EXPERIMENT NO   2

Title: -   STUDY OF LOGIC GATES

Objective:-

To study about logic gates and verify their truth tables.

Parts required:-

SL No.	COMPONENT	SPECIFICATION	QTY
1.	AND GATE	IC 7408	1
2.	OR GATE	IC 7432	1
3.	NOT GATE	IC 7404	1
4.	NAND GATE 2 I/P	IC 7400	1
5.	NOR GATE	IC 7402	1
6.	X-OR GATE	IC 7486	1
7.	NAND GATE 3 I/P	IC 7410	1

Equipment required:-
- o Trainer/ proto board
- o Wire cutter
- o Voltmeter
- o Patch Cord

THEORY:

Circuit that takes the logical decision and the process are called logic gates. Each gate has one or more input and only one output.

OR, AND and NOT are basic gates. NAND, NOR and X-OR are known as universal gates. Basic gates form these gates.

AND GATE:

The AND gate performs a logical multiplication commonly known as AND function. The output is high when both the inputs are high. The output is low level when any one of the inputs is low.

OR GATE:

The OR gate performs a logical addition commonly known as OR function. The output is high when any one of the inputs is high. The output is low level when both the inputs are low.

NOT GATE:

The NOT gate is called an inverter. The output is high when the input is low. The output is low when the input is high.

NAND GATE:

The NAND gate is a contraction of AND-NOT. The output is high when both inputs are low and any one of the input is low .The output is low level when both inputs are high.
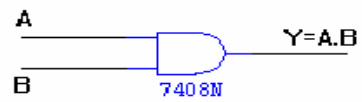
 NOR GATE:

The NOR gate is a contraction of OR-NOT. The output is high when both inputs are low. The output is low when one or both inputs are high.

X-OR GATE:

The output is high when any one of the inputs is high. The output is low when both the inputs are low and both the inputs are high.
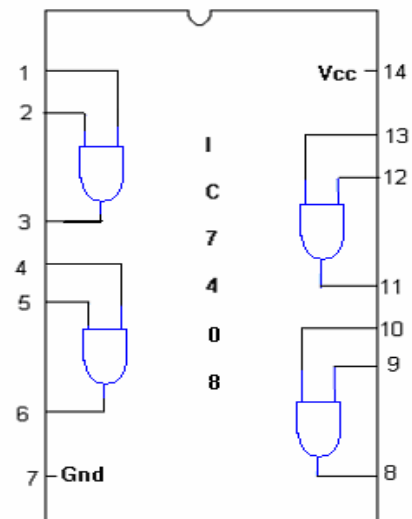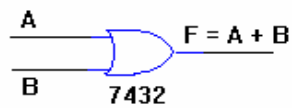
AND GATE:

SYMBOL:

A
B
7408N
Y=A.B

TRUTH TABLE

A	B	A.B
0	0	0
0	1	0
1	0	0
1	1	1

PIN DIAGRAM:

OR GATE:

SYMBOL :

A
B
7432
F = A + B

TRUTH TABLE

A	B	A+B
0	0	0
0	1	1
1	0	1
1	1	1

PIN DIAGRAM :

NOT GATE:

SYMBOL:

A ──▷○── $Y = \overline{A}$

7404N
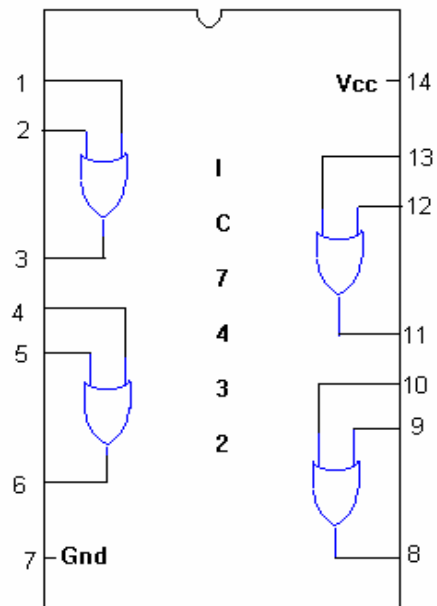
PIN DIAGRAM:

TRUTH TABLE :

A	$\overline{A}$
0	1
1	0

X-OR GATE :

SYMBOL :

A ───┐
B ───┘ $Y = \overline{A}B + A\overline{B}$

7486N
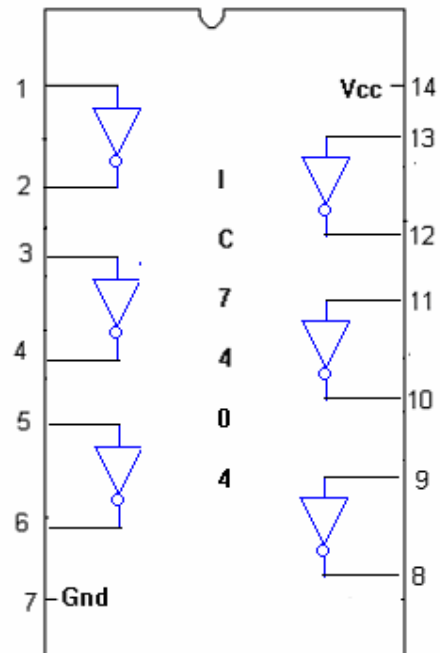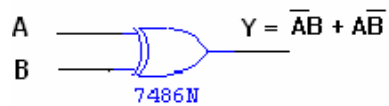
PIN DIAGRAM :

TRUTH TABLE :

A	B	$\overline{A}B + A\overline{B}$
0	0	0
0	1	1
1	0	1
1	1	0
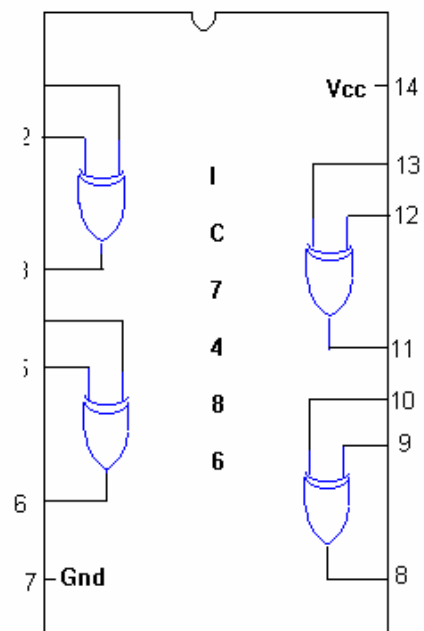
2-INPUT NAND GATE:

SYMBOL: **PIN DIAGRAM:**

A
B   Y = $\overline{A \cdot B}$
7400

TRUTH TABLE

A	B	$\overline{A \cdot B}$
0	0	1
0	1	1
1	0	1
1	1	0

1
2
3
4
5
6
7 — Gnd

I C 7 4 0 0

Vcc — 14
13
12
11
10
9
8

3-INPUT NAND GATE :

SYMBOL :   PIN DIAGRAM :

A
B   F = $\overline{A.B.C}$
C
7410
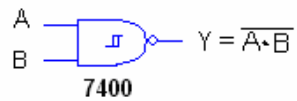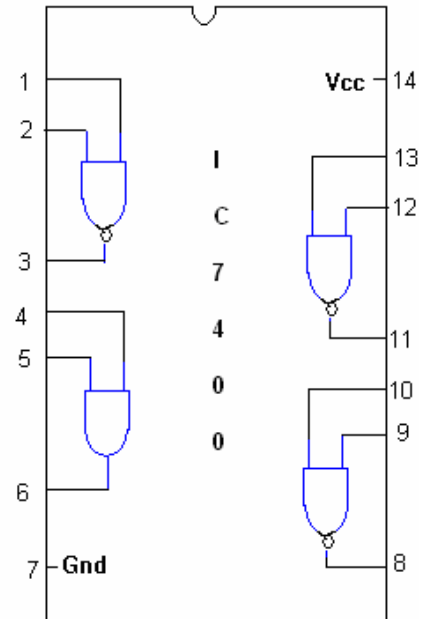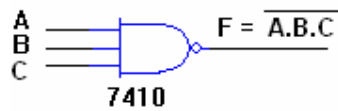
TRUTH TABLE

A	B	C	$\overline{A.B.C}$
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

1
2
3
4
5
6
7 — Gnd

IC 7 4 1 0

Vcc — 14
13
12
11
10
9
8

NOR GATE:

SYMBOL :

A
F = A̅ ̅+̅ ̅B̅

B   7402
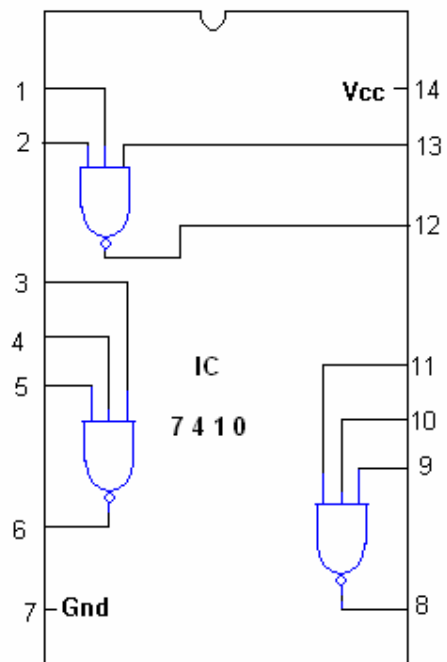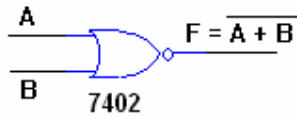
PIN DIAGRAM :

TRUTH TABLE

A	B	A̅+̅B̅
0	0	1
0	1	1
1	0	1
1	1	0
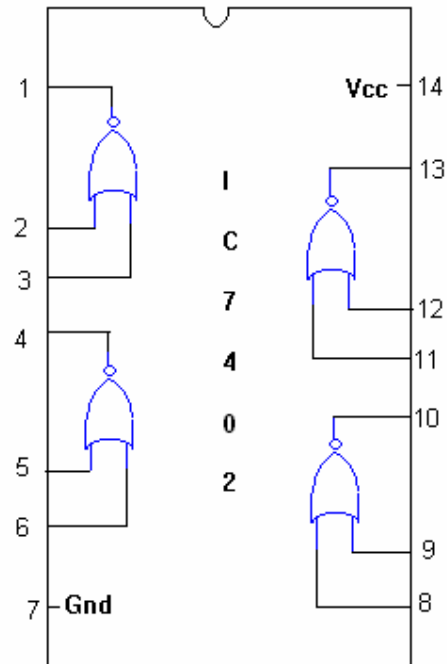
PROCEDURE:-

(a) Place the IC of required on the bread board. Be sure that it is seated firmly, straddling the notch in the socket, and that none of the pins are bent

(b) connect Vcc=5V to pin 14 and Ground to pin 7

(c) Pin lay out of the IC is given in Annex connect one of gates. connect inputs(pin1&2)to SW1 and SW2 and output to the LED

(d) Switch ON the circuit and complete following truth table

A	B	C
0	0	
0	1	
1	0	
1	1	

7. Repeat steps for following gates

a. NOT

b. NAND

C. OR