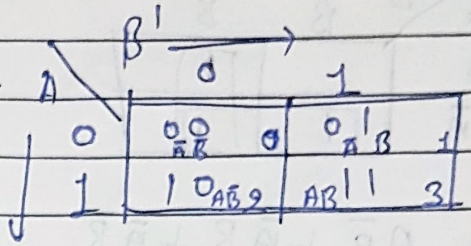
Boolean Algebra

Page No.
Date :

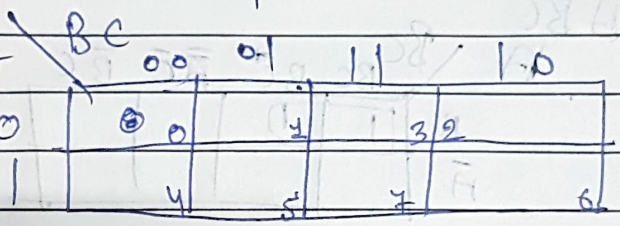
K-map :- pairing → 1, 2, 4, 8, 16

Two variable

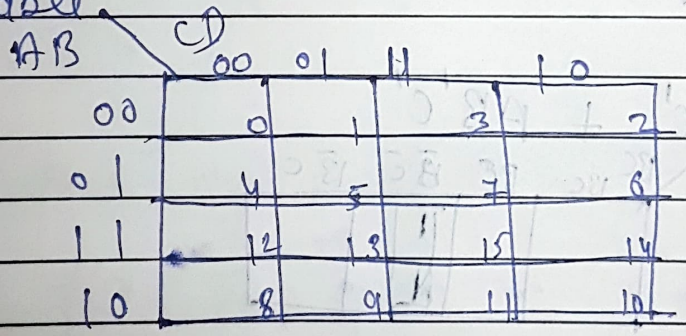
	A	B
0	0	0
1	0	1
2	1	0
3	1	1



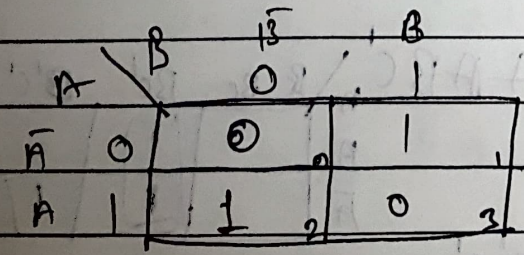
three variable map



4 variable



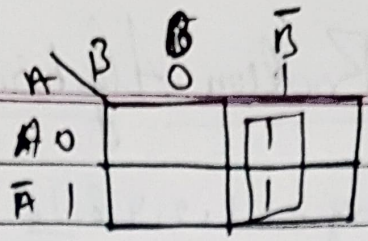
Ex :- $A\bar{B} + \bar{A}B$ find K-map



$A\bar{B} + \bar{A}B$

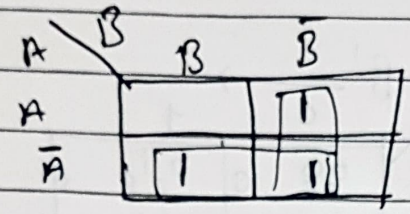
Page No.
Date :

② $A\bar{B} + \bar{A}\bar{B}$



$f = \bar{B}$

③

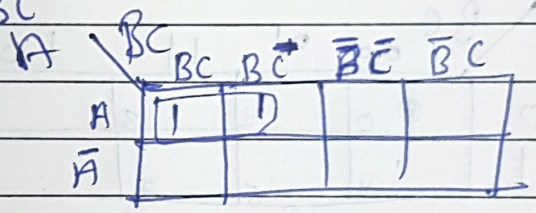


$f = A + \bar{B}$

$f \rightarrow A\bar{B} + \bar{A}B + \bar{A}\bar{B}$

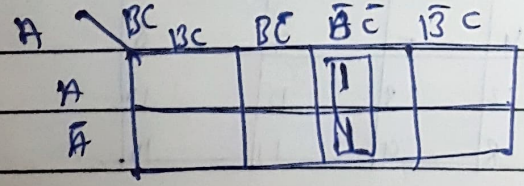
Q: 3- variable

(a) $X = AB\bar{C} + ABC$



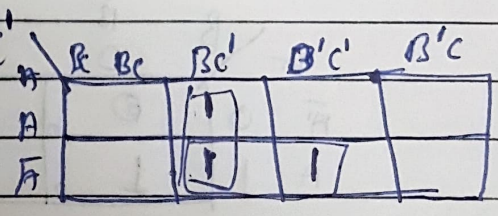
$X = AB$

(b) $X = A'B'C' + AB'C'$



$X = B'C'$

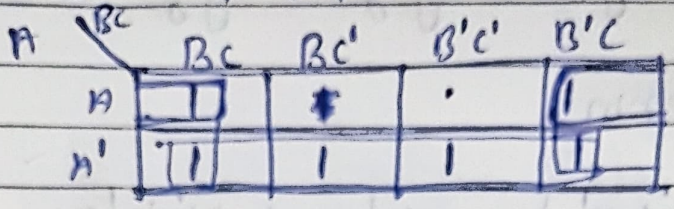
(c) $X = A'C' + BC' + ABC'$



$X = BC' + A'C'$

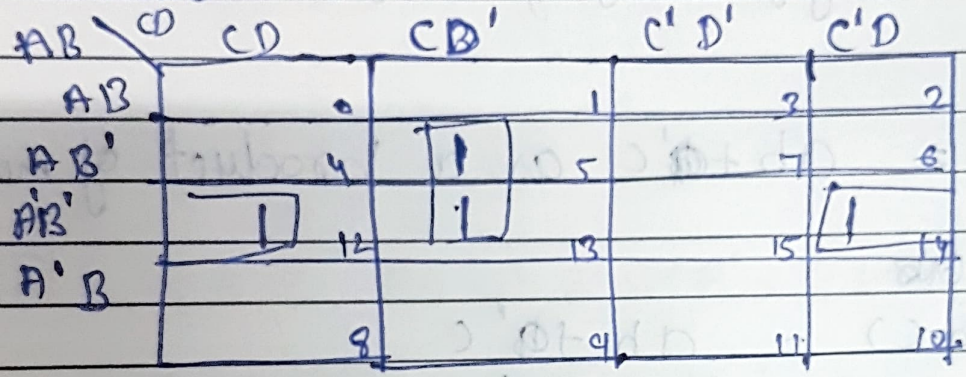
Date :

(d) $X = \bar{A}B\bar{C} + \bar{A}\bar{B}C + \bar{A}BC + \bar{A}B\bar{C} + AB\bar{C} + ABC$



$X = A' + AC$

4 Variable



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

Min $X = B'CD' + A'B'D$

Q:- Express the Boolean fun^{n}

$f(x,y,z) = x + y'z$ in a Sum of minterm

Sol^{n}: Here we have 3 variables x, y, z.

as we know $a + a' = 1$

1st term missing two variables y & z

Now

$x = x(y + y') = xy + xy'$

$x = xy(z + z') + xy'(z + z')$

$= xyz + xyz' + xy'z + xy'z'$

The Second term:

$y'z(x+x') = xy'z + x'y'z$

$f(x,y,z) = x + y'z$

$= xyz + xyz' + xy'z + xy'z'$

Ex:- $f(a,b,c) = ab + a'c$ as a product of maxterm

1st term ab

$f(a,b,c) = ab + a'c$

$= (ab + a')(ab + c)$

$= (a+a')(b+a')(a+c)(b+c)$

$= (b+a')(a+c)(b+c)$

Since each term missing one variable.

Now $a + a' = 1$

$a \cdot a' = 0$

$a' + b = a' + b + cc'$

$= (a' + b + c)(a' + b + c')$

$a + c = a + c + bb'$

$= (a + c + b)(a + c + b')$

$(b + c) = b + c + aa'$

$= (b + c + a)(b + c + a')$

Page No.
Date :

$f(a,b,c) = (a'+b+c)(a'+b+c')(a+c+b')(a+b+c)$

Q1. Simplify the Boolean Exp" and given that $C+CB=C$ $\forall B \in B$

(a) $C(CB+C)(CA+B+C)$

$= C(CB+CC)(CA+B+C)$ ∵ $C+C=C$

$= (CB+C)(CA+B+C)$ $CC=C$

$= C(CA+B+C)$

$= CA+CB+CC$ ∵ $CC=C$

$\Rightarrow CA+CB+C$ ∵ $CB+C=C$

$\Rightarrow CA+C$ $CA+C=C$

$\Rightarrow C$

(b) $A+B(A+B)+A(A'+B)$

$= A+BA+BB+AA'+AB$ ∵ $AA'=0$

$= A+AB+B+0+AB$ $A+1=1$

$= A+B(A+1)$ $BB=B$

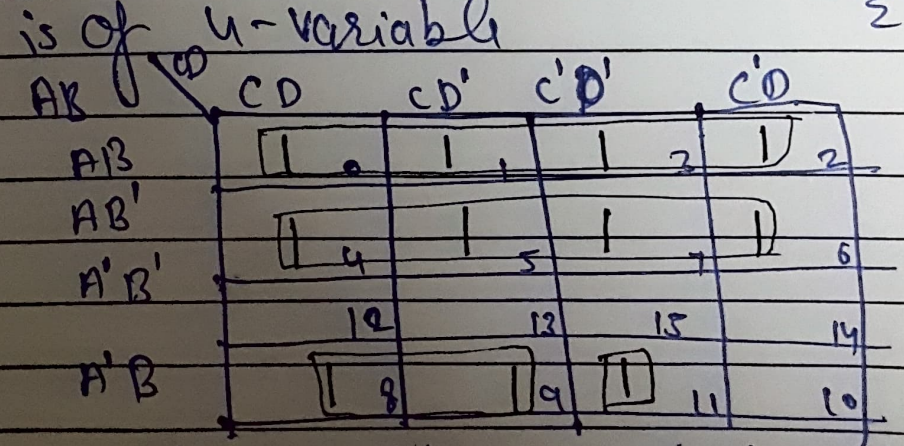
$= A+B$

$= A+B$

Q1. Simplify the Boolean Exp".

$F(A,B,C,D) = \overline{\Sigma}(0,1,2,3,4,5,6,7,8,9,11)$

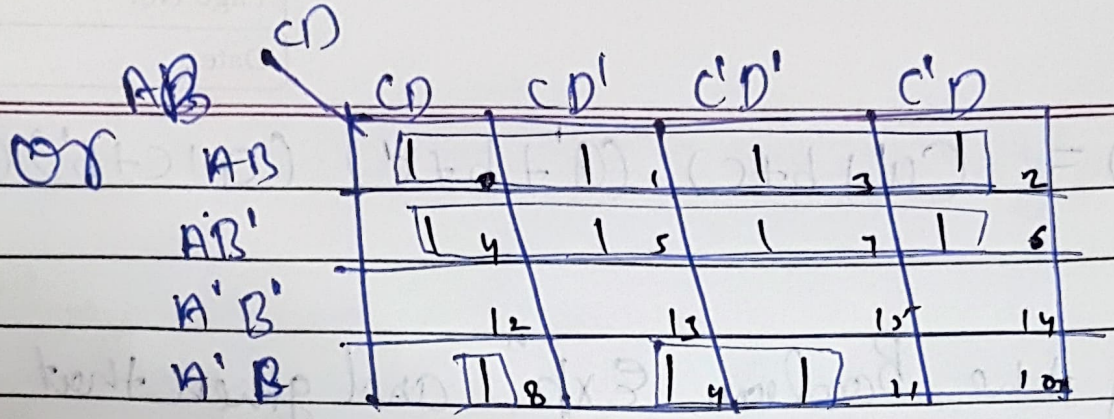
fun" is of 4-variable $\Sigma(0,1,2,3,4,5,6,7,8,9,11)$



$f(A,B,C,D) = AB + AB' + A'BC + A'BC'D'$

Page No.

Date :



$$F(A,B,C,D) = AB + AB' + A'BCD + A'BD'$$