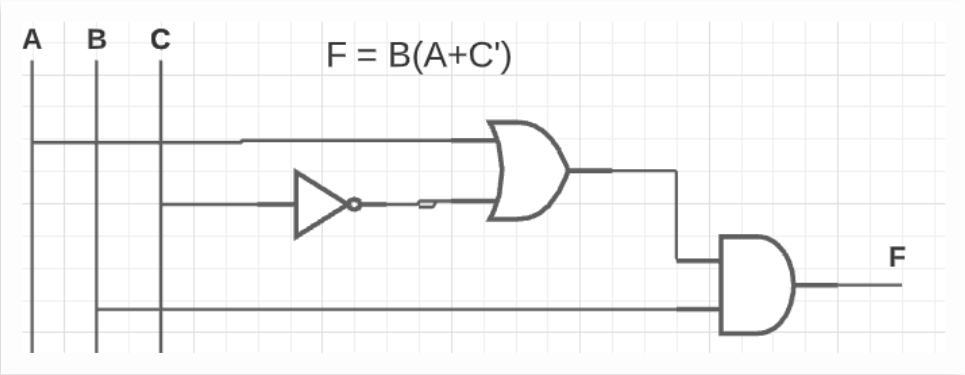
1. **All NOR Gate Implementation**

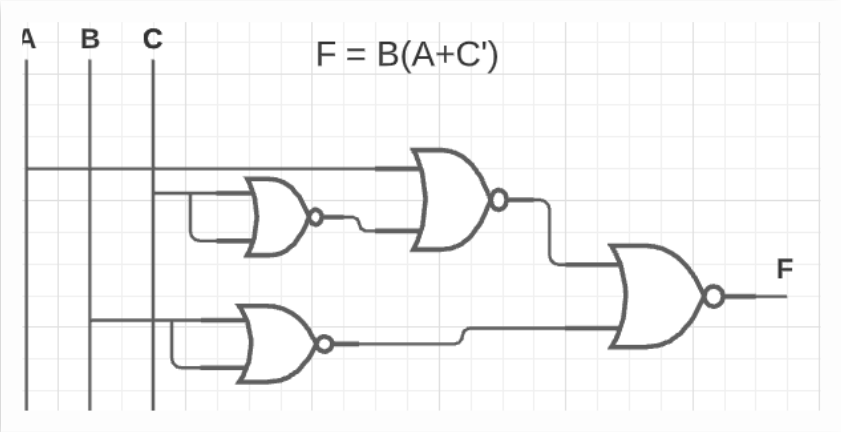
a) Rewrite the function as the Product of Sums format

i. **F = AB + BC' = B(A+C')**

b) Draw the logic diagram using AND, OR and NOT gates:



c) Convert the circuit diagram to **all NOR gates implementation.**



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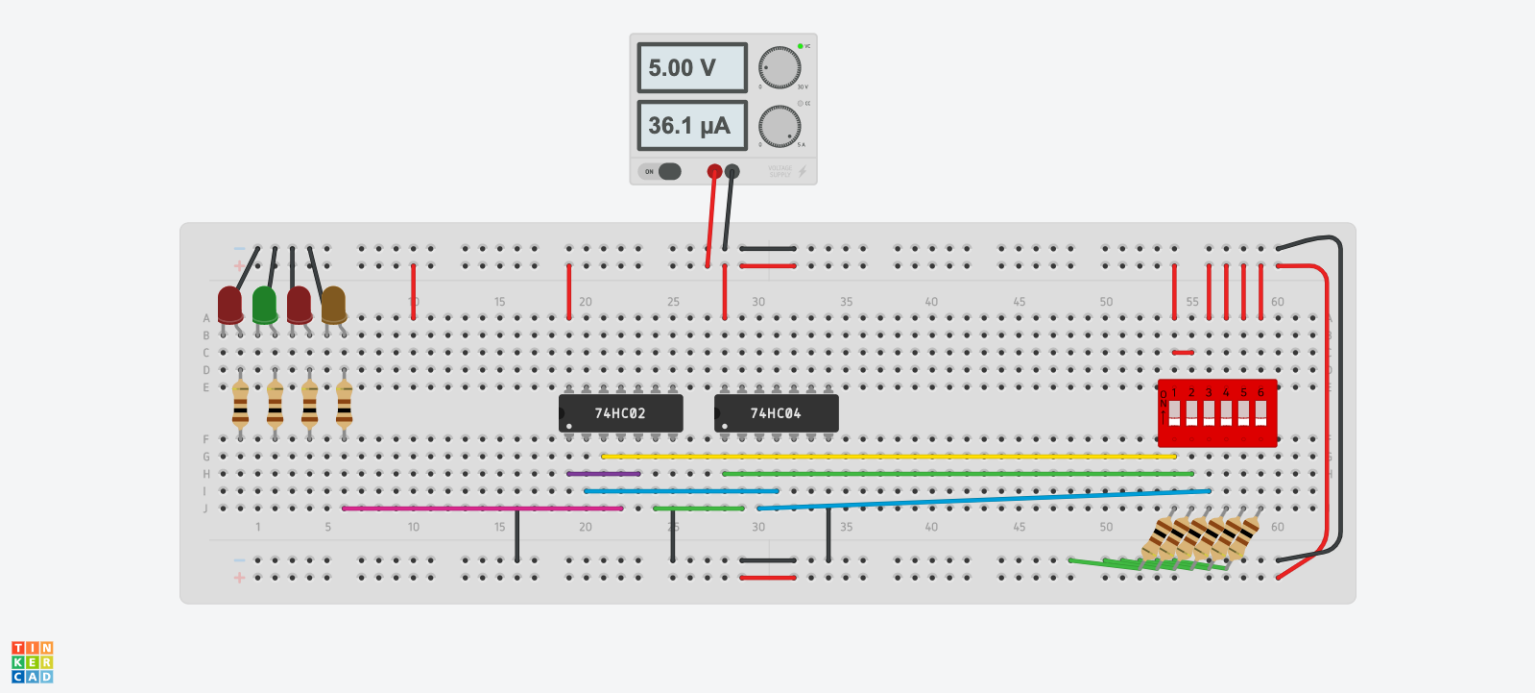


0 0 0 = 0

0 0 1 = 0

0 1 0 = 1

0 1 1 = 0

1 0 0 = 0

1 0 1 = 0

1 1 0 = 1

1 1 1 = 1

2. **Odd Parity Bit Checker**

The parity checker circuit takes 4 input bits, x, y, z, and P, and produce one output error bit E. E = 0 if no error and E = 1 otherwise.

(a) Obtain the truth table for a 4-bit odd parity checker function E

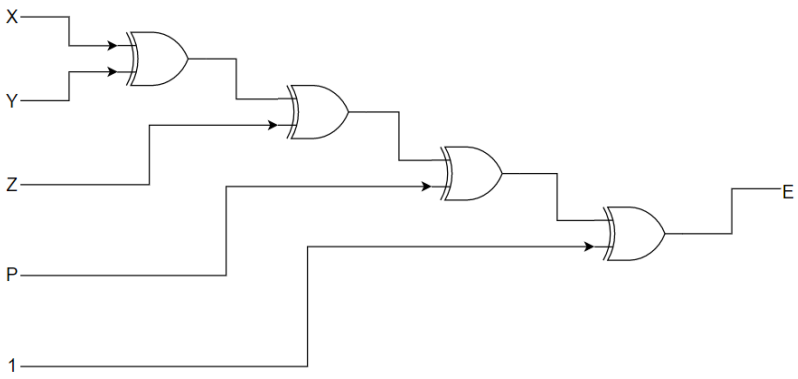
x y z P	E
0 0 0 0	1
0 0 0 1	0
0 0 1 0	0
0 0 1 1	1
0 1 0 0	0
0 1 0 1	1
0 1 1 0	1
0 1 11	0

x y z P	E
1 0 0 0	0
1 0 0 1	1
1 0 1 0	1
1 0 1 1	0
1 1 0 0	1
1 1 0 1	0
1 1 1 0	0
1 1 1 1	1

(b) Derive the Boolean function for E using **XOR operation only**.

E = (X⊕Y⊕Z⊕P)'

(c) Draw the logic diagram **<u>using XOR gates only</u>**.



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