North South University

Department of Electrical & Computer Engineering

LAB REPORT

Course Code : EEE211. L

Course Title: Digital Electronics

Section: 01

Experiment Number: 01

Experiment Name: Universal Gates

Experiment Date: 23rd of November, 2020

Date of Submission: 27th of November, 2020

Course Instructor: FHE

Submitted To: Fatema Zahra

Submitted by: Mohammed Mahmudur Rahman

Student ID# 1520386043

Experiment Name:

Universal Gates.

Objective:

→ Verify each of NAND Gate equivalent circuits to perform same operations of Basic gates.

→ Implementations of XOR & XNOR gates using universal gates.

Theory:

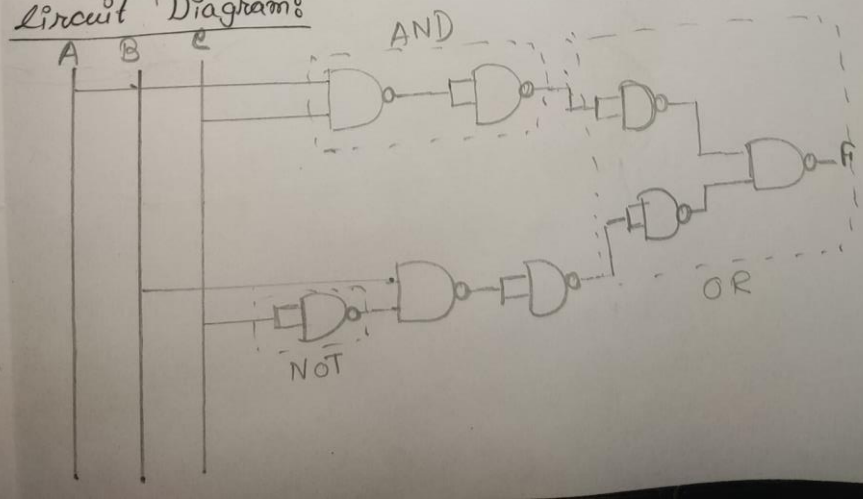
A universal gate is that kind of gate which can implement any boolean function without the help of any other gates. There are two universal gates. NAND gate & NOR gate.

~~Circuit Diagram:~~

Apparatus:

→ Trainer Board
→ 2-input NAND gates (IC 7400).
→ 2-input NOR gates (IC 7402).

Circuit Diagram:



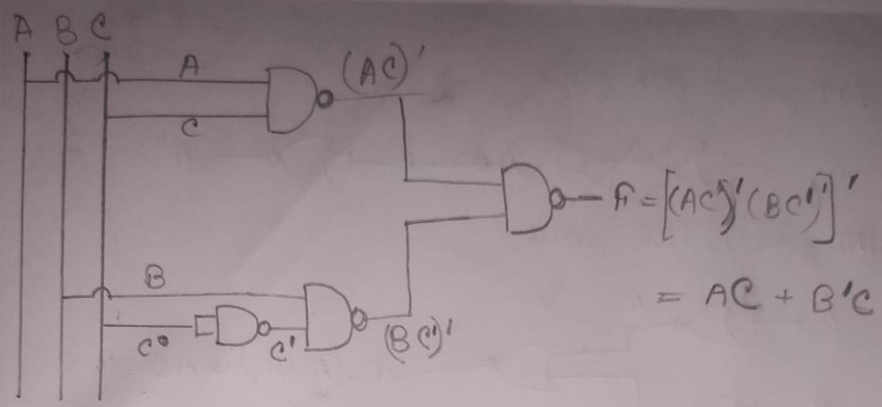


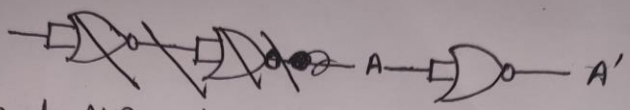
Figure: Combinational Circuit using NAND gate.

Table:

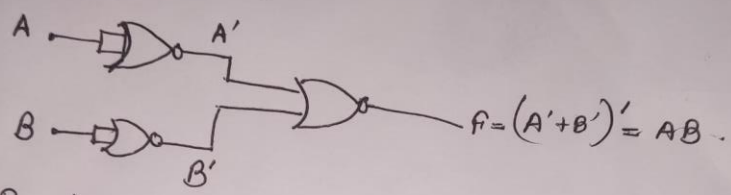
A B C	$I_1 = AC$	$I_2 = BC'$	$f = I_1 + I_2$
0 0 0	0	0	0
0 0 1	0	0	0
0 1 0	0	1	1
0 1 1	0	0	0
1 0 0	0	0	0
1 0 1	1	0	1
1 1 0	0	1	1
1 1 1	1	0	1

Question - Answers:

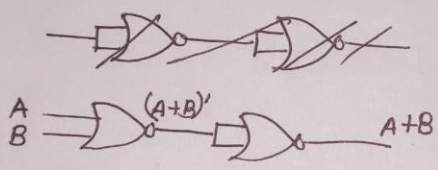
NOT gate to NOR gate →



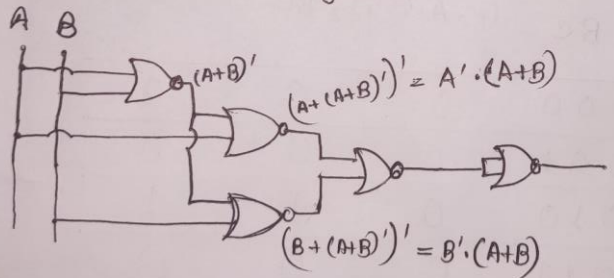
AND gate to NOR gate →



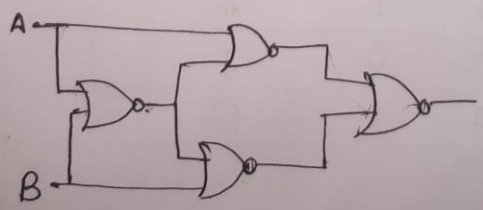
OR gate to NOR gate →



XOR gate to NOR gate →

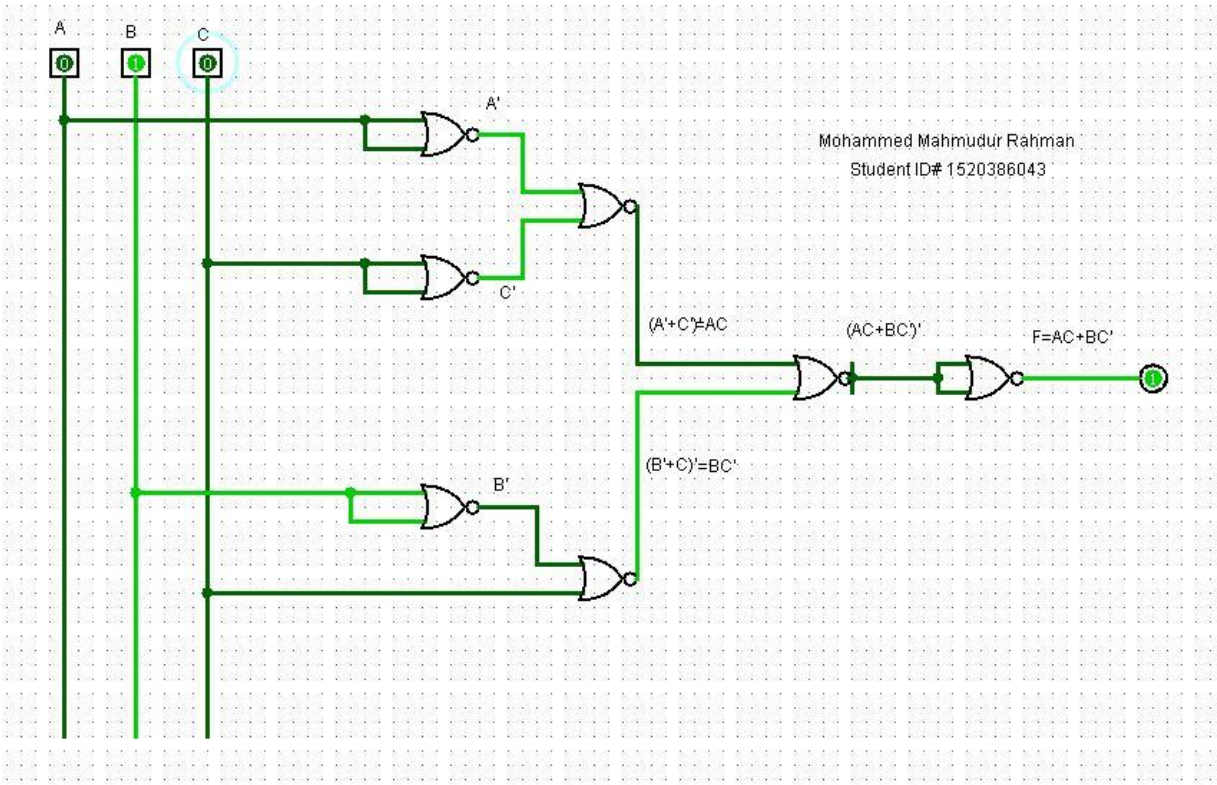


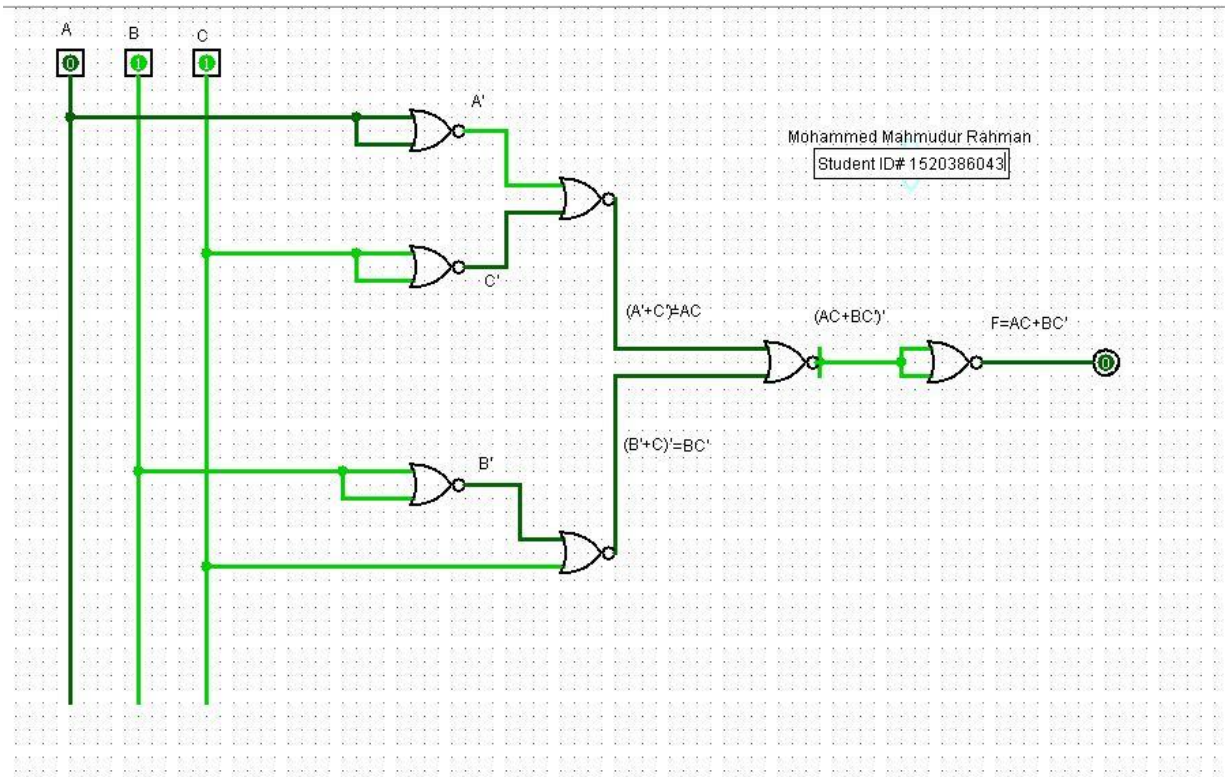
~~XO~~XNOR gate to NOR gate →



Discussions

Due to pandemic instead of practical lab session we are attending in online session. Through software simulation we are implementing our theoretical knowledge. After completion of this lab, we learned it is efficient to use universal gate. And, through universal gates we can implement any Boolean function. During simulation, I did not face any major difficulties.


A
B
C
A'
C'
B'
(A'+C')'=AC
(AC+BC')'
F=AC+BC'
(B'+C)'=BC'
Mohammed Mahmudur Rahman
Student ID# 1520386043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