

Project Title: Basic Logic Gates

Course: ELET 1210 – DIGITAL EELECTRONICS 1

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Table of Contents

Introduction.....	3
Description of Experimental Setup/List of Equipment Used	3
Logic Diagram Experiment 1A	3
Pictorial Diagram Experiment 1A.....	4
Logic Diagram Experiment 1B	4
Pictorial Diagram Experiment 1B	5
Logic Diagram Experiment 2.....	5
Pictorial Diagram Experiment 1B	6
Procedure /Method.....	6
Results.....	7

Introduction

The report discusses the use and implementation of basic logic gates. Logic gates either output a 1 or 0 depending on their implantation and inputs. The logic gates used in the experiments are the basic gates AND, OR and NOT. These gates are used to produce possible outputs for the equations $A B \bar{C} + A \bar{B} C + \bar{A} B C$, $A (\bar{B} + C) + A \bar{B} C$ and $TRF + \bar{T}M(R + F)$. Truth tables are used to provide all possible outputs for the equations and can be tested using the logic gates and circuits. This experiment aims to test this theory.

Description of Experimental Setup/List of Equipment Used

Equipment Used:

The equipment used for this experiment include, a breadboard, power supply, wires, Dip switch, resistors, and a LED and ICs.

Required IC's:

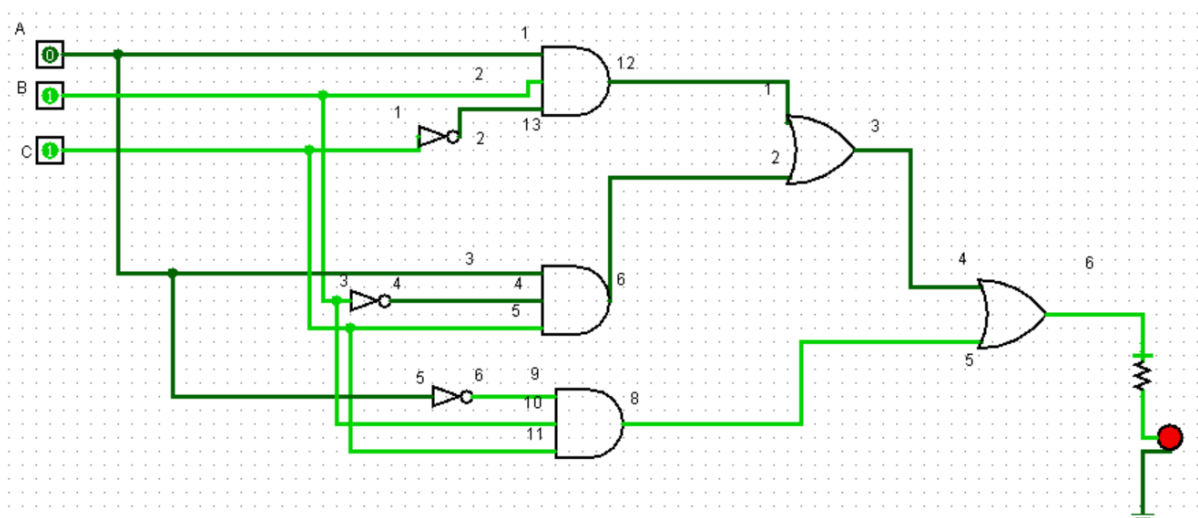
74LS04 Hex Inverter

7408, 74LS08 Quad 2-Input AND

7411, 74LS11 Triple 3-Input AND

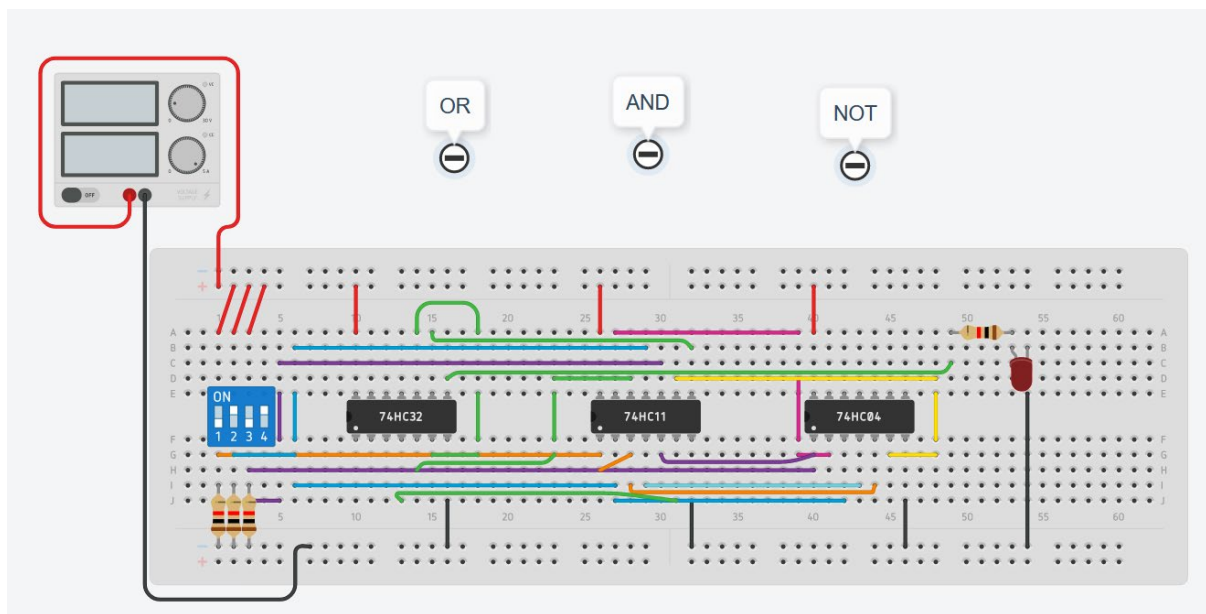
7432, 74LS32 Quad 2 – Input OR

Logic Diagram Experiment 1A



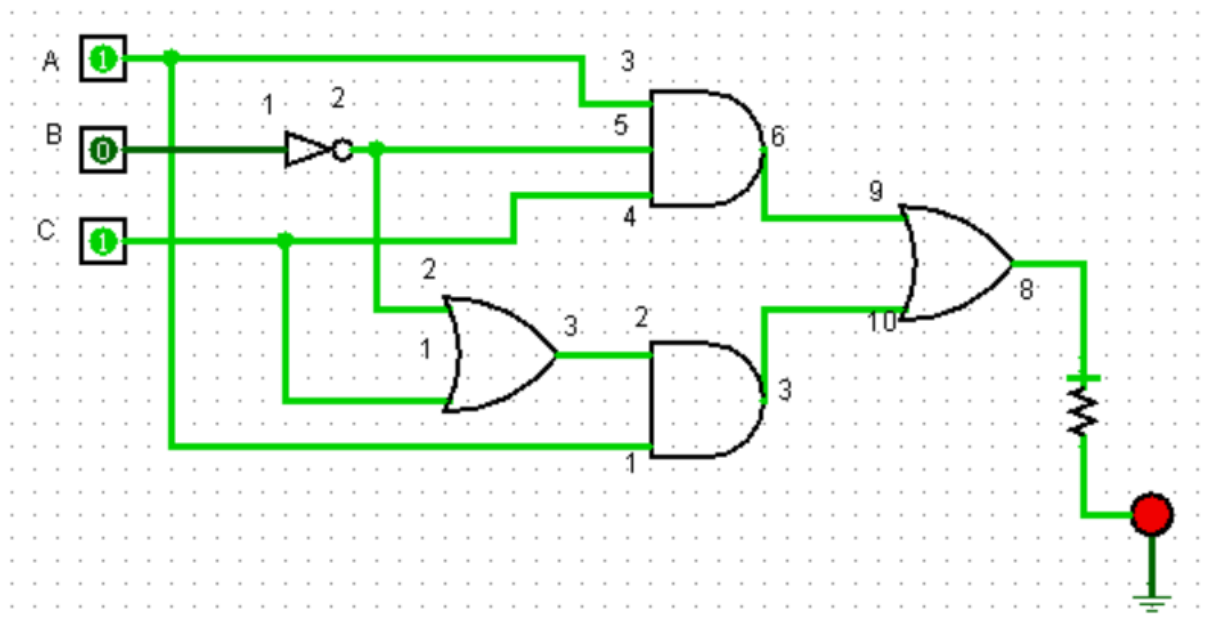
Example of a Logic diagram for $F = AB\bar{C} + A\bar{B}C + \bar{A}BC$

Pictorial Diagram Experiment 1A



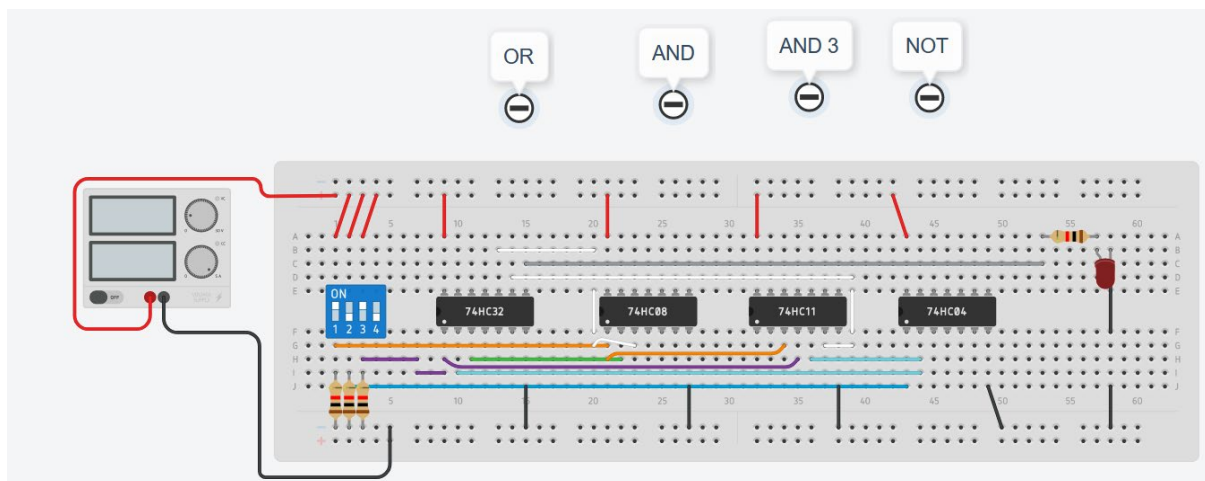
Example of a Pictorial diagram for $F = AB\bar{C} + A\bar{B}\bar{C} + \bar{A}BC$

Logic Diagram Experiment 1B



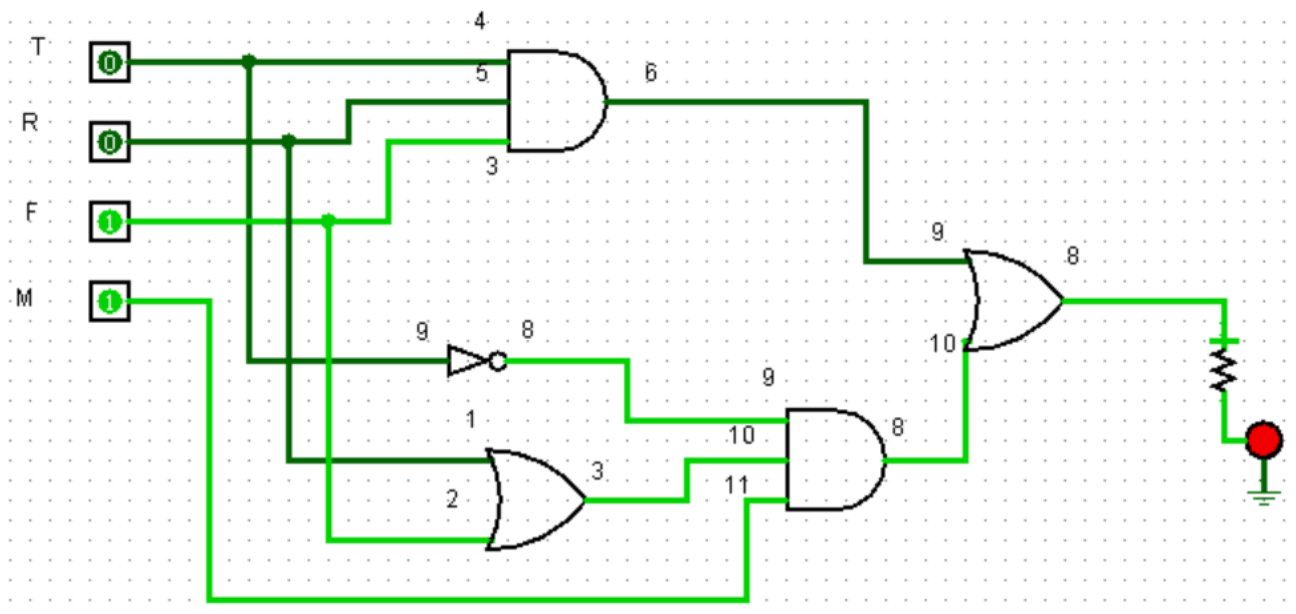
Example of a Logic diagram for $F = A(\bar{B} + C) + \bar{A}\bar{B}\bar{C}$

Pictorial Diagram Experiment 1B



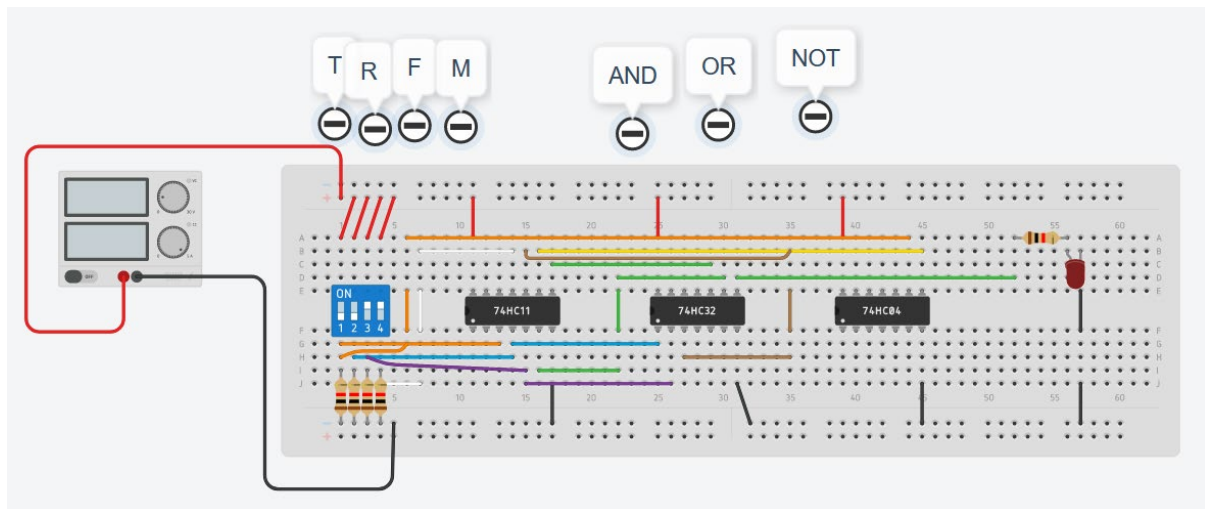
Example of a Pictorial diagram for $F = A(\bar{B} + C) + A\bar{B}\bar{C}$

Logic Diagram Experiment 2



Example of a Logic diagram for $F = TRF + \bar{T}M(R + F)$

Pictorial Diagram Experiment 1B



Example of a Pictorial diagram for $F = TRF + \overline{T}M(R + F)$

Procedure/Method

All equipment required was gathered and setup. The IC's and DIP switch were setup in positions showed in pictorial diagrams. Red wires were then used to connect power to the IC's and DIP switch. The DIP switch had 3-4 wires sending power to it and each IC had a wire sending power to their pin 14. Resistors are placed in the DIP switch rows used and were sent to ground and all IC's pin 8 were connected to ground with a black wire. Wires were then setup as showed in the pictorial diagrams and the final output from the ICs were connected to a wire and put in a free row not connected. A resistor was then connected to the output wire row and connected to another free row. A LED 's anode was then connected to the resistor's row and the cathode was place in a free row. The cathode row was then sent to ground. Power from the power supply was then sent to the breadboard with a red wire and grounded with a black wire. With everything connected correctly, the switches on the DIP switch were used to test the equation's results producing 1's and 0's. The LED on represented the output was 1 and off represented a 0.

Results

In the experiment nothing unusual happened and the expected results were shown by the on/off state of the LED. The results reflected the truth tables for the different equations and combinations used to produce 1's and 0's. The results reflected are showed in the truth tables below.

Experiment 1A			
$A B \bar{C} + A \bar{B} C + \bar{A} B C$			
A	B	C	F
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	0

Experiment 1B							
$F = A (\bar{B} + C) + A \bar{B} C$							
A	B	C	\bar{B}	$\bar{B}+C$	$A (\bar{B} + C)$	$A \bar{B} C$	F
0	0	0	1	1	0	0	0
0	0	1	1	1	0	0	0
0	1	0	0	0	0	0	0
0	1	1	0	1	0	0	0
1	0	0	1	1	1	0	1
1	0	1	1	1	1	1	1
1	1	0	0	0	0	0	0
1	1	1	0	1	1	0	1

Experiment 2								
$TRF + \bar{T}M(R + F)$								
T	R	F	M	T R F	\bar{T}	R+ F	$\bar{T}M(R + F)$	F
0	0	0	0	0	1	0	0	0
0	0	0	1	0	1	0	0	0
0	0	1	0	0	1	1	0	0
0	0	1	1	0	1	1	1	1
0	1	0	0	0	1	1	0	0
0	1	0	1	0	1	1	1	1
0	1	1	0	0	1	1	0	0
0	1	1	1	0	1	1	1	1
1	0	0	0	0	0	0	0	0
1	0	0	1	0	0	0	0	0
1	0	1	0	0	0	1	0	0
1	0	1	1	0	0	1	0	0
1	1	0	0	0	0	1	0	0
1	1	0	1	0	0	1	0	0
1	1	1	0	1	0	1	0	1
1	1	1	1	1	0	1	0	1

Discussion and Conclusion

In Summary, the experiment shows the circuits implemented were able to produce the output from the truth tables of each equation. Therefore, it can be said basic logic gates can be used to produce the output showed in truth tables.

