

ARM-GCC

NARENDRA MANIKANTA

manikantakesana0@gmail.com

IITH - Future Wireless Communications (FWC)

CONTENTS

1 Question

$A = a_1a_0$ and $B = b_1b_0$ are two 2-bit unsigned binary numbers. If $F(a_1, a_0, b_1, b_0)$ is a Boolean function such that $F = 1$ only when $A > B$, and $F = 0$ otherwise, then F can be minimized to the form _____

- (A) $a_1\bar{b}_1 + a_1a_0\bar{b}_0$
 (B) $a_1\bar{b}_1 + a_1a_0\bar{b}_0 + a_0\bar{b}_0\bar{b}_1$
 (C) $a_1a_0\bar{b}_0 + a_0\bar{b}_0\bar{b}_1$
 (D) $a_1\bar{b}_1 + a_1a_0\bar{b}_0 + a_0\bar{b}_0b_1$

2 Answer

The above question can be solved by using Truth Table and karnaugh-map.

2.1 Truth Table

a_1	a_0	b_1	b_0	F
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

Truth table for Boolean function F

2.2 K-Map Implementation

		b_1b_0			
		00	01	11	10
a_1a_0	00	0	0	0	0
	01	1	0	0	0
	11	1	1	0	1
	10	1	1	0	0

Fig. 1

Therefore, the Boolean function is $F = a_1\bar{b}_1 + a_1a_0\bar{b}_0 + a_0\bar{b}_0\bar{b}_1$.

3 Logic Diagram

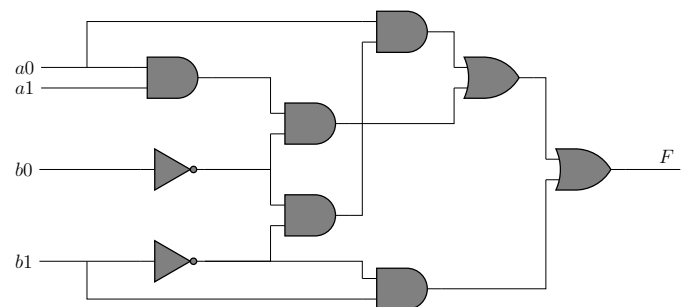


Fig. 2

4 Components

Components	Values	Quantity
vaman	Uno	1
Jumper Wires	M-F	6
Breadboard		1

5 Implementation

arm	INPUT	OUTPUT
22	a_1	
23	a_0	
24	b_1	
25	b_0	
21		F

Connections

Procedure

1. Connect the circuit as per the above table.
2. Connect inputs to Vcc for Logic 1, ground for Logic 0.
3. Execute the circuit using the below codes.

Approach 1

<https://github.com/koushikkalyani/FWC/blob/main/IDE/IDE.cpp>

Approach 2

<https://github.com/koushikkalyani/FWC/blob/main/IDE/IDE2.cpp>

4. Change the values of a_0, a_1, b_0, b_1 in the Hardware and verify the Truth Table.