ELL201 – Tutorial Sheet 1

1. Two products are sold from a vending machine, which has two push buttons P1 and P2. When a button is pressed, the price of the corresponding product is displayed in a 7-segment display.
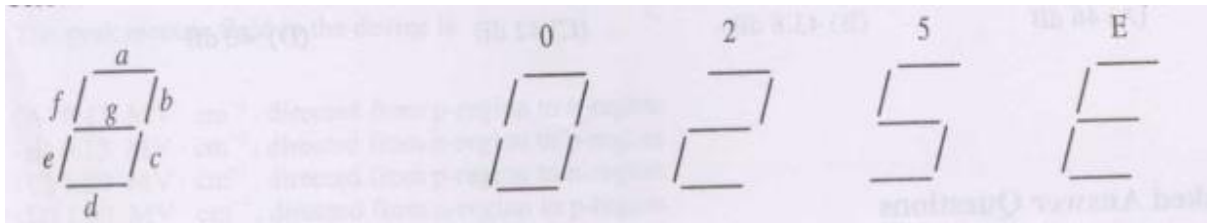
If no buttons are pressed, '0' is displayed, signifying 'Rs. 0'.

If only P1 is pressed, '2' is displayed, signifying 'Rs. 2'.

If only P2 is pressed, '5' is displayed, signifying 'Rs. 5'.

If both P1 and P2 are pressed, 'E' is displayed, signifying 'Error'.

The names of the segments in the 7-segment display, and the glow of the display for '0', '2', '5' and 'E', are shown below


Consider

(i) push button pressed/not pressed is equivalent to logic 1/0 respectively

(ii) a segment glowing / not glowing in the display is equivalent to logic 1/0 respectively

Express segments a to g, as functions of P1 and P2.

2. Express a half substractor using NAND gates only.

3. For the circuit shown in the following figure I0-I3 are inputs to the 4:1 multiplexer R(MSB) and S are control bits. Express Z as a function of P, Q, R and S.
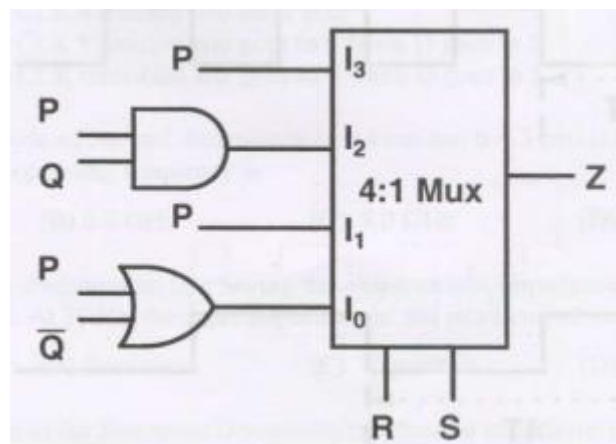

4. A 4:1 multiplexer is to be used for generating the output carry of a full adder. A and B are the bits to be added while Cin is the input carry and Cout is the output carry. A and B are to be used as the select bits with A being the more significant select bit.

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What would be your choice of signals to be connected to the inputs I0, I1, I2 and I3 so that the output is Cout?

5. Identify the operation of the circuit below.
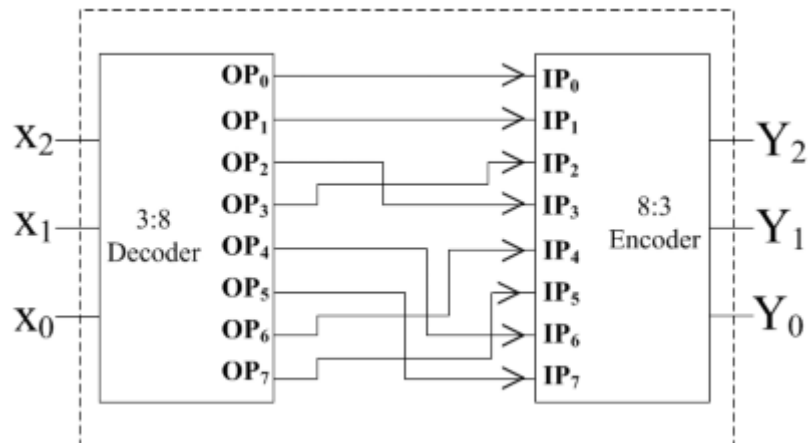
6. Consider the following circuit. What will be the function f?
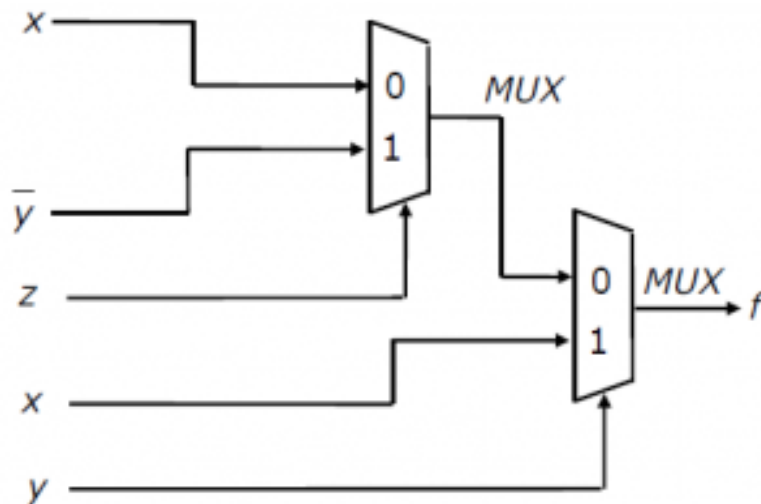
7. The implication gate shown below, has two inputs (x and y), the output is 1 except when x=1 and y=0. Realize f=x'y + xy' using only four implication gates.

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