

Verification of Basic Logic Gates.

Aim of the Experiment:

- 1) Verification and interpretation of truth tables for AND, OR, NOT, NAND, NOR, Exclusive OR (EX-OR)
- 2) Implement AND, OR, NOT, functions using universal gates NAND and NOR.
- 3) Implement XOR function using NOR gates.

Apparatus required:

1. Component Development System (CDS)
2. Logic gates IC
3. Wires
4. 2mm banana connector.

Theory:

Logic gates are electronic circuits which perform logical functions on one or more inputs to produce one output. When all the input combinations of a logic gate are written in a series and their corresponding outputs written along them, then this input/output combination is called Truth Table.

Procedure:

- 1) Connect the Vcc to the IC pin 14 and Ground pin 7.
- 2) Connect the inputs of logic gates to the logic switches and its output to the logic indicators (LED)
- 3) Apply various combinations and observe output for each one.
- 4) Verify its truth table for each input/output combination.

AND Gate (7408) :-

AND Gate produces an output as 1, when all its inputs are 1, otherwise the output is 0. This gate can have minimum two inputs but output is always one. Its output is 0 when any input is 0,

Observation :-

$$Y = A \cdot B$$

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

OR Gate (7432) :-

OR Gate produces an output as 1, when any or all its inputs are 1, otherwise the output is 0. This gate can have minimum 2 inputs but output is always one. Its output is 0 when all input are 0,

Observation :-

$$Y = A + B$$

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

NOT Gate (7404) :-

NOT gate produces the complement of its input. This gate also called the inverter. If always has one input and output, the output is 0 when input is 1 and output is 1 when input is 0.

Observation

$Y = \bar{X}$

A	Y
1	0
0	1

NAND Gate (7400) :-

NAND Gate is a series of AND and NOT Gates. If we connect the output of an AND Gate to the input of a NOT Gate, this combination will work as NOT-AND or NAND gate.

Observation

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

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

NOR Gate (7402):-

NOR Gate is a series of OR & NOT gate. If we connect the output of an OR gate at the input of NOT Gate, this combination will work as NOR-Gate.

Observation

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

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

Ex-OR Gate (X-OR) (7486):-

It produces an output as 1, when number of 1's at its input is odd, otherwise output is 0.

Observation

$$Y = A \oplus B$$

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

Conclusion:-

The experiment was performed and all the logic gates are synthesized and tested and their truth table was verified.