Platformio

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CONTENTS

I QUESTION

A Boolean function F of three variables X, Y, and Z is given as
F(X, Y, Z) = (X′ + Y + Z).(X + Y′ + Z′).(X′ + Y + Z′).(X′ Y′ Z′ + X′ Y Z′ + X Y Z′)
Which one of the following is true?

i. F(X, Y, Z) = (X + Y + Z′).(X + Y′ + Z′).(X′ + Y′ + Z′)
ii. F(X, Y, Z) = (X′ + Y).(X + Y′ + Z′)
iii. F(X, Y, Z) = (X′ Z′) + (Y Z′)
iv. F(X, Y, Z) = (X′ Y′ Z) + (X Y Z)

II SOLUTION

F(X, Y, Z) = (X′ + Y + Z).(X + Y′ + Z′).(X′ + Y + Z′).(X′ Y′ Z′ + X′ Y Z′ + X Y Z′)
= (X′ + Y + Z).(X + Y′ + Z′).(X′ + Y + Z′).(X′ Z′.(Y + Y′) + X Y Z′)
= (X′ + Y + Z).(X + Y′ + Z′).(X′ + Y + Z′).(X′ Z′ + X Y Z′)
= (X′ + Y + Z).(X + Y′ + Z′).(X′ + Y + Z′).(Z′).(X′ + X Y)
= (X′ + Y + Z).(X + Y′ + Z′).(X′ + Y + Z′).(Z′).(X′ + Y)
= (X′ + Y + Z).(X + Y′ + Z′).(X′ + Y + Z′).(Z′).(X′ + Y)

Let (X′ + Y) = A

F(X, Y, Z) = (A + Z).(X + Y′ + Z′).(A + Z′).(Z′).(X′ + Y)
= (X + Y′ + Z′).(A + ZZ′).(Z′).(X′ + Y)
= (X + Y′ + Z′).(X′ + Y).(Z′).(X′ + Y)
= (X + Y′ + Z′).(X′ + Y).(Z′)
= (X′ + Y).(XZ′ + Z′Y′ + Z′Z′)
= (X′ + Y).(XZ′ + Z′Y′ + Z′Z′)
= (X′ + Y).(XZ′ + Z′Y′ + Z′)
= (X′ + Y).(Z′).(X + Y′ + 1)

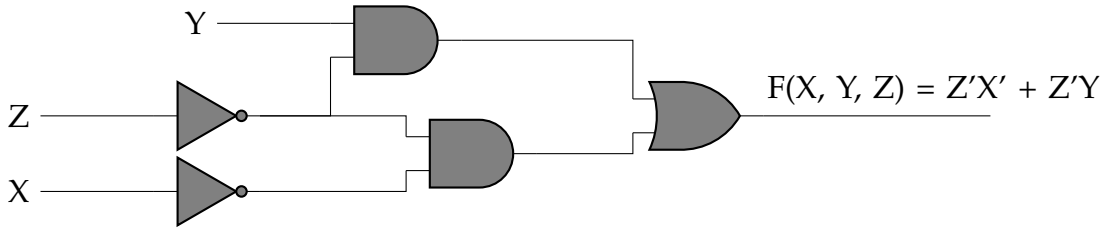
= (Z′).(XX′ + X′Y′ + X′ + YX + YY′ + Y)
= (Z′).(X′Y′ + X′ + YX + Y)
= (Z′).(X′.(Y′ + 1) + Y.(X + 1))
= (Z′).(X′ + Y)
F(X, Y, Z) = Z′X′ + Z′Y

III TRUTH TABLE

X	Y	Z	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

Truth table for Boolean function 'F'

IV LOGICAL DIAGRAM



V COMPONENTS

Component	Values	Quantity
Arduino	UNO	1
Jumper Wires	M-M	10
Breadboard		1
LED		2
Resistor	220 ohms	1

List of items required

VI IMPLEMENTATION

Arduino PIN	INPUT	OUTPUT
2	X	
3	Y	
4	Z	
13		F

Connections

Procedure:

a. Connect the circuit as per the above table.
b. Connect the output pin to LED.
c. Connect inputs to Vcc for logic 1, ground for logic 0.
d. Execute the circuit using the below code.

https://github.com/shr-eyas/FWC/blob/main/platformio.cpp

e. Change the values of X, Y, Z in the code and verify the truth table.