Laborator Proiectare Logică 5

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Optimizarea funcțiilor logice

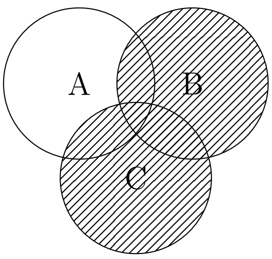
Optimizarea-reducerea numărului de operații

Website: lg.ccpr.ro

Exerciții

Exercițiul 1:
$y : 2^3 \to 2^1$; $y = \sum(1, 2, 3, 5, 6) = FCD_y$
$y = \Pi(0, 4, 7) = FCC_y$
$FCD_y = \bar{A}\bar{B}C + \bar{A}B\bar{C} + \bar{A}BC + A\bar{B}C + AB\bar{C}$
21 operații logice $\uparrow$
$FCC_y = (A + B + C)(\bar{A} + B + C)(\bar{A} + \bar{B} + \bar{C})$
12 operații logice $\uparrow$
Rezolvare: $FCD_y = \sum(2, 3) = n(2, 3) = A\bar{B} + AB$
$FCC_y = \Pi(0, 1) = m(0, 1) = (A + B)(A + \bar{B})$
$y = A\bar{B} + AB = A(\bar{B} + B) = A \times 1 = A$
$y = (A + B)(A + \bar{B}) = A^2 + A\bar{B} + BA + B\bar{B}$
$= A + A\bar{B} + AB + 0 = A(1 + B + \bar{B}) = A$

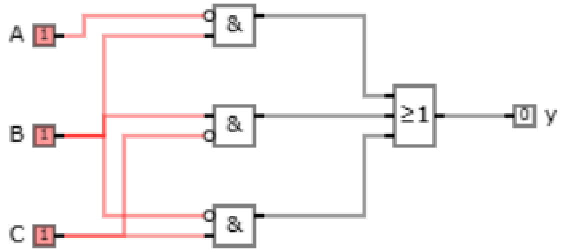
A	B	C	y
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	0



	$\bar{A}$	$\bar{A}$	A	A
$\bar{C}$	0	1	1	0
C	1	1	0	1
	$\bar{B}$	B	B	$\bar{B}$

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

Exercițiul 2:
Faceți schema pentru funția:
$y = B\bar{C} + \bar{A}B + C\bar{B}$



Exercițiul 3:
Simplificați funcția dată prin tabela de adevăr:

A	B	C	D	y
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
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
1	1	1	1	0

Rezolvare:
$y = \sum(0, 2, 3, 4, 5, 6, 8, 9, 10, 12)$
$= \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}CD + \bar{A}B\bar{C}\bar{D} +$
$+\bar{A}B\bar{C}D + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D + A\bar{B}C\bar{D} + AB\bar{C}\bar{D}$
$y = \Pi(1, 7, 11, 13, 14, 15)$
$= (A + B + C + \bar{D})(A + \bar{B} + \bar{C} + \bar{D})(\bar{A} + B + \bar{C} + \bar{D})$
$(\bar{A} + \bar{B} + C + \bar{D})(\bar{A} + \bar{B} + \bar{C} + D)(\bar{A} + \bar{B} + \bar{C} + \bar{D})$

	$\bar{A}$	$\bar{A}$	A	A	
$\bar{C}$	1	1	1	1	$\bar{D}$
$\bar{C}$	0	1	0	1	D
C	1	0	0	0	D
C	1	1	0	1	$\bar{D}$
	$\bar{B}$	B	B	$\bar{B}$	

$y = \bar{C}\bar{D} + \bar{A}B\bar{C}D + A\bar{B}\bar{C}D + \bar{A}\bar{B}C + \bar{A}C\bar{D} + A\bar{B}C\bar{D}$