No: Tutorial (3) Date: 17: 05 2023

① 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.
b) Draw the most suitable logic circuit / gate for this.

(a)

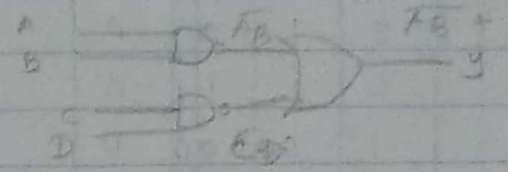
G	F	B
0	0	0
0	1	1
1	0	1
1	1	0

(b)

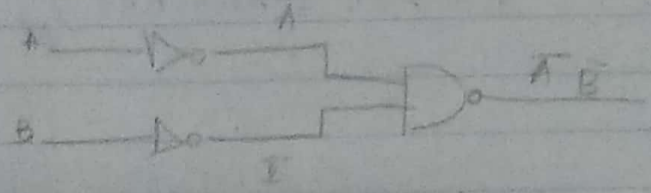
② The boolean function $Y = AB + CD$ is to be realized using only 2 input 'NAND' gates.

a) Extract the boolean function for NAND gates using the above formula.

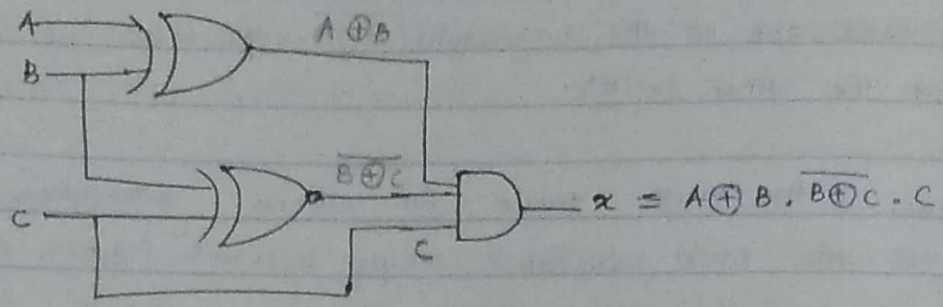
$$y = AB + CD$$



b) Draw the logic circuitt for the extracted Boolean function.



(8) What is the Boolean expression for the given logic circuit below.



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(Q4)

A	B	D	C	out	
0	0	0	0	0	
0	0	1	0	1	→ $\bar{A}\bar{B}\bar{C}D$
0	0	0	1	0	
0	0	1	1	0	
0	1	0	0	0	
0	1	1	0	1	→ $A\bar{B}\bar{C}D$
0	1	0	1	0	
0	1	1	1	0	
1	0	0	0	0	
1	0	1	0	1	→ $A\bar{B}\bar{C}D$
1	0	0	1	1	→ $A\bar{B}C\bar{D}$
1	0	1	1	1	→ $A\bar{B}CD$
1	1	0	0	0	
1	1	1	0	1	→ $AB\bar{C}D$
1	1	0	1	0	
1	1	1	1	1	→ $ABCD$

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

$\bar{C}D$: $A\bar{B}\bar{C}D$, $ABCD$, $\bar{A}\bar{B}CD$

AD : $AB\bar{C}D$, $A\bar{B}\bar{C}D$, $ABCD$, $A\bar{B}CD$

ABC : $A\bar{B}CD$, $AB\bar{C}D$

$f = \bar{C}D + AD + ABC$

(05) Minimize the given boolean expression by using four-variable K-map.

$$F(A,B,C,D) = \Sigma m(1,5,6,12,13,14) + d(2,4)$$