UNIT-II

Combinational Logic System

Lecture 16

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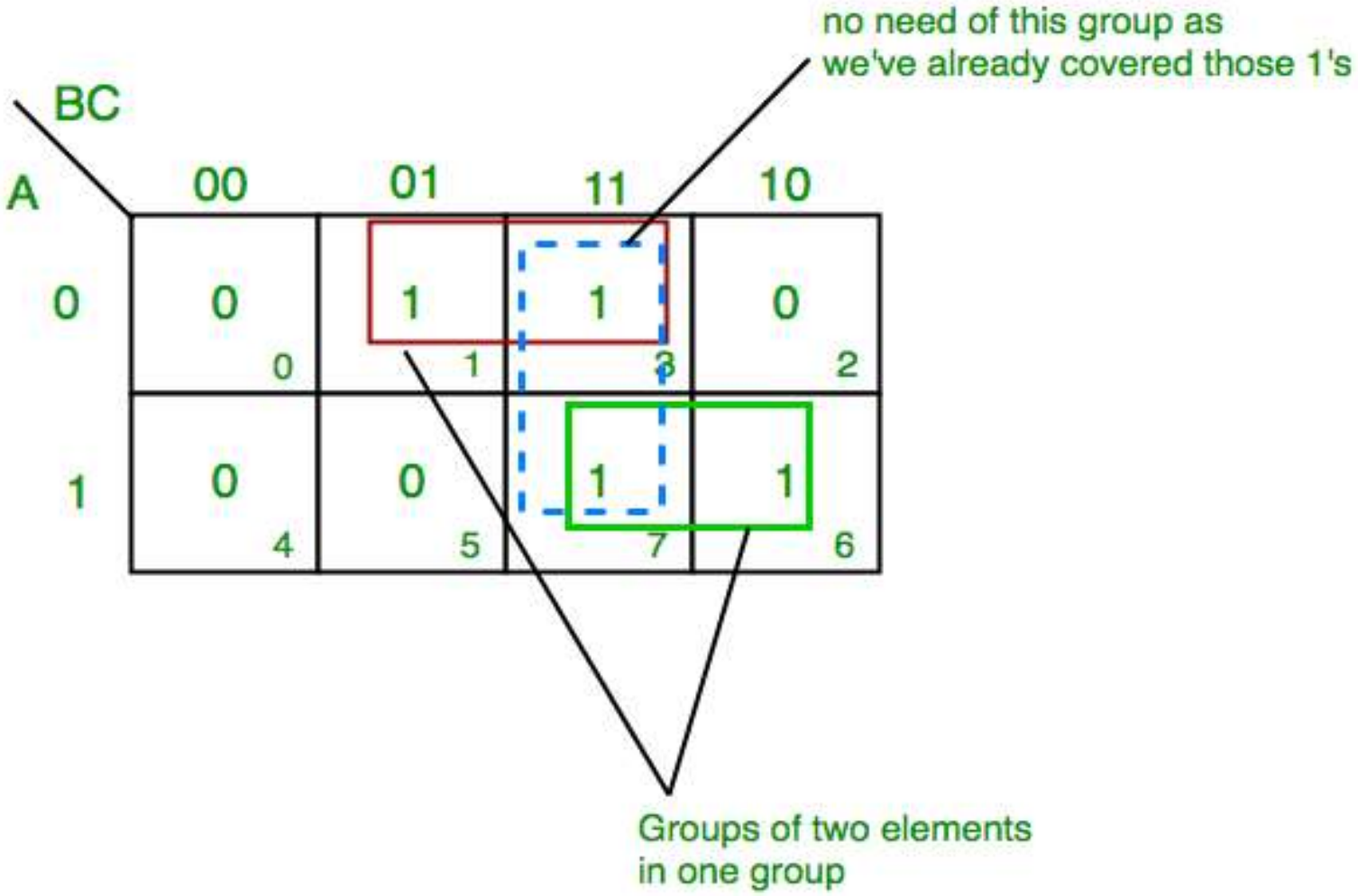
Practice Example 1

$Z = \sum A,B,C(1,3,6,7)$

Solution


no need of this group as
we've already covered those 1's
BC
A
00
01
11
10
0
1
0
1
0
0
1
1
0
0
0
1
1
0
1
2
3
4
5
7
6
Groups of two elements
in one group

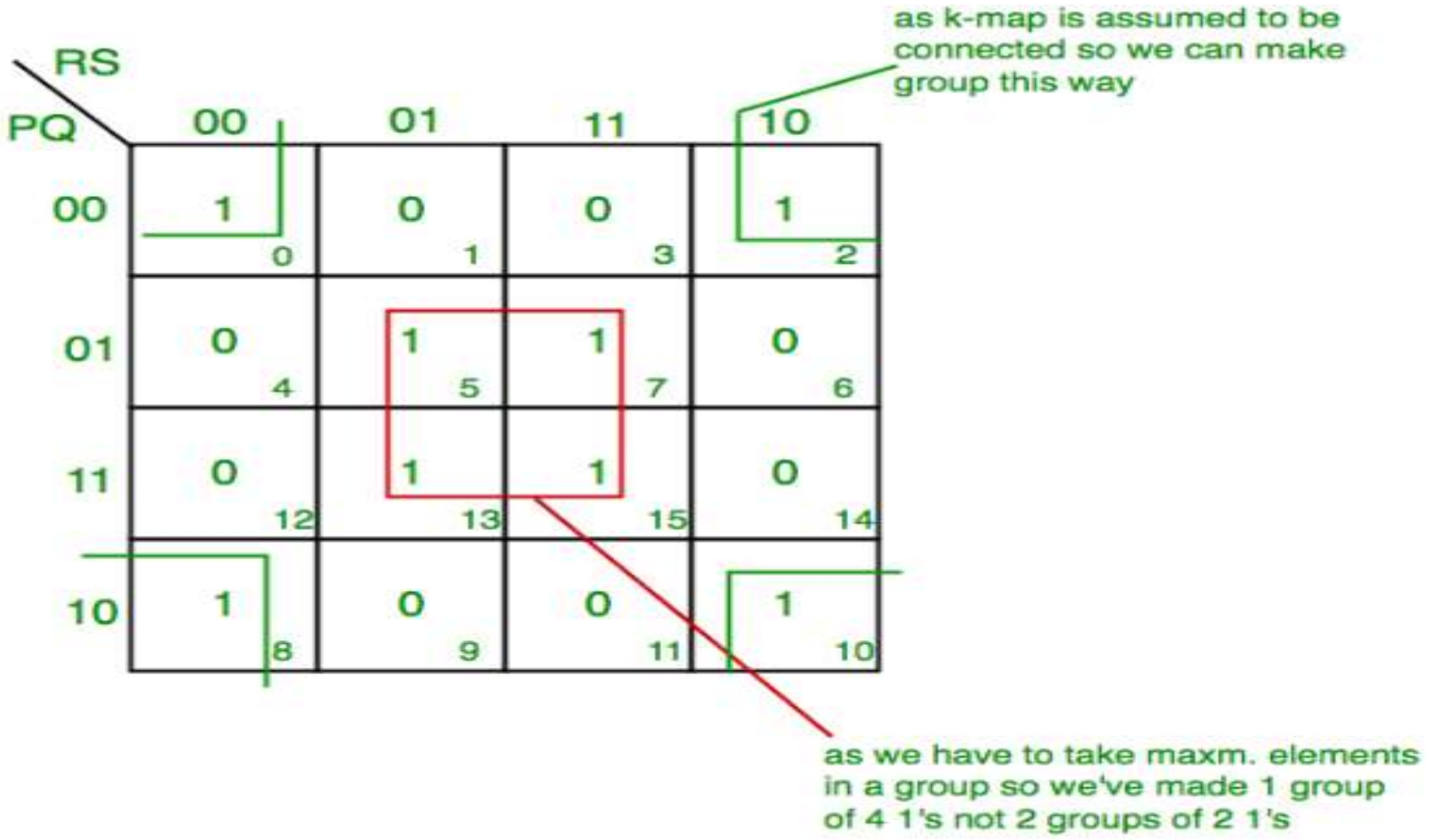
- From **red** group we get product term—
- A’C
- From **green** group we get product term—
- AB
- Summing these product terms we get- **Final expression**

  (A’C+AB)

Practice Example 2

- $F(P,Q,R,S)=\sum(0,2,5,7,8,10,13,15)$

Solution

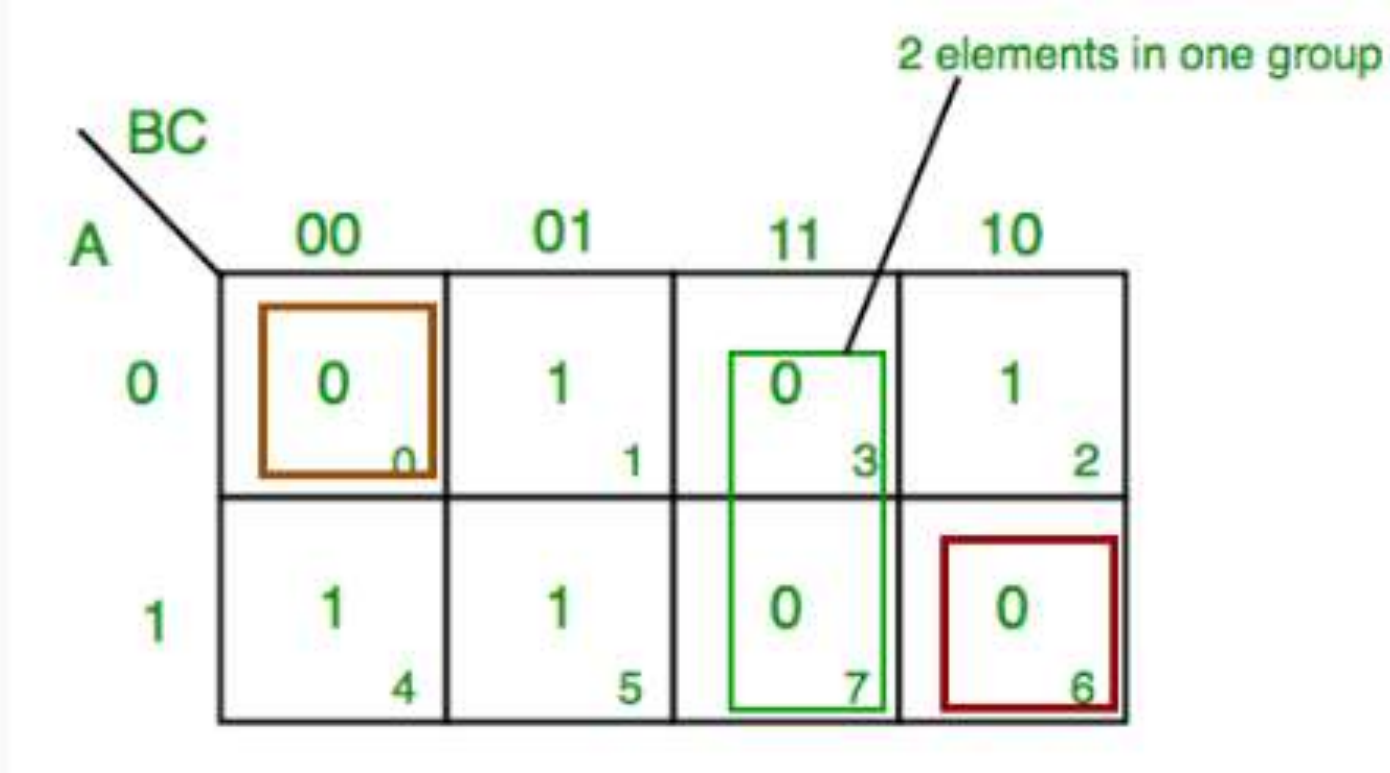

as k-map is assumed to be connected so we can make group this way
RS
PQ
00
01
11
10
00
01
11
10
1 0
0 1
0 3
1 2
0 4
1 5
1 7
0 6
0 12
1 13
1 15
0 14
1 8
0 9
0 11
1 10
as we have to take maxm. elements in a group so we've made 1 group of 4 1's not 2 groups of 2 1's

- From **red** group we get product term—
- QS
- From **green** group we get product term—
- Q’S’
- Summing these product terms we get- **Final expression (QS+Q’S’)**

Practice Example 3

- $F(A,B,C)=\pi(0,3,6,7)$

Solution

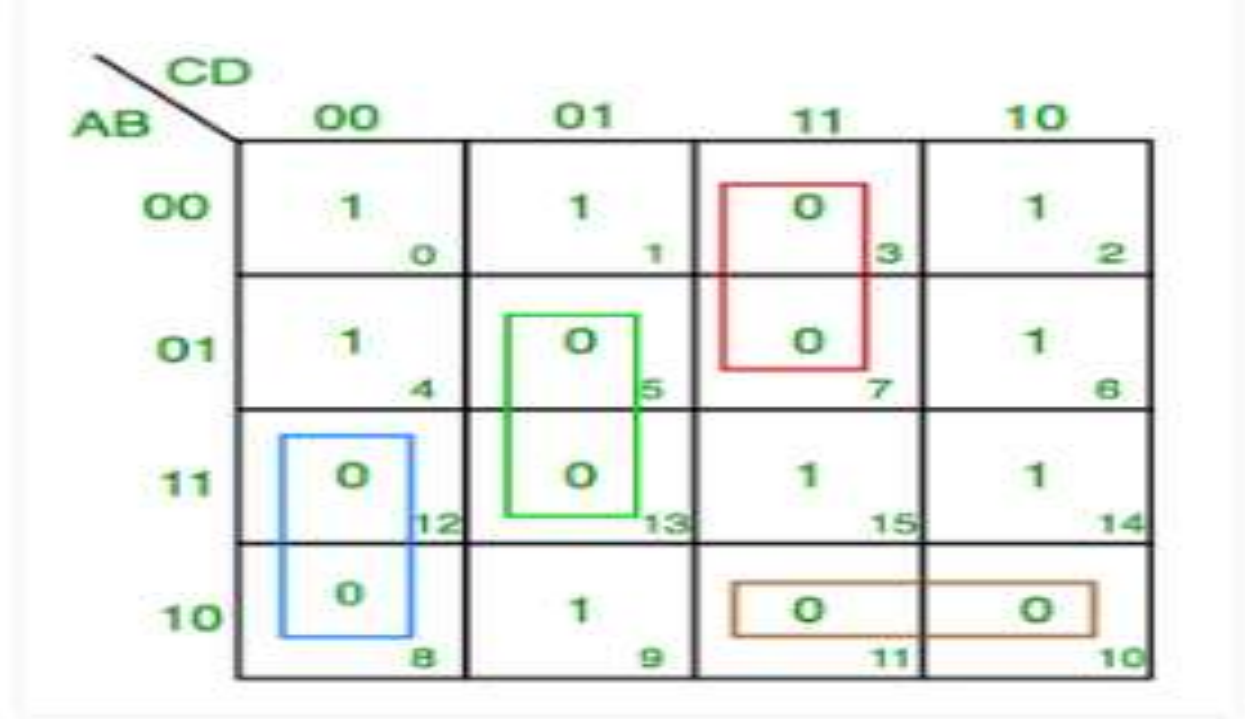


:Final expression (A’ + B’ + C) (B’ + C’) (A + B + C)

Practice Example 4

- $F(A,B,C,D)=\pi(3,5,7,8,10,11,12,13)$

Solution

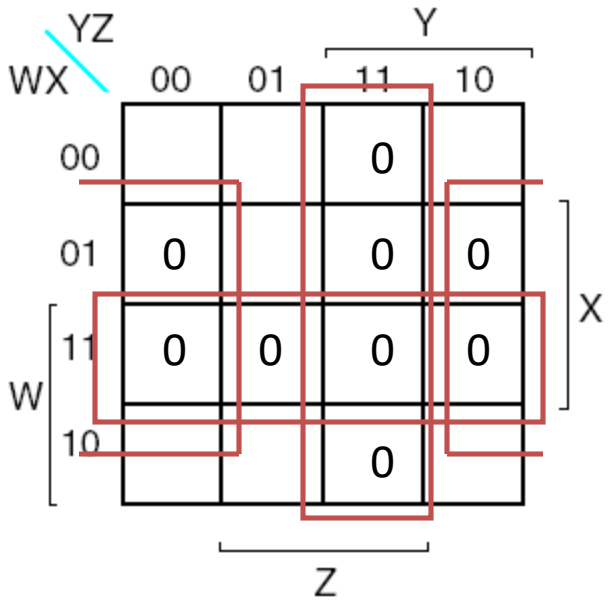


(C+D'+B').(C'+D'+A).(A'+C+D).(A'+B+C')

PoS Optimization from SoP

F(W,X,Y,Z)= Σm(0,1,2,5,8,9,10)

= ∏ M(3,4,6,7,11,12,13,14,15)



F(W,X,Y,Z)= (W’ + X’)(Y’ + Z’)(X’ + Z)

Or,

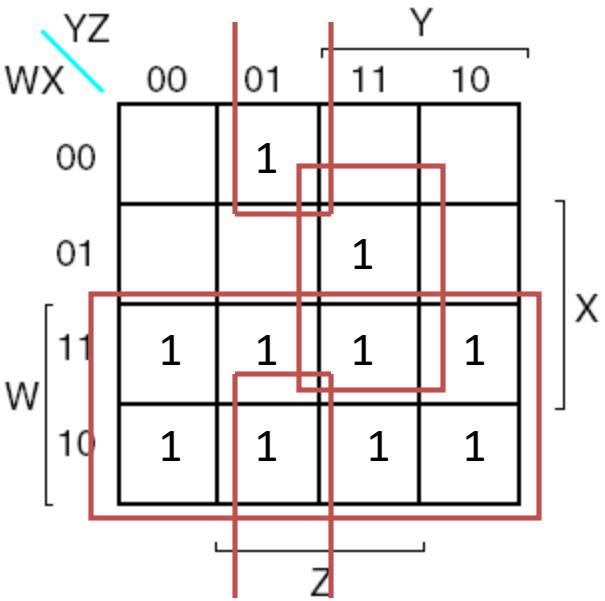
F(W,X,Y,Z)= X’Y’ + X’Z’ + W’Y’Z

Which one is the minimal one?

SoP Optimization from PoS

F(W,X,Y,Z)= ∏ M(0,2,3,4,5,6)

= Σm(1,7,8,9,10,11,12,13,14,15)



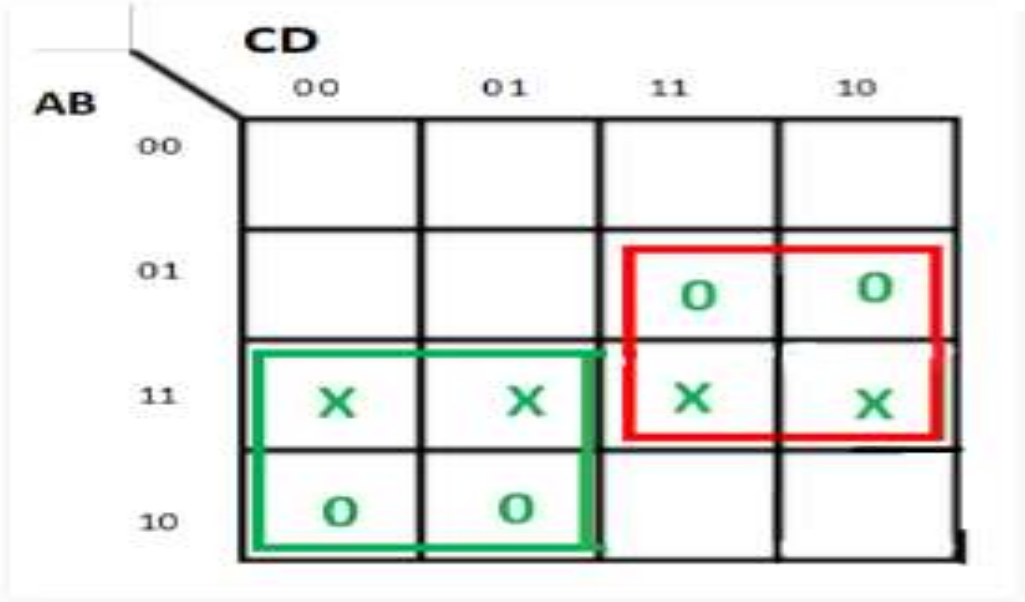
F(W,X,Y,Z)= W + XYZ + X'Y'Z

Practice Example 7

- Writing the given expression in POS form:

- $F(A, B, C, D) = M(6, 7, 8, 9) + d(12, 13, 14, 15)$

Solution



Therefore, POS minimal is,
F = (A'+ C)(B' + C')

Practice Example 8

- Minimise the following function in SOP minimal form using K-Maps:
  $F(A, B, C, D) = m(1, 2, 6, 7, 8, 13, 14, 15) + d(0, 3, 5, 12)$

Solution

f = AC'D' + A'D + A'C + AB