

# Kathmandu University

## Department of Electrical and Electronics Engineering

### Digital logic laboratory experiments

**Experiment:** Verification of truth tables for different logic gates: AND, OR, NOT, NAND, NOR

Components required:

IC 7400	IC 7408	Light emitting diode (LED)
IC 7402	IC 7432	Resister (1K $\Omega$ )
IC 7404	Bread board	

### Theory

Logic gates are the basic building blocks of any digital system. It is an electronic circuit having one or more than one input and only one output. The relationship between the input and the output is based on certain logic. The commonly used logic gates are AND, OR, NOT, NAND and NOR.

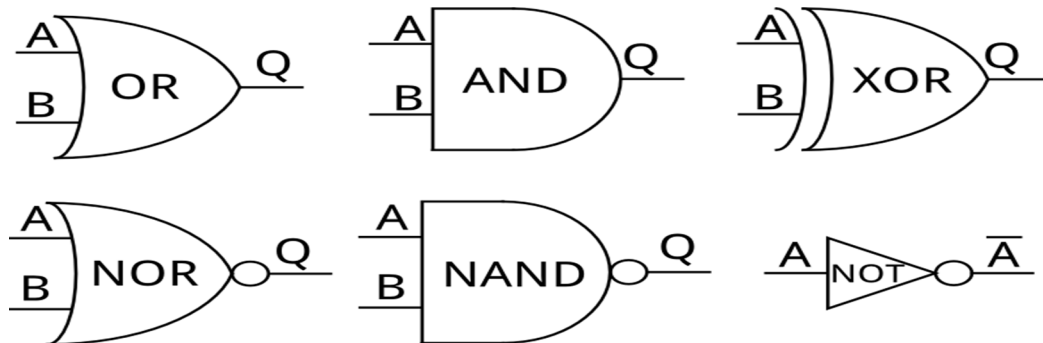


Fig: Symbols of different logic gates

## NOT gate

NOT gate is also known as inverter. Generates complements of the input

Truth table for NOT gate

A	Y
0	1
1	0

## OR gate

Generates logic 1 output when any of its inputs are at logic 1

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

## AND gate

Generates logic 1 output only when both inputs are at logic high

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

## Universal gates

NOR and NAND gates are universal gates.

## NOR gate

Equivalent to OR gate followed by an inverter. NOR gate gives logic 1 output only when both inputs are at logic 0

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

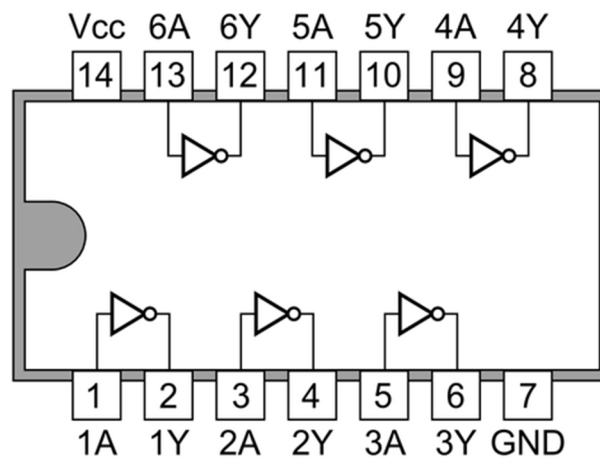
## NAND gate

Equivalent to AND gate followed by an inverter. NAND gate gives logic 0 outputs only when both inputs are at logic 1

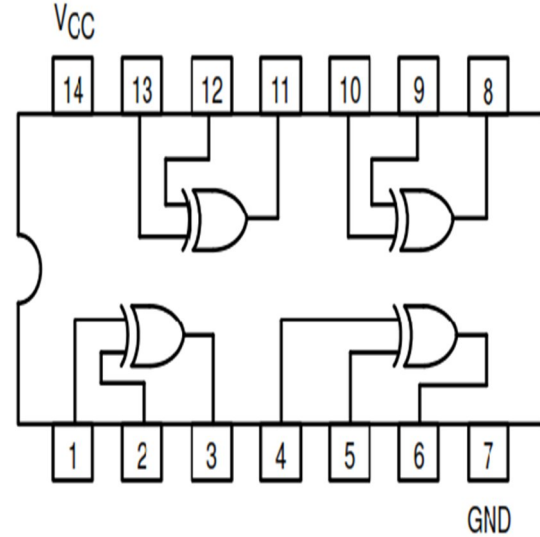
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

## Datasheet of Different logic gates (References)

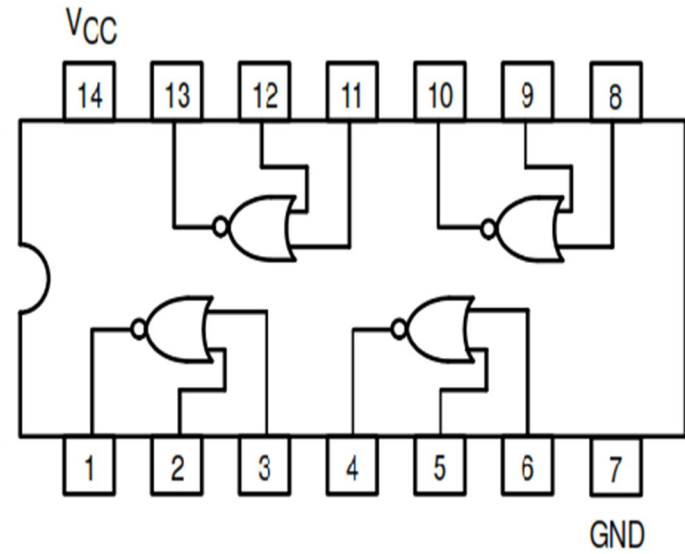
### 7404 Hex Inverters



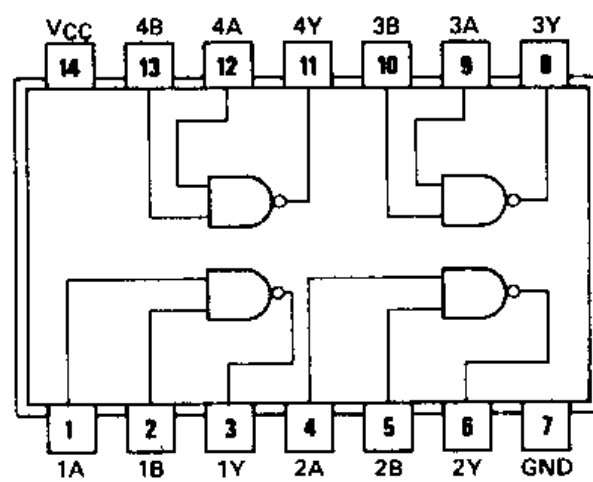
**7486**



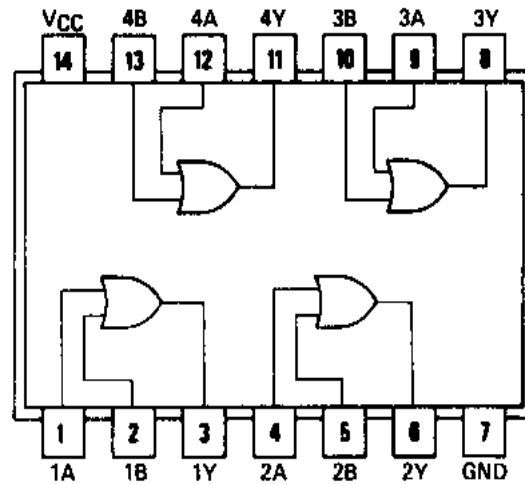
**7402**



**7400**



**7432**



**Discussion and conclusion**

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