IMPLEMENTATION OF NAND NOR LATCH USING ARDUINO AND LEDS

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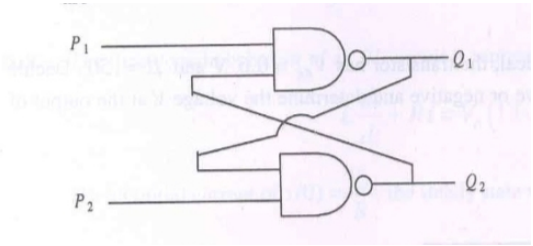
Question

Q.38 Refer to the NAND and NOR latches shown in the figure. The inputs (P_1, P_2) for both the latches are first made (0,1) and then, after a few seconds, made (1,1). The corresponding stable outputs (Q_1, Q_2) are observed.



Truth Table for NAND and NOR Latch

Latch Type	P_1	P_2	Q_1	Q_2	State
NAND	0	1	1	0	Set
NAND	1	1	1	0	Hold (Set)
NOR	0	1	1	0	Reset
NOR	1	1	0	0	Invalid

Components

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

Setup

1. Connect push button P1 to digital pin D2 with a 10kΩ pull-down resistor.
2. Connect push button P2 to digital pin D3 with a 10kΩ pull-down resistor.
3. Connect LED Q1 to digital pin D12 through a 220Ω resistor to ground.
4. Connect LED Q2 to digital pin D13 through a 220Ω resistor to ground.
5. Upload latch emulation code to Arduino to simulate NAND latch behavior using inputs P1 and P2.

Implementation

1. Define digital pins D2 and D3 as inputs for buttons P1 and P2.
2. Define digital pins D12 and D13 as outputs for LEDs Q1 and Q2.
3. Use `pinMode()` in `setup()` to configure input and output pins.
4. In `loop()`, read inputs P1 and P2 using `digitalRead()` and apply NAND or NOR latch logic.
5. Use `digitalWrite()` to display Q1 and Q2 states on LEDs according to the selected latch type.