

Experiment Number -03

PEC-101/201 Fundamental of Electronics Engineering Lab
Er. Yadvendra Sharan
Assistant Professor
Department of Electrical & Electronics Engineering
Phonics Group of Institutions, Roorkee
Phone: +91-8273990016
yadvendra.sharan@yahoo.com

OBJECT

To Verify the Universal Gates (NAND and NOR Gates)

APPARATUS REQUIRED

1. Logic Gates Kit.
2. Connecting Probes (Leads).
3. Power Supply

THEORY

1. NAND GATE

The NAND or “Not AND” function is a combination of the two separate logical functions, the AND function and the NOT function connected together in series. The logic NAND function can be expressed by the Boolean expression of, $\overline{A.B}$

“If both A and B are true, then Y is false”

$$Y = \overline{A.B}$$

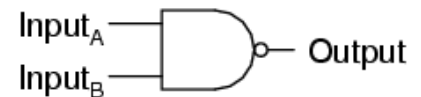
2. NOR GATE

The NOR or “Not OR” function is a combination of the two separate logical functions, the OR function and the NOT function connected together in series. The logic NOR function can be expressed by the Boolean expression of, $\overline{A + B}$

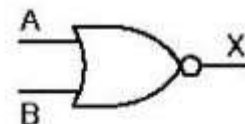
“If either A or B is true, then Y is false”

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

NAND gate



A	B	Output
0	0	1
0	1	1
1	0	1
1	1	0



A	B	X
0	0	1
0	1	0
1	0	0
1	1	0

UNIVERSAL GATES

NAND and NOR gates are also known as the universal gates because with these gates all gates can be design as given in the circuit diagram below.

CIRCUIT DIAGRAM

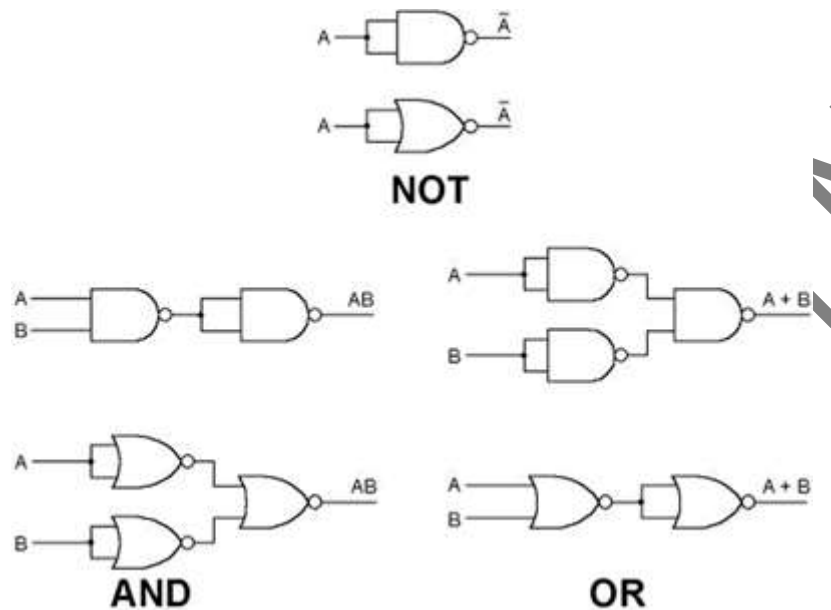


Fig.1 Design of Basic Logic Gates using NAND and NOR Gates

PROCEDURE

Make connections on the Logic Gates Kit as the circuit diagram and verify the truth table for each logic gate.

RESULT

Successfully constructed basic logic gates using universal gates. Verified NAND and NOR gates as the universal gates.

DISCUSSION

Concept of the digital logic gates is cleared after performing this experiment.

PRECAUTIONS

1. Connections should be proper and tight.
2. Switch "ON" the power after completing the circuit.
3. Carefully read the Logic "High" and Logic "Low" condition.