>3</u>
XOR	A,B	C	<u>4</u>

Mathematical Expressions

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

AND

OR

NOR

NOT

NAND

XOR

Truth Table

e

c

d

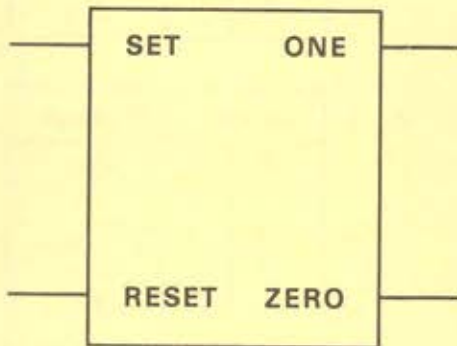
f

b

a

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.)

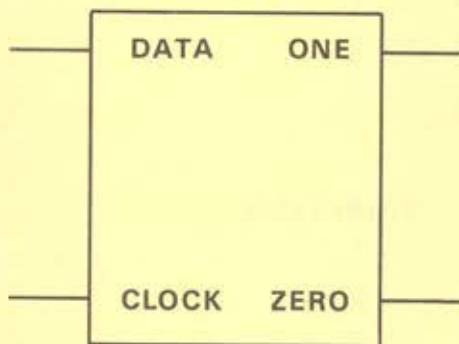
SET-RESET
FLIP-FLOP
DIAGRAM



TRUTH TABLE

INPUT		OUTPUT	
SET	RESET	ONE	ZERO
0	0	NO CHANGE	
0	1	0	1
1	0	1	0
1	1	UNCERTAIN	

D-TYPE FLIP-FLOP
DIAGRAM



TRUTH TABLE

INPUT		OUTPUT	
CLOCK	DATA	ONE	ZERO
0	0	NO CHANGE	
0	1	NO CHANGE	
↑	1	1	0
↑	0	0	1

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.

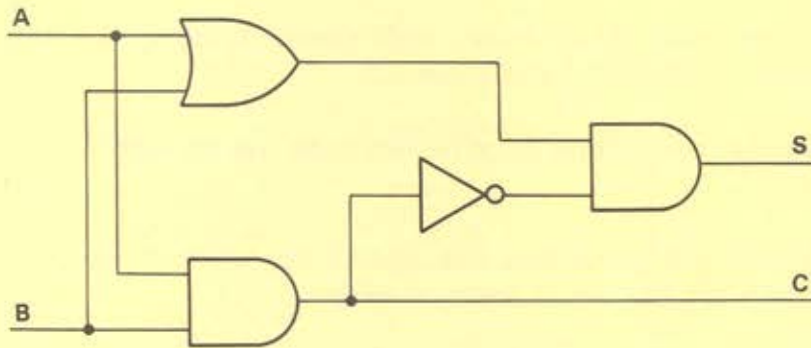
Shift Register

- 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 = 0

C = 1

S = 1

S = 0

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

Term	Definition
Truth Table	<u>b</u>
Don't Care	<u>f</u>
Enable	<u>e</u>
Disable	<u>a</u>
Chip	<u>d</u>
Integrated Circuit	<u>c</u>

Definitions

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