Problema 9.3.8.

Desenaţi circuitul logic asociat funcţiei booleene de mai jos, simplificaţi funcţia şi desenaţi circuitele logice corespunzătoare tuturor formelor simplificate ale funcţiei, utilizând doar porţi de bază:

1. *f*5(*x*, *y*, *z*) *=* ¯*x* (*y* ⊕ ¯*z*) ∨ ¯*y* (*x* ⊕ *z*) ∨ ¯*x* ( *y* ↓*z*) ∨ (¯*x* ↓ *y*) ¯*z* ;

Circuitul inițial:

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

*y*

*x*

*z*

*y* ⊕ ¯*z*

¯*x* (*y* ⊕ ¯*z*)

*x* ⊕ *z*

¯*y* (*x* ⊕ *z*)

*y* ↓*z*

¯*x* ( *y* ↓*z*)

¯*x* ↓ *y*

(¯*x* ↓ *y*) ¯*z*

*f*5(*x*, *y*, *z*) *=* ¯*x* (*y* ⊕ ¯*z*) ∨ ¯*y* (*x* ⊕ *z*) ∨ ¯*x* ( *y* ↓*z*) ∨ (¯*x* ↓ *y*) ¯*z*

Determinarea FCD:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | *y* | *z* | *y* ⊕ ¯*z* | ¯*x* (*y* ⊕ ¯*z*) | *x* ⊕ *z* | ¯*y* (*x* ⊕ *z*) | *y* ↓*z* | ¯*x* ( *y* ↓*z*) | ¯*x* ↓ *y* | (¯*x* ↓ *y*) ¯*z* | *f5*(*x,y,z*) |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1(*m0*) |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1(*m1*) |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1(*m3*) |
| 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1(*m4*) |
| 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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*0 ∨ *m*4 = ¯*y* ¯*z*

*max*2= *m*1 ∨ *m*3 = ¯*x z*

*max*3= *m*0 ∨ *m*1 = ¯*x* ¯*y*

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

C(*f* ) = { *max*1, *max*2}

M(*f* ) ≠ C(*f* ) , C(*f* ) ≠ ∅ ⇒ ca*z*ul II *g* (*x*,*y*,*z*)= *max*1∨ *max*2

*f**5*‘(*x,y,z*)*= g* (*x,y,z*) = *max*1∨ *max*2 =¯ *y*  ¯*z* ∨ ¯*x z*

Un circuit simplificat:

*f* ‘(*x,y,z*)

*y*

*x*

*z*

¯ *y*  ¯*z*

¯*x z*