

Logical Expression through assembly

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CONTENTS

1	Abstract	1
2	Components	1
3	Solution :	1
3.1	Truth table for Boolean Logic	1
3.2	Theoretical Solution	1
4	Procedure	2
4.1	LED Blinking	2

1 ABSTRACT

In the circuit A,B,C and D are digital inputs, Y is digital output. The equivalent circuit shows the logical expression $Y=AB+CD$.

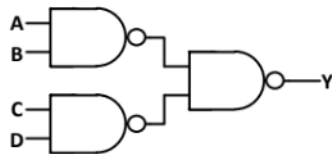


Fig. 1: $Y=AB+CD$

2 COMPONENTS

Component	Value	Quantity
Resistor	220 Ohm	1
Arduino	UNO	1
Seven Segment Display		1
Decoder	7447	1
Jumper Wires	M-M	20
Breadboard		1

TABLE I

3 SOLUTION :

3.1 Truth table for Boolean Logic

A	B	C	D	Y
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

TABLE II

3.2 Theoretical Solution

Based on Demorgans Law

$$\overline{AB} = \overline{A} + \overline{B} \quad (1)$$

$$\overline{\overline{A}} = A \quad (2)$$

As per the boolean circuit A,B,C and D are inputs and Y is the output. The equivalent expression of the boolean logic is

$$Y = \overline{\overline{AB} \cdot \overline{CD}}$$

By using equation(1) then the output Y is

$$Y = \overline{\overline{AB} + \overline{CD}}$$

Again by using equation(2) then the output Y is

$$Y = AB + CD$$

4 PROCEDURE

4.1 LED Blinking

- 1) Connect Arduino ground to the led - resistor end
- 2) Connect Arduino 13 pin to the LED Positive
- 3) Execute the following code
- 4) Observe the results as per below TABLE III by changing input values

Observe the circuit and verify the program by executing the link provided below.

<https://github.com/naveed790/FWC/assembly>