DEPARTMENT OF ELECTRONICS ENGINEERING
SARDAR VALLABHBHAI NATIONAL INSTITUTE OF TECHNOLOGY

DLED LAB
Practical-2

Verification of truth table of basic logic gates. Implementation of basic logic gates using NAND and NOR gates.

Binary Logic:

- Deals with binary variables that take 2 discrete values (0 and 1), and with logic operations
- Three basic logic operations: AND, OR, NOT
- F (variables)= Expression

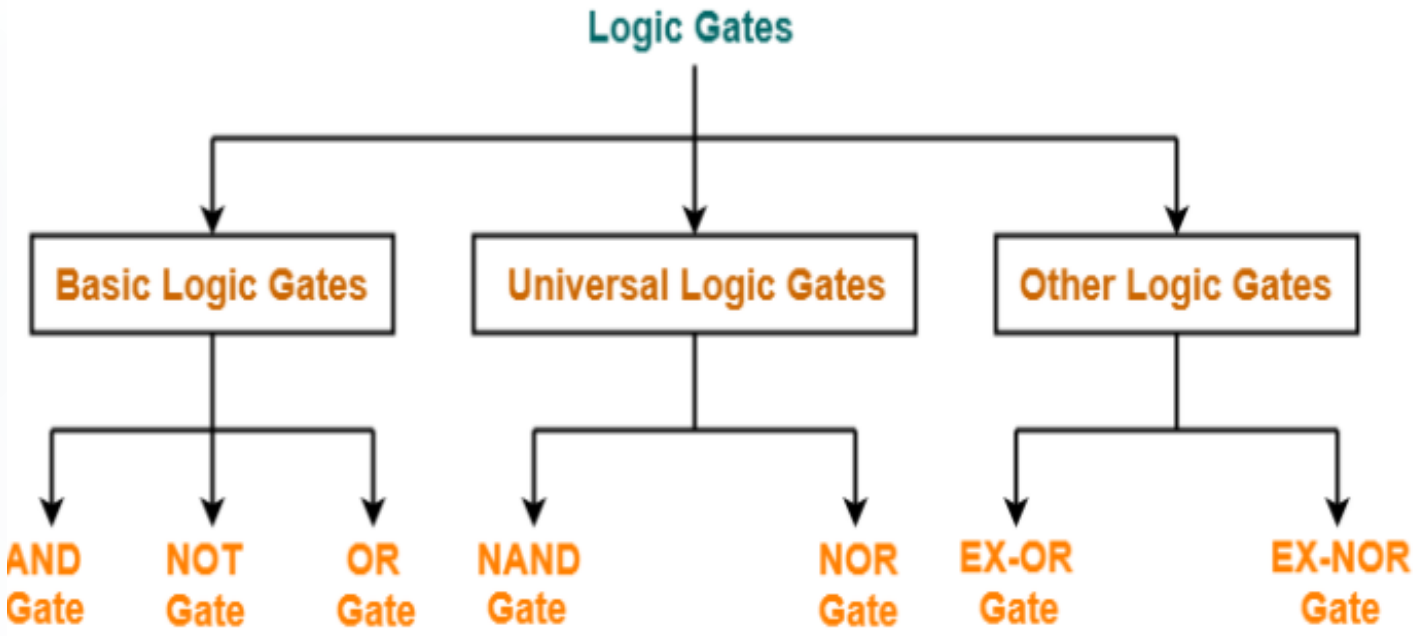
- Operators (+, •, ‘)
- Variables
- Constants (0, 1)
- Groupings (parenthesis)

set of binary variables

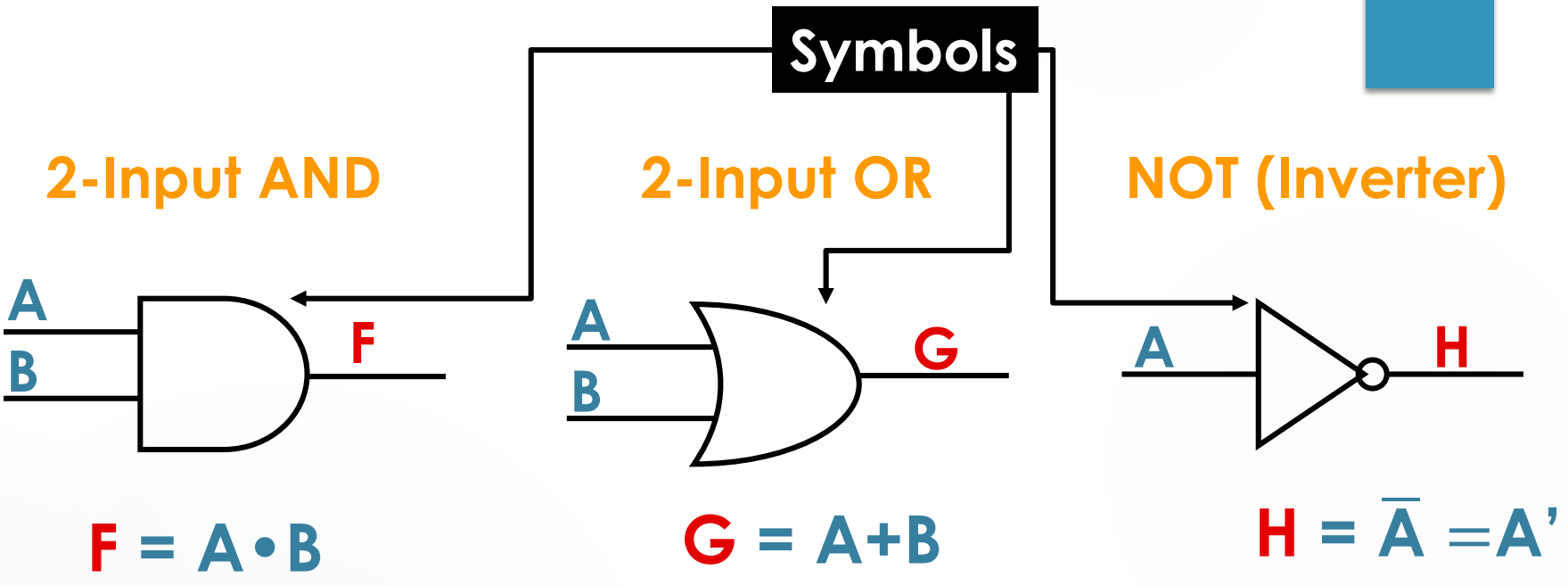
- Example: F(a,b) = a•b

Logic Gates:

- Logic gates are the switches that turn ON or OFF depending on the input conditions.
- They are the basic building blocks of computers.



Basic Logic Gates:



$F = A \cdot B$

$G = A + B$

$H = \bar{A} = A'$

A	B	F=A•B
0	0	0
0	1	0
1	0	0
1	1	1

A	B	G=A+B
0	0	0
0	1	1
1	0	1
1	1	1

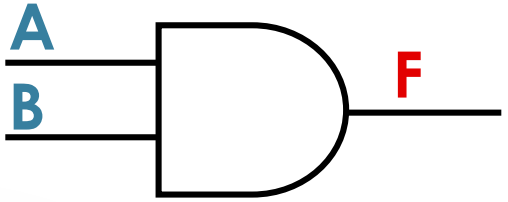
A	F=$\bar{A}$
0	1
1	0

Truth Tables

Basic Logic Gates:

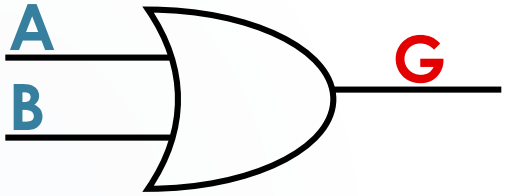
2-Input AND

F = A•B



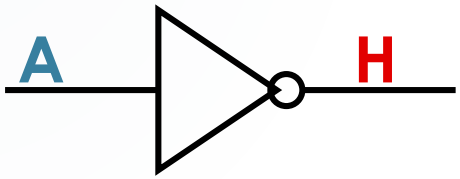
2-Input OR

G = A+B

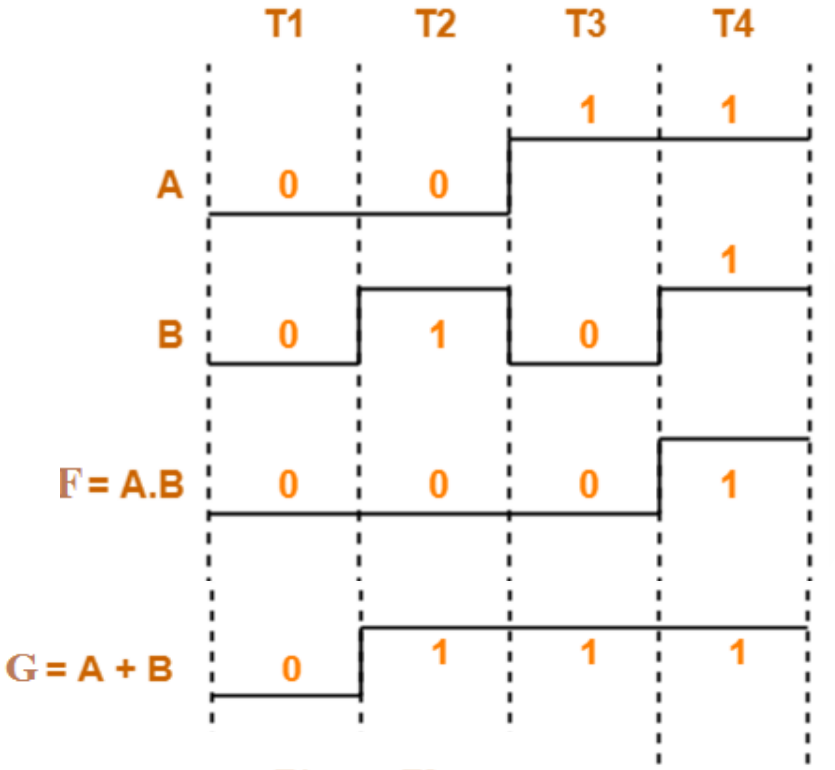


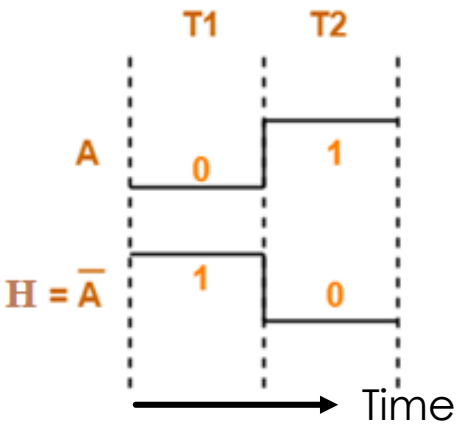
NOT (Inverter)

H = A'



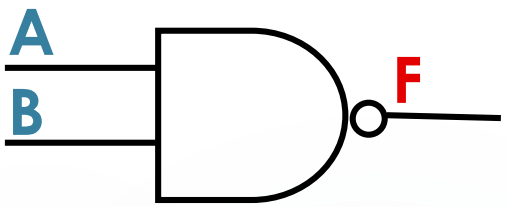
Timing Diagrams





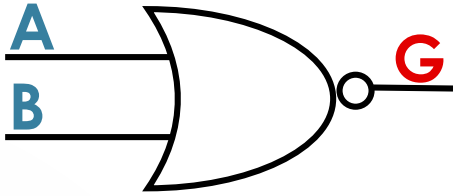
Universal Logic Gates:

2-Input NAND



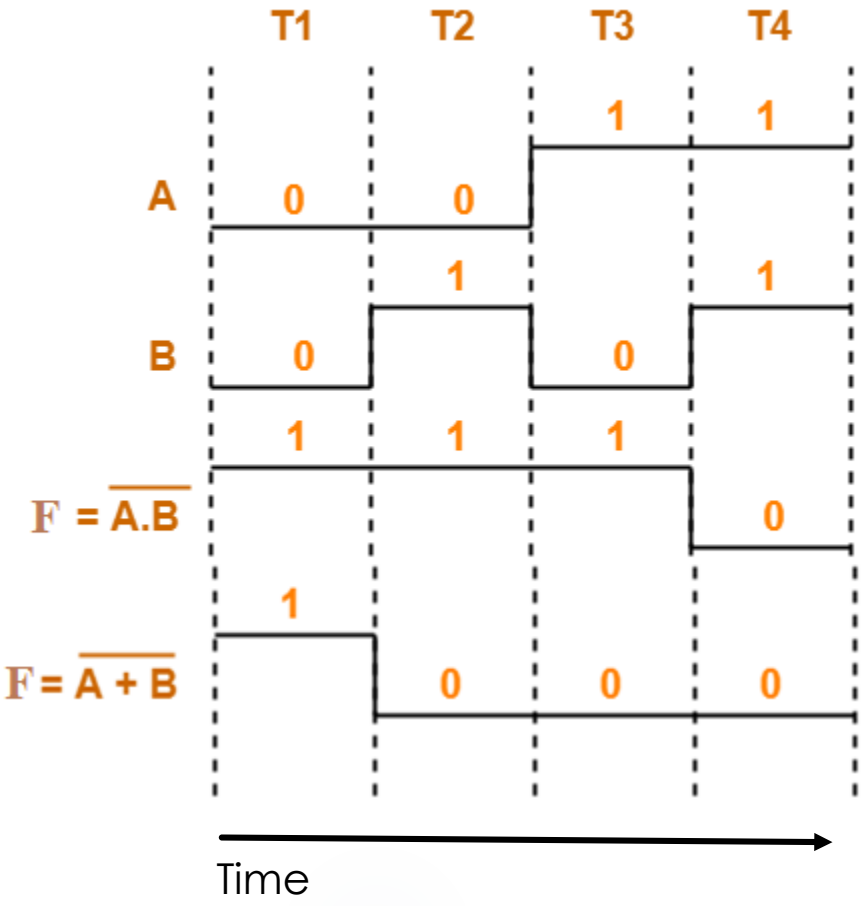
$F = \overline{A \cdot B}$

2-Input NOR



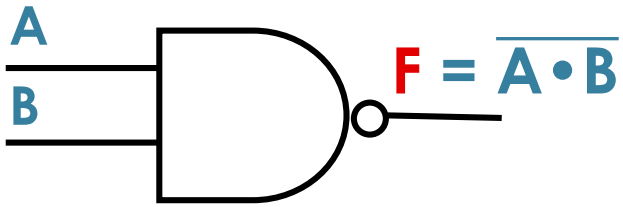
$G = \overline{A+B}$

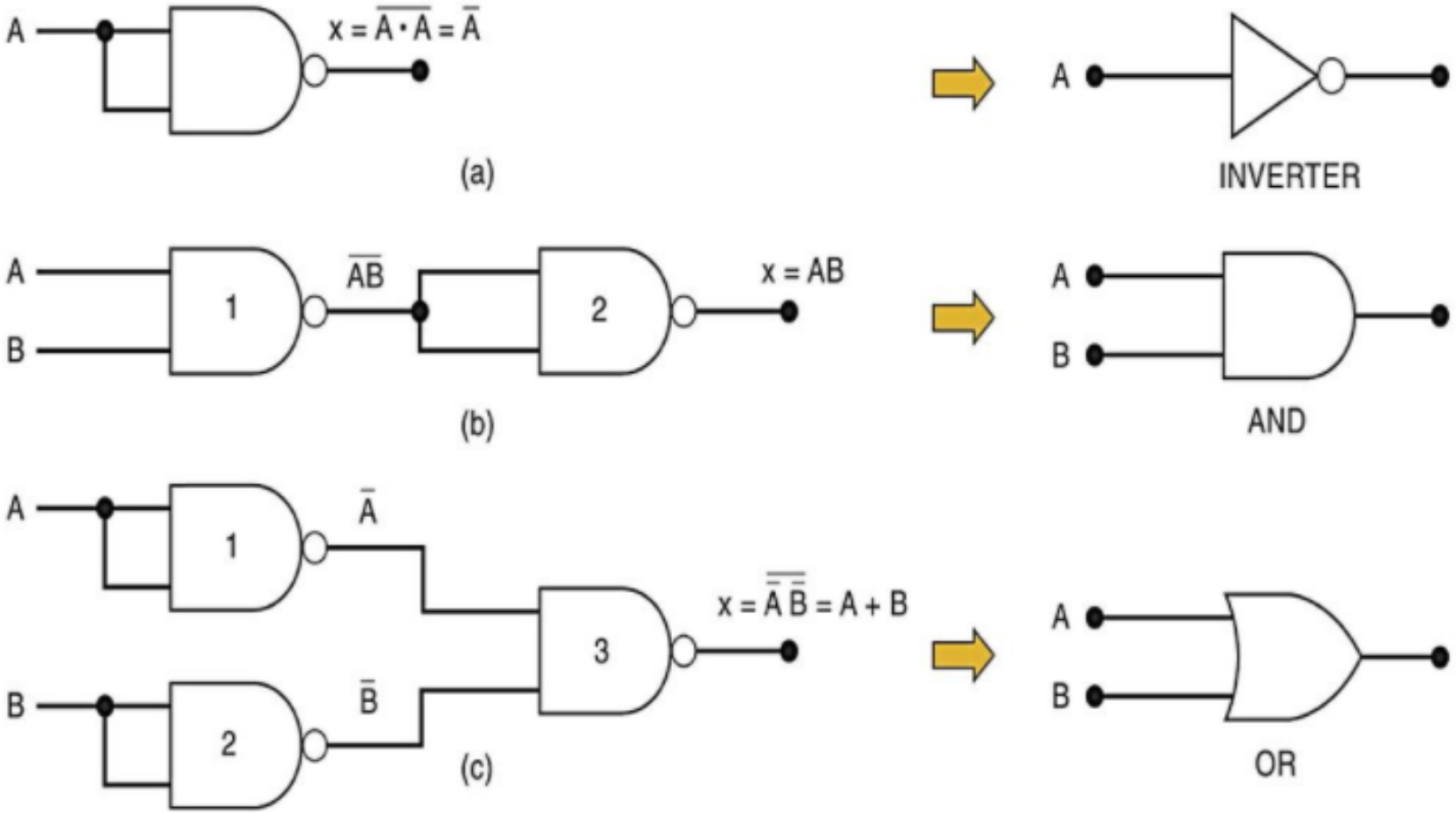
A	B	$F=\overline{A \cdot B}$	$G=\overline{A+B}$
0	0	1	1
0	1	1	0
1	0	1	0
1	1	0	0



Basic Logic Gates using NAND:

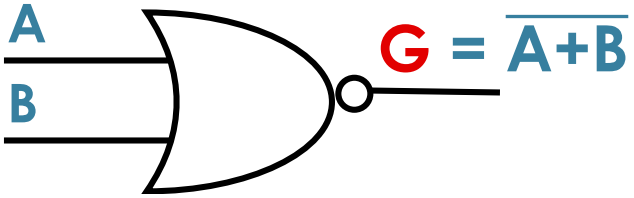
2-Input NAND

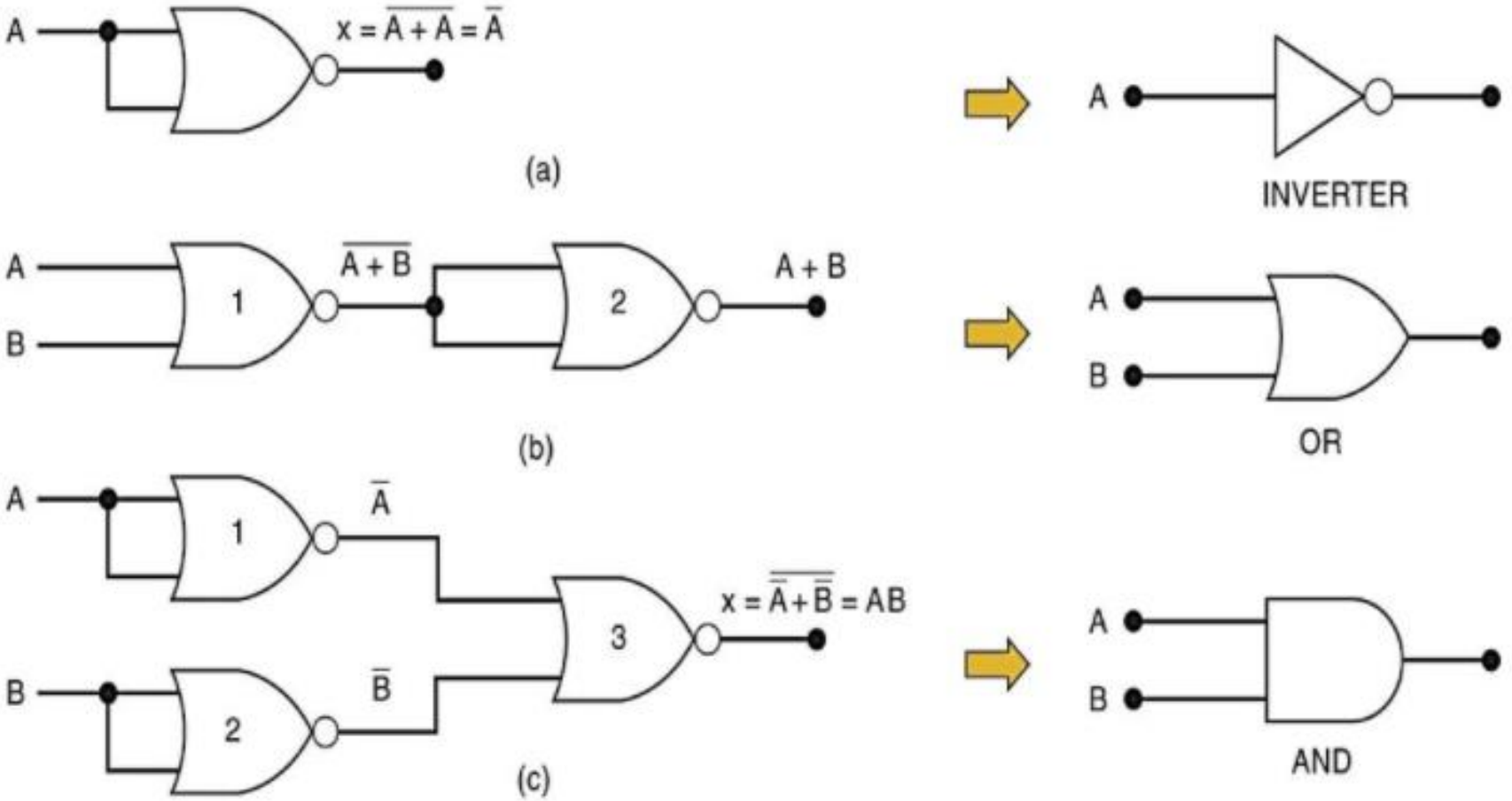




Basic Logic Gates using NOR:

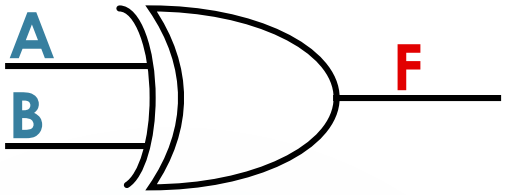
2-Input NOR





Other Logic Gates:

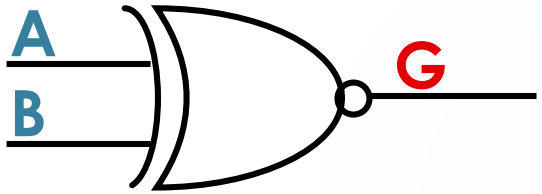
2-Input EX-OR



$F = A \oplus B = A\bar{B} + \bar{A}.B$

A	B	F=A⊕B
0	0	0
0	1	1
1	0	1
1	1	0

2-Input EX-NOR



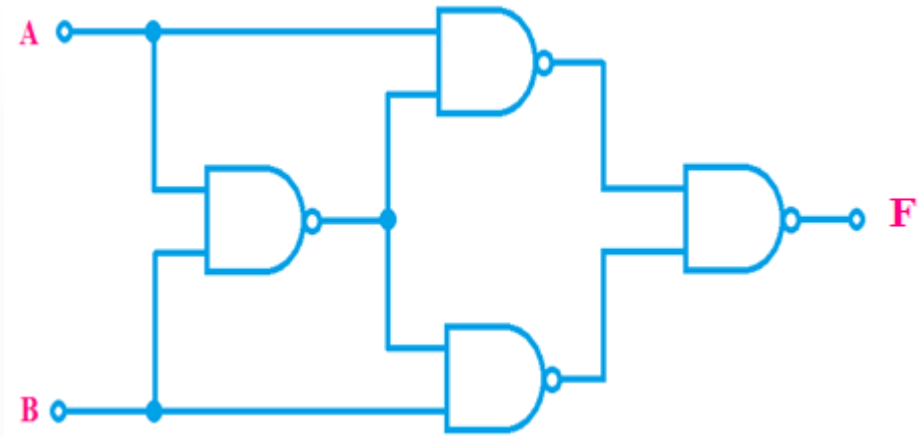
$G = A \odot B = AB + \bar{A}.\bar{B}$

A	B	G=A⊙B
0	0	1
0	1	0
1	0	0
1	1	1

EX-OR and EX-NOR using NAND/NOR:

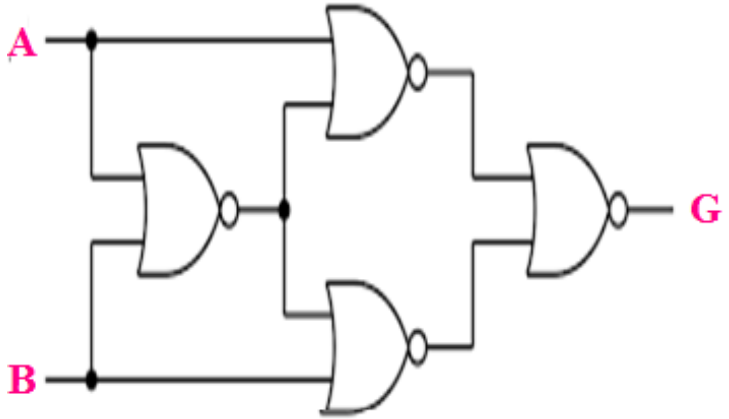
2-Input EX-OR using NAND

$F = A \oplus B$

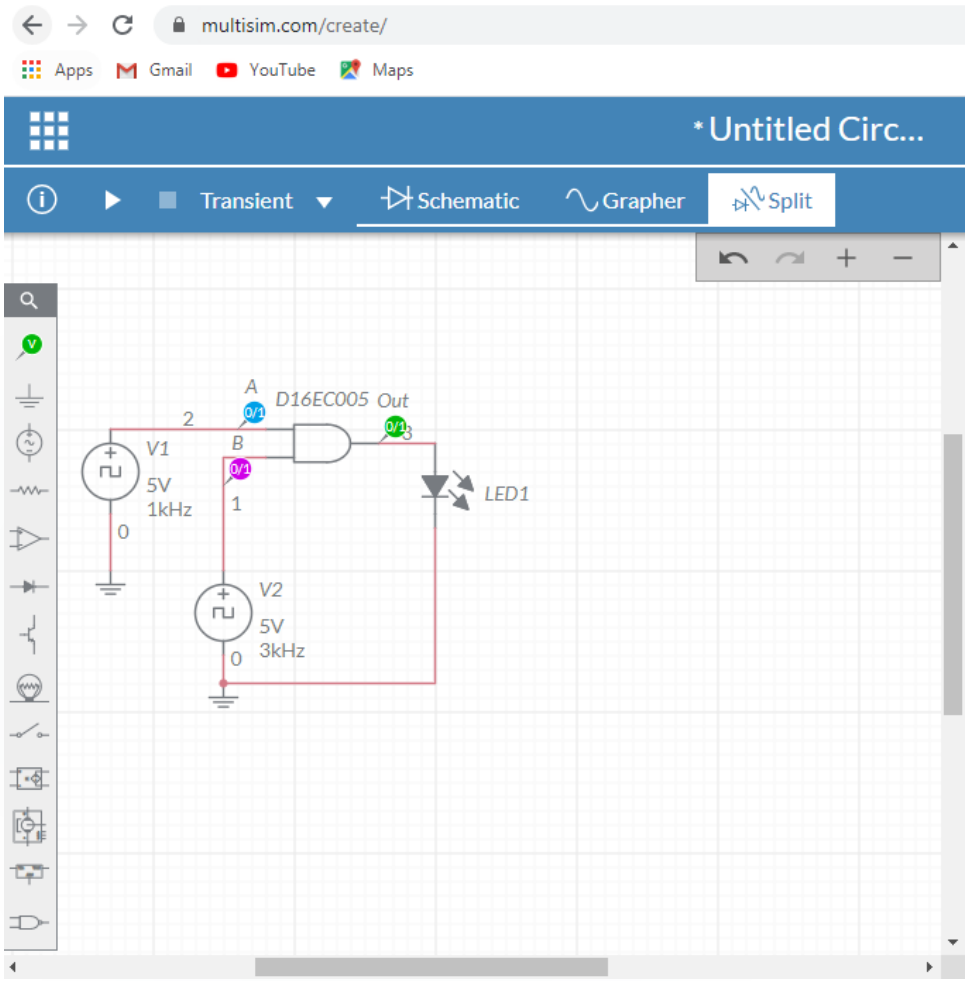


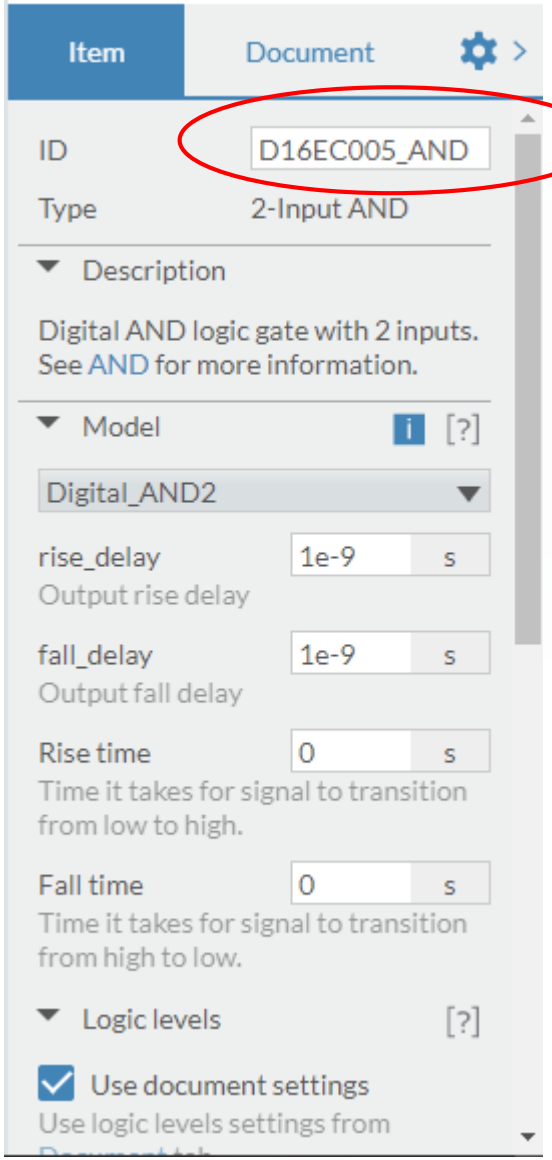
2-Input EX-NOR using NOR

$G = A \odot B$

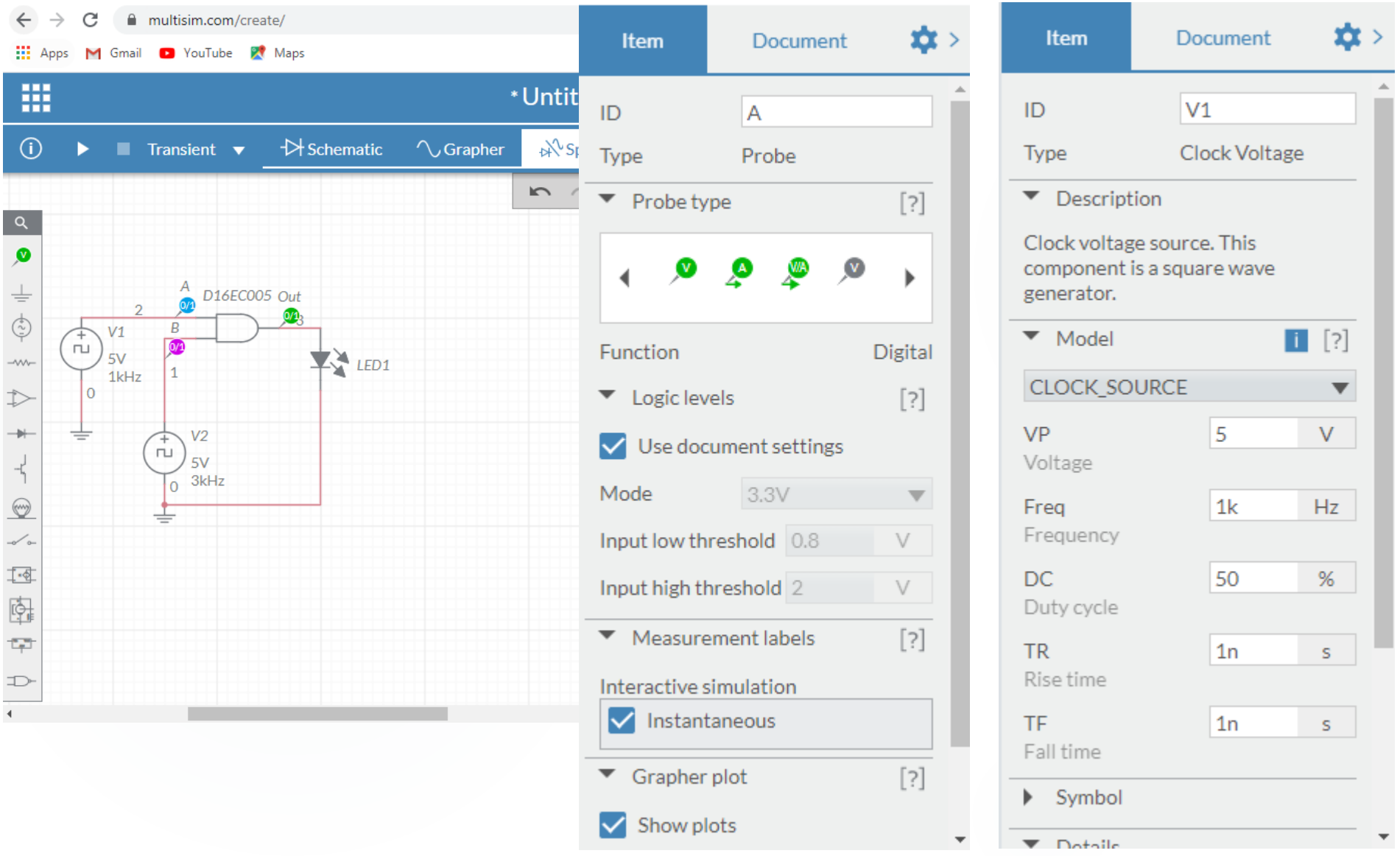


Simulation of AND Gate in Multisim:

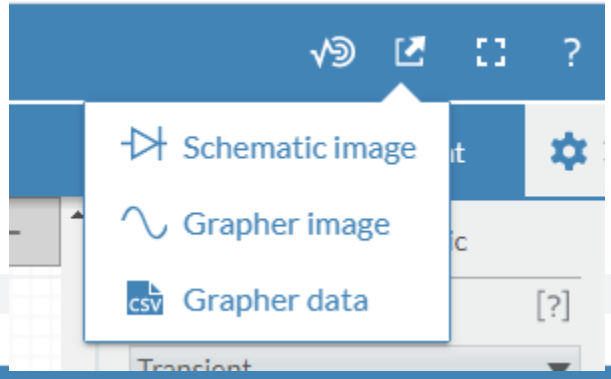




Simulation of AND Gate in Multisim:



Simulation of AND Gate in Multisim:

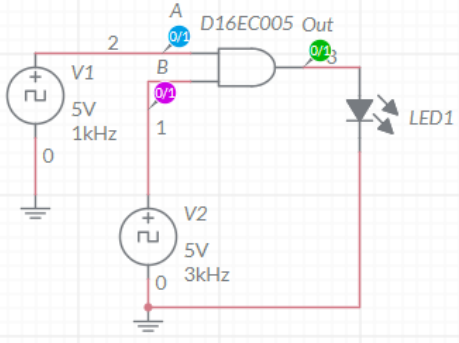


multisim.com/create/

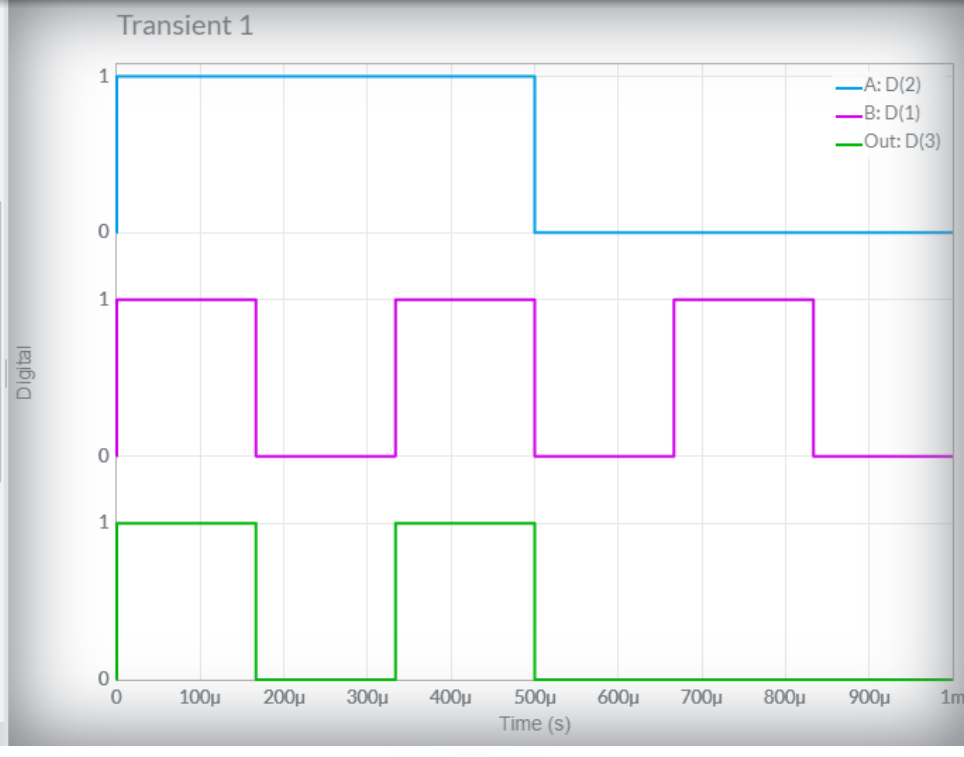
Apps Gmail YouTube Maps

*Untitled Circ...

Transient Schematic Grapher Split



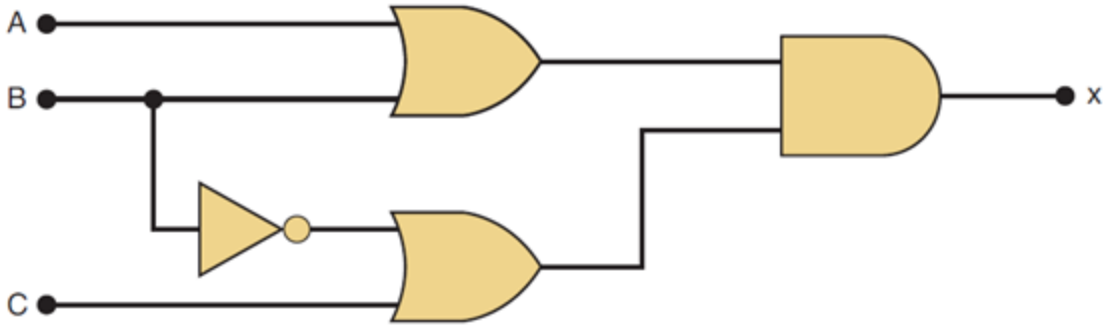
A	B	Out=A•B
0	0	0
0	1	0
1	0	0
1	1	1



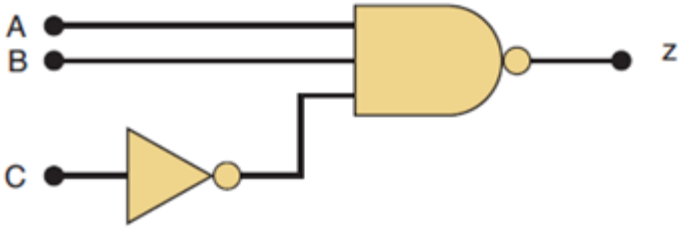
Assignment:

- Derive the logic expressions of following circuits and draw the truth table.
- Implement these circuits in Multisim and verify the truth table by from timing diagrams.

Circuit: 1



Circuit: 2



Circuit: 3