VERIFICATION OF BOOLEAN IDENTITIES

Rudra Pratap Singh

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1 PROBLEM

(GATE CS-2008) Q.5 In the Karnaugh map shown below, X denotes a don't care term. What is the minimal form of the function represented by the Karnaugh map?

cd \ *ba*	00	01	11	10
00	1	1	0	1
01	X	0	0	0
11	X	0	0	0
10	1	1	0	X

(A) $b'd' + a'd'$

(B) $a'b' + b'd' + a'bd'$

(C) $b'd' + a'bd'$

(D) $a'b' + b'd' + a'd'$

Table 1

cd \ *ba*	00	01	11	10
00	1	1	0	1
01	X	0	0	0
11	X	0	0	0
10	1	1	0	X

Table 2

cd \ *ba*	00	01	11	10
00	1	1	0	1
01	X	0	0	0
11	X	0	0	0
10	1	1	0	X

One group is $\{0000, 0001, 1000, 1001\}$ (Table 1) which gives $a'd'$.
Another group consists of $\{0000, 0010, 1000, 1010\}$ (Table 2) which gives $b'd'$.
Hence, the correct option is **a)**.

2 COMPONENTS

Component	Value	Quantity
Arduino	UNO	1
Bread board	-	1
Jumper wires	M-M	10
LED	-	1

3 TRUTH TABLE

The Truth Table for the identity is as follows:

(A) $Y = b'd' + a'd'$

a	**b**	**d**	**Y**
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

Table 1

4 ARDUINO CONNECTIONS

1) The connections taken from Arduino as Input and Output is as follows:

Input	a	b	d	Y
Arduino	3	4	5	6

Table 2

2) The input **a,b,c** here are connected to Arduino D3,D4,D5 pins.
3) The output **Y** here are connected to Arduino D6 pins.
4) The values for these inputs are conncted either to GND or 5V according to the truth table.

5 CODE

The arduino code can be downloaded from the below link.

https://github.com/Rudrapratap1404/Rudrapratap1404/blob/main/ide/code/src/GATE2008.cpp