Tutorial – 06

"Number System and Boolean Algebra"

Q1. Convert the following numbers with the indicated bases to decimal:

   (a). $(4310)_5$ (b). $(198)_{12}$ (c). $(735)_8$

   (d). $(526)_6$ (e). $(123)_8$ (f). $(246)_8$

Q2. Convert the hexadecimal number 68BE to binary, and then convert it from binary to octal.

Q3. Express the following numbers in decimal:

   (a). $(10110.0101)_2$ (b). $(16.5)_{16}$ (c). $(26.24)_8$

   (d). $(FAFA.B)_{16}$ (e). $(1010.1010)_2$ (f). $(BABA)_{16}$

   (g). $(ABCD)_{16}$

Q4. Add and multiply the following numbers without converting them to decimal.

   (a) Binary numbers 1011 and 101.
   (b) Hexadecimal numbers 2E and 34.

Q5. (a). Find the 16's complement of BABA.

   (b). Convert BABA to binary.

   (c). Find the 2's compliment of the result in (b).

   (d). Convert the answer in (c) to hexadecimal and compare with the answer in (a).

Q6. Reduce the following Boolean expressions to the indicated number of literals:

   (a). A'C' + ABC + AC' + AB'   to two literals
   (b). (x'y' + z') + z + xy + wz   to three literals
   (c). A'B(D' + CD) + B(A + A'CD)   to one literals
   (d). (A'+C)(A' + C')(A + B + CD)   to four literals
   (e). ABCD + A'BD + ABC'D + A'D   to four literals

Q7. Draw logic diagrams of the circuits that implement the original and simplified expressions in Q6.

Q8. Express the complement of the following functions in sum-of-minterms form:

(a). $F(A,B,C,D) = \sum(3,5,9,11,15)$

(b). $F(x,y,z) = \Pi(2,4,5,7)$

Q9. Convert each of the following expressions into sum of products and products of sums:

(a). $(AB+C)(B+C'D)$

(b). $x'+x(x+y')(y+z')$

Q10. Draw the logic diagram corresponding to the following Boolean expressions without simplifying them:

(a). $BC'+AB+ACD$

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

(c). $(AB+A'B')(CD'+C'D)$

(d). $A+CD+(A+D')(C'+D)$