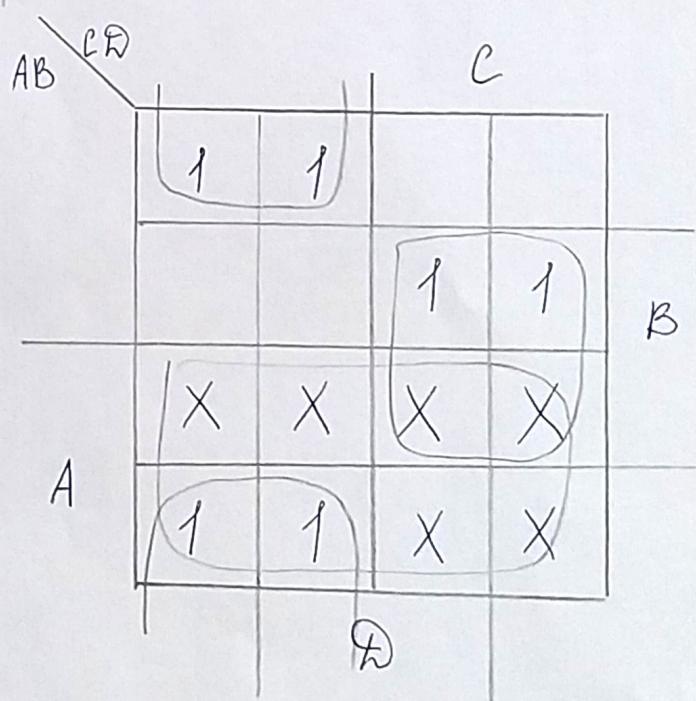
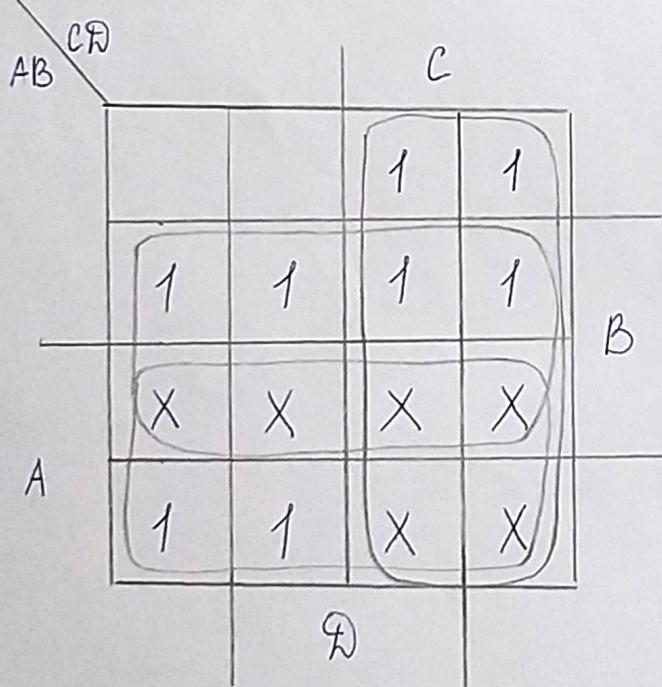


1.

Decimal digit	Input BCD				Output (Input + 6 in binary)			
	A	B	C	D	W	X	Y	Z
0	0	0	0	0	0	1	1	0
1	0	0	0	1	0	1	1	1
2	0	0	1	0	1	0	0	0
3	0	0	1	1	1	0	0	1
4	0	1	0	0	1	0	1	0
5	0	1	0	1	1	0	1	1
6	0	1	1	0	1	1	0	0
7	0	1	1	1	1	1	0	1
8	1	0	0	0	1	1	1	0
9	1	0	0	1	1	1	1	1



$$W = A + B + C$$

$$X = \bar{B}\bar{C} + BC$$

AB		C	
A	B		
1	1		
1	1		
X	X	X	X
1	1	X	X

AB		C	
A	B		
		1	1
		1	1
X	X	X	X
		1	X
			X

$$y = \bar{C}$$

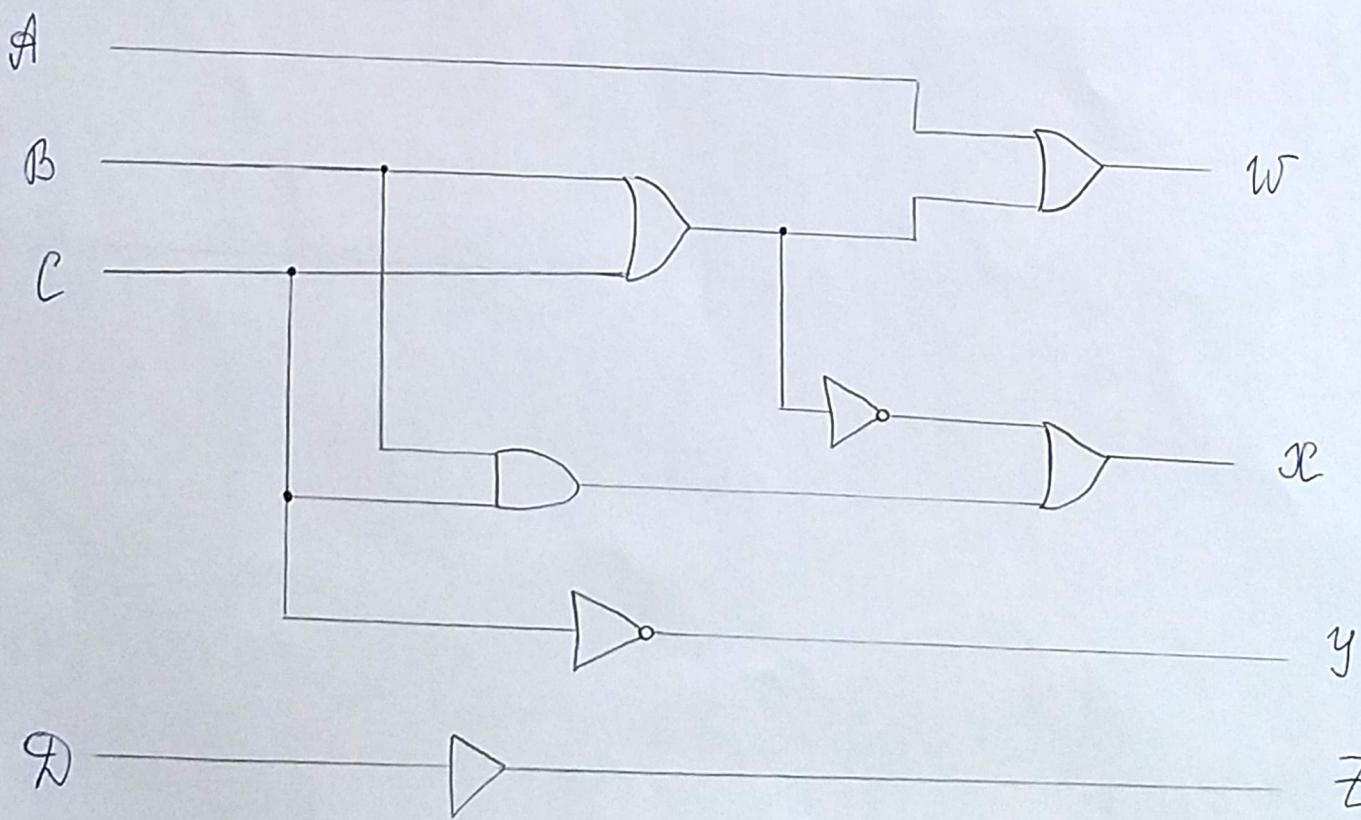
$$z = \bar{D}$$

If $T_1 = B + C$, then $w = A + T_1$

$$x = \bar{T}_1 + BC$$

$$y = \bar{C}$$

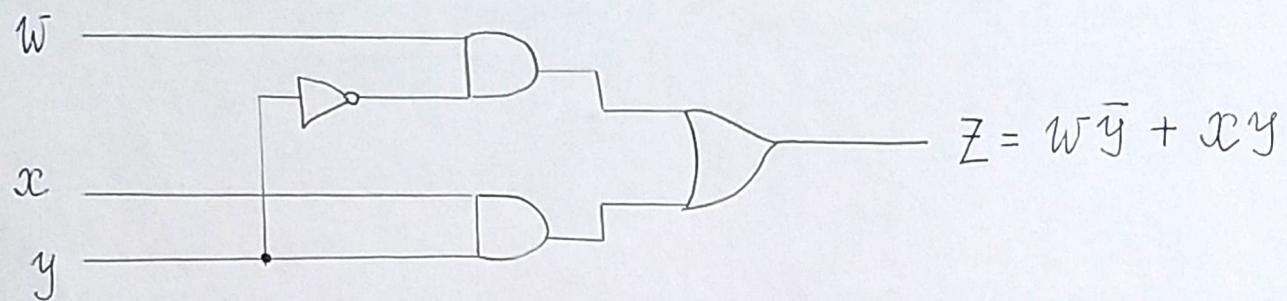
$$z = \bar{D}$$



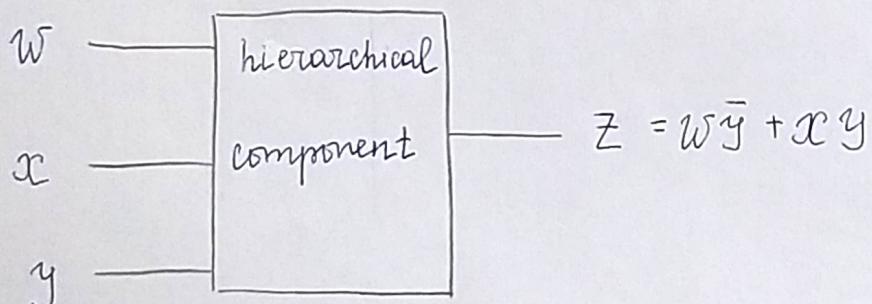
$$2. \quad F = A(C\bar{E} + \bar{D}E) + \bar{A}\bar{D}$$

$$G = B(C\bar{E} + \bar{D}E) + \bar{B}C$$

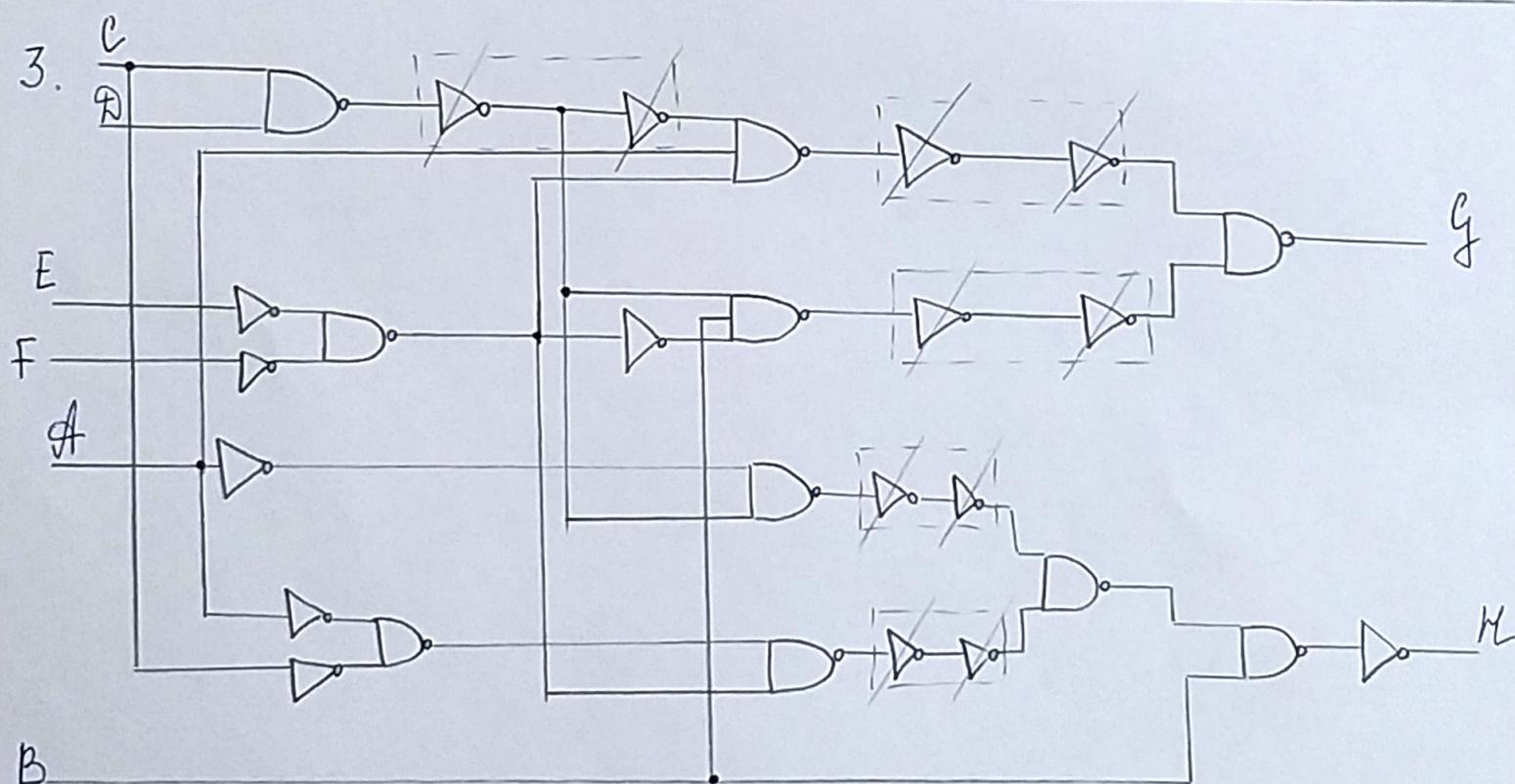
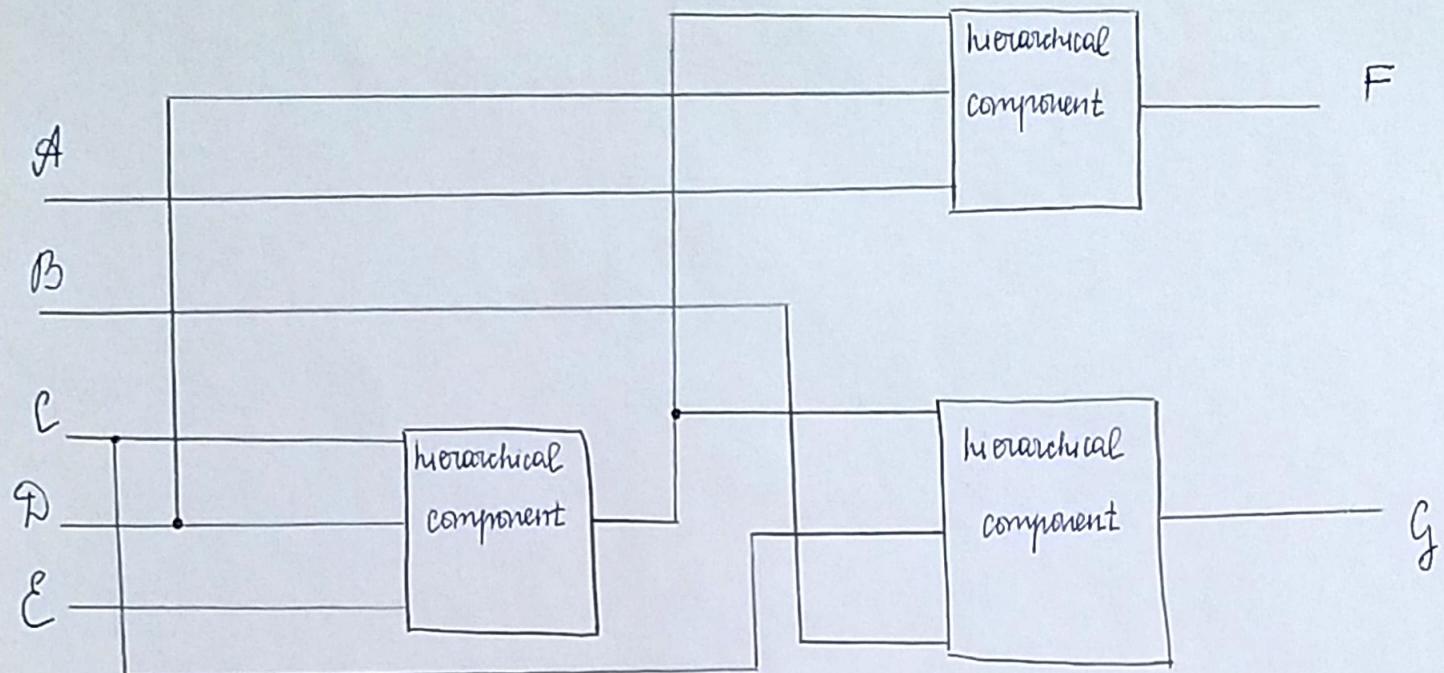
The logic diagram for the hierarchical component:

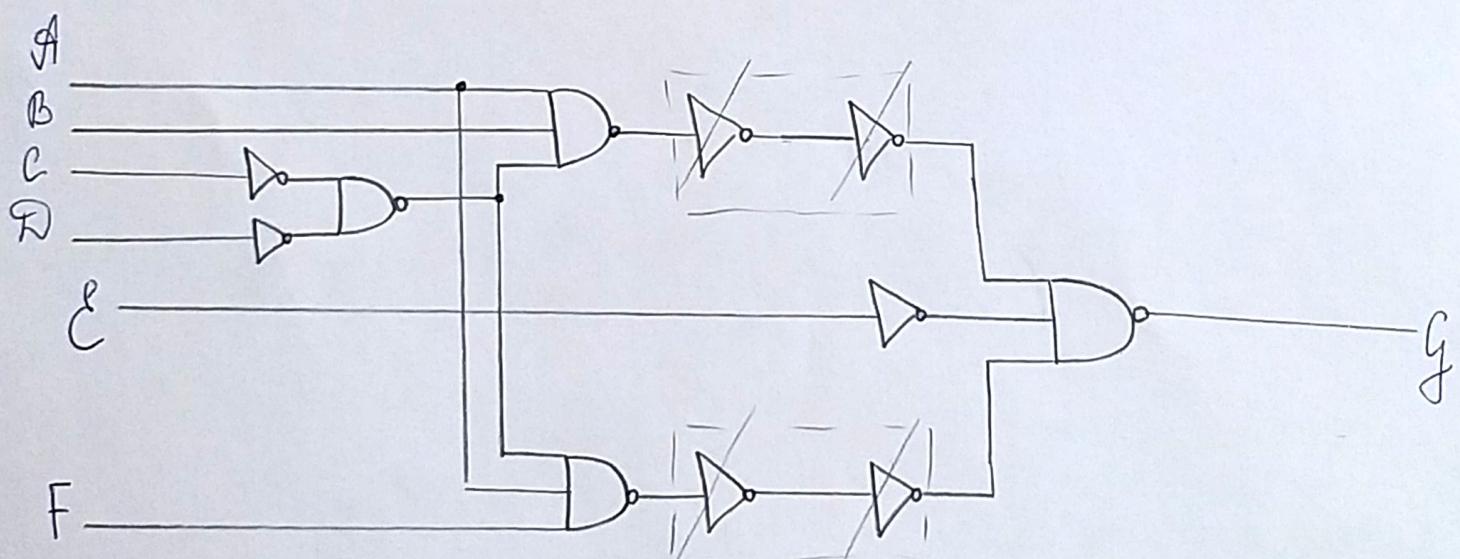
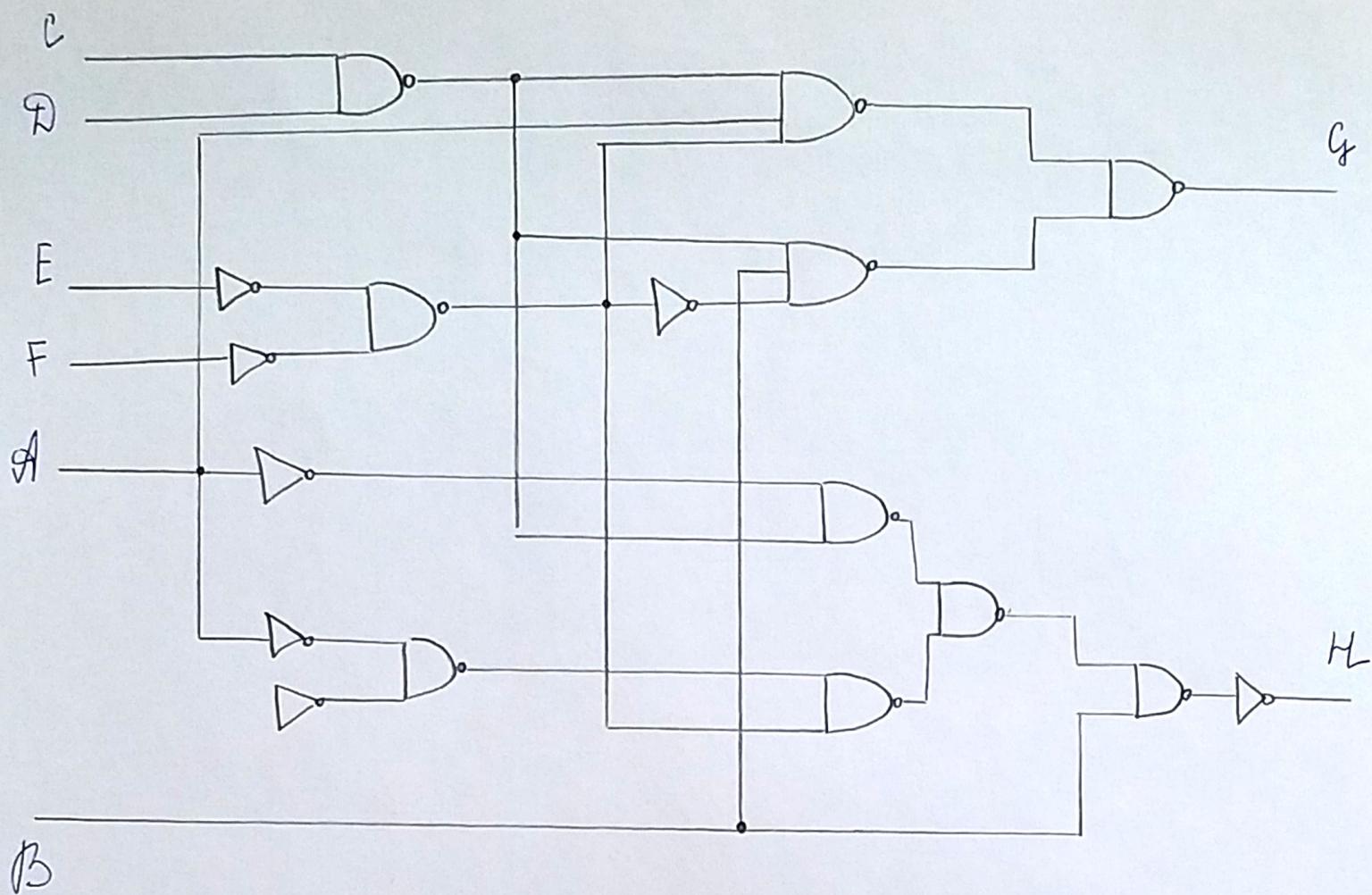


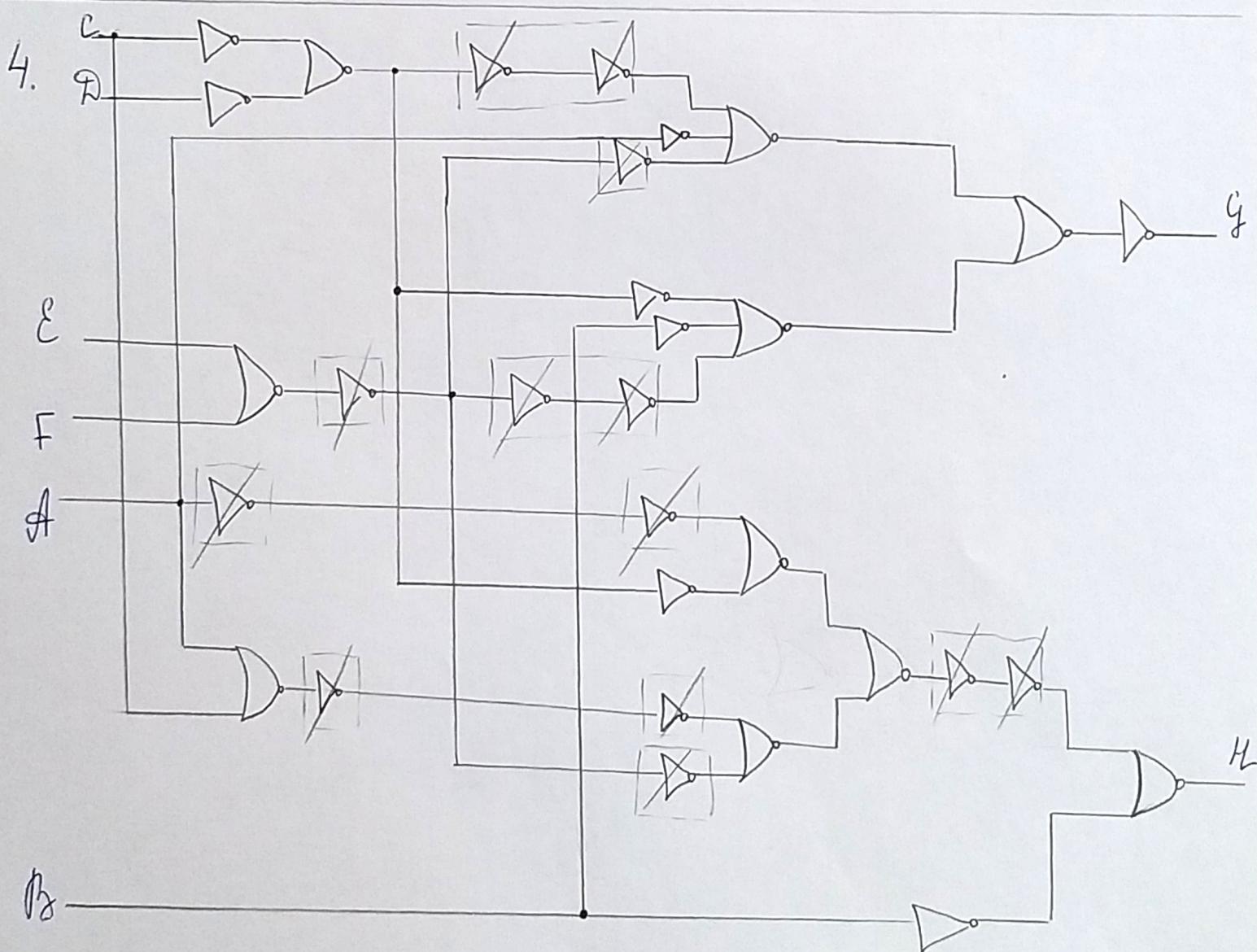
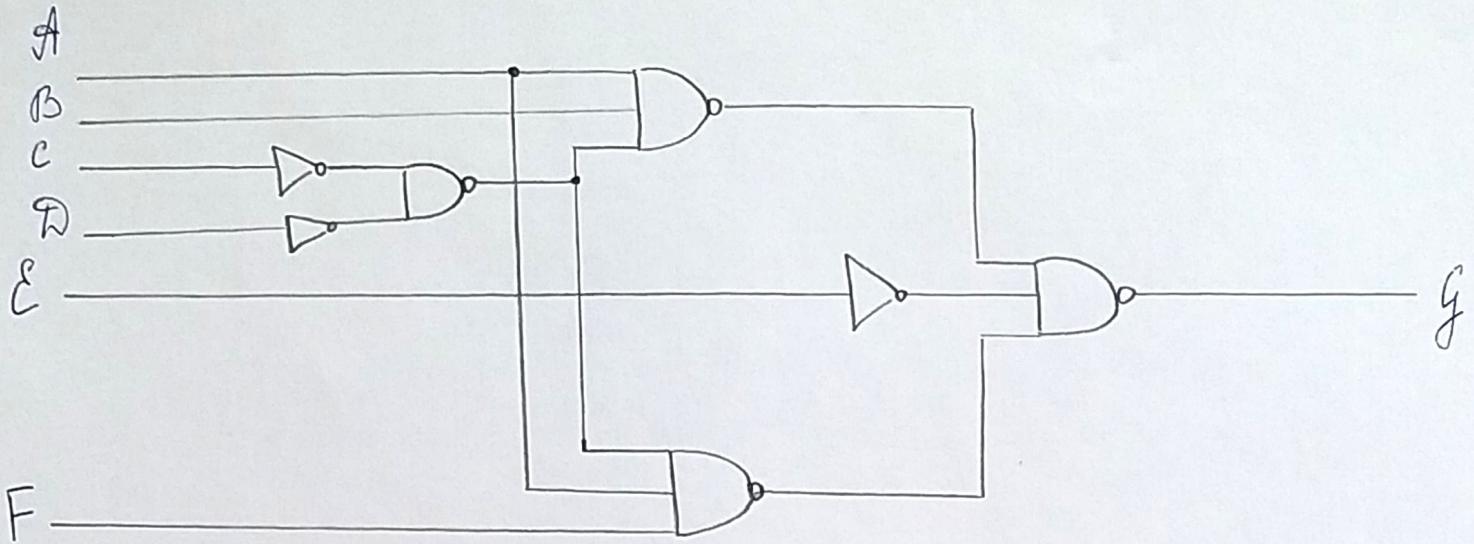
Symbol for the hierarchical component:

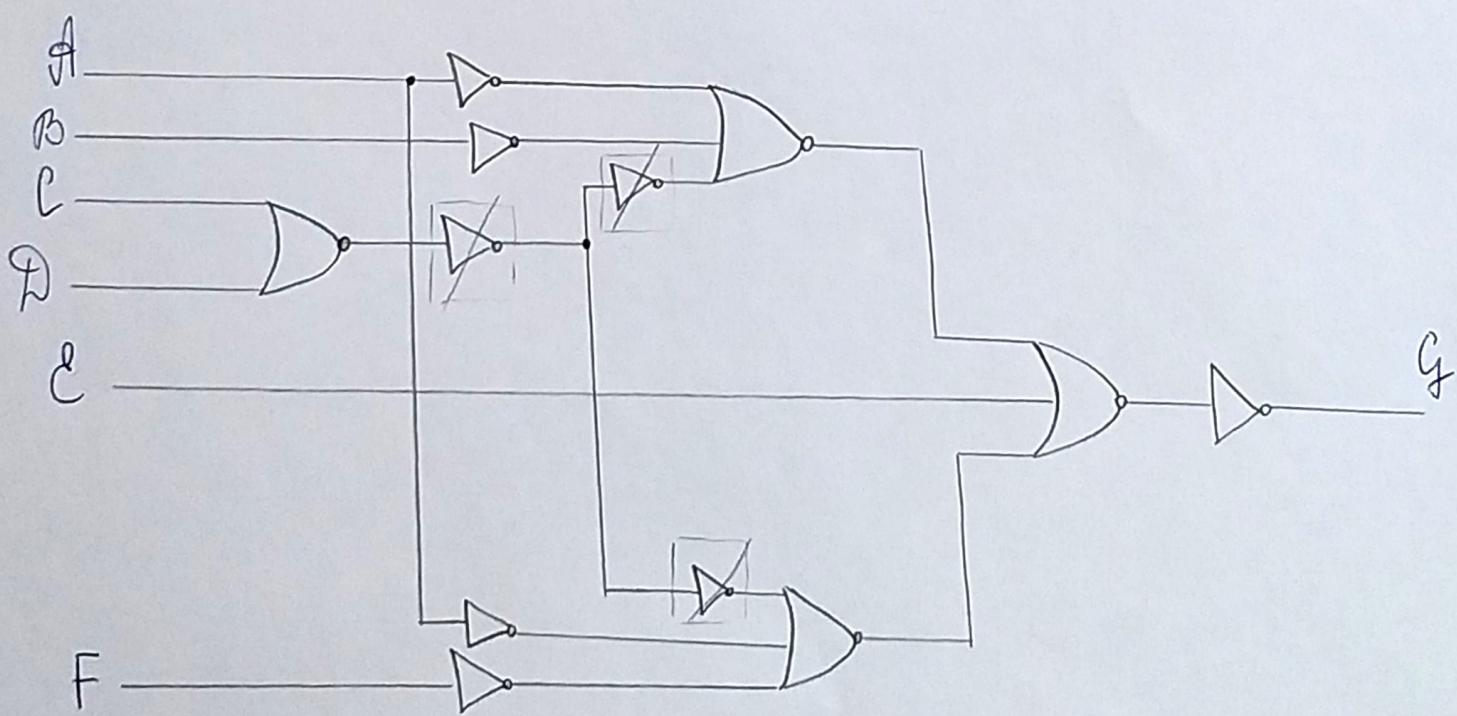
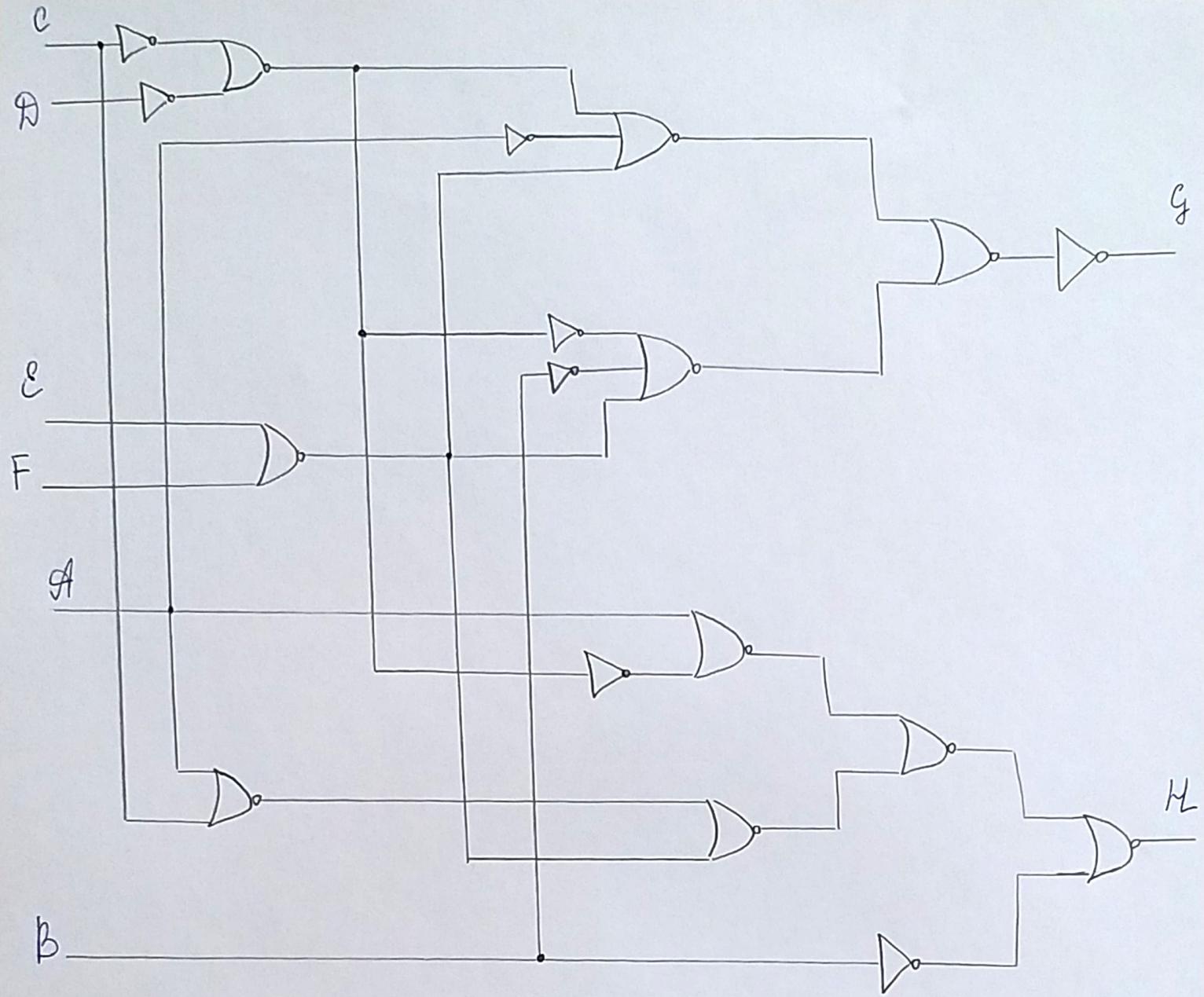


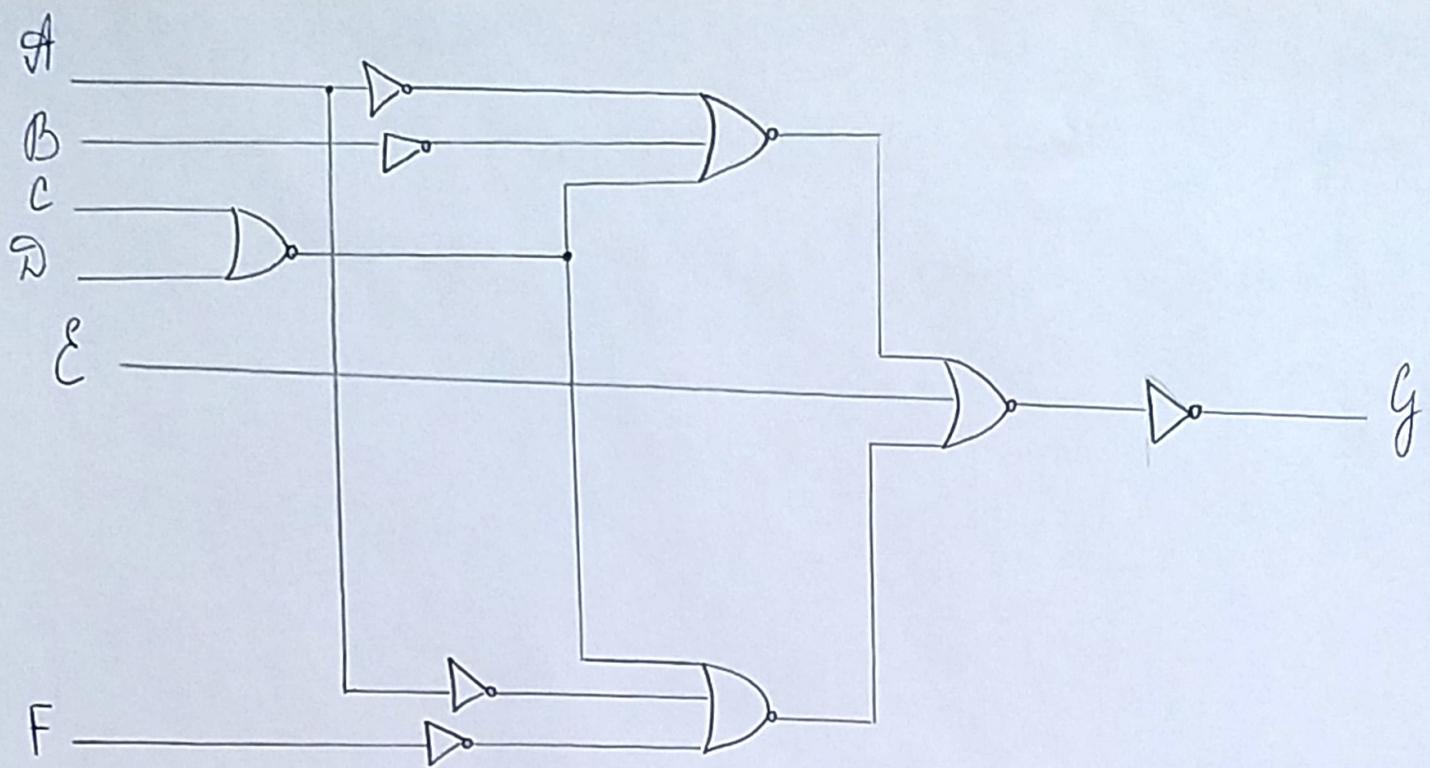
The logic diagram for the overall circuit diagram:











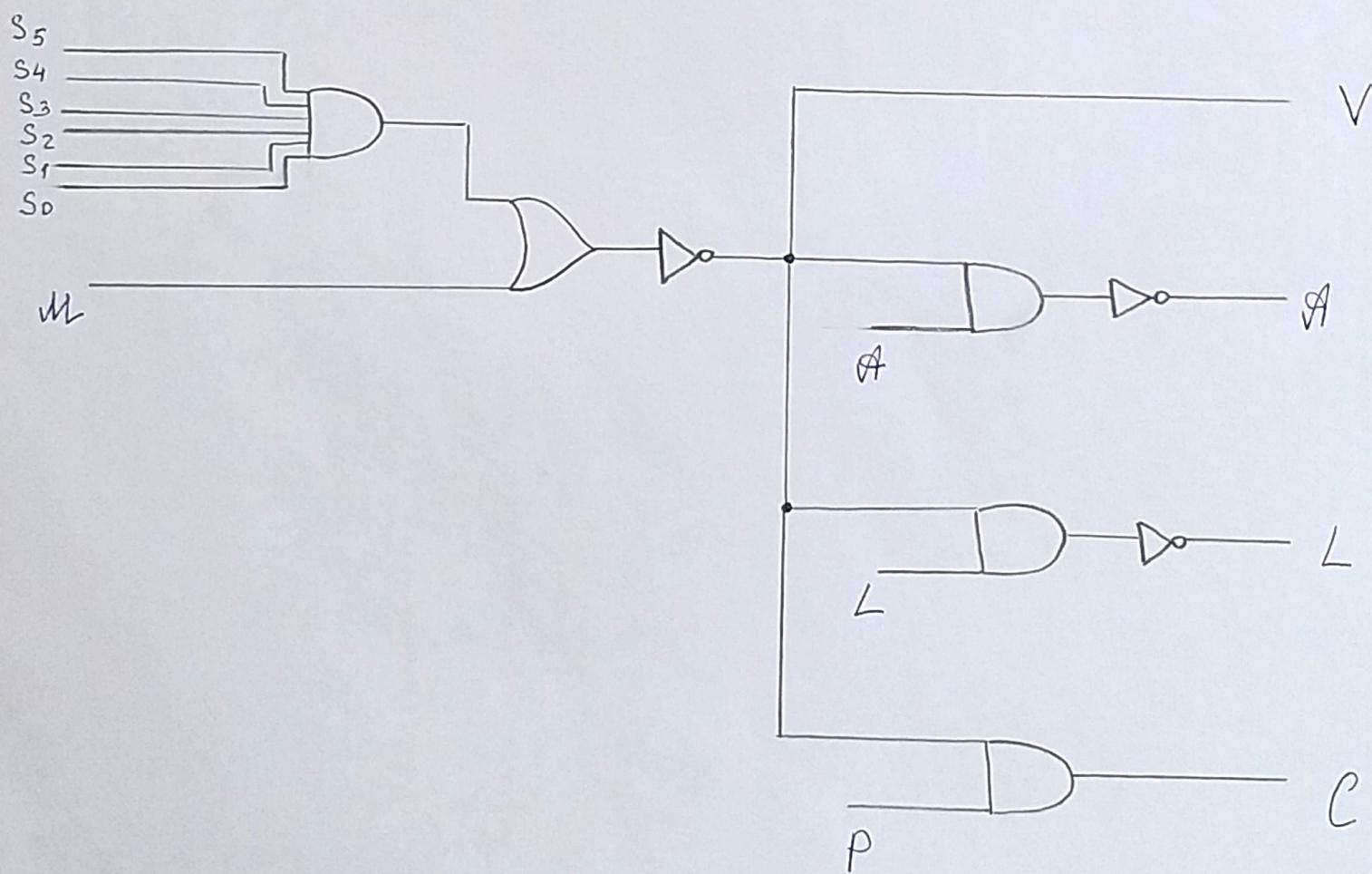
5. For six sets of sensors, AND is used so that it equals 1 only when all six sets of sensors equal 1 (no intrusion detected)

OR is used for this AND and master switch, and the following truth table is obtained:

M	S_5	S_4	S_3	S_2	S_1	S_0	Output 1
1	X	X	X	X	XX		1
0	0	X	X	X	XX		0
0	X	0	X	X	XX		0
0	X	X	0	X	XX		0
0	X	X	X	0	XX		0
0	X	X	X	X	0X		0
0	X	X	X	X	X0		0
0	1	1	1	1	11		1

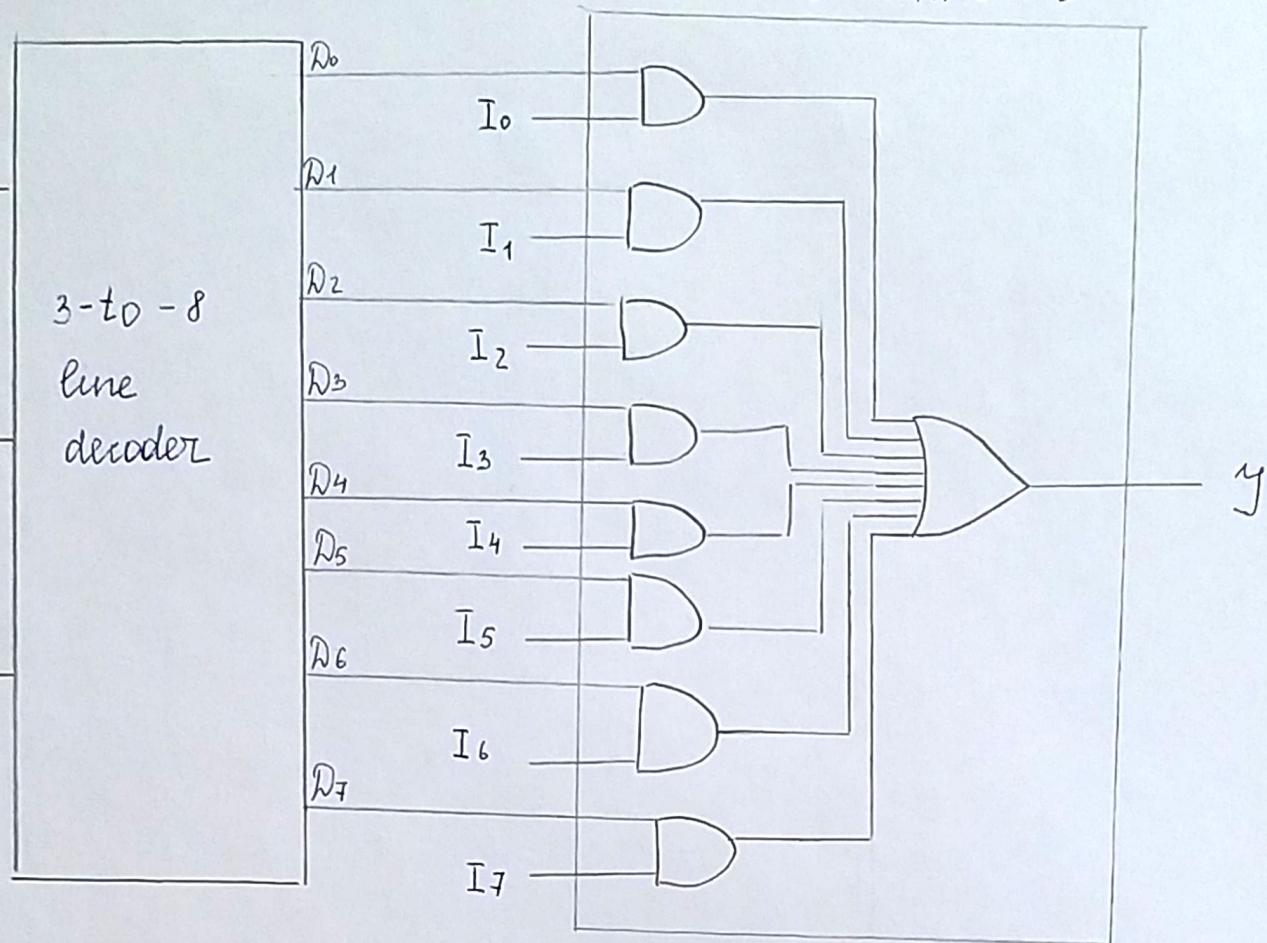
Then this DR is inverted and is used as input for alarm, light, video cameras, and call to police.

Three other ANDs are used for this input and alarm switch, light switch, or police such.
Two inverters are used for alarm and lights

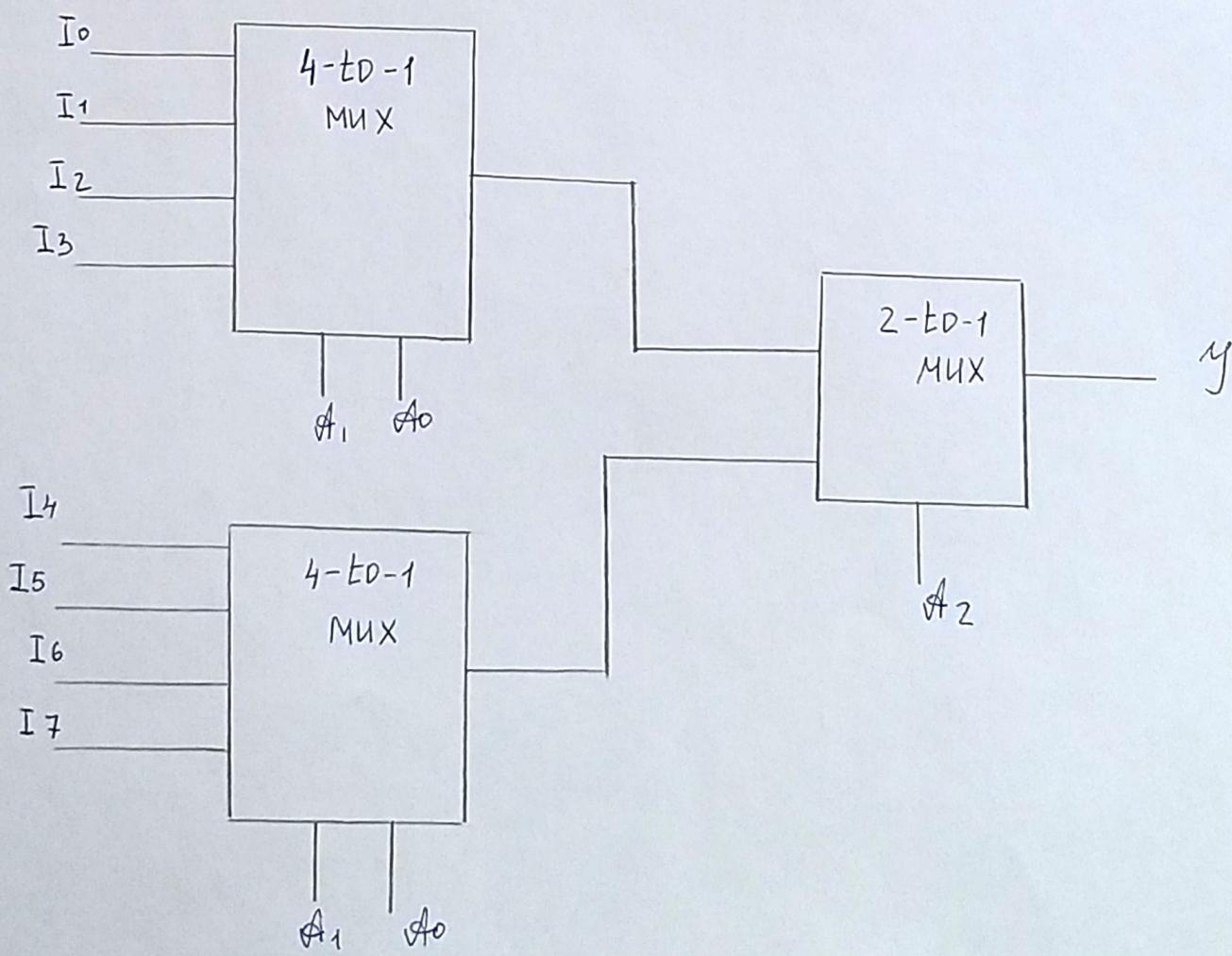


6.

a)

 A_0 A_1 A_2 

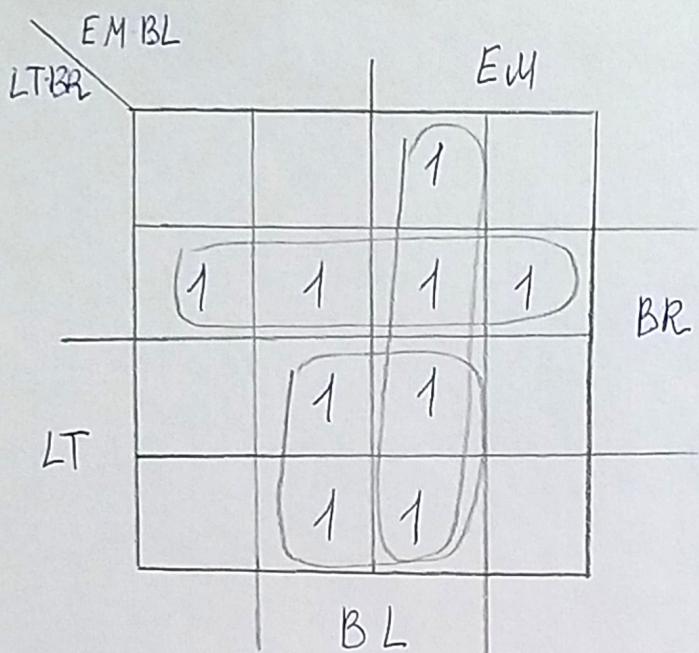
b.



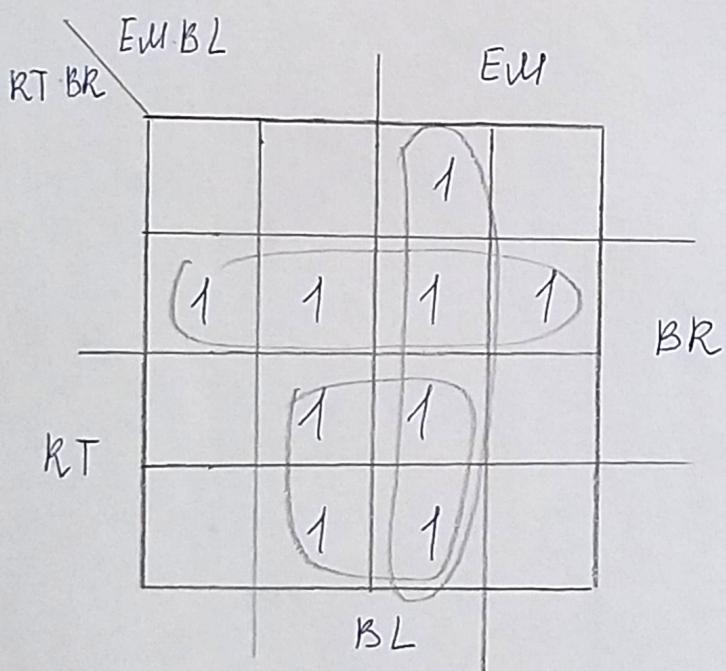
7.

a)

LT	BR	ELU	BL	LR		RT	BR	ELU	BL	RR
0	0	0	0	0		0	0	0	0	0
0	0	0	1	0		0	0	0	1	0
0	0	1	0	0		0	0	1	0	0
0	0	1	1	1		0	0	1	1	1
0	1	0	0	1		0	1	0	0	1
0	1	0	1	1		0	1	0	1	1
0	1	1	0	1		0	1	1	0	1
0	1	1	1	1		0	1	1	1	1
1	0	0	0	0		1	0	0	0	0
1	0	0	1	1		1	0	0	1	1
1	0	1	0	0		1	0	1	0	0
1	0	1	1	1		1	0	1	1	1
1	1	0	0	0		1	1	0	0	0
1	1	0	1	1		1	1	1	0	0
1	1	1	0	0		1	1	1	1	1
1	1	1	1	1						

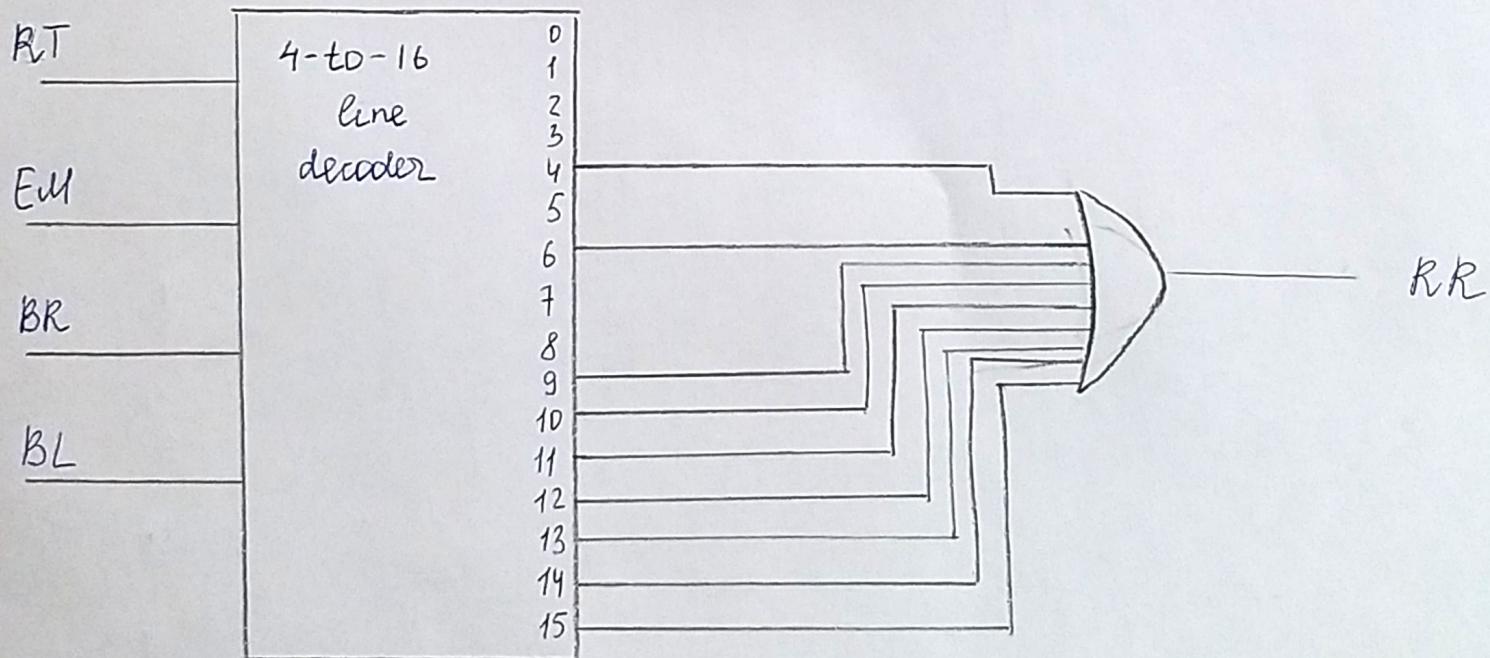
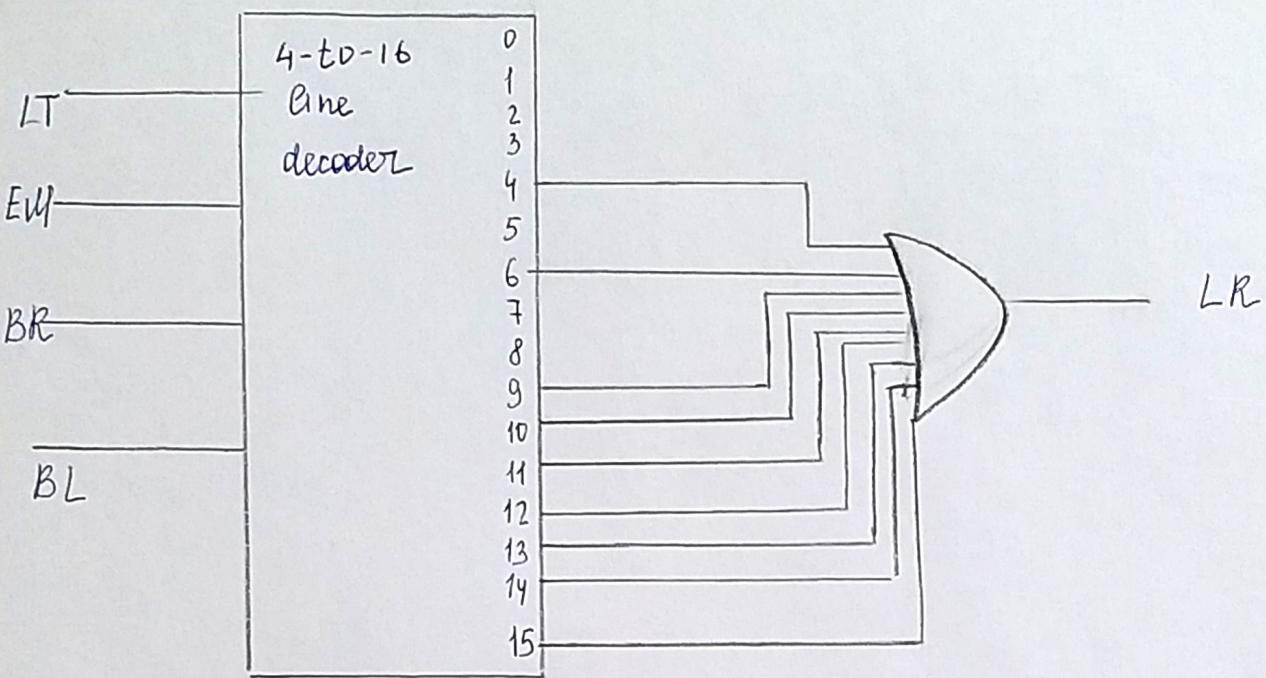


$$LR = \overline{LT} \cdot BR + EM \cdot BL + LT \cdot BL$$



$$RR = \overline{RT} \cdot BR + EM \cdot BL + RT \cdot BL$$

b)



$$8. \quad F(A, B, C, D) = \sum m(1, 3, 4, 11, 12, 13, 14, 15)$$

A	B	C	D	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
<hr/>				
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
<hr/>				
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
<hr/>				
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

$$F = D$$

$$F = \overline{C+D}$$

$$F = CD$$

$$F = 1$$

