

SNS COLLEGE OF TECHNOLOGY



Coimbatore-35
An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECB204 – LINEAR AND DIGITAL CIRCUITS

II YEAR/ III SEMESTER

UNIT 3 – GATES AND MINIMIZATION TECHNIQUES

TOPIC 7 - KARNAUGH MAP MINIMIZATION - Problems



KARNAUGH MAP - Simplifications



1. Plot the logical expression ABCD+AB'C'B'+AB'C+AB on a 4 variable K-map and obtain the simplified expression from the K-map.

$$Y = ABCD + A\overline{B}\overline{C}\overline{D} + A\overline{B}C + AB$$

$$= ABCD + A\overline{B}\overline{C}\overline{D} + A\overline{B}C(D + \overline{D}) + AB(C + \overline{C})(D + \overline{D})$$

$$= ABCD + A\overline{B}\overline{C}\overline{D} + A\overline{B}CD + A\overline{B}C\overline{D} + (ABC + AB\overline{C})(D + \overline{D})$$

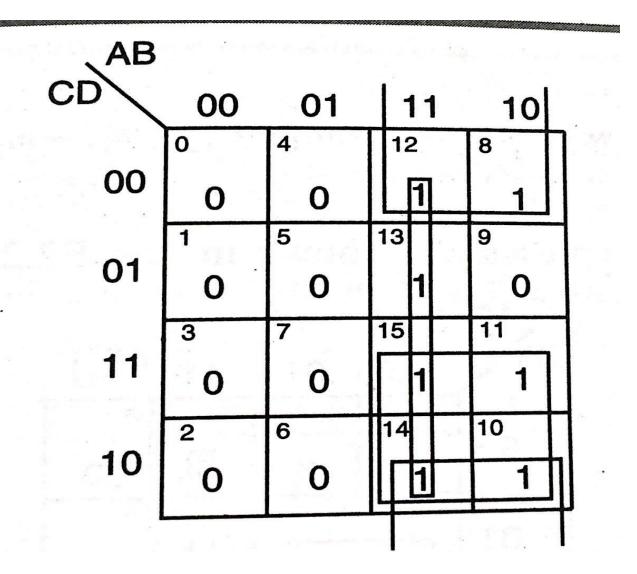
$$= ABCD + A\overline{B}\overline{C}\overline{D} + A\overline{B}CD + A\overline{B}C\overline{D} + ABCD + ABC\overline{D} + AB\overline{C}D + AB\overline{C}\overline{D}$$

$$= ABCD + A\overline{B}\overline{C}\overline{D} + A\overline{B}CD + A\overline{B}C\overline{D} + ABC\overline{D} + ABC\overline{D} + AB\overline{C}D + AB\overline{C}\overline{D}$$

$$= ABCD + A\overline{B}\overline{C}\overline{D} + A\overline{B}CD + A\overline{B}CD + ABC\overline{D} + ABC\overline{D} + ABC\overline{D} + AB\overline{C}D + AB\overline{C}\overline{D}$$

$$= m_{15} + m_8 + m_{11} + m_{10} + m_{14} + m_{13} + m_{12}$$

$$= \Sigma_m(8, 10, 11, 12, 13, 14, 15)$$



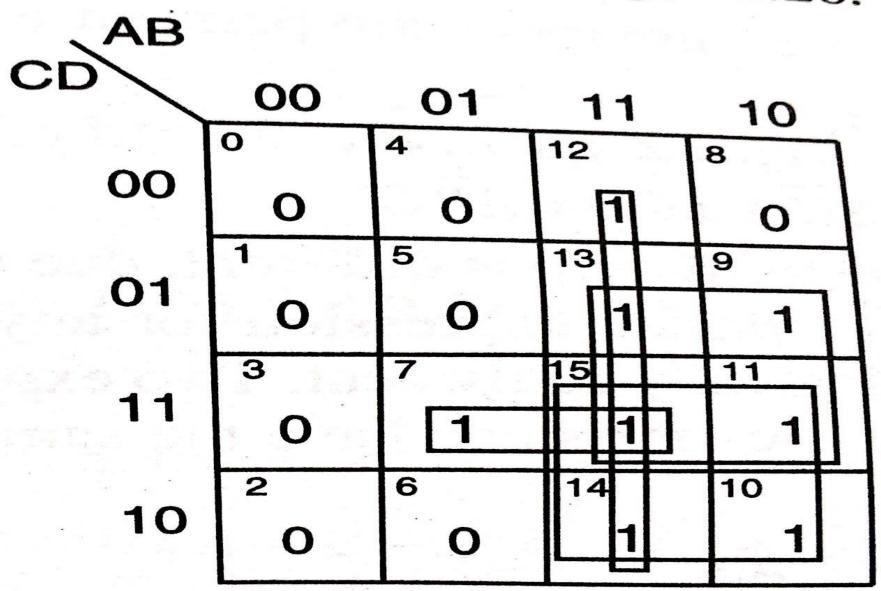
$$Y = AB + AC + AD'$$



KARNAUGH MAP



2. Simplify the expression $Y = \sum_{m} (7,9,10,11,12,13,14,15)$, using the K- map method.









- ➤ Don't Care conditions allow us to replace the empty cell of a K-Map to form a grouping of the variables.
- ➤ While forming groups of cells, we can consider a "Don't Care" cell as either 1 or 0 or we can simply ignore that cell.
- ➤ Don't Care condition can help us to form a larger group of cells.



Don't Care Conditions



1. Simplify the Boolean function $F(A,B,C,D) = \sum_{m} (1,3,7,11,15) + \sum_{d} (0,2,5)$

$$Y = \overline{A}\overline{B} + CD$$

AB					
CD	_	00	01	11	10
00	7.490 2.21	d	0	О	0
01		1	d	0	0
11		1	1	1	1
10	,	d	0	0	0





THANK YOU