



EXPERIMENT - 3

Switching Theory and Logic Design (STLD)

Aim

To verify the truth tables of all logical gates(AND, OR, NOT, NAND, NOR, XOR, XNOR) using NOR gate only.

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EXPERIMENT - 3

AIM:

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Hardware and Software Apparatus Required

Hardware:

- ❖ Power supply, Bread Board, Connecting Wires, respective IC, LED, Wire Cutter.
- ❖ Circuit is designed on bread board using Integrated Chips (ICs), Voltage supply and LEDs.
- ❖ The set-up of apparatus and working of the circuit were demonstrated via recorded videos.

Software Simulation:

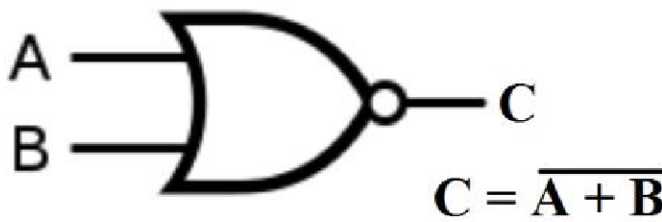
The schematic models of the desired circuits will be stimulated on MULTISIM (Free Software), easily accessible at www.multisim.com.

Components used – Source (Clock Voltage), Passive elements (resistor), Digital components (AND, OR, NAND, NOR, XOR, XNOR, Inverter), Probe for Analysis and annotation (Digital), Schematic connectors (Ground)

Theory:

Circuit Symbol and Truth table:

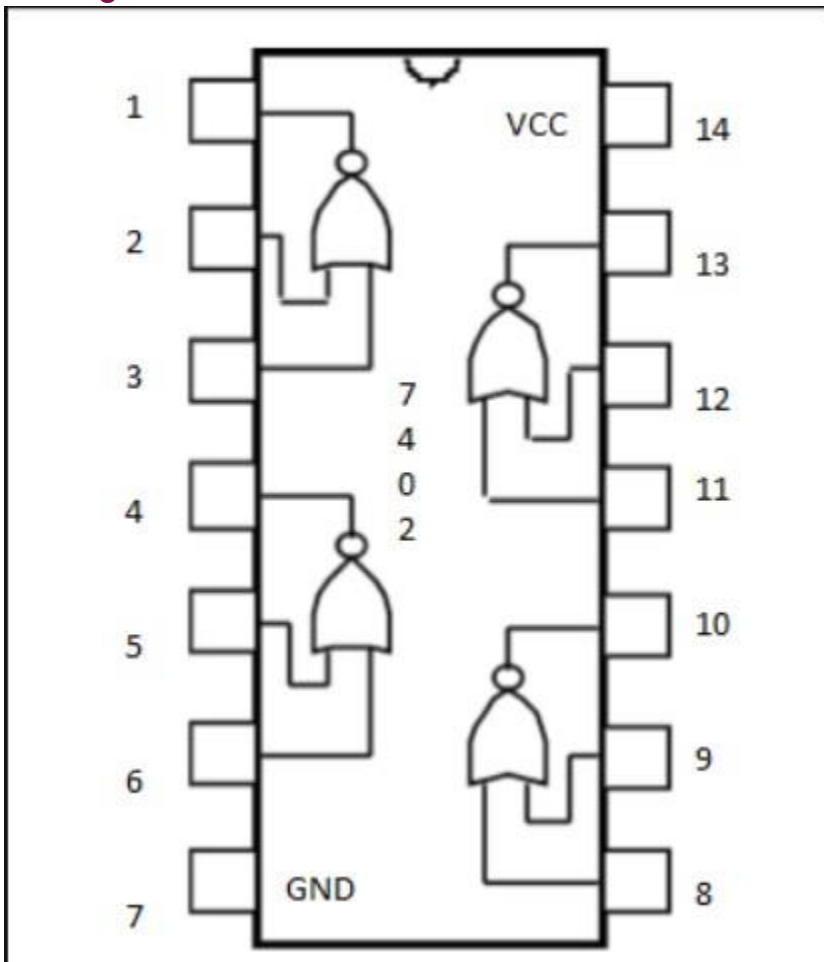
NOR GATE



$C = \overline{A + B}$

INPUT		OUTPUT
A	B	A NOR B
0	0	1
0	1	0
1	0	0
1	1	0

Pin Diagram:



NOR gate:

The NOR gate is a digital logic gate that implements logical NOR - it behaves according to the truth table to the right. 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. It can also in some senses be seen as the inverse of an AND gate. NOR is a functionally complete operation—NOR gates can be combined to generate any other logical function. It shares this property with the NAND gate. By contrast, the OR operator is monotonic as it can only change LOW to HIGH but not vice versa.

Procedure followed on MULTISIM:

1. LOG IN ON www.multisim.com
2. CREATE THE CIRCUIT
3. SAVE THE CIRCUIT
4. SAVE THE SCREENSHOTS FOR
 - i. INPUT & OUTPUT WAVEFORMS (ALONG WITH YOUR ID ON TOP LEFT)
 - ii. CIRCUIT (ALONG WITH YOUR ID ON TOP LEFT)

The screenshot shows the MultisimLive web interface. At the top, there's a navigation bar with links like FEATURES, PRICING, CIRCUITS, and RESOURCES. Below it, the title "AND from NOR" is displayed. The main workspace contains a circuit diagram where two NOR gates (U1, U2) are connected to an AND gate (U3). Input pulses are provided by V1 (5V, 1kHz) and V2 (5.00V, 1.50kHz). Logic probes PR1, PR2, and PR3 monitor the signals at various points in the circuit. A resistor R1 (1kΩ) is connected to the output. On the right side, there's a creator profile for "reeha" and a section for "MOST POPULAR CIRCUITS".

The "Circuit Graph" window, titled "Interactive 1", shows a timing diagram with three waveforms:

- PR1: D(3) - Green waveform, square wave between 0 and 1.
- PR2: D(4) - Cyan waveform, square wave between 0 and 1.
- PR3: D(5) - Blue waveform, square wave between 0 and 1.

The x-axis represents Time (s) from 50m to 57m. The y-axis represents Digital signal levels (0 and 1).

Screenshot of circuit: OR using NOR

multisim.com/content/YmZYBrzwWuCCWTejP5ngXU/or-from-nor/

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OR from NOR

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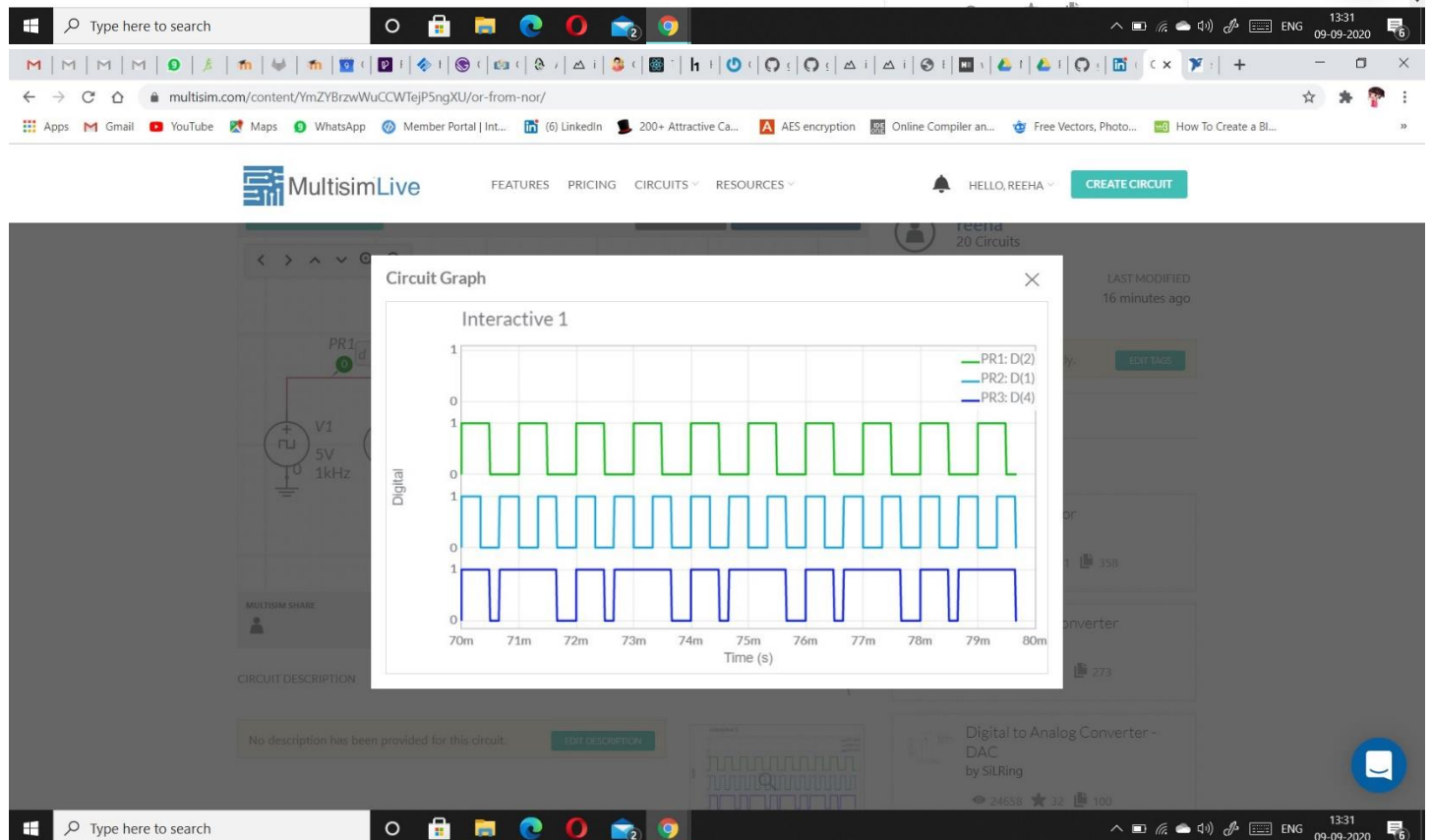
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DATE CREATED: 16 minutes ago LAST MODIFIED: 16 minutes ago

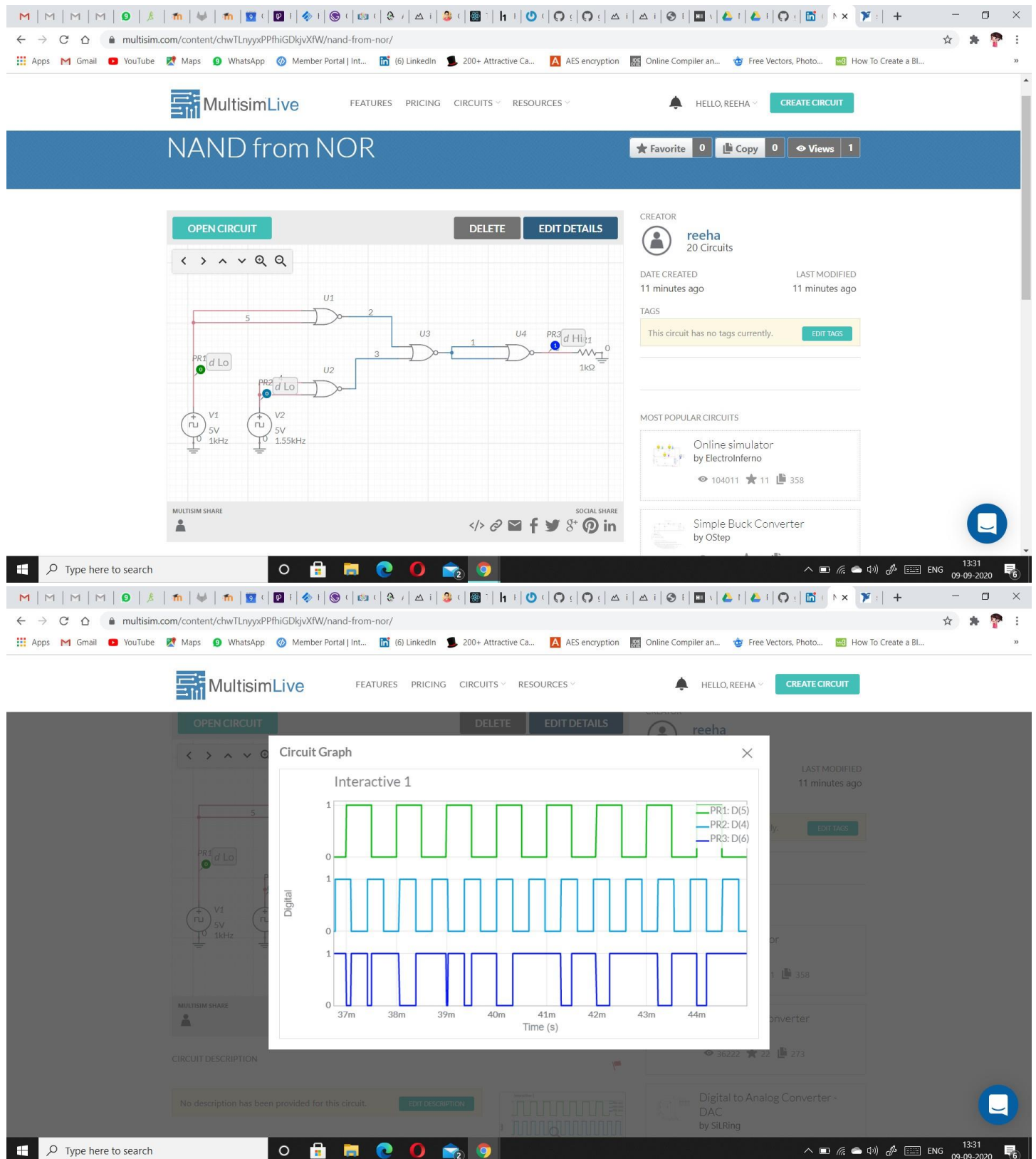
TAGS: This circuit has no tags currently. EDIT TAGS

MOST POPULAR CIRCUITS

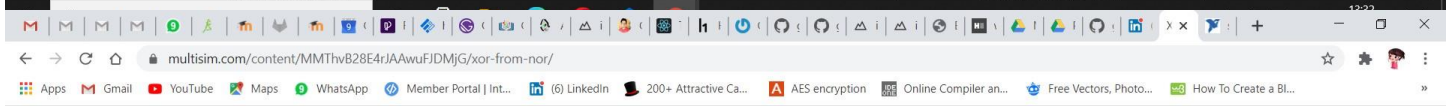
- Online simulator by ElectroInferno (104010 views, 11 stars, 358 downloads)
- Simple Buck Converter by OStep



Screenshot of circuit: NAND using NOR



The screenshot shows a web browser window with the address bar displaying "multisim.com/content/MMthvB28E4rJAawuFJDMjG/xor-from-nor/". The page content is mostly blank, with a few small icons visible in the top right corner. The browser's taskbar at the bottom shows various open applications, including Google Chrome, Microsoft Edge, and several other web browsers.



Screenshot of circuit: XNOR using NOR

multisim.com/content/qBQN3JmbQppry9R9GXmpTo/xnor-from-nor/

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XNOR from NOR

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- Simple Buck Converter by OStep

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EDIT TAGS

358

273

Digital to Analog Converter - DAC by SILRing 24658 32 100

13:50 09-09-2020

Circuit Graph

Interactive 1

PR1: D(2)
PR2: D(1)
PR3: D(8)

Digital

Time (s)

18.5m 19m 19.5m 20m 20.5m 21m 21.5m 22m

CIRCUIT DESCRIPTION

No description has been provided for this circuit. EDIT DESCRIPTION

13:50 09-09-2020

Result:

All gates has been verified

Viva Questions

1. A logic circuit that provides a HIGH output for both inputs HIGH or both inputs LOW is a(n):

- A. Ex-NOR gate
- B. OR gate
- C. Ex-OR gate
- D. NAND gate

ANS.

Option A

2. How many two-input AND and OR gates are required to realize $Y = CD + EF + G$?

- a) 2, 2
- b) 2, 3
- c) 3, 3
- d) 3, 2

Ans.

Answer: a

Explanation: $Y = CD + EF + G$

The number of two input AND gate = 2

The number of two input OR gate = 2.

3. Which of following are known as universal gates?

- a) NAND & NOR
- b) AND & OR
- c) XOR & OR
- d) EX-NOR & XOR

Ans.

Answer: a

Explanation: The NAND & NOR gates are known as universal gates because any digital circuit can be realized completely by using either of these two gates, and also they can generate the 3 basic gates AND, OR and NOT.

4. A single transistor can be used to build which of the following digital logic gates?

- A. AND gates
- B. OR gates
- C. NOT gates
- D. NAND gates

Ans.

C) Or Gates