

# COMBINATIONAL CIRCUITS

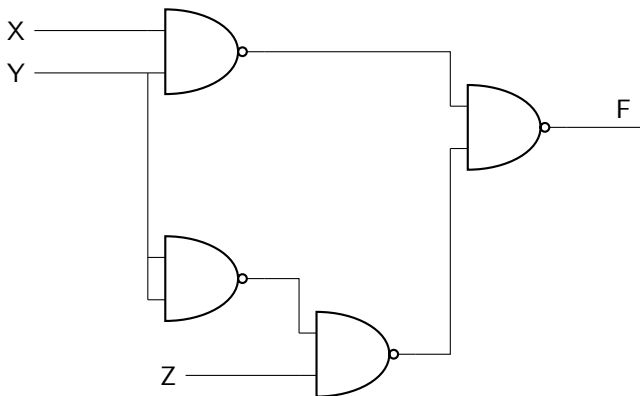


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IITH - Future Wireless Communication(FWC220107)

## Abstract

Q(19)2016 GATE: In the Digital Circuit given below, F is.



(1)  $XY + YZ'$  (2)  $XY + Y'Z$  (3)  $X'Y' + YZ'$  (4)  $XZ' + Y'$

## 1 Components

| Components  | Values | Quantity |
|-------------|--------|----------|
| Arduino     | UNO    | 1        |
| JumperWires | M-M    | 6        |
| Breadboard  |        | 1        |
| LED         |        | 1        |

## 2 Logic

The circuit takes 3-bit number from (0-7) as input X,Y,Z and produces the F as output according to the logic given in table 1.

| X | Y | Z | F(XY+!YZ) |
|---|---|---|-----------|
| 0 | 0 | 0 | 0         |
| 0 | 0 | 1 | 0         |
| 0 | 1 | 0 | 1         |
| 0 | 1 | 1 | 0         |
| 1 | 0 | 0 | 0         |
| 1 | 0 | 1 | 0         |
| 1 | 1 | 0 | 1         |
| 1 | 1 | 1 | 1         |

Table 1: abeltable:dummytable

## 3 karnaugh map

Using the boolean logic output F can be expressed in terms of the inputs X,Y,Z with the help of the following Kmap.

|   |   |    |    |    |    |
|---|---|----|----|----|----|
|   |   | YZ |    |    |    |
|   |   | 00 | 01 | 11 | 10 |
| X | 0 | 0  | 0  | 0  | 1  |
|   | 1 | 0  | 0  | 1  | 1  |

Fig. 2

## 4 Hardware Connection

| Arduino    | 2 | 3 | 4 | 5 | GND | Vcc |
|------------|---|---|---|---|-----|-----|
| breadboard | F | X | Y | Z | +ve | -ve |
| led        | - | - | - | - | -   |     |

Table 2:

Give the connections as per Table 2. For taking the inputs connect 5V of arduino to +ve line of bread board to consider it as logic 'HIGH'.connect GND pin of arduino to -ve line of bread board to consider it as logic 'LOW'.

For example if the inputs X,Y,Z are connected 0,1,0 respectively the output should be 1 i.e., the LED connected to the GND LED should glow.

In the another case if we connect the inputs X,Y,Z to 0,0,0 respectively the output should be 0 i.e., the LED connected to GND pin should turn off

The circuit implementation of the above function is given in figure 1.

## 5 Procedure

- 1.Connect the arduino to the USB port of computer
- 2.Download the follwing code

<https://github.com/srikanth9515/FWC/tree/main/IDE%20ASSIGMENT/CODES>

3.Upload the code into the arduino board.

```
pio run -t upload
```

4.The output '1' is represented as the state:'LED ON' and  
'0' is represented as the state 'LED OFF'