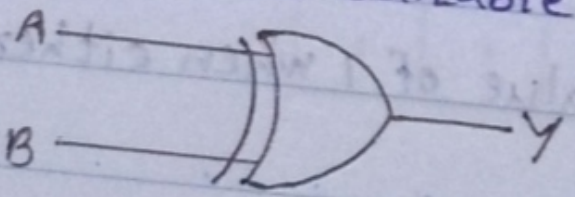
Tutorial 03

01. A bulb in a staircase has two switches, one switch being at the ground floor and the other one at the first floor. The bulb can be turned ON and can be turned OFF by and one of the switches irrespective of the state of the other switch.

a. Draw the truth table for above situation.

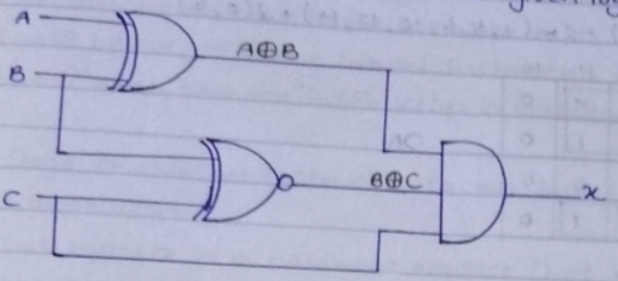
A	B	Output (Y)
0	0	0
0	1	1
1	0	1
1	1	0

b. Draw the most suitable logic circuit / gate For this.



SAD WEB

03. What is the boolean expression for the given logic circuit below.



$(A+B).\bar{C}$

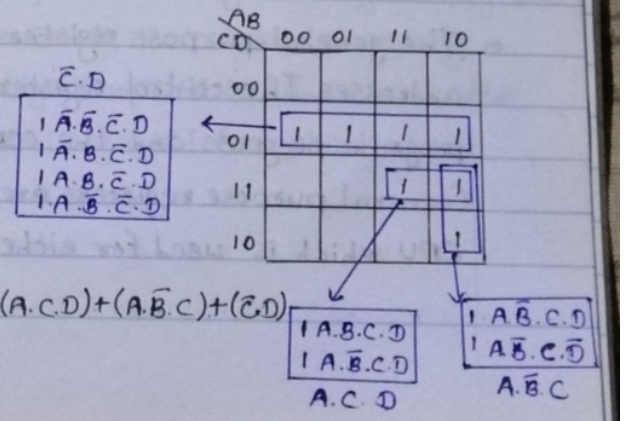
02. The boolean function $Y = AB + CD$ is to be realized using only 2 input NAND gates.

a. Extract the boolean Function for NAND gates using the above formula.

b. Draw the logic circuit for the extracted boolean function

04. Complete the following karnaugh map. According to the values found in the given truth table.

A	B	C	D	out	
0	0	0	0	0	
0	0	0	1	1	$M_1 = \bar{A}.\bar{B}.\bar{C}.D$
0	0	1	0	0	
0	0	1	1	0	
0	1	0	0	0	
0	1	0	1	1	$M_2 = \bar{A}.B.\bar{C}.D$
0	1	1	0	0	
0	1	1	1	0	
1	0	0	0	0	
1	0	0	1	1	$M_3 = A.\bar{B}.\bar{C}.D$
1	0	1	0	1	$M_4 = A.\bar{B}.C.\bar{D}$
1	0	1	1	1	$M_5 = A.\bar{B}.C.D$
1	1	0	0	0	
1	1	0	1	1	$M_6 = A.B.\bar{C}.D$
1	1	1	0	0	
1	1	1	1	1	$M_7 = A.B.C.D$



05. Minimize the given boolean expression by using the four variable k-map.

$F = (A, B, C, D) = \Sigma m(1, 5, 6, 12, 13, 14) + d(0, 4)$

AB \ CD	00	01	11	10
00	0	1	X	0
01	X	1	1	0
11	0	0	0	0
10	1	1	1	0