IDE ASSIGNMENT

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IITH - Futute Wireless Communication

CONTENTS

I. 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) $a_1\bar{b}_1 + a_1a_0\bar{b}_0 + a_0\bar{b}_0b_1$

II. ANSWER

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

A. 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 funtion F

B. K-Map Implentation

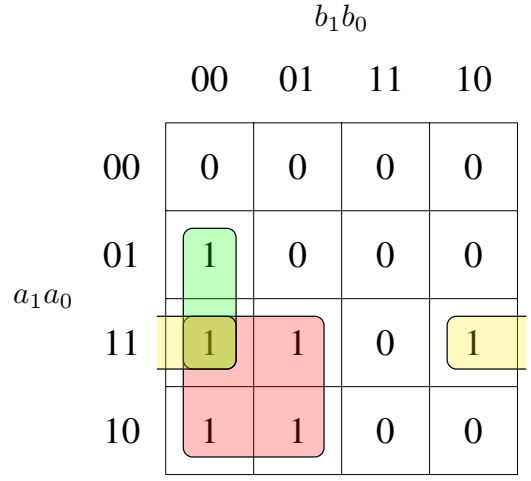

Fig. 1

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

III. Logic Diagram

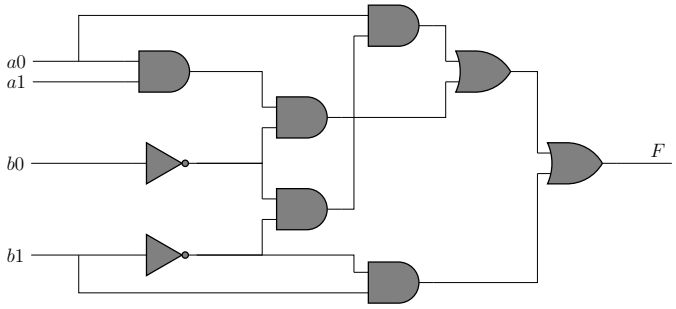

Fig. 2

IV. Components

Components	Values	Quantity
Arduino	Uno	1
Jumper Wires	M-M	6
Breadboard		1

V. Implementation

Arduino PIN	INPUT	OUTPUT
2	a_1	
4	a_0	
6	b_1	
8	b_0	
13		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.