

PH-218 Analog & Digital Electronics

Assignment-5 (Due date: 14th April 2011)

(1) Obtain the truth table of the following functions and using the truth table express each function in sum of minterms and product of maxterms:

(a) $(xy + z)(y + xz)$

(b) $(A'+B)(B'+C)$

(2) For the Boolean function F given in the truth table, find the following:

(a) List the minterms of the function

(b) List the minterms of F'

(c) Express F in sums of minterms in algebraic form

(d) Simplify the function to an expression with a minimum number of literals

x	y	z	F
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

(3) Express the following functions in sum of minterms and product of maxterms:

(a) $F(A, B, C, D) = B'D + A'D + BD$

(b) $F(x, y, z) = (xy + z)(xz + y)$

(4) Simplify the following Boolean functions using Karnaugh map method:

(a) $F(w, x, y, z) = \sum(1, 4, 5, 6, 12, 14, 15)$

(b) $F(A, B, C, D) = \sum(0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$

(c) $f(A, B, C, D) = \sum(2, 3, 7, 12, 13, 14, 15)$

(d) $f(A, B, C, D) = \prod(2, 3, 7, 12, 13, 14, 15)$

(5) Draw the NAND logic diagram for each of the following expressions using multiple-level NAND gate circuits:

(a) $(AB'+CD')E + BC(A+B)$

(b) $w(x+y+z) + xyz$

(6) An 8·1 multiplexer has inputs A, B, C connected to selection inputs s_2, s_1 and s_0 respectively. The data inputs I_0-I_7 are connected as follows

$$I_0 = I_4 = D ; I_1 = I_2 = I_7 = 0 ; I_3 = I_5 = 1 ; I_6 = D'$$

Determine the Boolean function that the multiplexer implements.

(7) Implement the following Boolean function with an 8·1 multiplexer

$$F(A, B, C, D) = \sum(0, 3, 5, 6, 8, 9, 14, 15)$$