DIGITAL LOGIC DESIGN COE 202

QUIZ-2, Section 5

Saturday, November 29, 2008

Student Name and ID…………………………………………..

<u>**Simplification of Boolean Functions**</u>

1. Consider the Boolean expression $F(x, y, z, t) = \Pi (0, 3, 7, 12, 14, 15)$ which is expressed as product of Maxterms.

   a. Determine the expression of $F(x, y, z, t)$ as sum of Minterms.
   b. Determine the expression of $F'(x, y, z, t)$ as sum of Minterms.
   c. Determine the expression of $F'(x, y, z, t)$ as product of Maxterms.

2. Consider the Boolean expression $F(x, y, z) = \Sigma (0, 2, 3, 4, 6)$ which is expressed as sum of Minterms. Answer each of the following questions:

   a. Use the K-Map (only) to find a minimal expression of $F(x, y, z)$ as sum of products (SOP).
   b. Use the K-Map (only) to find the expression of $F(x, y, z)$ as a product of Maxterms.
   c. Use the K-Map (Only) to find a minimal expression of $F(x, y, z)$ as a sum of products (SOP).

SOLUTION

1. $F(x, y, z, t) = \Pi (0, 3, 7, 12, 14, 15)$ as product of maxterms:

   a. The expression of $F(x, y, z, t) = \Sigma (1, 2, 4, 5, 6, 8, 9, 10, 11, 13)$ as sum of Minterms.
   b. The expression of $F'(x, y, z, t) = \Sigma (0, 3, 7, 12, 14, 15)$ as sum of Minterms.
   c. The expression of $F'(x, y, z, t) = \Pi (1, 2, 4, 5, 6, 8, 9, 10, 11, 13)$ as product of Maxterms.

2. $F(x, y, z) = \Sigma (0, 2, 3, 4, 6)$ as sum of Minterms.

   a. Use the K-Map to find the expression of $F(x, y, z)$ as a minimal sum of products (SOP).

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

	YZ			
X	00	01	11	10
0	1	0	1	1
1	1	0	0	1

   b. Use the K-Map to find the expression $F(x, y, z)$ as a product of Maxterms (POM)
   $F(x, y, z) = \Pi (1, 5, 7)$ because Maxterms appear with o in the above K-MAP

	YZ			
X	00	01	11	10
0	0	1	3	2
1	4	5	7	6

   c. Use the K-Map to find the expression $F(x, y, z)$ on $F(x, y, z)$ as a minimal product of sums (POS)
   $F(x, y, z) = (y + z')(x' + z')$

	YZ			
X	00	01	11	10
0	1	0	1	1
1	1	0	0	1