

a)

Ochtał $\overbrace{\hspace{1cm}}^{\hspace{1cm}}_6 \overbrace{\hspace{1cm}}^{\hspace{1cm}}_5 \overbrace{\hspace{1cm}}^{\hspace{1cm}}_4 \mid_8$

BCD 010000100101 | BCD

b) $B = 65_{10}$

$$\underline{0100001} \big|_{a_2} \rightarrow (-B)_{a_2} = 1011111$$

$$\begin{array}{r} 1011110 \\ + \quad 1 \\ \hline \end{array} \quad |_{\text{Carry}}$$
$$+111011111 \quad (-65)$$

① 0 1 0 1 1 0 1 0 0 0 → positive number. No over flow.
(+360)

exponent $\rightarrow E - 127 = 8 \rightarrow E = 135 \rightarrow 10000111$

0 10000111, 0 110100000 ...
23 bits.

2

a)

E_{in}	T	H	Tox	L_{red}	L_{yellow}	L_{green}	L_{red}	L_{yellow}
0	0	0	0	0	0	1		
	0	0	1	1	0	0	Tox	
	0	1	0	0	1	0		
	0	1	1	1	0	0		
	1	0	0	0	1	0		
	1	0	1	1	0	0	Tox	\overline{Tox}
	1	1	0	0	1	0		
	1	1	1	1	0	0		
1	0	0	0	1	0	0		
	0	0	1	1	0	0		
	0	1	0	1	0	0		
	0	1	1	1	0	0		

b) L_{red}

$E_{in} T$	$H Tox$	00	01	11	10
00		1	1		
01		1	1		
11	1	1	1	1	1
10	1	1	1	1	1

$Tox + E_{in} = L_{red}$

$E_{in} T$	$H Tox$	00	01	11	10
00					1
01	1				1
11					
10					

$\overline{E_{in}} H \overline{Tox} + \overline{E_{in}} T \overline{Tox} = L_{yellow}$

$$L_{green} = \overline{E_{in}} \cdot \overline{T} \cdot H \cdot \overline{Tox}$$

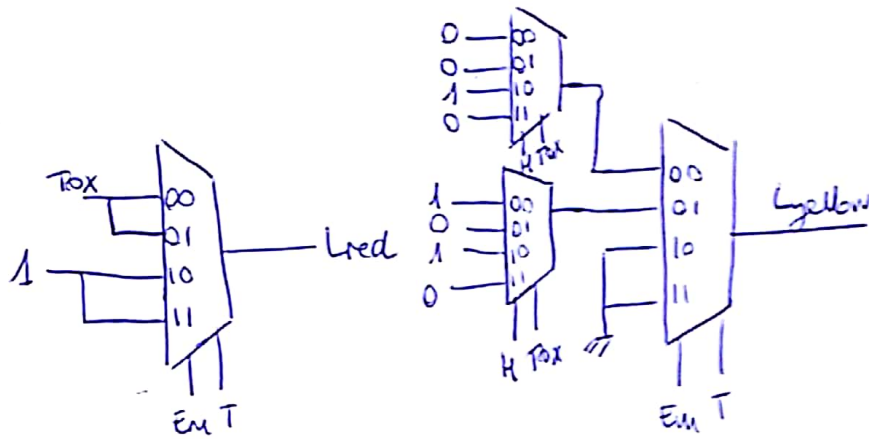
Or using minterms:

$$4 \leftarrow \overline{Tox} \cdot \overline{E_{in}} (H + T) = L_{yellow}$$

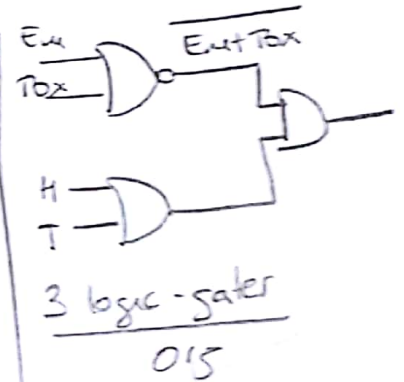
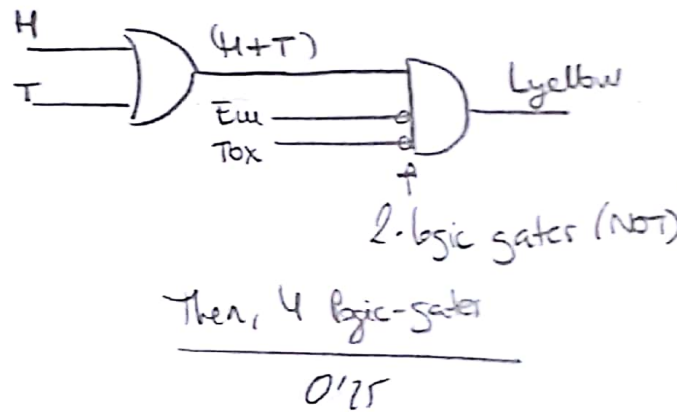
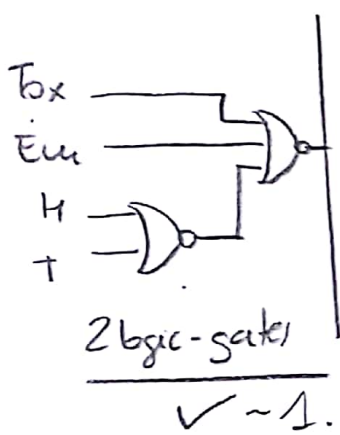
$$3 \leftarrow \overline{Tox} + \overline{E_{in}} (H + T) = L_y$$

$$NOR \cdot 2 \leftarrow \overline{Tox} + \overline{E_{in}} + (H + T)$$

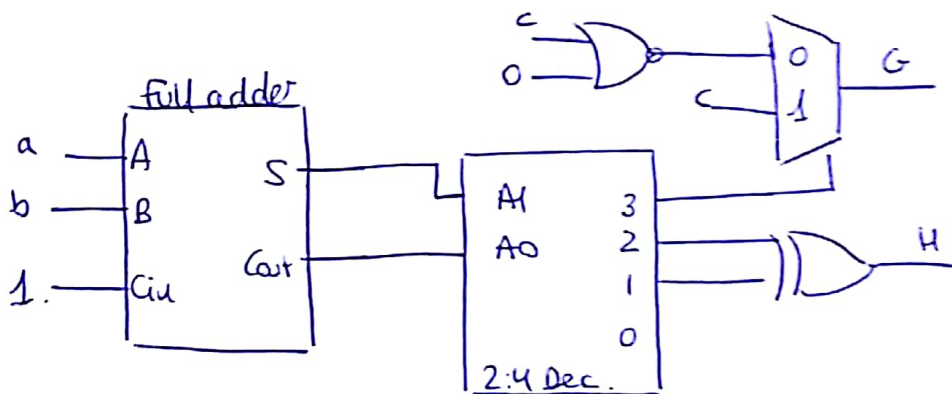
d)



c) $\bar{E_m} H \bar{T} \bar{O_x} + \bar{E_m} T \bar{T} \bar{O_x} = \bar{E_m} \bar{T} \bar{O_x} (H + T) = \bar{E_m} + \bar{T} \bar{O_x} (H + T)$



③



a	b	c	G	H
0	0	0	1	1
0	0	1	0	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	0
1	1	1	1	0

a	b	Cin	S	Cout
0	0	1	1	0
0	1	1	0	1
1	0	1	0	1
1	1	1	1	1

→ Dec out 2

→ Dec out 1

→ Dec out 3

$G = c$

Rest of the cases

$G = \bar{c} + 0$ $\left\{ \begin{array}{l} c=0 \ G=1 \\ c=1 \ G=0 \end{array} \right.$

Out 2	Out 1	H
0	0	0
0	1	1
1	0	1
1	1	0

→ when output 3 active

→ Not possible

②