

# Introduction to Computer

## Lecture # 26

# Topics

**Number Systems**

**Binary Number System**

**Octal Number System**

**Decimal Number System**

**Hexadecimal Number System**

# Number Systems

In **computers**, **Number System** is defined as a writing **system** to represent the **numbers** in different ways i.e. we are using different symbols and notations to represent **numbers**. There are four ways we can represent the **number**. That is, there are four types of **Number System** – Binary, Decimal, Octal and Hexadecimal.

# What is number system and types

- What is number system and types?

The **number system** is simply a **system** to represent or express **numbers**. There are various **types** of **number systems** and the most commonly used ones are decimal **number system**, binary **number system**, octal **number system**, and hexadecimal **number system**.

# Binary Number System

- What is binary number system with example?  
**binary number system.**

A method of representing **numbers** that has 2 as its base and uses only the digits 0 and 1. Each successive digit represents a power of 2.

For **example**,

10011 represents  $(1 \times 2^4) + (0 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (1 \times 2^0)$ , or  
 $16 + 0 + 0 + 2 + 1$ , or 19.

- The **octal numeral system**, or octal for short, is the base-8 **number system**, and uses the digits 0 to 7.
- **Octal** numerals can be made from binary numerals by grouping consecutive binary digits into groups of three (starting from the right)

# Example Octal Number System

- For example, the binary representation for decimal 74 is 1001010.
- Two zeroes can be added at the left: (00)1 001 010, corresponding the octal digits 1 1 2, yielding the octal representation 112.

# Decimal Number System

- Decimal is a term that describes the base-10 number system, probably the most commonly used number system. The decimal number system consists of ten single- digit numbers: 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. The number after 9 is 10. The number after 19 is 20 and so forth. Additional powers of 10 require the addition of another positional digit.



# Decimal      Binary      Octal      Hexadecimal

1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5
6	110	6	6
7	111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F
16	10000	20	10
17	10001	21	11
etc	etc	etc	etc

# Example of Decimal Number System

- **Example:** the numbers we use in everyday life are **decimal** numbers, because they are based on 10 digits (0,1,2,3,4,5,6,7,8 and 9).
- "**Decimal** number" is often used to mean a number that uses a **decimal** point followed by digits that show a value smaller than one. **Example:** 45.6 (forty-five point six) is a **decimal** number.