EC2.101 – Digital Systems and Microcontrollers

Practice Sheet 1 (Lec 1 – Lec 8)

Q1. Verify whether the inhibition and implication operations follow commutative and associative properties.

Q2. Express the following functions in sum-of-minterms and product-of-maxterms form.

a. $a'b'c' + acd + ab'd' + b'cd$
b. $(b + c'd')(a + bc')$
c. $xy'z + x'y'z + w'xy + wx'y + wxy$
d. F', where $F = \sum(0, 1, 3, 8, 9, 13, 15)$

Q3. Find the duals of the following expressions.

a. $xy' + x'y$. Is it the same as its complement?
b. $xy' + (y + z)(x + z')$

Q4. What is the sum of all 2^n minterms possible with n variables?

Q5. Consider the equation $L + M = N$ where $L = (312)_8$ and $N = (451)_8$. Find the value of M and represent the answer in hexadecimal.

Q6. Convert the following numbers to decimal:

a. $(101.01)_2$
b. $(7.12172)_8$

Q7. Add the BCD numbers 1001 and 0100. Represent the answer in BCD as well.

Q8. Subtract 010001 from 001001 using 2's complement.

Q9. If X is the number of distinct integers that can be represented in 16 bit 2's complement notation, and Y is the number of distinct integers that can be represented in 16 bit sign-magnitude notation, what is $X - Y$?

Q10. $(210)_3 = (\quad)_{16}$