LAB 4 – REPORT

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DESIGNING A CIRCUIT USING BASIC GATES

Aim: *Implementing the circuit for a given question using the IC's through the basic gates designs.*

    (a) Design a digital circuit with the minimum number of 2 input gates

    (b) Repeat using a minimum of 2 input NAND gates.

Given Problem: A Security System opens and closes a door for the Red, Green, and Blue colored LED outputs, sensed by the controlling unit. The door remains closed for the following conditions:-

I)   All the LEDs are off

II)   Green is ON and Blue is OFF

Summary of the Experiment: *Solving the given circuit problem*

using the appropriate gates and implementing them by considering the given conditions.

Components Used:: IC 7400,

IC 7408, IC 7432, IC 7486, 1Kohm resistor array -2 , DIP

switches, LED displays, breadboard, *multimeter, and power supply.*

Circuit Diagrams & Snapshots :

1) Given, Red, Blue, Green, coloured LCD outputs.
for which A door opens & closes.

I) All LED's are off   open-1
II) Green is ON & Blue is OFF   closed-0

MSB - Red (R)
LSB - Blue (B)

R	G	B	y= door open/close
0	0	0	0
0	1	0	0
1	1	0	0
0	1	1	1
0	0	1	1
1	0	0	1
1	0	1	1
1	1	1	1

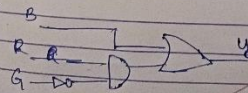$y \Rightarrow$ represents door
open or close.
open $\Rightarrow$ 1 (logic 1)
close $\Rightarrow$ 0 (logic 0)

By using sum of products $\Rightarrow$

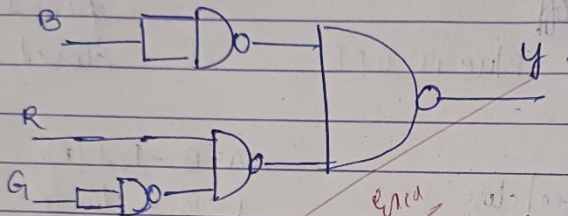$(\overline{R}\,\overline{G}\,B') + \cancel{}$

(a) Design a digital circuit with min no. of 2 input gates.

$y = B + R\overline{G}$

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b) Repeat using minimum 2 i/p NAND gates.

$y = \overline{\overline{B + R\overline{G}}} = \overline{\overline{B} \cdot \overline{R\overline{G}}}$

y

end

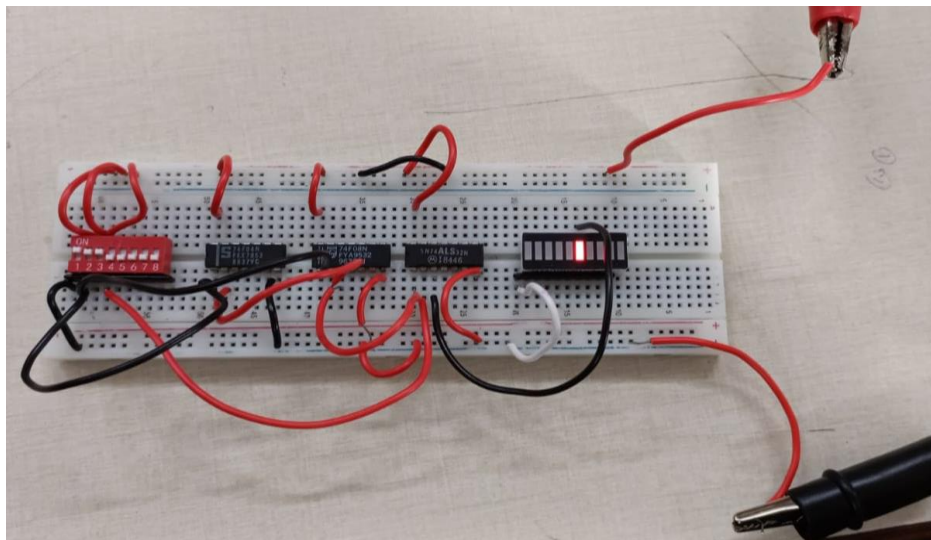I) All the LEDs are off :
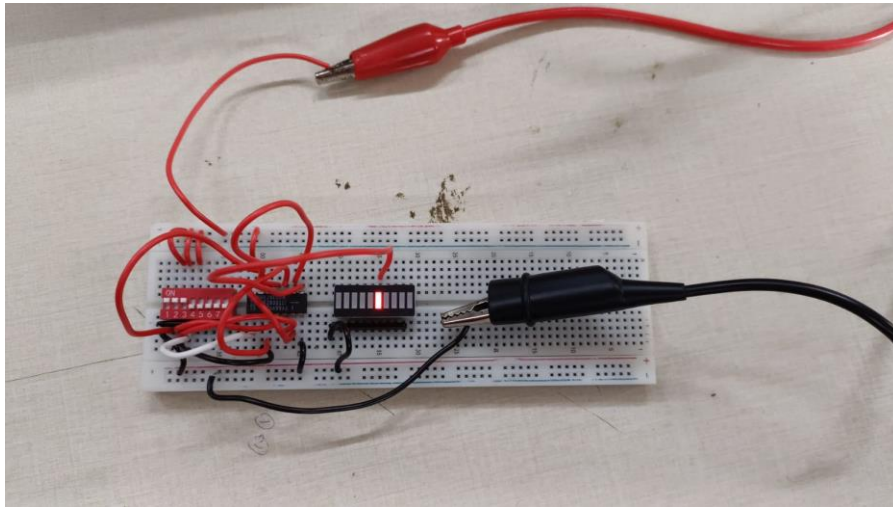
II) Green is ON and Blue is OFF

Results & Conclusions :

- *By using K-mapping we the problem because it reduces the number of components required in the logic circuits*
- *The truth table is Y = B+RG′*
- *We need minimum 3 two input gates which are an AND an OR and a NOT gate to implement the digital circuit*
- *We need minimum 4 two input NAND gates to implement the digital circuit*