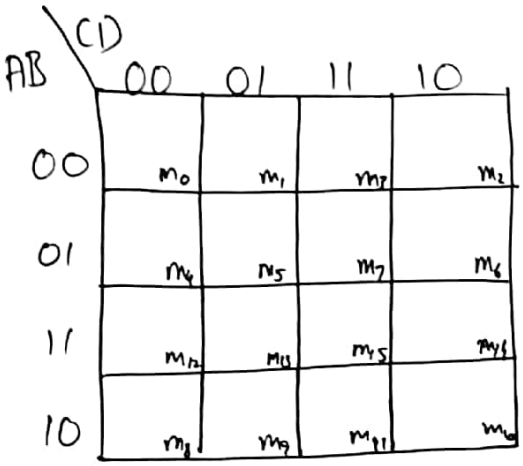
Date: 4/2/19

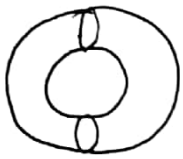
Digital Systems - Notes

FOUR VARIABLE K-MAP

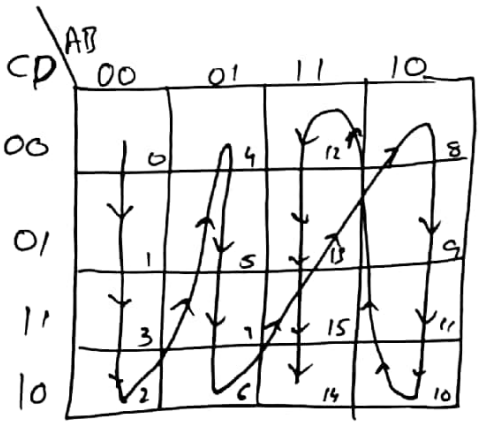
$$F(A,B,C,D) = \Sigma m(0,2,3,8,9,14,15)$$

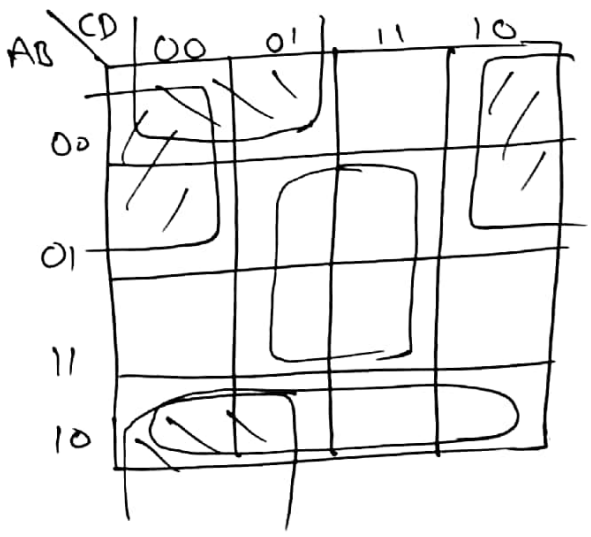


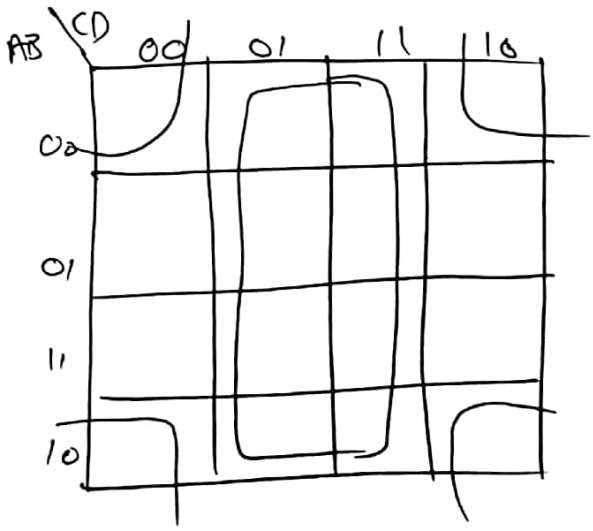
→ imagine that the columns are wrapped around

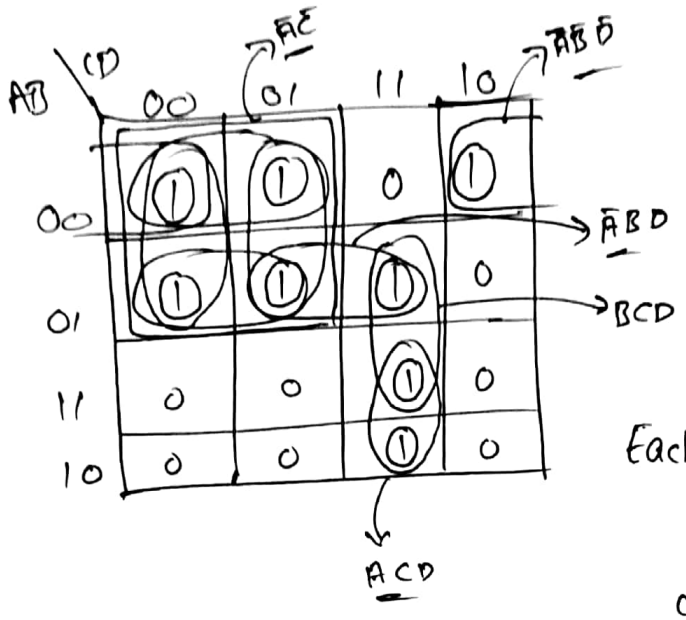


→ columns and rows both are wrapped around









$F = \sum m(0,1,2,4,5,7,11,15)$

Principle : $\bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}C\bar{D}$

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

Each ( ) term in the wrapper is called an "Implicant" (because it implies that the func^n is 1)

↓ wrapper

— All minterms (1's) have to be covered

— A 1 can be covered more than once.

— Prime Implicant — An implicant in which no new 1's can be added without dropping the existing 1's and covering the maximum possible 1's

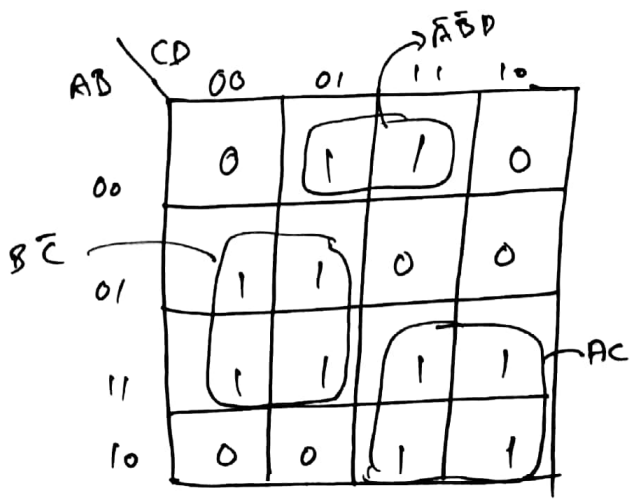
Essential Prime Implicants: $\bar{A}\bar{C}$, $\bar{A}\bar{B}\bar{D}$, ACD

Non-essential Prime Implicants: BCD, $\bar{A}BD$

$F = \bar{A}\bar{C} + \bar{A}\bar{B}\bar{D} + ACD + BCD$ (or $\bar{A}BD$)

↓ Choose any one term

$F = \sum m(1,3,4,5,10,11,12,13,14,15)$



$F = \sum m(0,2,3,4,8,10,11,15)$