



IMPLEMENTATION OF LOGIC EXPRESSION WITH ARDUINO

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Abstract

Q.36 If $X = 1$ in the logic equation

$$[x + Z (\bar{Y} + (\bar{Z} + X\bar{Y}))] (\bar{X} + \bar{Z}(X + Y)) = 1,$$

then:

- (A) $Y = Z$
- (B) $Y = \bar{Z}$
- (C) $Z = 1$
- (D) $Z = 0$

Components

Component	Value	Quantity
Arduino Board	–	1
Jumper Wires	M-F	10
Push Buttons	–	2
Breadboard	–	1
USB Cable	–	1
LED	–	1
Resistors	220 Ω , 10k Ω	1,2

Truth Table for $f = \bar{Z}(1 + Y)$

Y	Z	\bar{Z}	$1 + Y$	$f = \bar{Z}(1 + Y)$
0	0	1	1	1
0	1	0	1	0
1	0	1	1	1
1	1	0	1	0

Setup

1. Connect push button for Y to D2 with a 10k Ω pull-down resistor to GND.
2. Connect push button for Z to D3 with a 10k Ω pull-down resistor to GND.
3. Connect LED anode to D13 through a 220 Ω resistor, and cathode to GND.
4. Upload the Arduino code that reads Y and Z , sets $X = 1$, evaluates logic, and controls the LED.
5. Power the Arduino using a USB cable or external 5V source to run the circuit.

Implementation

1. Set $X = 1$ directly in the Arduino code.
2. Read Y from digital pin D2 and Z from D3 using `digitalRead()`.
3. Compute `notZ = !Z` to evaluate the simplified logic expression.
4. Use the result (`notZ`) to control the LED with `digitalWrite(13, result)`.
5. Continuously run the logic in the `loop()` function to respond to input changes.