LCS TD N°2 2019-202

EX N° 1 :

1°/ $F_1 = a.(a+b) = a.a + a.b$

$= a + ab = a(\cancel{1+b}^{1}) = a$

2°/ $F_2 = (a+b)(\bar{a}+b) = a\bar{a} + ab + b\bar{a} + b.b$

$= ab + b\bar{a} + b$

$= b(a+1) + b\bar{a} = b + b\bar{a} = b(1+\bar{a}) =$

3°/ $F_3 = (a\bar{b}+c)(a+\bar{b}).c$

$= (a\bar{b}+c)(ac+\bar{b}c)$

$= a\bar{b}c + a\bar{b}c + ca + c\bar{b}$

$= ac(\bar{b}+\bar{b}+1) + c\bar{b}$

$= ac + c\bar{b} = c(a+\bar{b})$

4°/ $F_4 = a\bar{b} + a\bar{c} + \overline{bc}$

$= a\bar{b} + a\bar{c} + \bar{b} + \bar{c}$

$= \bar{b}(a+1) + \bar{c}(a+1) = \bar{b}+\bar{c} = \overline{bc}$

5°/ $F_5 = \overline{\overline{(\bar{a}+b)} + \overline{(\bar{a}.b)}\,\overline{(a.\bar{b})}} = \overline{\underbrace{(a\bar{b})}_{x} + \underbrace{\overline{(a\bar{b})}}_{\bar{x}}.\underbrace{(\bar{a}b)}_{y}}$

On a : $x + \bar{x}.y = x + y$

donc

$F_5 = \overline{a\bar{b} + \bar{a}b} = \overline{a\bar{b}}\,.\,\overline{\bar{a}b}$

$= (\bar{a}+b)(\bar{a}b)$

$= \bar{a}\bar{a}b + b\bar{a}b = \bar{a}b + \bar{a}b$

$= \bar{a}b.$

Ex N° 2

1°/ Réalisation de F avec des NAND

$$F(A,B,C) = (A+B)(B+\bar{C})(A+\bar{B})$$

$$F(A,B,C) = \overline{\overline{(A+B)}}\;\overline{\overline{(B+\bar{C})}}\;\overline{\overline{(A+\bar{B})}}$$

$$= \overline{\bar{A}.\bar{B}} \,.\, \overline{\bar{B}.C} \,.\, \overline{\bar{A}.B}$$

$$= \overline{\overline{\overline{\bar{A}.\bar{B}} \,.\, \overline{\bar{B}.C}}} \,.\, \overline{\bar{A}.B}$$

$$= \overline{\overline{\overline{\overline{\overline{\bar{A}.\bar{B}} \,.\, \overline{\bar{B}.C}}} \,.\, \overline{\bar{A}.B}}}$$

2°/ $F(A,B,C) \overset{?}{=} AB + A\bar{C}$

$$F(A,B,C) = (A+B)(B+\bar{C})(A+\bar{B}) = (A+B)(A+\bar{B})(B+\bar{C})$$

$$= (A + A\bar{B} + BA + B\bar{B})(B+\bar{C})$$

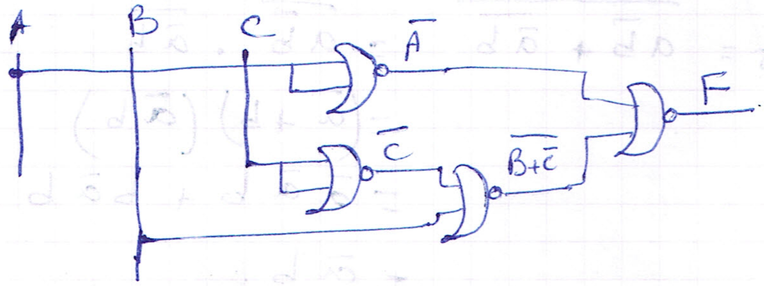
$$= (A + A(B+\bar{B}) + 0)(B+\bar{C})$$

$$= A(B+\bar{C}) = AB + A\bar{C}$$

3°/ L'expression de F avec 4 NOR à 2 entrées

$$F = AB + A\bar{C} = A(B+\bar{C})$$

$$= \overline{\overline{A(B+\bar{C})}} = \overline{\bar{A} + \overline{(B+\bar{C})}}$$



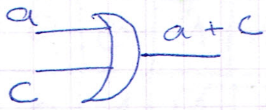
Ex N° 3

a/ $F = \bar{a}\bar{b}c + \bar{a}bc + a\bar{b}\bar{c} + a\bar{b}c + ab\bar{c} + abc$

$= \bar{a}c(\bar{b} + b) + a\bar{b}(\bar{c} + c) + ab(\bar{c} + c)$

$= a + c$

b/ Le logigramme



c/ $T = \bar{a}bc + a\bar{b}c + ab\bar{c} + abc$

a	b	c	T
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1