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*2(x, y, z) *=* x (y↑z) ∨ ¯x (¯y ⊕ z) ∨ y (¯x ⊕ ¯z);

Circuitul inițial:

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

*y*

*x*

*z*

y↑z

x (y↑z)

¯y ⊕ z

¯x (¯y ⊕ z)

y (¯x ⊕ ¯z)

¯x ⊕ ¯z

Determinarea FCD:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | *y* | *z* | y↑z | x (y↑z) |  |  | *f*x(*x,y,z*) |
| 0 | 0 | 0 |  |  |  |  |  |
| 0 | 0 | 1 |  |  |  |  |  |
| 0 | 1 | 0 |  |  |  |  |  |
| 0 | 1 | 1 |  |  |  |  |  |
| 1 | 0 | 0 |  |  |  |  |  |
| 1 | 0 | 1 |  |  |  |  |  |
| 1 | 1 | 0 |  |  |  |  |  |
| 1 | 1 | 1 |  |  |  |  |  |

Diagrama Karnaugh:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *yz*  *x* | 00 | 01 | 11 | 10 |
| 00 | *m*0 | *m*1 | *m*3 | *m*2 |
| 01 | *m*4 | *m*5 | *m*7 | *m*6 |
| 11 | *m*12 | *m*13 | *m*15 | *m*14 |
| 10 | *m*8 | *m*9 | *m*11 | *m*10 |

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

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

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

*h*1(*x*1*,x*2*,x*3*,x*4)= *max*4

*f* x‘(1)(*x,y,z*)*= g* (*x,y,z*) ∨ *h*1(*x,y,z*)= *max*3∨ *max*2∨ *max*1∨ *max*4= ¯ *x* ¯ *y*  ¯*z* ∨

Un circuit simplificat:

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

*y*

*x*

*z*

*M*2

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.

Circuitul inițial:

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

*y*

*x*

*z*

*M*2

Determinarea FCD:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | *y* | *z* |  |  |  |  | *f*x(*x,y,z*) |
| 0 | 0 | 0 |  |  |  |  |  |
| 0 | 0 | 1 |  |  |  |  |  |
| 0 | 1 | 0 |  |  |  |  |  |
| 0 | 1 | 1 |  |  |  |  |  |
| 1 | 0 | 0 |  |  |  |  |  |
| 1 | 0 | 1 |  |  |  |  |  |
| 1 | 1 | 0 |  |  |  |  |  |
| 1 | 1 | 1 |  |  |  |  |  |

Diagrama Karnaugh:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *yz*  *x* | 00 | 01 | 11 | 10 |
| 00 | *m*0 | *m*1 | *m*3 | *m*2 |
| 01 | *m*4 | *m*5 | *m*7 | *m*6 |
| 11 | *m*12 | *m*13 | *m*15 | *m*14 |
| 10 | *m*8 | *m*9 | *m*11 | *m*10 |

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

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

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

*h*1(*x*1*,x*2*,x*3*,x*4)= *max*4

*f* x‘(1)(*x,y,z*)*= g* (*x,y,z*) ∨ *h*1(*x,y,z*)= *max*3∨ *max*2∨ *max*1∨ *max*4= ¯ *x* ¯ *y*  ¯*z* ∨

Un circuit simplificat:

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

*y*

*x*

*z*

*M*2