Experiment number: 04

Name of the experiment : Application of k-Map Method

Group number : 03

Group members names and Ids:

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Name of the Experiment: Application of K-Map method.

Objective:

- To investigate the rules of K-map
- To gain experience working with practical circuits.
- To simplify a complex function using K-map.

Required Components and Equipments

- AT-700 Portable Analog/Digital Laboratory
- AND, OR, NOT, XOR IC

Experimental Setup:

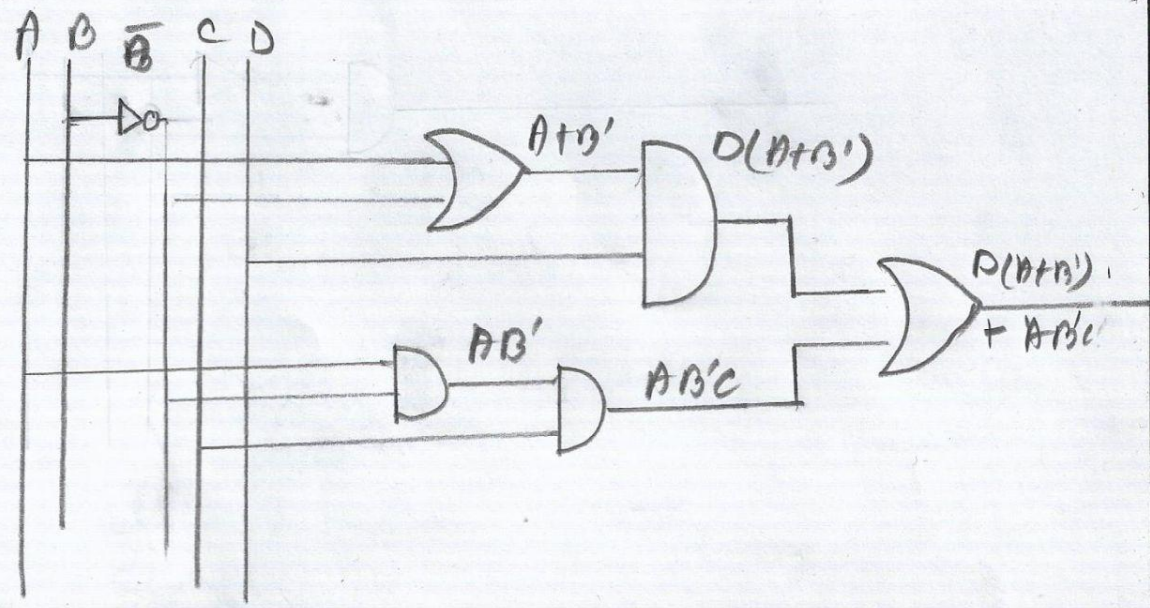


Fig-1-D(A+B')+AB'C

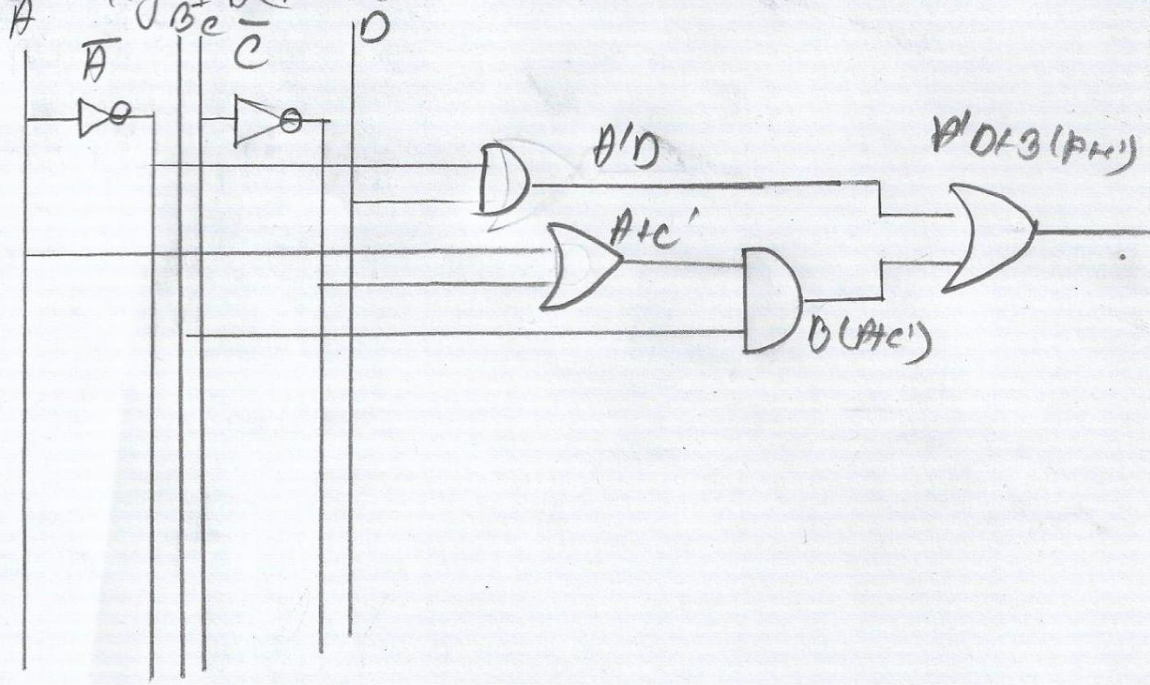


Fig-2 – AD' + B(C'+A)

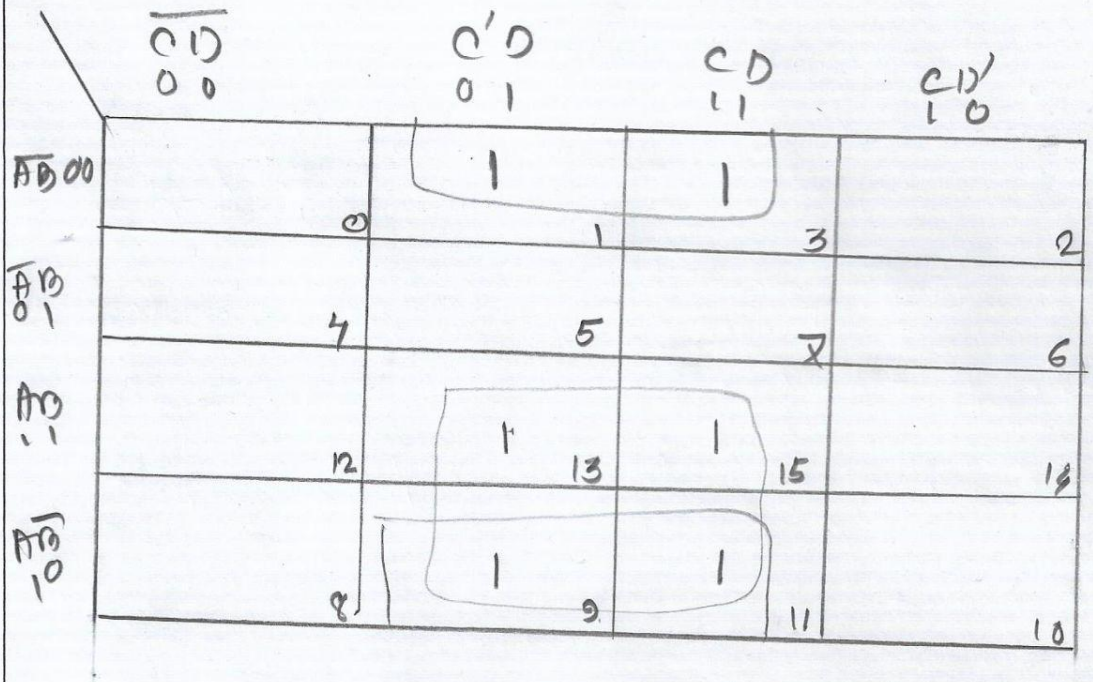
Results:

- Given function -1 =

$f(A,B,C,D) = \sum(1,3,9,10,11,13,15)$

$= \bar{A}\bar{B}\bar{C}D + \bar{A}B\bar{C}D + AB\bar{C}D + A\bar{B}CD +$

$A\bar{B}\bar{C}D + AB\bar{C}D + ABCD$



$\therefore F = AD + B'D + AB'C$

$= D(A + B') + AB'C$

Truth Table :-

A	B	C	D	$\overline{A}$	$\overline{B}$	$\overline{C}$	$\overline{D}$	$D(A+B)^D$	$B \vee C$	$D(AB') + AB'C$
0	0	0	0	1	1	1	1	0	0	0
0	0	0	1	1	1	1	0	1	0	1
0	0	1	0	1	1	0	1	0	0	0
0	0	1	1	1	1	0	0	1	0	1
0	1	0	0	1	0	1	1	0	0	0
0	1	0	1	1	0	1	0	0	0	0
0	1	1	0	1	0	0	1	0	0	0
0	1	1	1	1	0	0	0	0	0	0
1	0	0	0	0	1	1	1	0	0	0
1	0	0	1	0	1	1	0	1	0	1
1	0	1	0	0	1	0	1	0	1	1
1	0	1	1	0	1	0	0	1	1	1
1	1	0	0	0	0	1	1	0	0	0
1	1	0	1	0	0	1	0	1	0	1
1	1	1	0	0	0	0	1	0	0	0
1	1	1	1	0	0	0	0	1	0	1

Given function - 2

$F(A,B,C,D) = \Sigma(1,4,15) + d(3,5,7,12,13,14)$

$F(A,B,C,D) = \bar{A}\bar{B}\bar{C}D + \bar{A}B\bar{C}\bar{D} + ABCD$

$d(A,B,C,D) = (3,5,7,12,13,14)$

$= \bar{A}\bar{B}CD + \bar{A}B\bar{C}D + \bar{A}BC\bar{D} + AB\bar{C}D +$

$AB\bar{C}\bar{D} + ABCD$

CD \ AB	00	01	11	10
00	0	1	X 3	2
01	1 4	X 5	X 7	6
11	X 12	X 13	1 15	X 14
10	8	9	11	10

$\therefore F = A'D + BC' + AB$

$= A'D + B(C' + A)$

Truth-Table-2

on	A	B	C	D	$\overline{A}$	$\overline{B}$	$\overline{C}$	$\overline{D}$	$\overline{B}D$	$B(\overline{C}+A)$	$\overline{A}D+B(\overline{C}+A)$
1	0	0	0	0	1	1	1	1	0	0	0
2	0	0	0	1	1	1	1	0	1	0	1
3	0	0	1	0	1	1	0	1	0	0	0
4	0	0	1	1	1	1	0	0	1	0	1
5	0	1	0	0	1	0	1	1	0	1	1
6	0	1	0	1	1	0	1	0	1	1	1
7	0	1	1	0	1	0	0	1	0	0	0
8	0	1	1	1	1	0	0	0	1	0	1
9	1	0	0	0	0	1	1	1	0	1	1
10	1	0	0	1	0	1	1	0	0	1	1
11	1	0	1	0	0	1	0	1	0	1	1
12	1	0	1	1	0	1	0	0	0	1	1
13	1	1	0	0	0	0	1	1	0	1	1
14	1	1	0	1	0	0	1	0	0	1	1
15	1	1	1	0	0	0	0	1	0	1	1
16	1	1	1	1	0	0	0	0	0	1	1

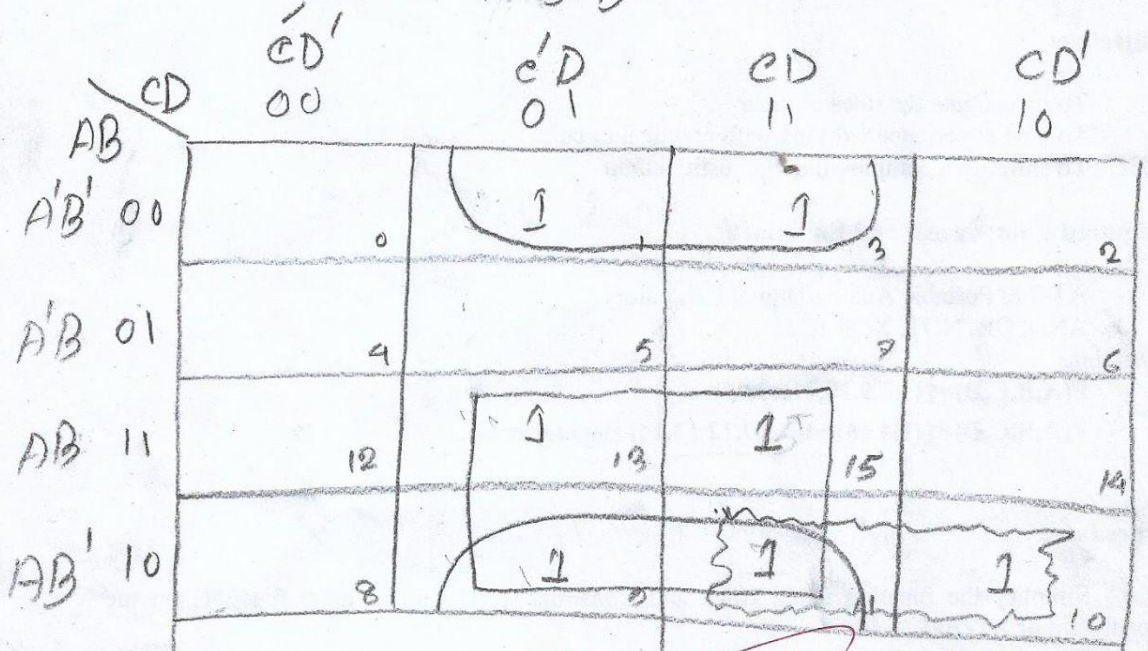
Discussions:

- The simplification by K-Map was easier
- In this case parallel circuit aren't work..

0 → ' 8 4 2 1

$F(A,B,C,D) = \Sigma(1,3,9,10,11,13,15)$

$= A'B'C'D + A'B'CD + AB'C'D + AB'CD' + AB'CD + ABC'D + ABCD$



$F = AD + B'D + AB'C$

$= D(A+B') + AB'C$