

Experiment 1

To study the basic logic gates Verify their truth table.

Contents

Aim, Component required, Boolean Expression, Circuit Diagram,
Procedure, Result and Precaution

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AIM: To verify the truth tables of AND, OR, NOT, EX-OR, NAND and NOR gates using integrated circuits

COMPONENTS REQUIRED:

AND gate (IC 7408), NOT gate (IC 7404), OR gate (IC 7432), NAND gate (IC 7400), NOR gate (IC 7402), X-OR gate (IC 7486), Power supply, Digital IC trainer kit, connecting wires.

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Boolean Expressions

(i) AND gate $Y = A.B$

(iv) Ex OR gate $Y = \bar{A}B + A\bar{B}$

(ii) OR gate $Y = A+B$

(v) NAND gate $Y = \overline{A.B}$

(iii) NOT gate $Y = \bar{A}$

(vi) NOR gate $Y = \overline{A+B}$

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Circuit Diagram

Pin Identification

Note: The chip must be inserted in the bread board in such a way that the identification mark should be on our left side. In this position, pin numbers are counted as marked in the picture above. Pin identification is the same for all chips that are mentioned below.

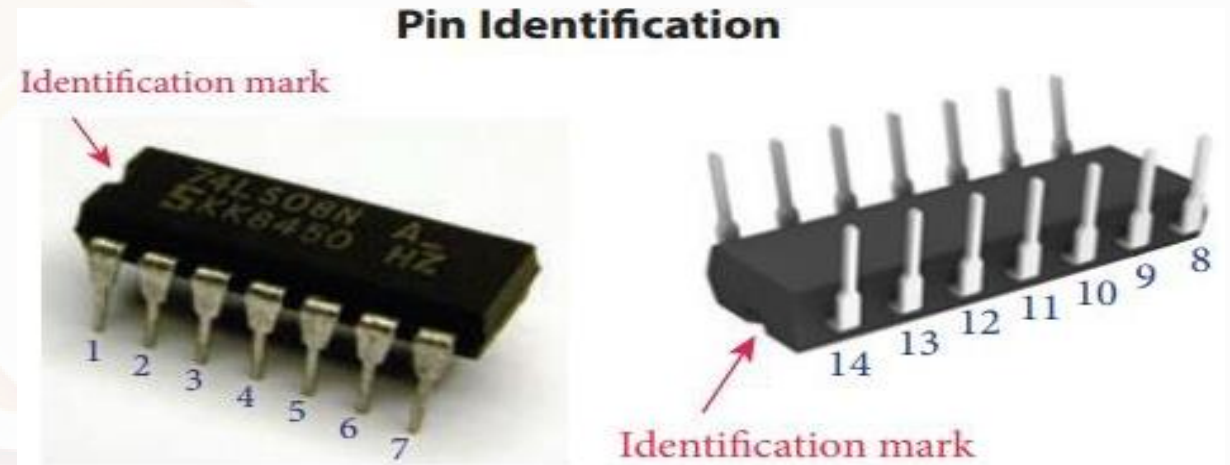
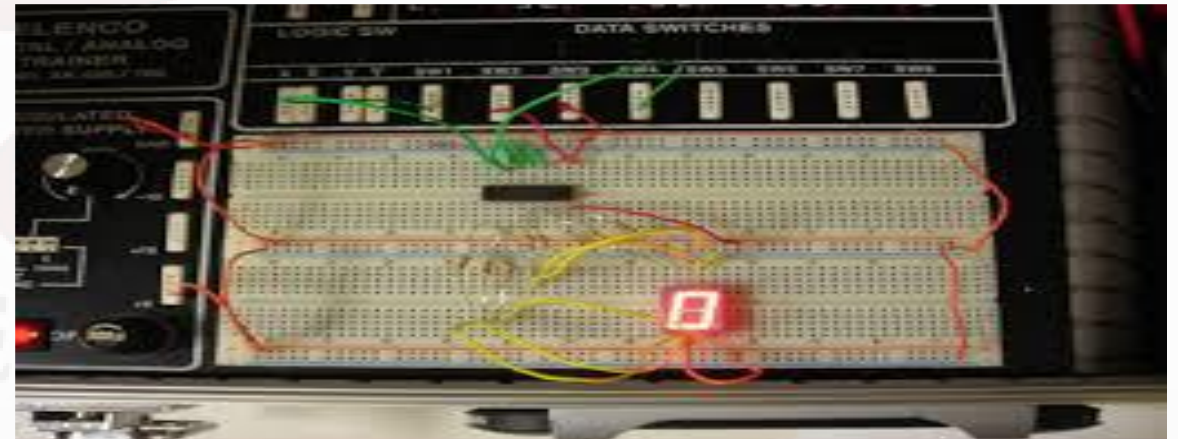
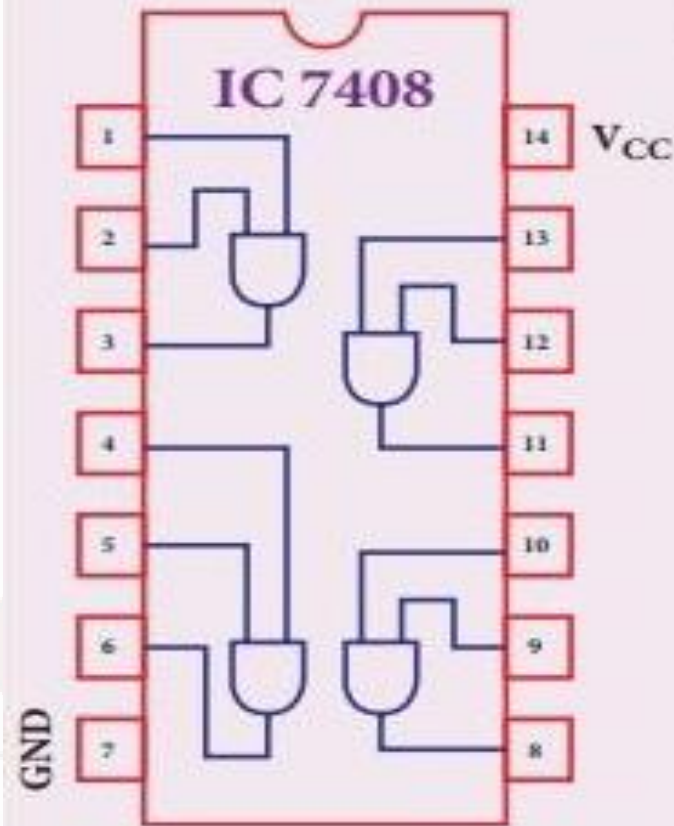


Figure (a) Integrated circuit

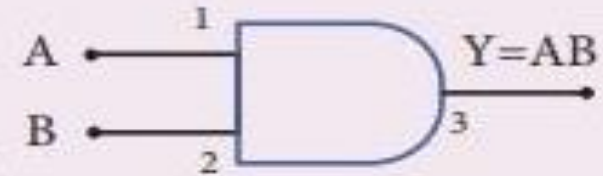


AND GATE

PIN DIAGRAM-IC 7408



SYMBOL

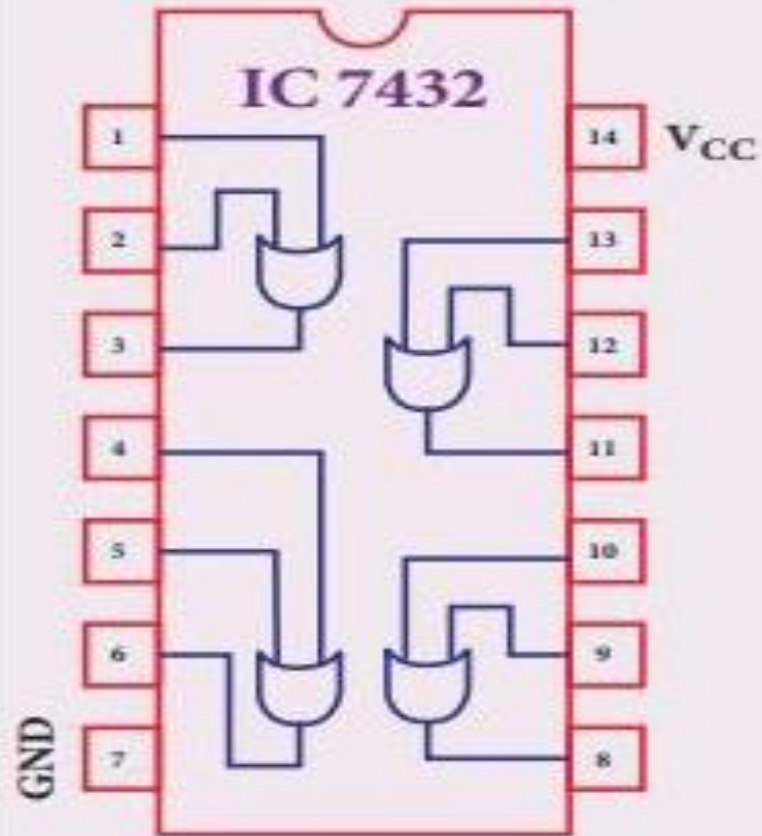


TRUTH TABLE

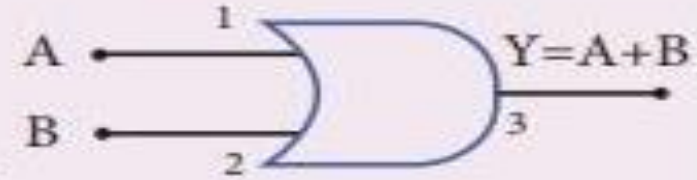
A	B	Y=AB
0	0	0
0	1	0
1	0	0
1	1	1

OR GATE

PIN DIAGRAM-IC 7432



SYMBOL

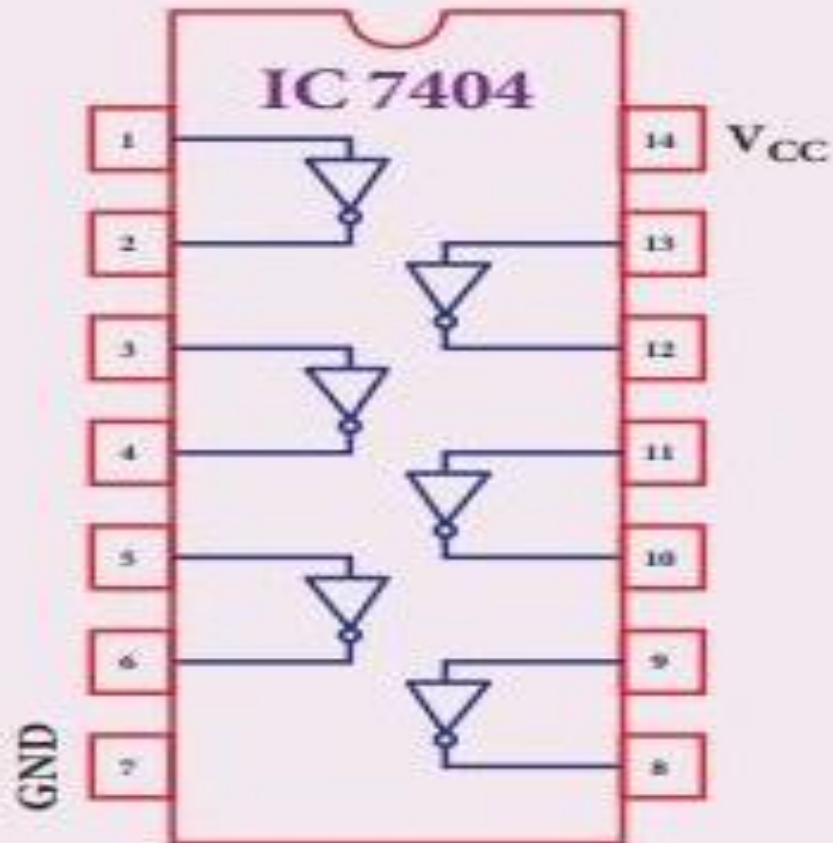


TRUTH TABLE

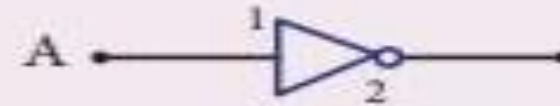
A	B	$Y = A + B$
0	0	0
0	1	1
1	0	1
1	1	1

NOT GATE

PIN DIAGRAM-IC 7404



SYMBOL

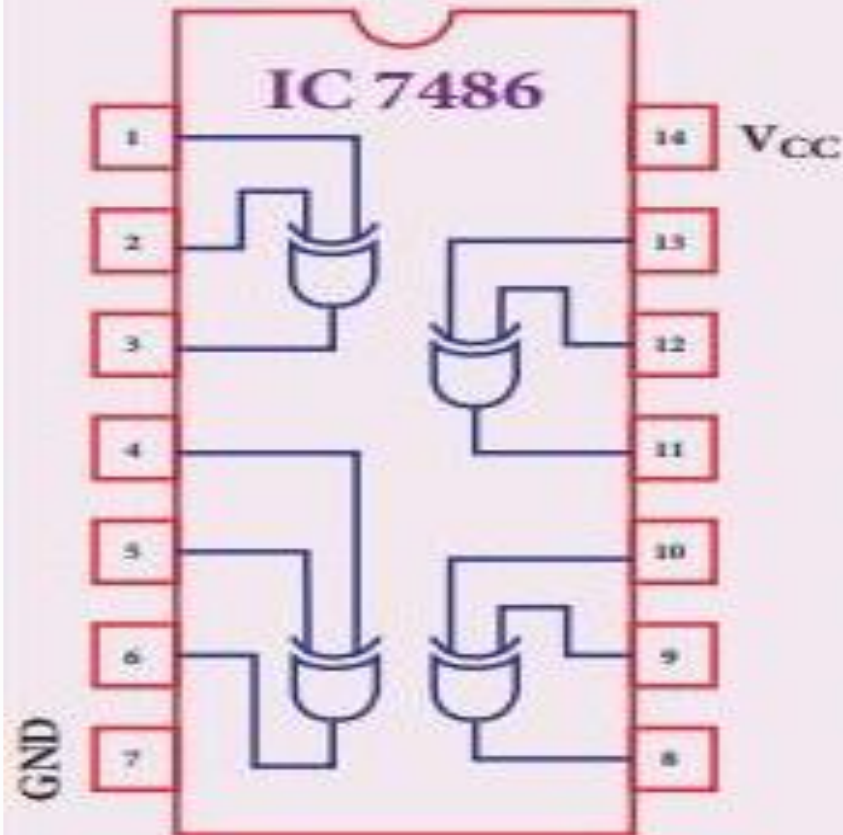


TRUTH TABLE

A	$Y = \bar{A}$
0	1
1	0

X-OR GATE

PIN DIAGRAM-IC 7486



SYMBOL

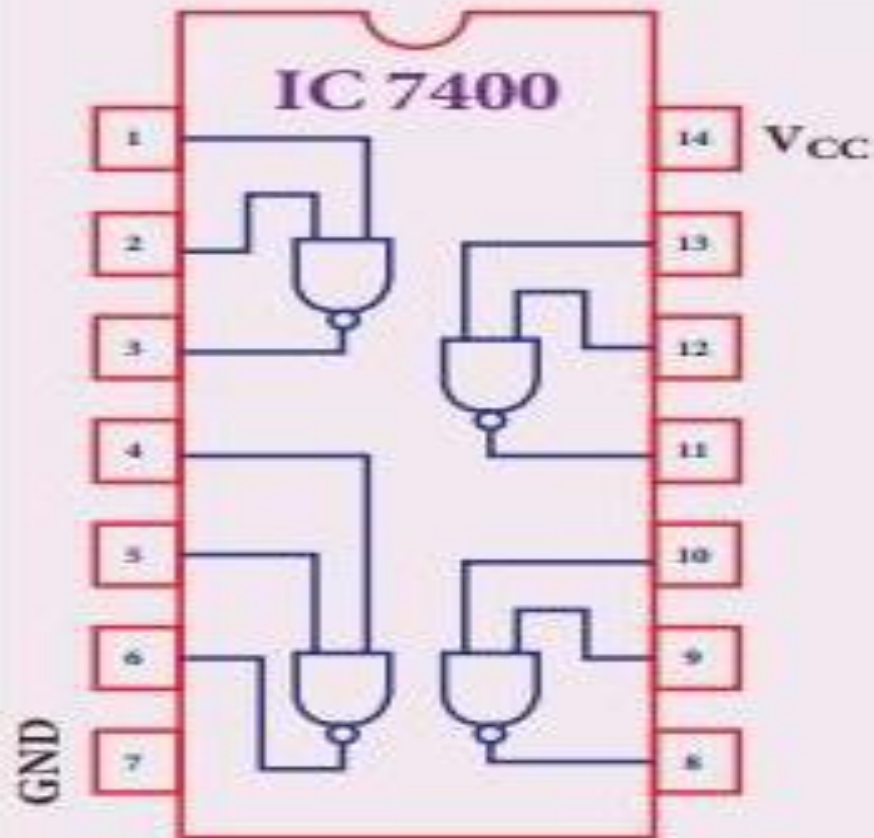


TRUTH TABLE

A	B	$Y = \bar{A}B + A\bar{B}$
0	0	0
0	1	1
1	0	1
1	1	0

NAND GATE

PIN DIAGRAM-IC 7400



SYMBOL

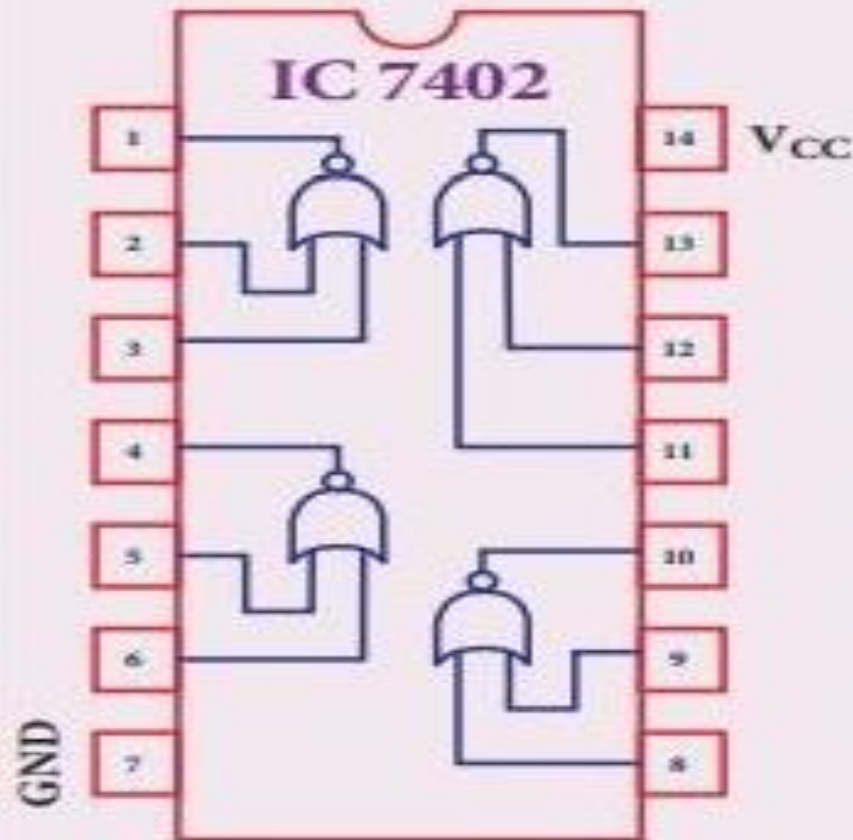


TRUTH TABLE

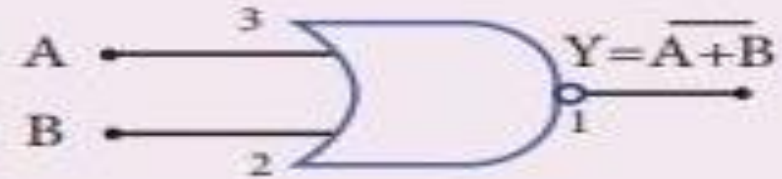
A	B	Y = \overline{AB}
0	0	1
0	1	1
1	0	1
1	1	0

NOR GATE

PIN DIAGRAM-IC 7402



SYMBOL



TRUTH TABLE

A	B	$Y = \overline{A + B}$
0	0	1
0	1	1
1	0	1
1	1	0

Procedure

- To verify the truth table of a logic gate, the suitable IC is taken and the connections are given using the circuit diagram.
- For all the ICs, 5V is applied to the pin 14 while the pin 7 is connected to the ground.
- The logical inputs of the truth table are applied and the corresponding output is noted.
- Similarly the output is noted for all other combinations of inputs.
- In this way, the truth table of a logic gate is verified.

Result

- The truth table of logic gates AND, OR, NOT, Ex-OR, NAND and NOR using integrated circuits is verified.

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Precaution

- VCC and ground pins must not be interchanged while making connections. Otherwise, the chip will be damaged.
- The pin configuration for NOR gate is different from other gates

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Thank You