

# ASSIGNMENT

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IITH - Future Wireless Communications (FWC)

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### 1 QUESTION

A logic circuit implements the boolean function  $F=X'Y+X.Y.Z'$ . It is found that the input combination  $X=Y=1$  can never occur. Taking this into account, a simplified expression for  $F$  is given by

### 2 COMPONENTS

Component	Values	Quantity
Arduino	UNO	1
JumperWires	M-M	10
Breadboard		1
LED		2
Resistor	220ohms	1

Figure.a

### 3 TRUTH TABLE

X	Y	Z	F
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	X
1	1	1	X

Truth table Boolean Function "F"

### 4 LOGICAL DIAGRAM

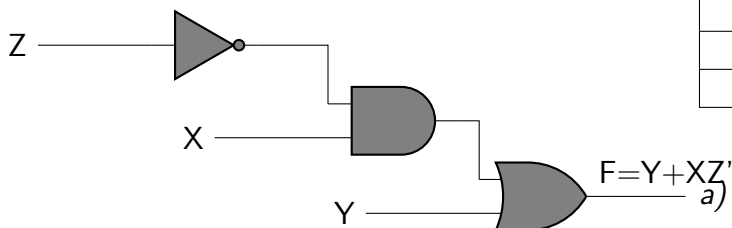


Fig. 1

### 5 K-MAP IMPLEMENTATION

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	1	1
	1	1	0	X	X

Fig. 2

#### a) Reducing the boolean Function

$$F=X'Y+XY'Z'$$

$$F=X'Y(Z+Z')+XY'Z'$$

$$X'YZ+X'YZ'+XY'Z'$$

Reduced expression using K-maps is

$$F=Y+XZ'$$

### 6 IMPLEMENTATION

Arduino PIN	INPUT	OUTPUT
2	X	
3	Y	
4	Z	
8		F

Connections

#### a) Problem-1

1. Connect the circuit as per the above table.
2. Connect the output pin to LED

3. Connect inputs to Vcc for logic 1, ground for logic 0
4. Execute the circuit using the below code.

<https://github.com/aruniot099/FWC-1/blob/main/IDE/code>

*b) Problem-2*

1. Change the values of X,Y,Z in the code and verify the Truth Table