

EC 2.101 - Digital Systems and Microcontrollers

Practice Sheet 1 (Lec 1 – Lec 9)

Q1. Base Conversions

- $(5641)_7$ into base 3.
- $(F3E612)_{16}$ into base 8, 4 and 2.
- $(10110.0101)_2, (16.5)_{16}, (26.24)_8, (DADA.B)_{16}$ into decimal.
- $(A4389)_{16}$ into BCD and $(100000101011000111000111)_{BCD}$ into decimal.

Q2. Complements

Perform the calculations assuming the binary numbers are in signed 2's complement representation (Convert the remaining before addition).

- $(-7634)_8 + (-512)_{10} + (+4AF)_{16} + (011001100110)_2$ [16 – bit]
- $(+657)_9 + (-565)_7 + (100001000101)_{BCD} + (1101010110)_2$ [12 – bit]
- $(1000100101010111)_{BCD} + (+7345)_8 + (4FB)_{16}$ [16 – bit]

Q3. Boolean Expressions

- Show that the dual of $(xy' + x'y)$ is equal to its complement.
- Simplify the following expressions.
 - $x'y + yz + xz' + x'y' + xyz'$
 - $xyz + x'y'z + xy'z + xz + xzy'$
 - $xy + xy' + x'y'z + xy'z' + xyz$
 - $x'y + x'y'z + xyz' + xy + xy'z'$

Q4. Logic Gates

Write the Boolean expressions describing the outputs of the circuits given below.

