Problema 9.3.9.

Desenaţi un circuit logic având trei variabile de intrare şi conţinând toate porţile de bază şi derivate. Scrieţi funcţia booleană corespunzătoare şi simplificaţi-o, iar apoi desenaţi un circuit logic simplificat.

not, nor, nand, și, sau, xor

Circuitul inițial:

((¯*xy* ∨ *yz*)⊕*z*)↓*y*

*f* (*x,y,z*)

*y*

*x*

*z*

¯*xy*

*yz*

¯*xy* ∨ *yz*

(¯*xy* ∨ *yz*)⊕*z*

*f* (*x,y,z*)= (((¯*xy* ∨ *yz*)⊕*z*)↓*y*)↑*x*

Determinarea FCD:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | *y* | *z* | ¯*xy* | *yz* | ¯*xy* ∨ *yz* | (¯*xy* ∨ *yz*)⊕*z* | ((¯*xy* ∨ *yz*)⊕*z*)↓*y* | *f*(*x,y,z*) | *m* |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | *m0* |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | *m1* |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | *m2* |
| 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | *m3* |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |  |
| 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | *m5* |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | *m6* |
| 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | *m7* |

Diagrama Karnaugh:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *yz*  *x* | 00 | 01 | 11 | 10 |
| 0 | *m*0 | *m*1 | *m*3 | *m*2 |
| 1 | *m*4 | *m*5 | *m*7 | *m*6 |

*max*1 = *m*3∨ *m*2∨ *m*7∨ *m*6= *y*

*max*2 = *m*0∨ *m*1∨ *m*3∨ *m*2= ¯*x*

*max*3 = *m*1∨ *m*3∨ *m*5∨ *m*7= *z*

M(*f* ) = { *max*1, *max*2, *max*3}

C(*f* ) = M(*f* ) ⇒ cazul I

*f*‘(*x,y,z*)= *max*1∨ *max*2∨ *max*3 = *y* ∨ ¯*x* ∨ *z*

Un circuit simplificat:

*f* ‘(*x,y,z*)

*y*

*x*

*z*