King Fahd University of Petroleum & Minerals
Department of Electrical Engineering

Solution

EE200-(01/03)   (101)

Homework # 1

Solution

1. Convert the following numbers from the indicated bases to decimal:

    i. 37.5_8 $= 3 \times 8^1 + 7 \times 8^0 + 5 \times 8^{-1} = 24 + 7 + 0.625 = 31.625_{10}$

    ii. $4B.6_{12}$ $= 4 \times 12^1 + 11 \times 12^0 + 6 \times 12^{-1} = 48 + 11 + 0.5 = 59.5_{10}$

    iii. $AF.4_{16}$ $= 10 \times 16^1 + 15 \times 16^0 + 4 \times 16^{-1} = 160 + 15 + 0.25 = 175.25_{10}$

    iv. $100110.101_2 = 2^5 + 2^2 + 2^1 + 2^{-1} + 2^{-3} = 32 + 4 + 1 + 0.5 + 0.125 = 37.625_{10}$

2. Calculate the largest decimal number that can be expressed in binary with:

    i.   4 bits $\rightarrow$ $2^4 - 1 = 16 - 1 = 15$

    ii. 7 bits $\rightarrow$ $2^7 - 1 = 128 - 1 = 127$

    iii. 10 bits $\rightarrow$ $2^{10} - 1 = 1024 - 1 = 1023$

    iv. 16 bits $\rightarrow$ $2^{16} - 1 = 65536 - 1 = 65535$

3. Convert the decimal number 394.5 to binary, octal and hexadecimal.

    $394 = 256 + 128 + 8 + 2 = 2^8 + 2^7 + 2^3 + 2^1$ $\rightarrow$ 110001010   and 0.5_{10} $\rightarrow$ 0.1

    $(394.5)_{10}$ $\rightarrow$ $(110001010.1)_2$ $\rightarrow$ $(612.4)_8$ $\rightarrow$ $(18A.8)_{16}$

4. Express the decimal numbers 0 to 16 in base 4, octal and hexadecimal forms.

R=10	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
R=4	0	1	2	3	10	11	12	13	20	21	22	23	30	31	32	33	100
R=8	0	1	2	3	4	5	6	7	10	11	12	13	14	15	16	17	20
R=16	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	10