Types of Number systems

By:
Maninder Jeet Kaur
Computer Department
For Class: BCA-I
Subject :Digital Electronics

Numbers

- We use numbers
- to communicate
- to perform tasks
- to quantify
- to measure
- Numbers have become symbols of the present era
- Many consider what is not expressible in terms of numbers is not worth knowing

Number Systems in use

- Symbolic number system
- uses Roman numerals (I = 1, V = 5, X = 10, L = 50, C = 100, D = 500 and M = 1000)
- still used in some watches Weighted position system
- Decimal system is the most commonly used
- Decimal numbers are based on Indian numerals
- Radix used is 10

Other weighted position systems

- Advent of electronic devices with two states created a possibility of working with binary numbers
- Binary numbers are most extensively used
- Binary system uses radix 2
- Octal system uses radix 8
- Hexa-decimal system uses radix 16

Commonly Occurring Bases

Name	Radix	Digits
Binary	2	0,1
Octal	8	0,1,2,3,4,5,6,7
Decimal	10	0,1,2,3,4,5,6,7,8,9
Hexadecimal	16	0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F
		(= 0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15)

Binary Number System

- Uses 2 as its radix
- Has only two numerals, 0 and 1
- Example: (N)2 = (11100110)2
- It is an eight digit binary number
- The binary digits are also known as bits
- (N)2 is an 8-bit number

Some features of Binary Numbers

- Require very long strings of 1s and 0s
- Some simplification can be done through grouping
- 3-bit groupings: Octal (radix 8) groups three binary digits Digits will have one of the eight values 0, 1, 2, 3, 4, 5, 6 and 7
- 4-digit groupings: Hexa-decimal (radix 16)
- Digits will have one of the sixteen values 0 through 15. Decimal values from 10 to 15 are designated as A (=10), B (=11), C (=12), D (=13), E (=14) and F (=15)

Binary Number System

- A binary number system is a code that uses only two basic symbols. The digits can be any two distinct characters, but it should be 0 or 1. The binary equivalent for some decimal numbers are given below

Decimal	0	1	2	3	4	5	6	7	8	9	10	11
Binary	0	1	10	11	100	101	110	111	1000	1001	1010	1011

Each digit in a binary number has a value or weight. The LSB has a value of 1. The second from the right has a value of 2, the next 4 , etc.,

Octal Number System

- Octal number system has a base of 8 i.e., it has eight basic symbols. First eight decimal digits 0, 1,2,3,4,5,6,7 are used in thiIn the octal number system each digit corresponds to the powers of 8. The weight of digital position in octal number is as follows.

8^4	8^3	8^2	8^1	8^0	8^{-1}	8^{-2}	8^{-3}

Hexadecimal Number System:

- The hexadecimal number system has a base of 16. It has 16 symbols from 0 through 9 and A through F.

Decimal	Hexadecimal	Binary
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	1001
10	A	1010
11	B	1011
12	C	1100
13	D	1101
14	E	1110
15	F	1111

Thank you