

## GATE 2009, ECE Question Number 60

### Abstract

This project demonstrates the implementation of segment logic using only NOT and OR gates as described in GATE Q60. It implements outputs  $g$ ,  $e$ , and  $d$  using an Arduino UNO.

### 1. Components

Component	Qty
Arduino UNO	1
Push Buttons	4
LEDs	3
220 $\Omega$ Resistors	7
Breadboard	1
Jumper Wires	10
Laptop with Arduino IDE	1

Table 1: List of components used

### 2. Setup and Connections

- Connect buttons P1, P2, b, c to D2, D3, D4, and D5.
- Connect LEDs to D8 (g), D9 (e), and D10 (d) via 220 $\Omega$  resistors.
- Use pull-down resistors for button pins.
- Ensure common GND for Arduino and components.

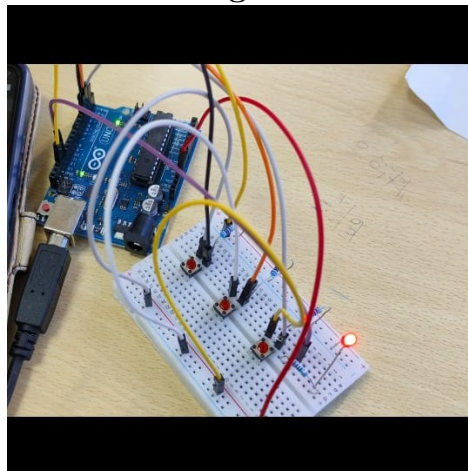
### 3. Logic Expressions

- $g = \overline{P1} + \overline{P2}$  (2 NOTs + 1 OR)
- $e = b + c$  (1 OR)
- $d = c + e$  (1 OR)

### 4. Pin Mapping

- P1 – D2 (Input)
- P2 – D3 (Input)
- b – D4 (Input)
- c – D5 (Input)
- g LED – D8 (Output)
- e LED – D9 (Output)
- d LED – D10 (Output)

### 5. Circuit Diagram



## 6. GitHub Code Link

[https://github.com/amuru052004/Likhitha\\_fwc/tree/main/Hardware](https://github.com/amuru052004/Likhitha_fwc/tree/main/Hardware)

## 7. Conclusion

This document provides the successful hardware implementation of GATE Q60 using Arduino and minimal gates. The outputs g, e, and d have been verified using the logic: 2 NOT gates and 3 OR gates, and the results matched expected behavior.