CS & IT ENGINEERING

DIGITAL Logic

MINIMIZATION

Lecture No. 06

By- CHANDAN SIR

01 Prime Implicants

02 Essential Prime Implicants

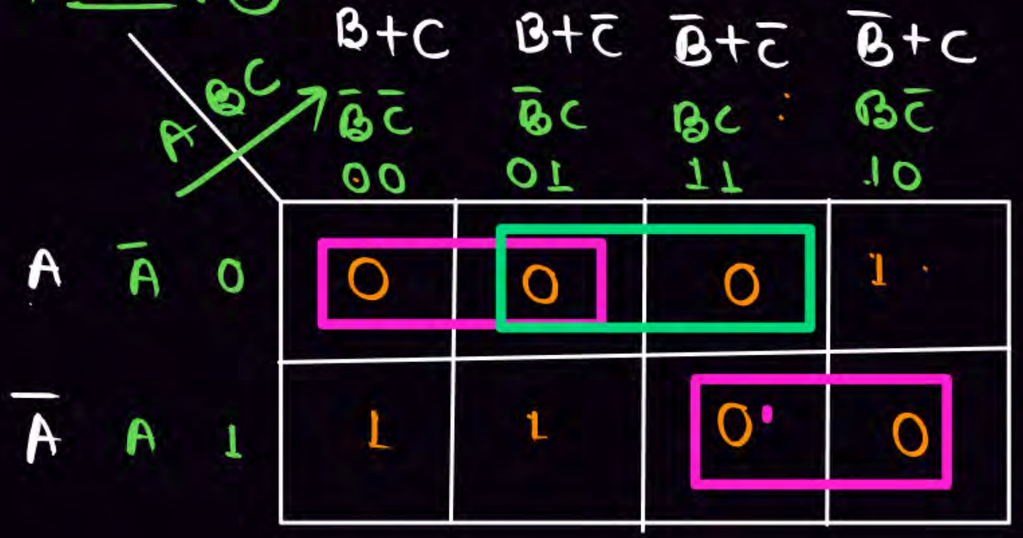
03 Question Practice

03 Discussion

Q $F(A,B,C) = \Pi M(0,1,3,6,7)$

$= \Sigma m(2,4,5)$

Method ①



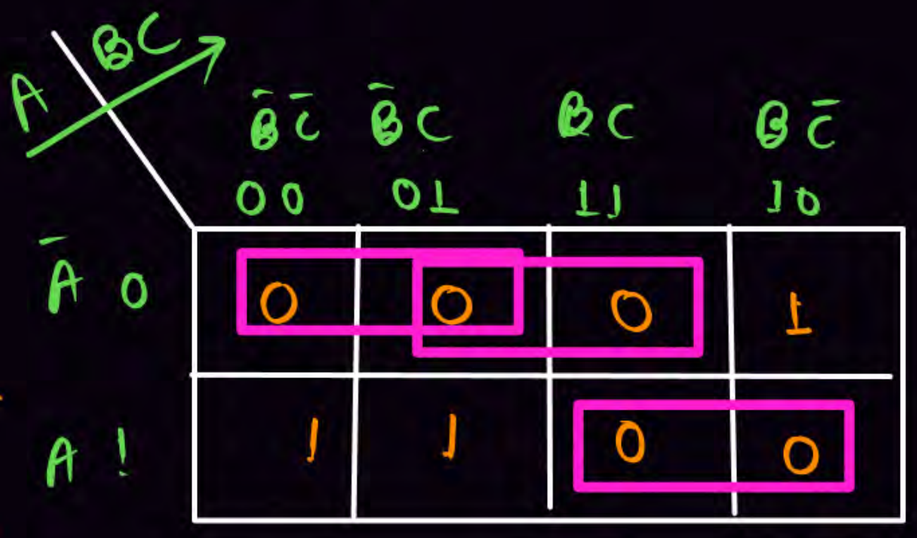
POS

$F = (A+B)\cdot(\bar{A}+\bar{B})\cdot(A+\bar{C})$ Ans

$\bar{F} = (A+B)(\bar{A}+\bar{B})(\bar{B}+\bar{C})$ Ans.

SOP $f = A\bar{B} + \bar{A}B\bar{C}$

Method ②



$\bar{F} = \bar{A}\bar{B} + AB + \bar{A}C$

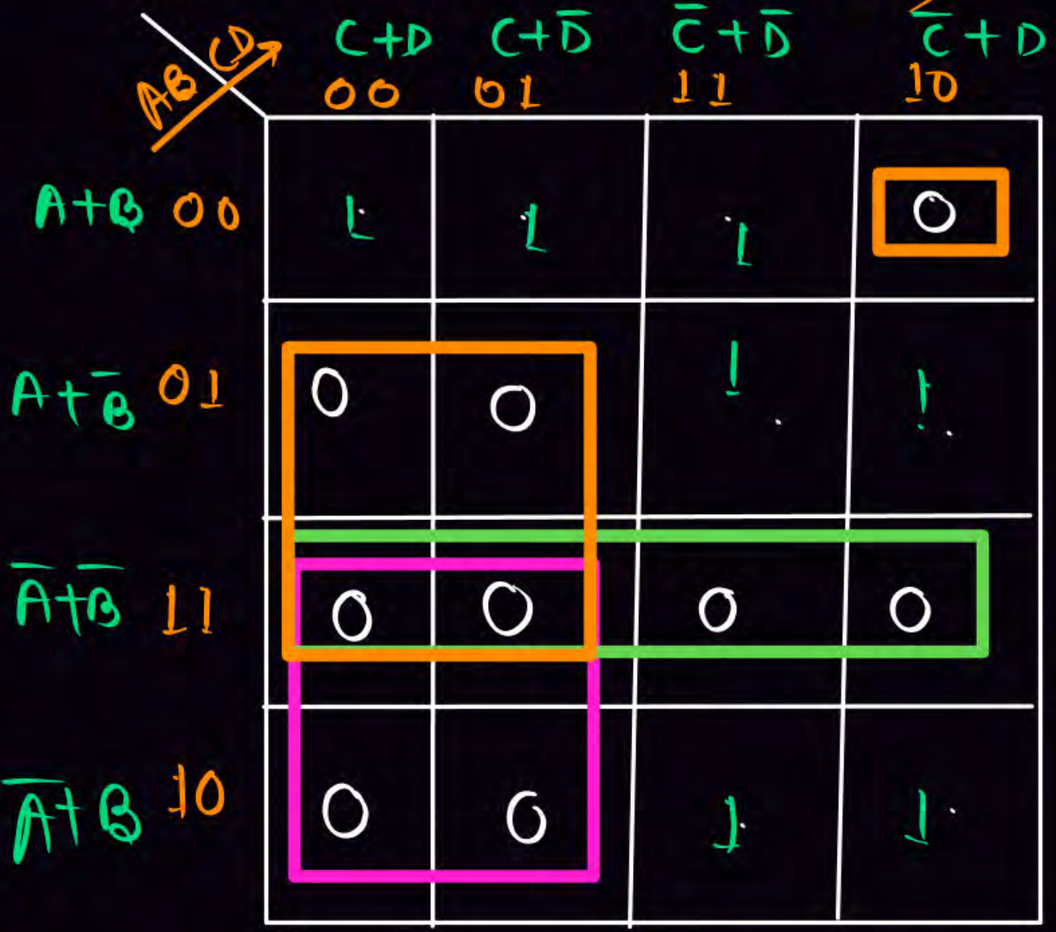
$F = \overline{\bar{A}\bar{B} + AB + \bar{A}C}$

$F = (A+B)\cdot(\bar{A}+\bar{B})\cdot(A+\bar{C})$ All

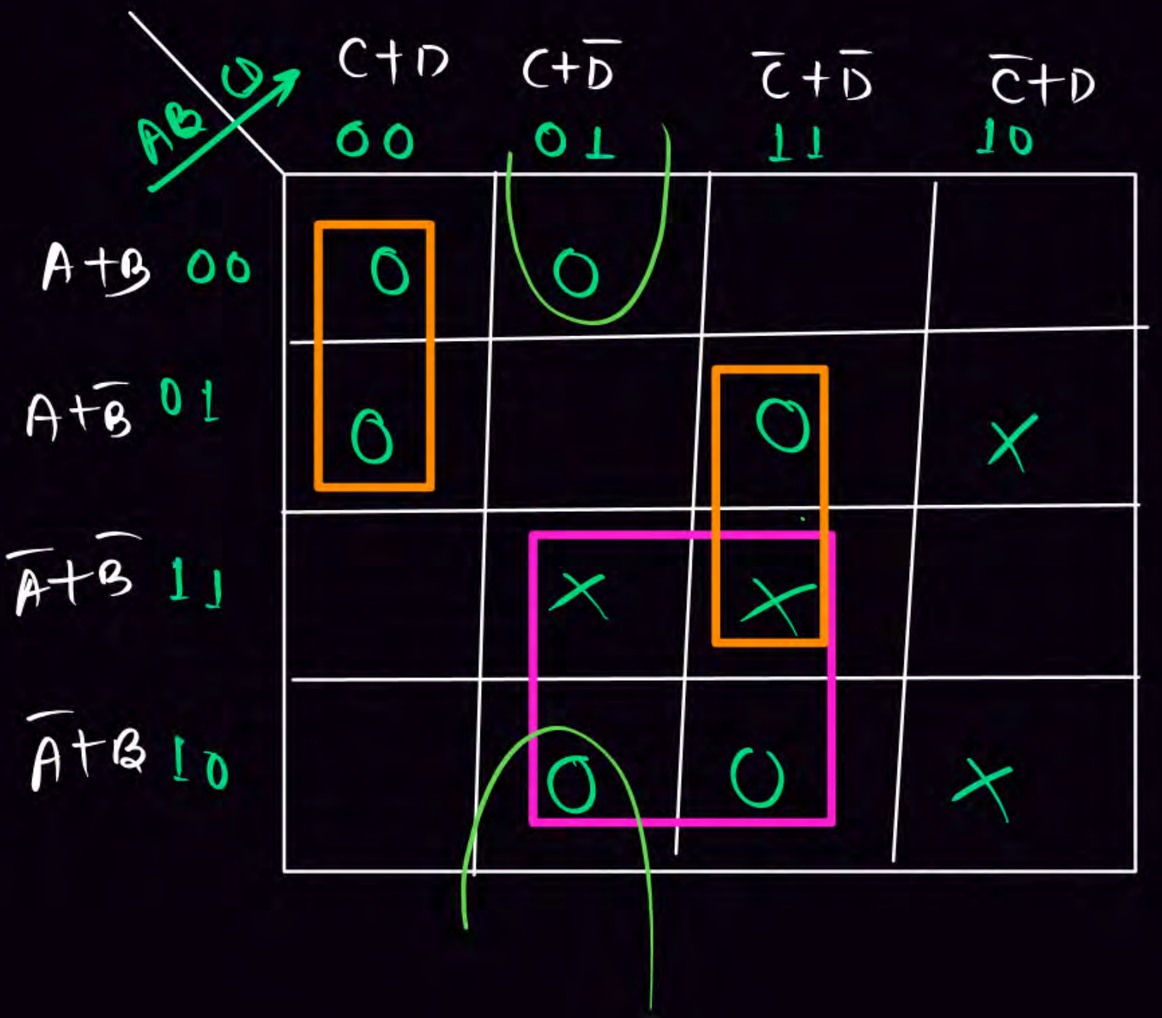
$= \prod M(2,4,5,8,9,12,13,14,15)$

Q $f(A,B,C,D) = \Sigma m(0,1,3,6,7,10,11)$

minimize it in POS form ?

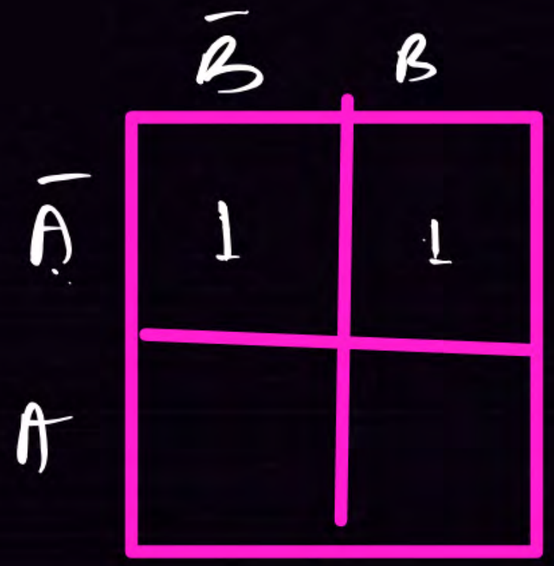


$F = (\bar{B}+C)\cdot(\bar{A}+\bar{B})\cdot(\bar{A}+C)\cdot(A+B+\bar{C}+D)$



$$= (A + C + D) \cdot (B + C + \bar{D}) \cdot (\bar{B} + \bar{C} + \bar{D}) \cdot (\bar{A} + \bar{D})$$

Ans.

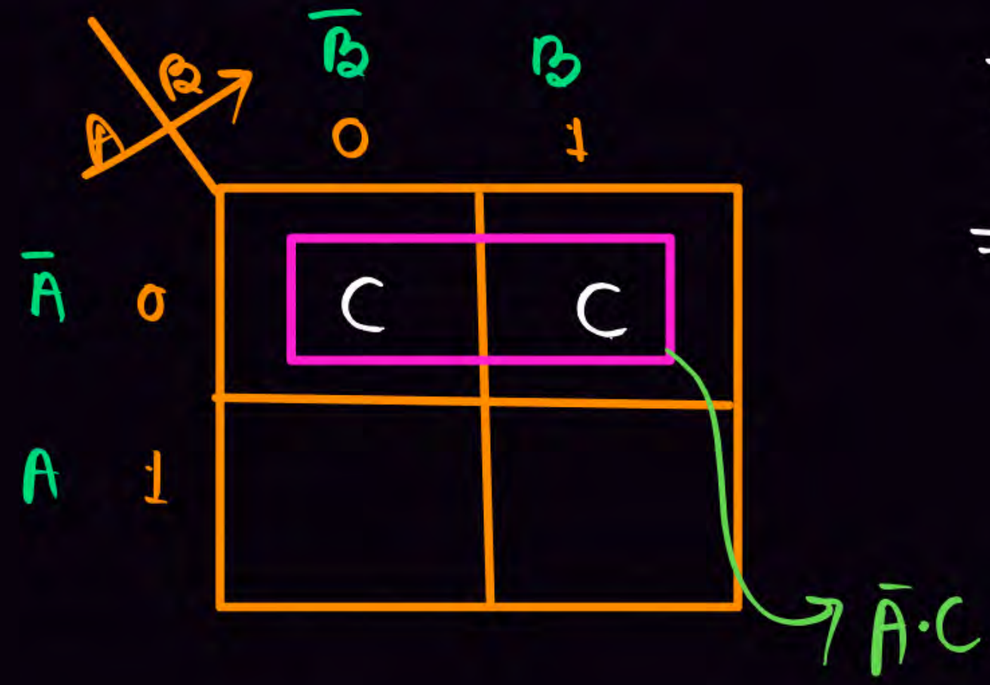


$$f(A,B) = \bar{A}\bar{B} + \bar{A}B$$

$$= \bar{A}\bar{B} \cdot 1 + \bar{A}B \cdot 1$$

Variable inside the K-MAP

Ex. 1



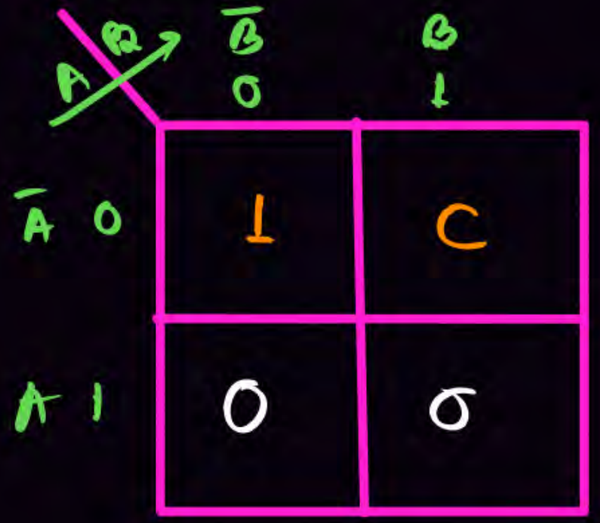
$$\bar{A}\bar{B}C + \bar{A}BC$$

$$= \bar{A}\bar{B}\cdot C + \bar{A}B\cdot C = \bar{A}C(\bar{B}+B)$$

$$= \bar{A}C \quad \text{Ans}$$

$$\text{Ans} = \bar{A}C \quad \text{Ans}$$

Ex. 2.



$f(A,B,C) = \bar{A}\bar{B}\cdot 1 + \bar{A}BC$

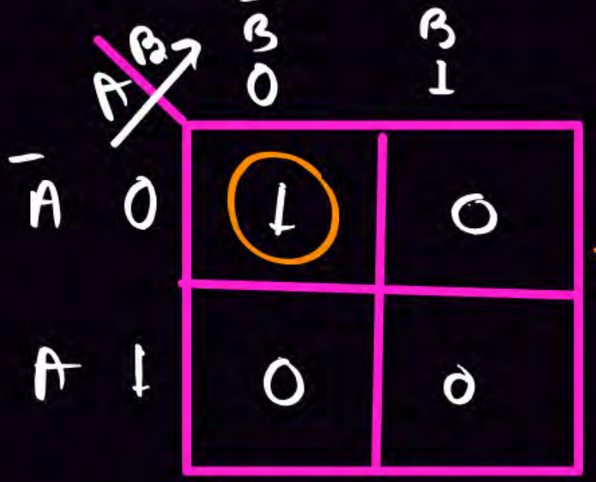
$= \bar{A}[\bar{B} + BC]$

$= \bar{A}[(\bar{B}+B)\cdot(\bar{B}+C)]$

$= \bar{A}\cdot(\bar{B}+C)$

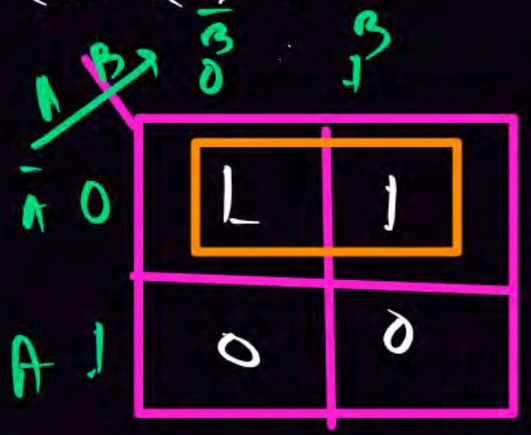
Ans

Case (1) C = 0



$= \bar{A}\bar{B}\bar{C}$

case(2) C = 1



$= \bar{A}C$

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

$\bar{A}[C + \bar{B}\bar{C}]$

$\bar{A}[(\bar{B}+C)]$

$\bar{A}\cdot(\bar{B}+C)$ //

Q $f(A,B,C) = \bar{A}\bar{B} + \bar{A}BC$

Method ① Boolean algebra

$$f(A,B,C) = \bar{A}[\bar{B} + BC]$$

$$= \bar{A}[(\bar{B}+B)(\bar{B}+C)]$$

$$= \bar{A}\cdot(\bar{B}+C)$$ Ans

Q $f(A,B,C) = \bar{A}\bar{B} + \bar{A}BC$

Method ② $f(A,B,C) = \bar{A}\bar{B}(\bar{C}+C) + \bar{A}BC$

$= \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}BC$

$= \Sigma m(0,1,3) = \Pi M(2,4,5,6,7)$

A \ BC	$\bar{B}\bar{C}$ 00	$\bar{B}C$ 01	BC 11	$B\bar{C}$ 10
$\bar{A}$ 0	1	1	1	0
A 1	0	0	0	0

SOP $f = \bar{A}\bar{B} + \bar{A}C$

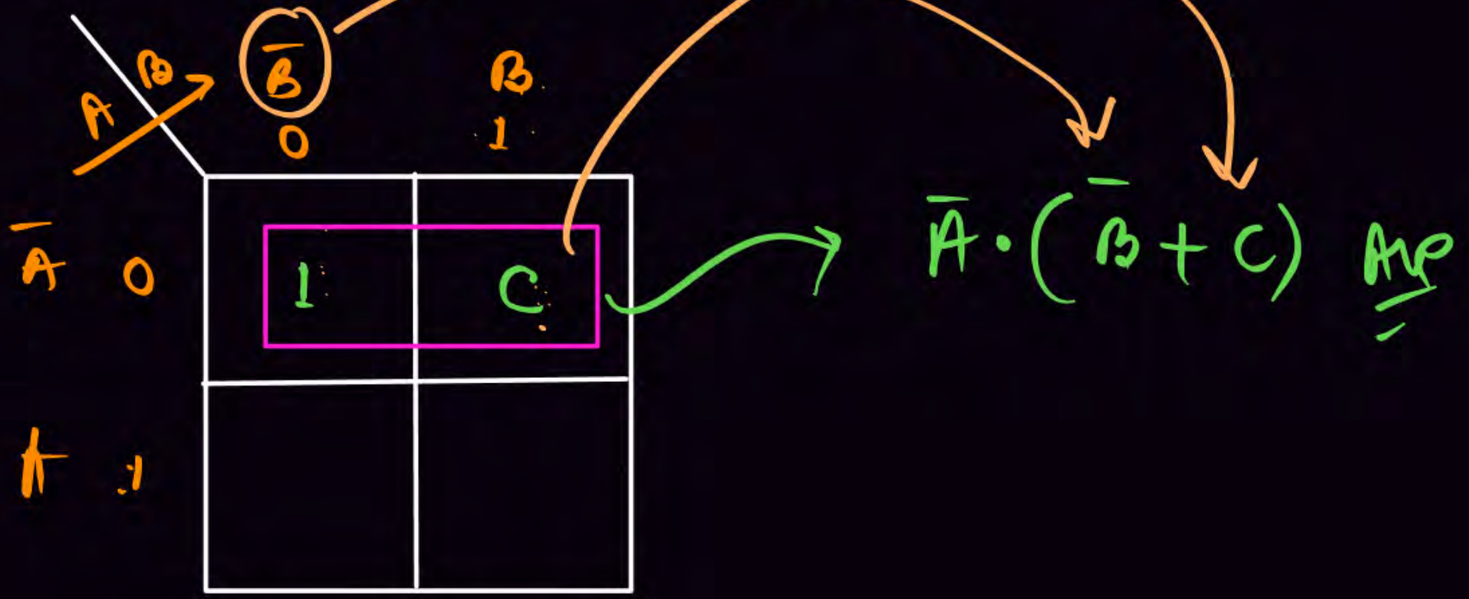
$= \bar{A}(\bar{B}+C)$

A \ BC	$\bar{B}\bar{C}$ $B+C$ 00	$\bar{B}C$ $B+\bar{C}$ 01	$B\bar{C}$ $\bar{B}+\bar{C}$ 11	BC $\bar{B}+C$ 10
$A\ \bar{A}$ 0	1	1	1	0
$\bar{A}\ A$ 1	0	0	0	0

POS $\bar{A}\cdot(\bar{B}+C)$ Ans

Q $f(A,B,C) = \bar{A}\bar{B} + \bar{A}BC = \bar{A}\bar{B}\cdot 1 + \bar{A}B\cdot C$

Method ③

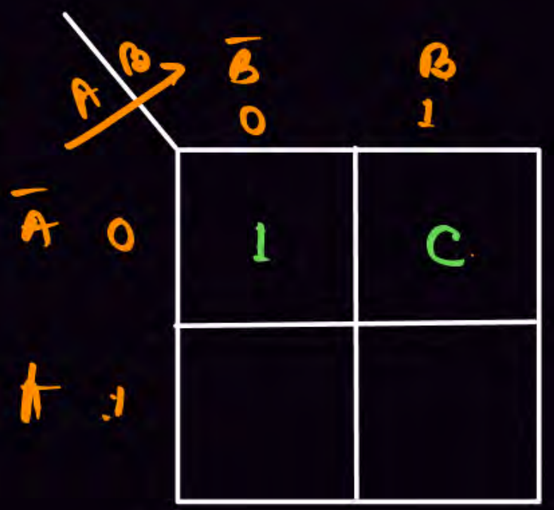


$\bar{A}\cdot(\bar{B}+C)$ Ans

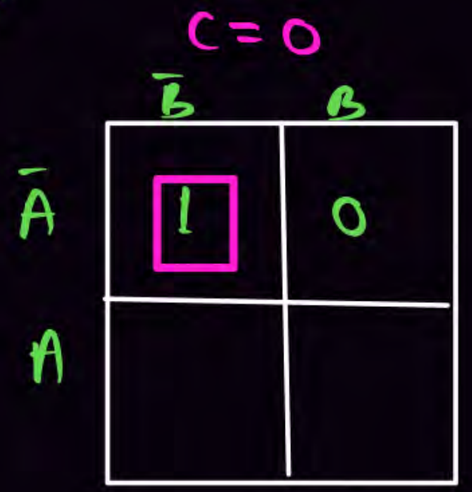
Short trick

Q $f(A,B,C) = \bar{A}\bar{B} + \bar{A}BC = \bar{A}\bar{B}\cdot 1 + \bar{A}B\cdot C$

Method ④

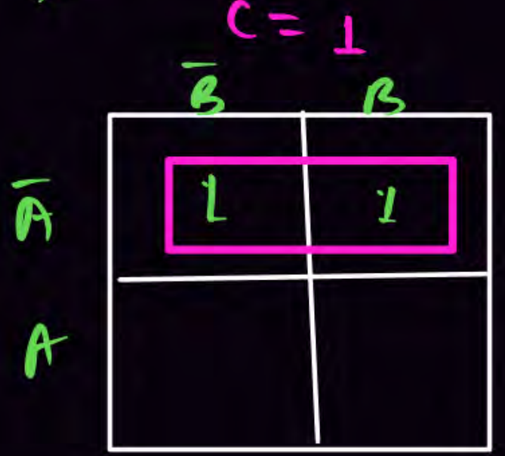


1)



$\bar{A}\bar{B}\cdot\bar{C}$

2)



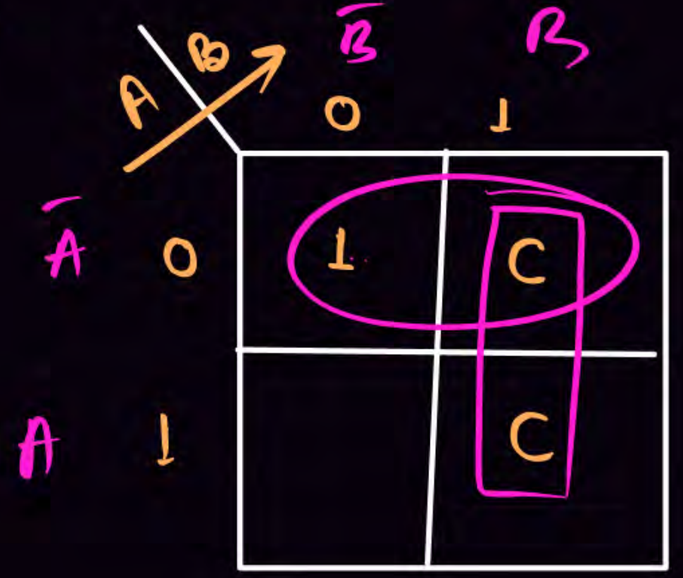
$\bar{A}C$

$f = \bar{A}C + \bar{A}\bar{B}\bar{C}$

$= \bar{A}[C + \bar{B}\bar{C}] = \bar{A}\cdot[(\bar{B}+C)(C+\bar{C})]$

$= \bar{A}\cdot(\bar{B}+C)$ Ans

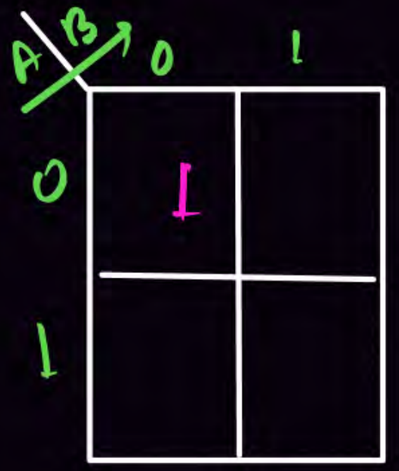
Q



$B\cdot C + \bar{A}\cdot(\bar{B}+C)$

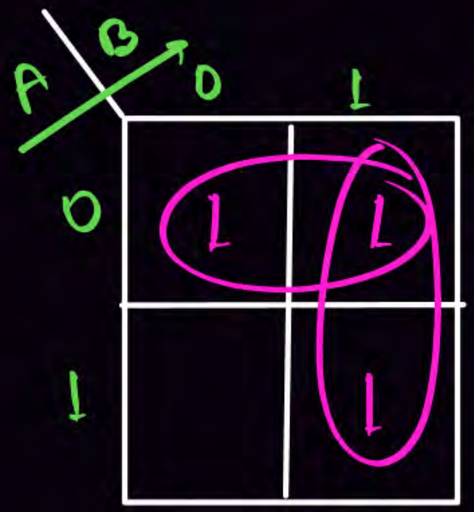
Ans

C=0



$\bar{A}\bar{B}\bar{C}$

C=1

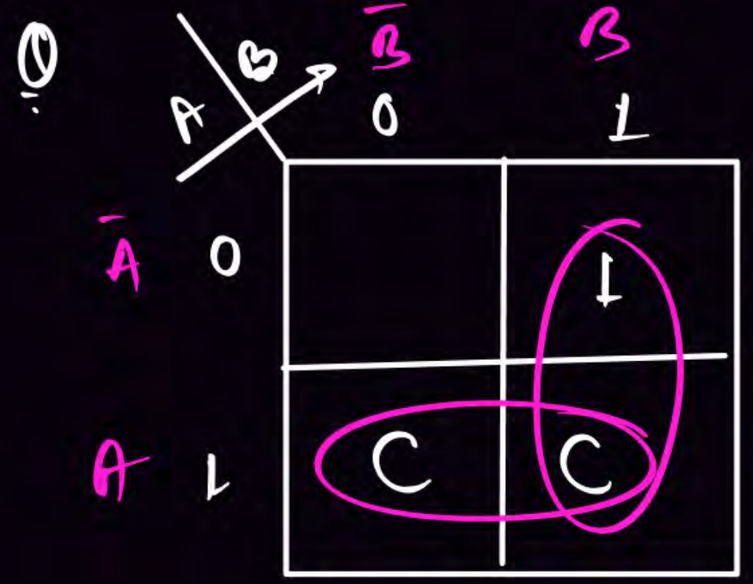


$(\bar{A}+B)C$

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

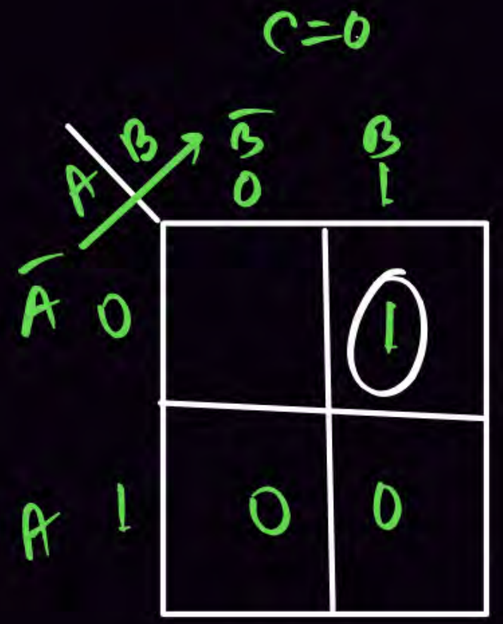
$\bar{A}(\bar{B}\bar{C}+C) + BC$

$\bar{A}(\bar{B}+C) + BC$ (Ans)

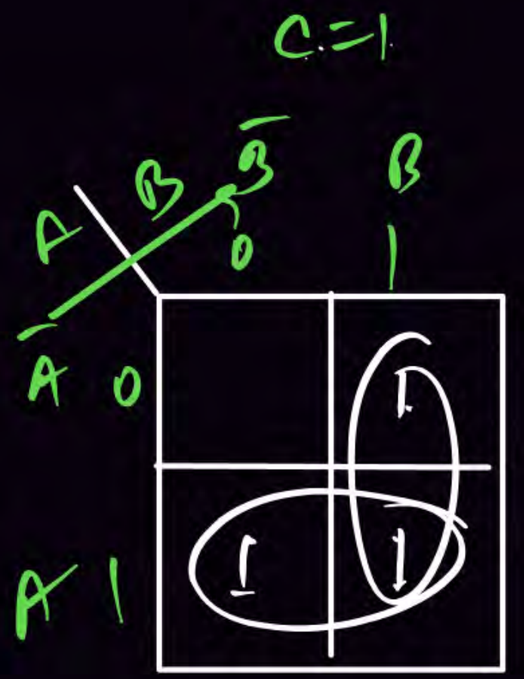


$AC + B(\bar{A} + C)$

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



$\Rightarrow \bar{A}B\bar{C}$



$(A + B)C$

$\bar{A}B\bar{C} + AC + BC$

$AC + B(\bar{A}\bar{C} + C) = AC + B(\bar{A} + C)$

HW

Q :

Thank you

GW

Soldiers !