Assignment 9 (GATE, EC2018,18)

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1 Question 18 MUX diagram

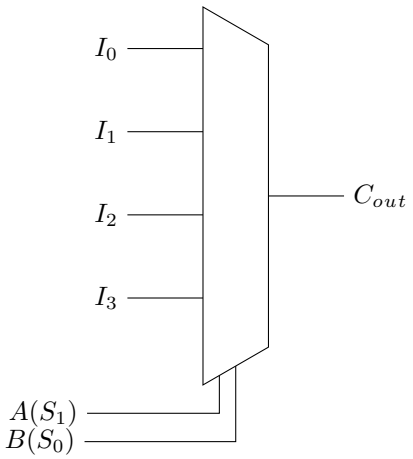

Figure 1: question MUX diagram

2 Question 18

A 4:1 multiplexer is to be used for generating the output carry of a full adder. A and B are the bits to be added while C_{in} is the input carry and C_{out} is the output carry. A and B are to be used as select bits with A being more significant select bit.

Which one of the following statement correctly describes the choice of signals to be connected to the inputs $I_0, I_1, I_2 and I_3$ so that the output is C_{out} ?

1. $I_0 = 0, I_1 = C_{in}, I_2 = C_{in}, I_3 = 1$
2. $I_0 = 1, I_1 = C_{in}, I_2 = C_{in}, I_3 = 1$

3. $I_0 = C_{in}, I_1 = 0, I_2 = 1, I_3 = C_{in}$
4. $I_0 = 0, I_1 = C_{in}, I_2 = 1, I_3 = C_{in}$

3 Solution

A	B	C_{in}	Sum	C_{out}
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

Table 1: TRUTH TABLE

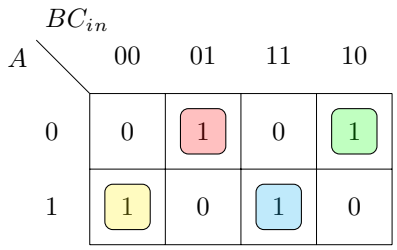

Figure 2: k-map for Sum

Boolean expression for Sum -
Sum=A$\overline{B}$ $\overline{C_{in}}$ + $\overline{A}$ $\overline{B}$C$_{in}$ + $\overline{A}$ B $\overline{C_{in}}$ + ABC_{in}

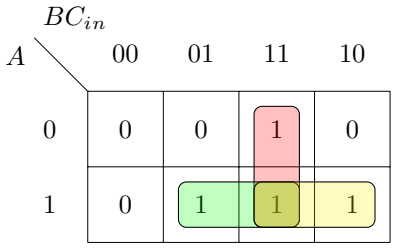

Figure 3: k-map for C_{out}

Boolean expression for C_{out} -
C_{out}= BC_{in} + AB + AC_{in}

A	B	C_{out}
0	0	0
0	1	C_{in}
1	0	C_{in}
1	1	1

Table 2: TRUTH TABLE for C_{out} to be output

So, by the truth table for C_{out} to be output, we get
$I_0 = 0, I_1 = C_{in}, I_2 = C_{in}, I_3 = 1$