**Digunakan untuk keperluan perbaikan nilai Logmat**

**Isilah soal dibawah ini dengan jawaban yang benar !**

1. Diketahui f(w,x,y,z) = xz + w’xy’+wx’z’
2. Tentukan bentuk kanonik SOP dan POS
3. Tentukan komplemennya
4. Sederhanakan fungsi Boolean f(A,B,C,D) = (0,2,3,4,8,10,11,12,13,15) menggunakan metode Quine Mc Clusky
5. Minimasi fungsi Boolean f(x,y,z) = x’y’z + x’yz’ + x’yz + xy’z + xyz menggunakan Peta Karnaugh. Gambarkan rangkaian logika fungsi Boolean diatas sebelum diminimasi dan setelah diminimasi.

JAWAB

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | MINTERM | | MAXTERM | |
| w | x | Y | z | SUKU | LAMBANG | SUKU | LAMBANG |
| 0 | 0 | 0 | 0 | w’x’y’z’ | m0 | w+x+y+z | M0 |
| 0 | 0 | 0 | 1 | w’x’y’z | m1 | w+x+y+z’ | M1 |
| 0 | 0 | 1 | 0 | w’x’yz’ | m2 | w+x+y’+z | M2 |
| 0 | 0 | 1 | 1 | w’x’yz | m3 | w+x+y’+z’ | M3 |
| 0 | 1 | 0 | 0 | w’xy’z’ | m4 | w+x’+y+z | M4 |
| 0 | 1 | 0 | 1 | w’xy’z | m5 | w+x’+y+z’ | M5 |
| 0 | 1 | 1 | 0 | w’xyz’ | m6 | w+x’+y’+z | M6 |
| 0 | 1 | 1 | 1 | w’xyz | m7 | w+x’+y’+z’ | M7 |
| 1 | 0 | 0 | 0 | wx’y’z’ | m8 | w’+x+y+z | M8 |
| 1 | 0 | 0 | 1 | wx’y’z | m9 | w’+x+y+z’ | M9 |
| 1 | 0 | 1 | 0 | wx’yz’ | m10 | w’+x+y’+z | M10 |
| 1 | 0 | 1 | 1 | wx’yz | m11 | w’+x+y’+z’ | M11 |
| 1 | 1 | 0 | 0 | wxy’z’ | m12 | w’+x’+y+z | M12 |
| 1 | 1 | 0 | 1 | wxy’z | m13 | w’+x’+y+z’ | M13 |
| 1 | 1 | 1 | 0 | wxyz’ | m14 | w’+x’+y’+z | M14 |
| 1 | 1 | 1 | 1 | wxyz | m15 | w’+x’+y’+z’ | M15 |

1. f(w,x,y,z) = xz + w’xy’+wx’z’

SOP

xz = xz (y+y’)

= xyz + xy’z

= xyz (w+w’) + xy’z (w+w’)

= wxyz + w’xyz + wxy’z + w’xy’z

w’xy’ = w’xy’ (z+z’)

= w’xy’z + w’xy’z’

wx’z’ = wx’y’ (y+y’)

= wx’yz’ + wx’y’z’

Jadi f(w,x,y,z) = xz + w’xy’+wx’z’

= wxyz + w’xyz + wxy’z + w’xy’z + w’xy’z + w’xy’z’ + wx’yz’ + wx’y’z’

= wxyz + w’xyz + wxy’z + w’xy’z + w’xy’z’ + wx’yz’ + wx’y’z’

Atau f(w,x,y,z) = m15 + m7 + m13 + m5 + m4 + m10 + m8

= ∑(4,5,7,8,10,13,15)

POS

f(w,x,y,z) = xz + w’xy’+wx’z’

=(w+x+y+z)(w+x+y+z’)(w+x+y’+z)(w+x+y’+z’)(w+x’+y’+z)(w’+x+y+z’)

(w’+x+y’+z’)(w’+x’+y+z)(w’+x’+y’+z)

= M0 M1 M2 M3 M6 M9 M11 M12 M14

= π(0,1,2,3,6,9,11,12,14)

1. SOP

f(w,x,y,z) = ∑(4,5,7,8,10,13,15)

f’(w,x,y,z) = ∑(0,1,2,3,6,9,11,12,14) = m0 + m1 + m2 + m3 + m6 + m9 + m11 + m12 + m14

f’(w,x,y,z) = (f’(w,x,y,z)’)

= (m0 + m1 + m2 + m3 + m6 + m9 + m11 + m12 + m14)’

= m0’ . m1’. m2’. m3’. m6’. m9’ . m11’ . m12’ . m14‘

=(w’x’y’z’)’ (w’x’y’z)’ (w’x’yz’)’ (w’xyz’)’ (wx’y’z)’ (wx’y’z)’ (wx’yz)’ (wxy’z’)’ (wxyz’)’

= (w+x+y+z) (w+x+y+z’) (w+x+y’+z) (w+x’+y’+z) (w’+x+y’+z’) (w’+x+y+z’) (w’+x+y’+z) (w’+x’+y+z) (w’+x’+y’+z)

= M0 M1 M2 M3 M6 M9 M11 M12 M14

= π(0,1,2,3,6,9,11,12,14)

Jadi, f(w,x,y,z) = ∑(4,5,7,8,10,13,15) = π(0,1,2,3,6,9,11,12,14)

1. f(A,B,C,D) = (0,2,3,4,8,10,11,12,13,15)

= ∑(0,2,3,4,8,10,11,12,13,15)

= m0, m2, m3,  m4,  m8, m10, m11, m12, m13, m15

ABCD ABCD ABCD ABCD

0 0 0 0 0 0 0 0 0 0 0,2 0 0 – 0 0,2,8,10 – 0 – 0

2 0 0 1 0 2 0 0 1 0 0,4 0 – 0 0 0,4,8,12 – – 0 0

3 0 0 1 1 4 0 1 0 0 0,8 – 0 0 0 0,8,2,10 – 0 – 0

4 0 1 0 0 8 1 0 0 0 2,3 0 0 1 – 0,8,4,12 – – 0 0

8 1 0 0 0 3 0 0 1 1 2,10 – 0 1 0 2,3,10,11 – 0 1 –

10 1 0 1 0 10 1 0 1 0 4,12 – 1 0 0 2,10,3,11 – 0 1 –

11 1 0 1 1 12 1 1 0 0 8,10 1 0 – 0

12 1 1 0 0 11 1 0 1 1 8,12 1 – 0 0

13 1 1 0 1 13 1 1 0 1 3,11 – 0 1 1

15 1 1 1 1 15 1 1 1 1 10,11 1 0 1 –

12,13 1 1 0 –

11,15 1 – 1 1

13,15 1 1 – 1

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | 0 | 2 | 3 | 4 | 8 | 10 | 11 | 12 | 13 | 15 |
| 12,13 | ABC’ |  |  |  |  |  |  |  | \* | \* |  |
| 13,15 | ABD |  |  |  |  |  |  |  |  | \* | \* |
| 11,15 | ACD |  |  |  |  |  |  | \* |  |  | \* |
| 0,2,8,10 | B’D’ | \* | \* |  |  | \* | \* |  |  |  |  |
| 0,4,8,12 | C’D’ | \* |  |  | \* | \* |  |  | \* |  |  |
| 2,3,10,11 | B’C |  | \* | \* |  |  | \* | \* |  |  |  |

Hasil = f(A,B,C,D) = ABD + C’D’ + B’C

1. f(x,y,z) = x’y’z + x’yz’ + x’yz + xy’z + xyz

yz

00 01 11 10

|  |  |  |  |
| --- | --- | --- | --- |
| x’y’z’ | x’y’z | x’yz | x’yz’ |
| xy’z’ | xy’z | xyz | xyz’ |

0

1

yz

00 01 11 10

|  |  |  |  |
| --- | --- | --- | --- |
| 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 0 |

0

1

Hasil : f(x,y,z) = x’y’z + x’yz’ + x’yz + xy’z + xyz

f(x,y,z) = z + x’y

Sebelum di minimasi f(x,y,z) = x’y’z + x’yz’ + x’yz + xy’z + xyz

x

y

z

Setelah di minimasi

f(x,y,z) = z + x’y

x

y

z