DIGITAL ELECTRONICS LAB

EXPERIMENT – 1

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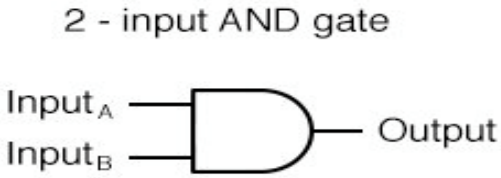
2K19/EP/076

AIM: To verify the truth tables of logic gates: AND, OR, NOT, NAND, NOR, XOR.

THEORY: Logic gates are the basic building blocks of any digital system. A logic gate is an idealized or physical electronic device implementing a Boolean function, a logical operation performed on one or more binary inputs that produces a single binary output. The relationship between the input and the output is based on a certain logic. The table used to represent the Boolean expression of a logic gate function is commonly called a Truth Table. A logic gate truth table shows each possible input combination to the gate or circuit with the resultant output depending upon the combination of these input(s).

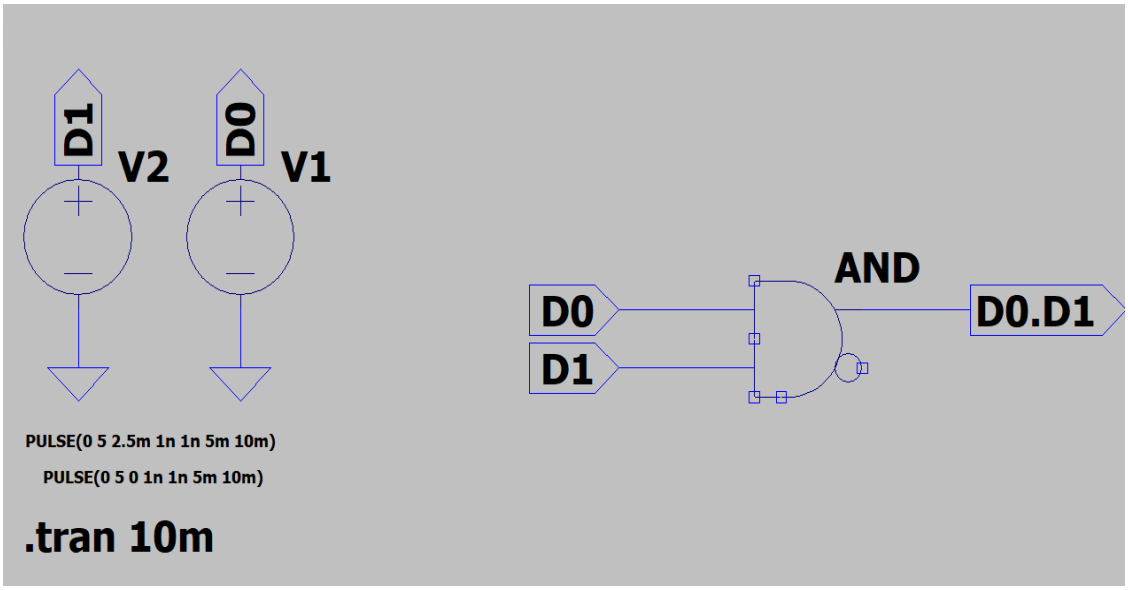
GATES:

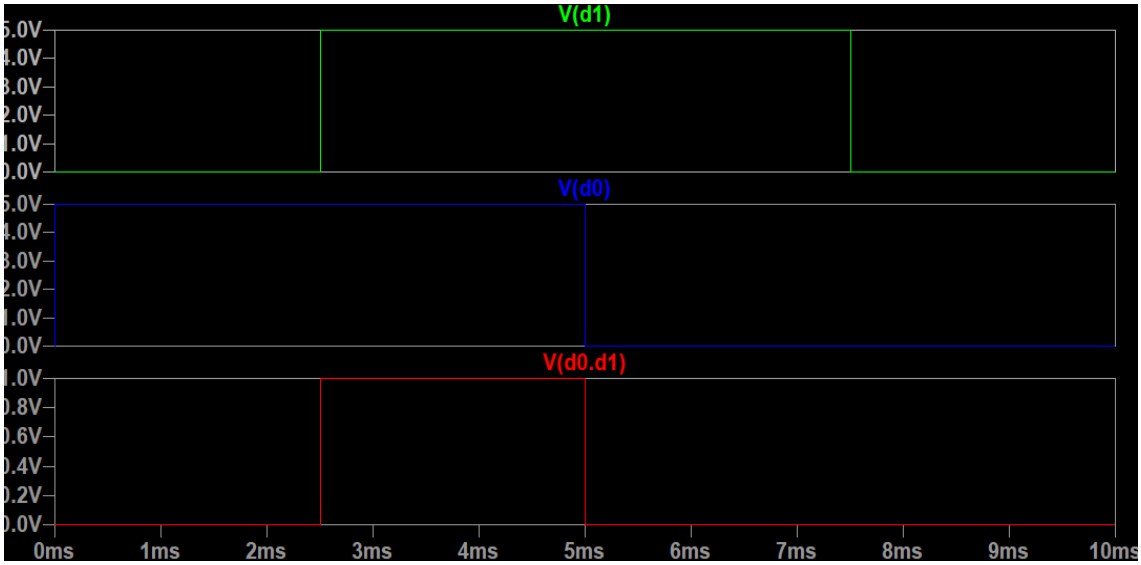
1. **AND**
   A HIGH output (1) results only if all the inputs to the AND gate are HIGH (1). If none or not all inputs to the AND gate are HIGH, a LOW output results.



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

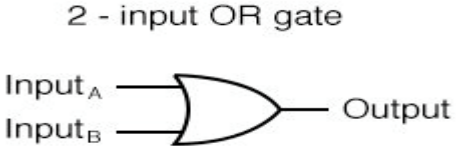
Pulkit



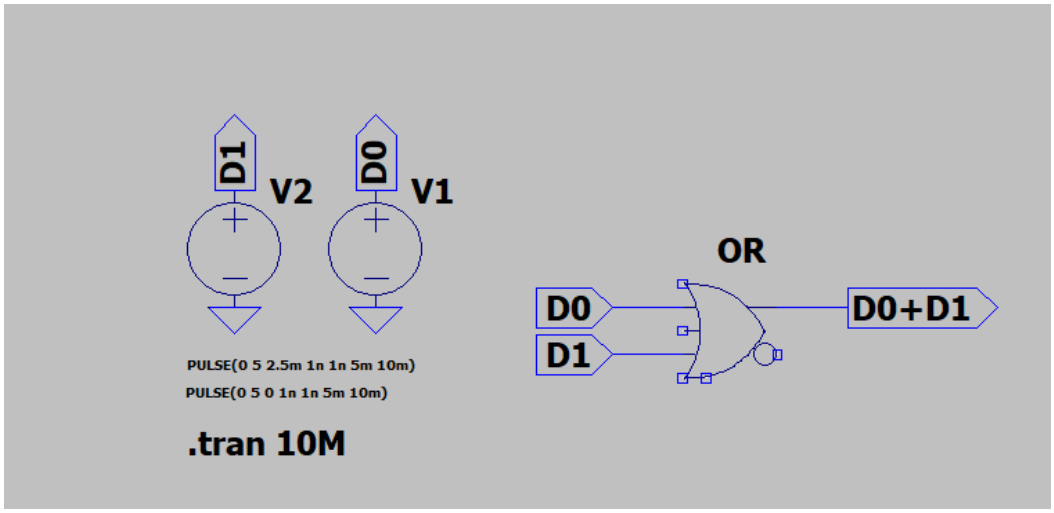


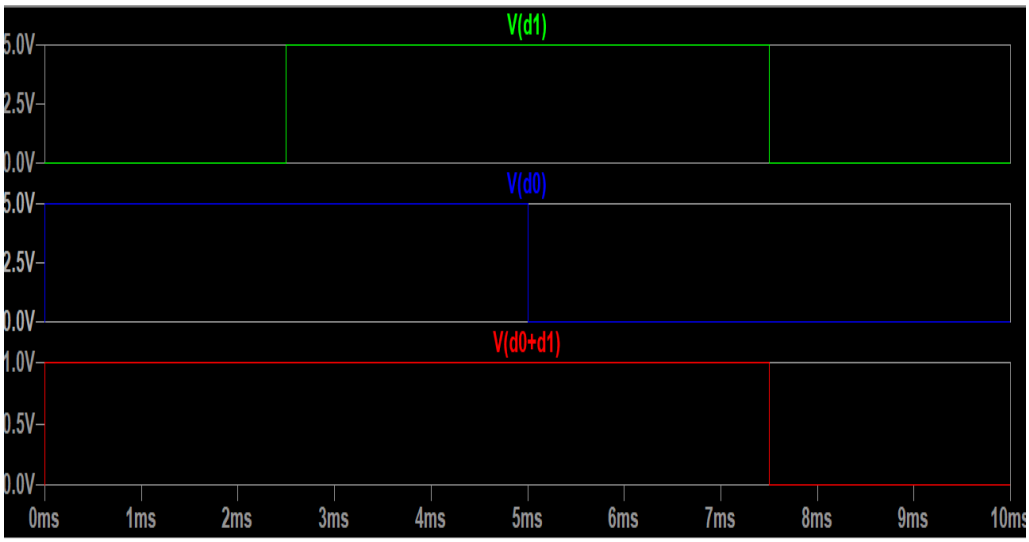
2. OR

A HIGH output (1) results if one or both the inputs to the gate are HIGH (1). If neither input is high, a LOW output (0) results.



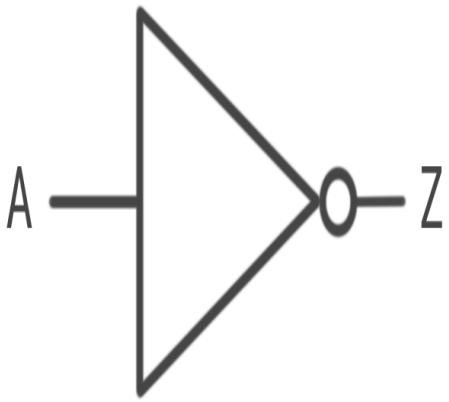
A	B	Output
0	0	0
0	1	1
1	0	1
1	1	1



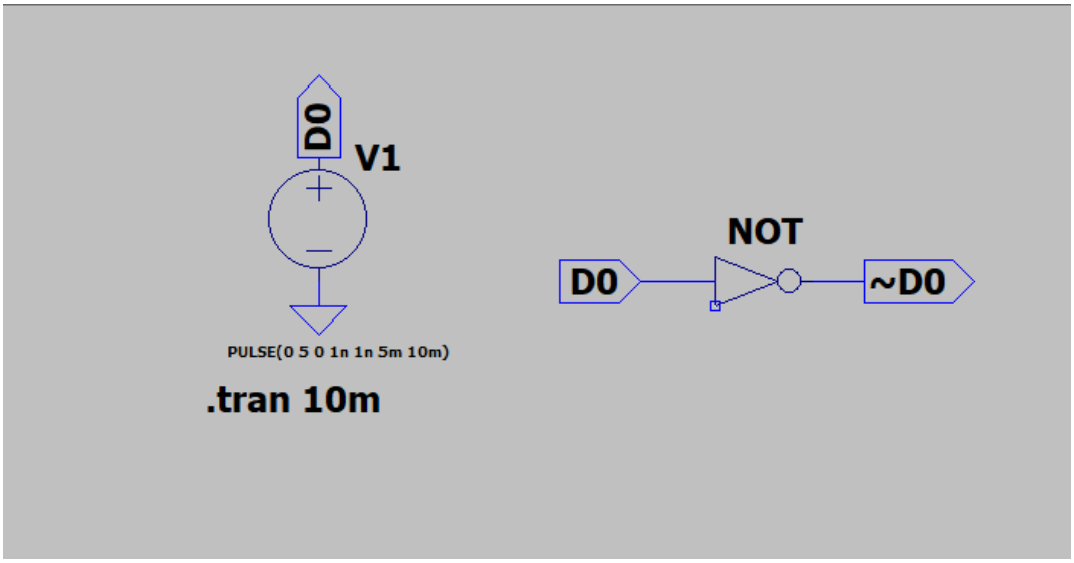


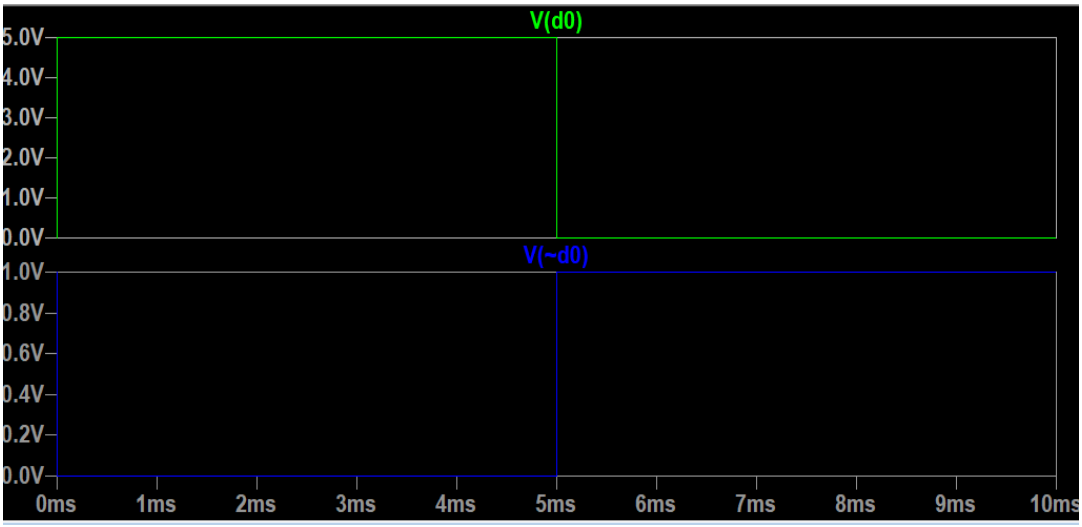
3. NOT

An inverter or NOT gate is a logic gate which implements logical negation.



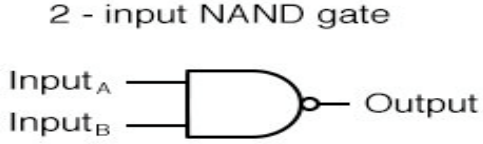
Input	Output
A	Y
0	1
1	0



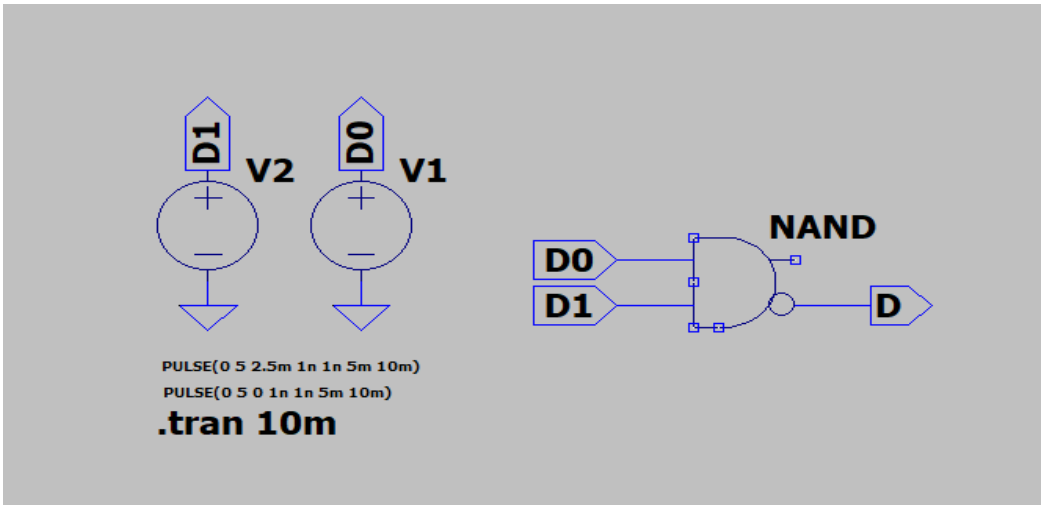


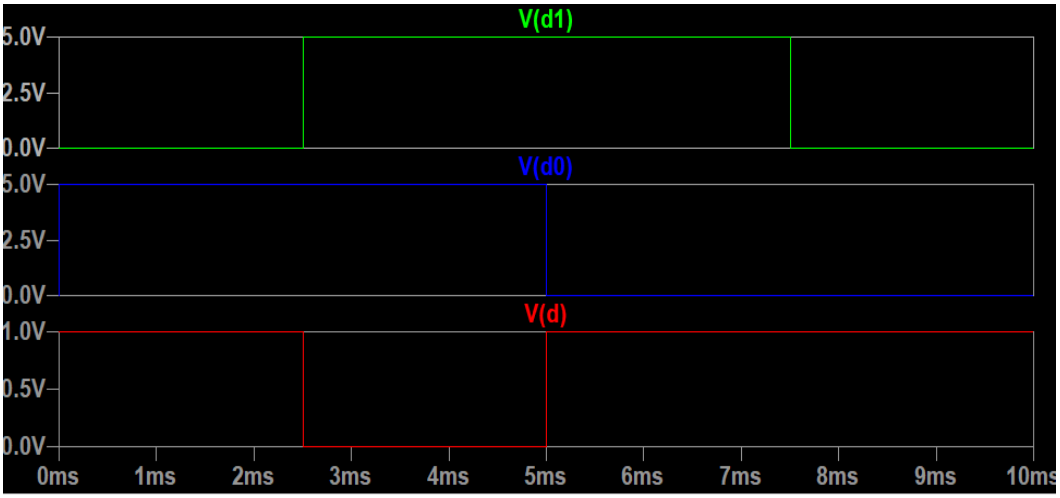
4. NAND

It is a logic gate which produces an output which is false only if all its inputs are true; thus its output is complement to that of an AND gate. A LOW (0) output results only if all the inputs to the gate are HIGH (1); if any input is LOW (0), a HIGH (1) output results.



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

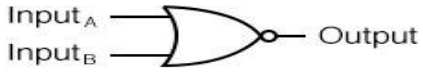




5. NOR

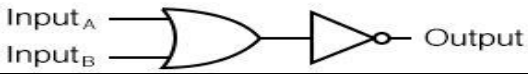
A HIGH output (1) results if both the inputs to the gate are LOW (0); if one or both input is HIGH (1), a LOW output (0) results. NOR is the result of the negation of the OR operator

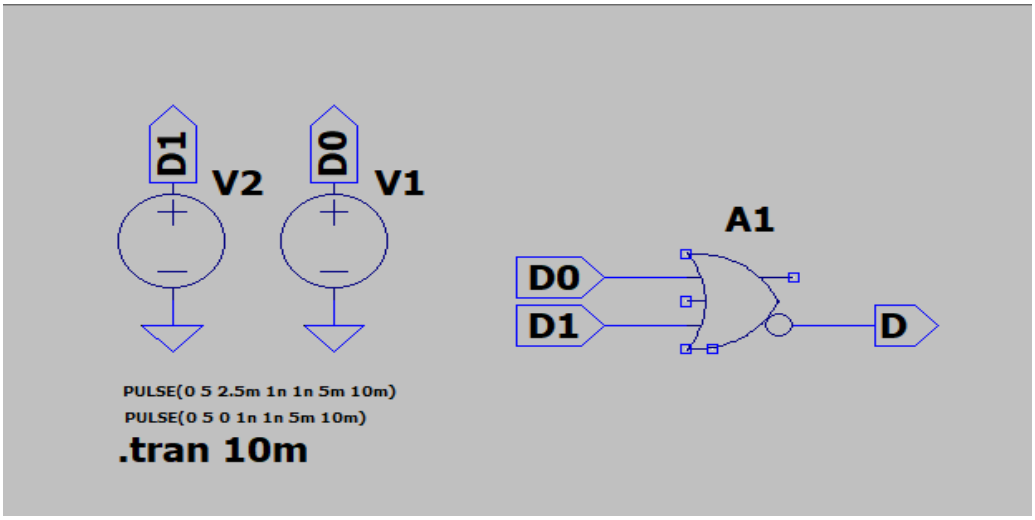
2 - input NOR gate

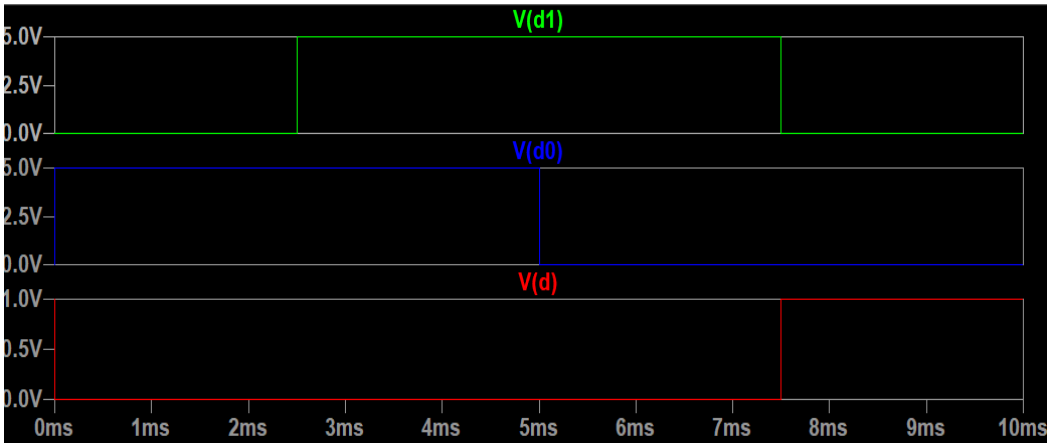


A	B	Output
0	0	1
0	1	0
1	0	0
1	1	0

Equivalent Gate Circuit

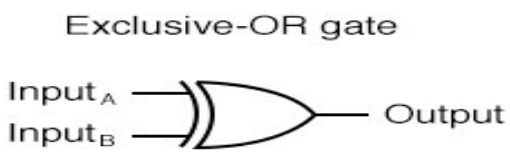


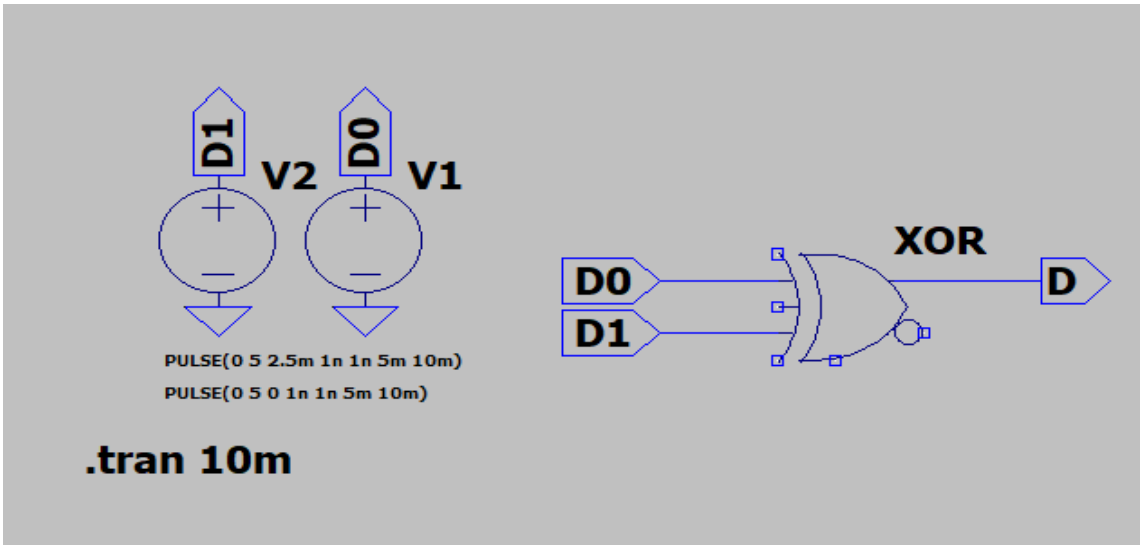
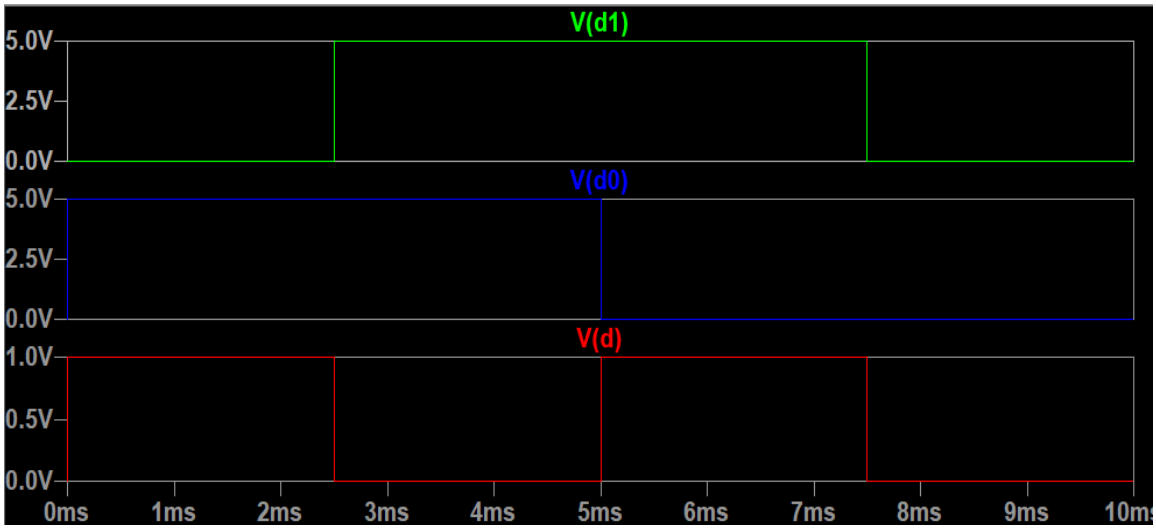




6. XOR

It is a digital logic gate that gives a true (1 or HIGH) output when the number of true inputs is odd. An XOR gate implements an exclusive or; that is, a true output results if one, and only one, of the inputs to the gate is true. If both inputs are false (0/LOW) or both are true, a false output results. XOR represents the inequality function, i.e., the output is true if the inputs are not alike otherwise the output is false.



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

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