Name: KEY **Id#**

COE 202, Term 131
Digital Logic Design

Quiz# 3

Date: Thursday, Oct. 31

Q1. For the Boolean function F(W, X, Y, Z)=Σ m**(0, 1, 2, 3, 7, 8, 10)**, d(W, X, Y, Z)=Σ m(**5, 6, 11, 15**) shown in the k-map below:

WX \ YZ	00	01	11	10
00	1	1	1	1
01	0	x	1	x
11	0	0	x	0
10	1	0	x	1

(i) Identify all the *prime implicants* and the *essential prime implicants* of F.

(ii) Simplify the Boolean function **F** into a minimal sum-of-products expression.

(iii) Simplify the Boolean function **F** into a minimal product-of-sums expression.

(i) prime implicants:

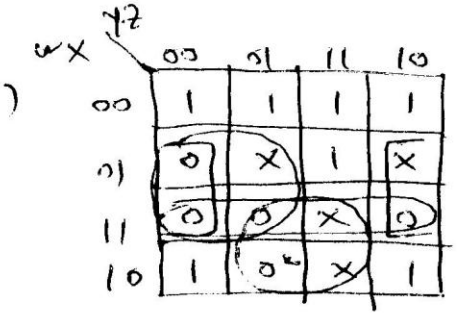
$\bar{w}\bar{x}$, $\bar{w}z$, $\bar{w}y$, $\bar{x}\bar{z}$, $\bar{x}y$, yz

Essential prime implicants:

$\bar{x}\bar{z}$

(ii) $F = \bar{x}\bar{z} + \bar{w}z$

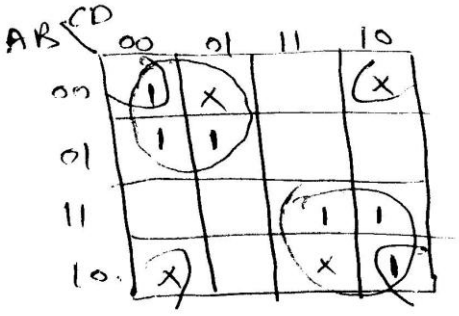
(iii)



$$\bar{F} = w\bar{z} + x\bar{z}$$

$$F = \bar{\bar{F}} = (\bar{w} + \bar{z})(\bar{x} + z)$$

Q2. The following Boolean expression: A'C' + AC + B'D' is a simplified version of the expression: A'C'D' + A'BC' + ABC + ACD'. Are there any don`t care conditions? If so, what are they?



The don't care conditions are:

$$\sum m(1, 2, 8, 11)$$