IMPLEMENTATION OF KMAP BOOLEAN LOGIC WITH ARDUINO

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Abstract

The minimal sum-of-products expression for the logic function f represented by the given Karnaugh map is:

PQ/RS	00	01	11	10
00	0	1	0	0
01	0	1	1	1
11	1	1	1	0
10	0	0	1	0

Options:

(A) $QS + P\overline{RS} + \overline{PQR} + PRS + \overline{PQR}$

(B) $QS + P\overline{RS} + \overline{PQR} + PRS$

(C) $P\overline{RS} + \overline{PQR} + PRS + \overline{PQR}$

(D) $P\overline{RS} + \overline{PQR} + \overline{PQR}$

Kmap

PQ/RS	00	01	11	10
00	0	1	0	0
01	0	1	1	1
11	1	1	1	0
10	0	0	1	0

Components

Component	Value	Quantity
ArduinoBoard	− M-F − − − −	1
JumperWires	220Ω,10kΩ	1
PushButtons		0
Breadboard		4
USBCable		1
LED		1
Resistors		1

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Setup

1. Connect buttons to pins D2–D5 for inputs P, Q, R, S, each with a 10kΩ pull-down resistor to ground.

2. Connect an LED to pin D13 through a 220 Ω resistor to ground.

3. Write Arduino code to read inputs and compute f = !P $\cdot R \cdot S + P \cdot Q \cdot R + !P \cdot$ R $\cdot !S + !P \cdot Q \cdot R$.

4. Use digitalWrite(13, f) to control the LED based on the computed output.

5. Upload the code and test by pressing buttons to check when the LED turns ON for f = 1.

Implementation

Connect push buttons to pins D2–D5 for inputs P, Q, R, S with 10kΩ pull-down resistors.

Connect an LED to pin D13 through a 220Ω resistor to ground.

Write Arduino code to read inputs and compute $f = !P \cdot R \cdot S + P \cdot Q \cdot R + !P \cdot R \cdot !S + !P \cdot Q \cdot R$.

Use digitalWrite(13, f) to control the LED based on the computed output.

Upload the code and test by pressing buttons to check when the LED turns ON for f = 1.