SC1005 Digital Logic Tutorial 1

Introductory concepts and number systems

1. What is the largest decimal number that can be represented using 16 bits in

    a) binary?

    b) BCD?

2. How many bits are needed to represent a decimal integer value not exceeding 350000_{10}?

3. Give the BCD representation of these decimal numbers:

    a) 285

    b) 47.19

4. Give the decimal value for each of these representations:

    a) $0011\ 1000_2$

    b) 0011 1000 (in ASCII)

5. Perform the following conversions:

    a) 101111.0111_2 = $?_{16}$ = $?_{10}$

    b) $15C.38_{16}$ = $?_8$ = $?_{10}$

    c) 1435_{10} = $?_{16}$ = $?_2$

    d) 7436.11_8 = $?_{16}$ = $?_{10}$

6. Convert the decimal fraction 0.8254 into an 8-bit binary fraction of the form $0.b_{-1}b_{-2} \ldots b_{-8}$.

7. Determine the parity bit to be generated for each of the following code words before transmission. Assuming even parity is used.

    a) 0110011

    b) 0x43 (0x is a common notation for hexadecimal)

    c) 0100 0111 0011

Answers

1. a) 65535
   b) 9999

2. 19

3. a) 0010 1000 0101
   b) 0100 0111. 0001 1001

4. a) 56
   b) 8

5.
   a) $101111.0111_2 = 2F.7_{16} = 47.4375_{10}$
   b) $15C.38_{16} = 534.16_8 = 348.21875_{10}$
   c) $1435_{10} = 59B_{16} = 10110011011_2$
   d) $7436.11_8 = F1E.24_{16} = 3870.140625_{10}$

6. 0.11010011_2

7.
   a) 0
   b) 1
   c) 0