COE 202, Term 142
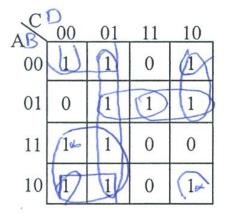**Digital Logic Design**

Quiz# 3

Date: Tuesday, March 17

Q1 For the following Boolean function F(A, B, C, D)=Σ m(0, 1, 2, 5, 6, 7, 8, 9, 10, 12, 13)

(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.

(i)   Prime Implicants:

$\bar{C}D$, $A\bar{C}$, $\bar{B}\bar{C}$, $\bar{B}\bar{D}$, $\bar{A}BD$, $\bar{A}BC$, $A\bar{C}\bar{D}$

Essential Prime Implicants:

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

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

Q2 Consider the following Boolean function **F** together with the don`t care conditions **d**

$$F(A, B, C, D) = \Sigma\ m(3, 6, 13),\ d(A, B, C, D) = \Sigma\ m(1, 4, 7, 9, 11, 12, 14, 15)$$

CD \ AB	00	01	11	10
00	0	X	1	0
01	X	0	X	1
11	X	1	X	X
10	0	X	X	0

Simplify the Boolean function **F** together with the don`t care conditions **d**, into **minimal product-of-sums** expression.

$$\overline{F} = \overline{B}\,\overline{D} + \widehat{A}\,\overline{C}$$

$$F = (B + D)(A + C)$$