Minterns and Maritums in Barlian Algebra

Minterns and Manterns form very basic fundamentals in analysis and disigning of digital functions/cks.

mr 1.1+4/+7 M6

Minterns:- A Product term which contains each of the n-variable in either complemented/non-complemented form.

Each individual turn in SOP (soum of the product) is
(alled as mintern of can be Represented as $\sum m(a,b)$

Manterm: A Sum tem which Contains each of n-variable in either Complemented I non - complemented form

Each individual term in Pos (Product of Sum) is called as martern. It can be Represented as TIM(0,6)

	lor	enample	L _i		fer	+	m 1	raviable A,	в,с
	7.					1	1	Mintand	1 Max term
	for	2- Val	able 1"!-		A	В	C	Sof	Pas
		1 .	Mintem	Maxtum	0 0	0	0	ABC- no	A+B+c-No
grap.	A	В	Sof	Pos	10	0		$\overrightarrow{A}\overrightarrow{B}C \longrightarrow m$	A+B+C-M.
验.	D	0	AB #0 = ma	A+B- No	20	1	0	ABC - m	A+B+C-N
,		,	AB -m,	A+B → M,	3 0	1		ABC → mg	A+B+C-N3
	0	'	1		14 1	O	O	ABC - my	At Btc -My
2	1	O	1	A+B-M2	3 ,	O	1	ABC - ms	A+B+C - N5
3	1	1	AB- M3	A+B => N2	6 1	1	0	ABC →m	A+B+c - N
					7 1	1	1	ABC→m ₇	A+B+C -M2
				1					

Noviable in Complemented or Uncomplemented form known

Represent a function in Mintum 4 Manteum!

 $f(A,B) = AB + \overline{A}B$ $\downarrow \text{ Binary to } \downarrow$ $\downarrow \text{ decimal } \downarrow$ $3 \rightarrow m_3 \qquad 1 = m_1$

f(A,B) = Z,m(1,3)

By this j' we can generalize the SOP form also

 $||y f(A, B)| = \sum_{m=1}^{\infty} m(1,3)$ $= m_1 + m_3$ = 01 + 11 $= \overline{AB} + \overline{AB}$

 $\oint \{A_1B_1C_1 = m_2 + m_3 + m_5$ = 010 + 011 + 101 $= \widehat{A}B\overline{C} + \widehat{A}BC + A\overline{B}C$

(3) f(A,B,C) = Zm(0,1,4,5) = mo +m,+my+ ms (ABC)+(ABC)+(ABC)+(ABC) $f(A_1B) = (A+B)(A+B)$ Nontum $O(M_0) 2(M_2)$ $f(A_1B) = \int M[0,2]$ Rinary $Pos form \begin{cases} 0.0 & 10 \\ A+B \end{cases}$ $(A+B) & (A+B) \end{cases}$ $(A+B) = \int M[0,2]$ $M_0 \cdot M_2$ $(A+B) \cdot (A+B)$

(a) $f(A,B,C) = M_3 \cdot M_4 \cdot M_5 \cdot M_6$ oi) 100 101 110 $(A+B+C) \cdot (\overline{A}+B+C) \cdot (\overline{A}+B+C)$ $(\overline{A}+B+C) \cdot (\overline{A}+B+C)$

(3) f(A,B,C) = JT(M)(0,1,4,5) $= M_0, M_1, M_4 \cdot M_5$ = (A+B+C)(A+B+C)(A+B+C)

Own: ① $f(A_1B_1C_1) = \sum_{i=1}^{n} m(0,2,3,6)$ ① $f(A_1B_1C_1) = \sum_{i=1}^{n} m(1,2,3,13,14)$ ① $f(A_1B_1C_1) = \sum_{i=1}^{n} m(1,2,3,13,14)$

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Menimal to Canonical form Convusion (SOP)
        f = A + B C
 gur.
            = A.I + BC.1
            = A(B+B) + B C (A+A)
            = AB1+ AB1+ BCA + BCA
           = AB(C+C) + AB(C+C) + BCA+BCA
           = ABC + ABC + ABC + ABC + BCA+BCA
          = ABC + ABC + ABC + ABC + ABC
                                   (4)
                            (1)
                      (2)
                                         (:: A+A=A)
           = (3)
Accimal equivalent
   to Birary
        f = \sum m(0, 1, 2, 3, 4)
            = mo + m, + m2 + m3 + my 3 minter
        f = M(5,6,7)
            = M5 , M6 , M7
It plurimal to canonical form conversion for POS :
          f = (A+B+\overline{c})(\overline{A}+c)
             = (A+B+C) (A+B+C)
        [ ' : (A+c) = A+c+BB
                      = [A+C+B] [A+C+B] by Dissibiled
          = (A+B+C) (A+B+C) (A+B+C)
           = 0 0 1 1 0 0 / 1
          f = MM(1,4,6)
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KARNAUGH MAP

K-MAP Representation of logic functions:technique for simplifying or reducing a function used for any no. of variables.

Disadvantage: It has no unique soe"

In n variable K-map there are 2" cells

The ordering of variable is done in such a way that only one variable charges at a time b/w adjacent cells.

overlapping and rolling the map is bossible.

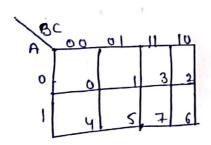
Top-bottom, first & Last columns are taken as continuous

2-variable Map!-

2" = 2 = 4 mintury : map consists 4 cells

A	Bo	1_		
Ö	00	01		
	(0)	1)		
1	(2)	(3)		

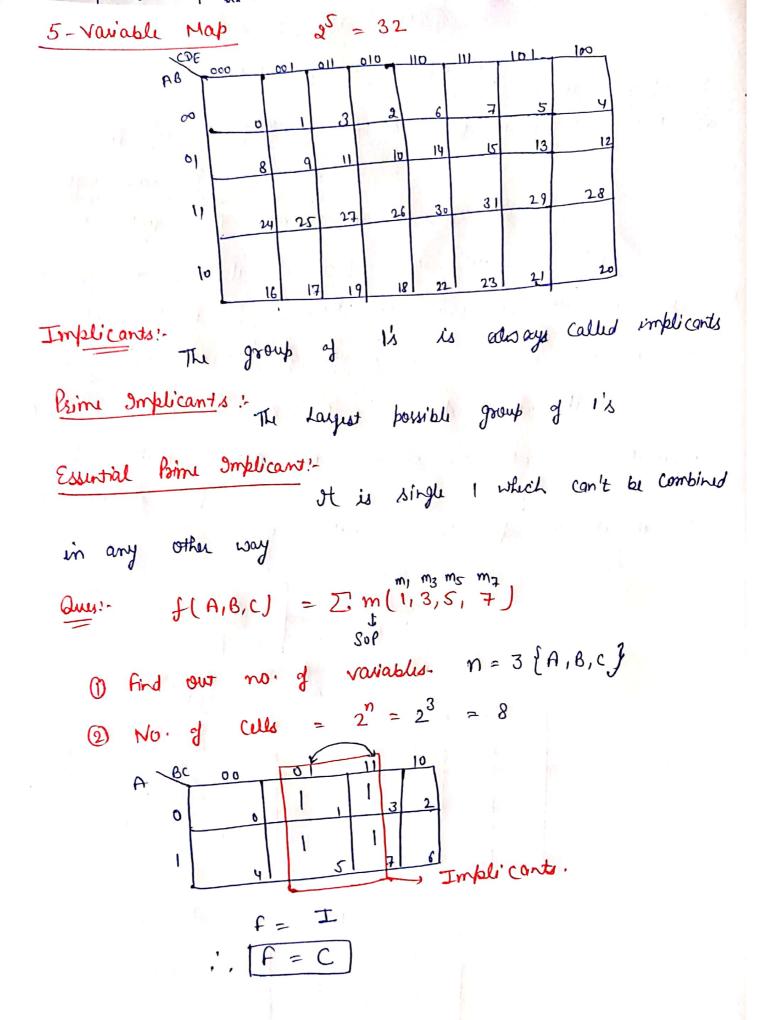
3-variable Map! - 23 = 8

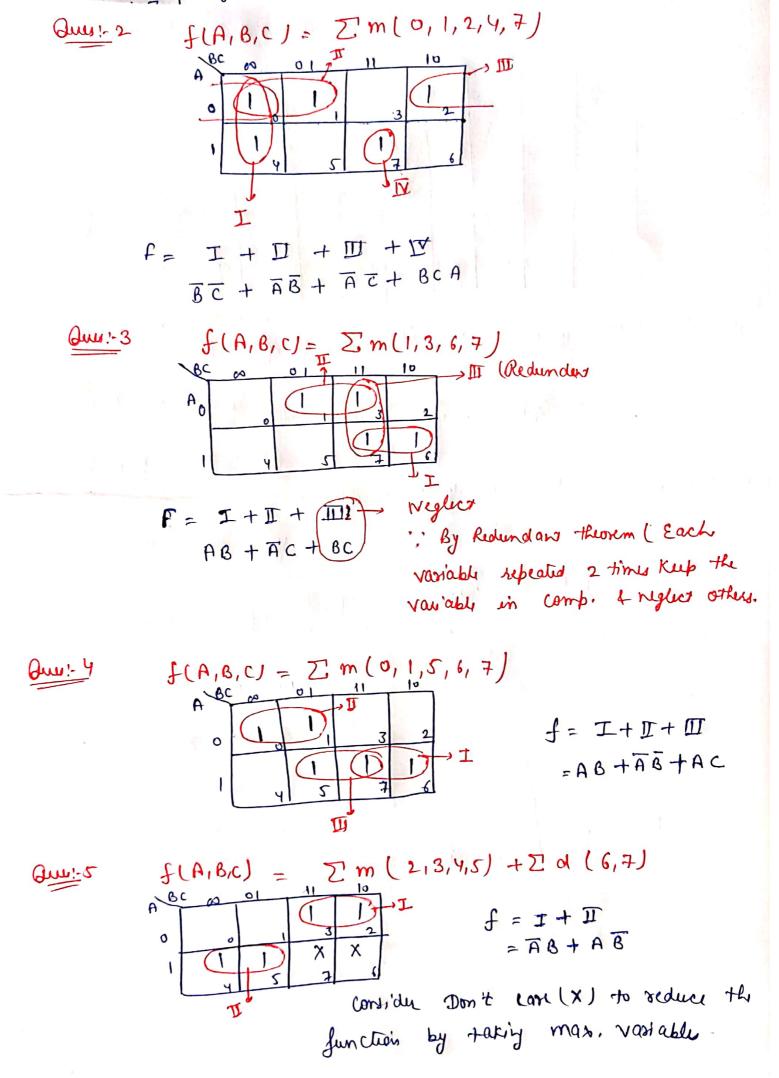


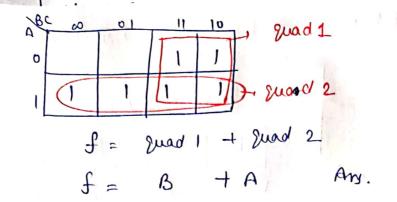
ABC	0	
60	0	1
01	2	3_
1)	6	7
lo	Ÿ	5.

4-variable Map!

08	24	= 16	cells	[0].
AB	6	1	3	2_
dl	9	S	7	6
11	12	13	15	14
10		9	1	Ю







Que: f = A+BC find the no. of mintums in Canonical.

$$F = A + BC$$

$$= A \cdot 1 + BC \cdot 1$$

$$= A(B+B) + BC(A+A)$$

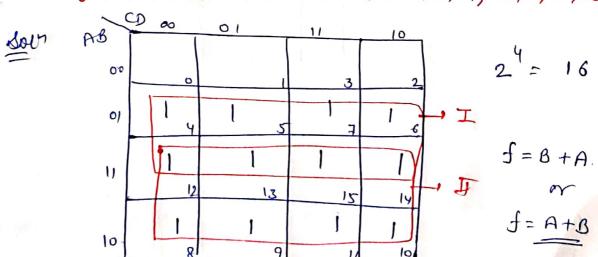
$$= AB \cdot 1 + AB \cdot 1 + BCA + BCA$$

$$= AB(C+C) + AB(C+C) + ABC +$$

= ABC + ABC + HBC + HBC

Ques! Simplify the following Boolean enpression using k-map.

f(A,B,C,D) = Im (4,5,6,7,8,9,10,11,12,13,14,15)



Que! - Simplefy f(A,B,C)= ABC+BC+ABC+ABC Using K-Map in SOP 4 POS form. ABC BC BC A A f= I+I +II = BA+BC + ABC - SWP $f = \sum m(2,3,5,6)$ F = T M [0, 1,4,7] f=I+I+III F AB+BC+ABC F = AB+BC+ABC f = (A+B) · (B+C)+(A+B+C) [Using A - Morgan's Law] f(A,B,C,D) = Zm(0,1,2,5,7,8,9,10,13,15) AB (D 01 17 チェエナエナ田

8 t + C) + BC=