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Hirasugar Institute of Technology, Nidasoshi.
Inculcating Values, Promoting Prosperity
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1 YEAR
BE
ISem
2018-19

FIRST YEAR Engg. Department

Course : BASIC ELECTRONICS -18ELN14/24 Sem:1 (2018-19)

Course Coordinator:

V.B.Dhere

Digital Systems and Binary Numbers

- ▣Digital age and information age
- ▣Digital computers
  - General purposes
  - Many scientific, industrial and commercial applications
- Digital systems
  - Telephone switching exchanges
  - Digital camera
  - Electronic calculators, PDA's
  - Digital TV
- Discrete information-processing systems
  - Manipulate discrete elements of information
  - For example, {1, 2, 3, …} and {A, B, C, …}…

Analog and Digital Signal

Analog system

- The physical quantities or signals may vary continuously over a specified range.

Digital system

- The physical quantities or signals can assume only discrete values.
- Greater accuracy

Decimal Number System

Base (also called radix) = 10
- 10 digits { 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 }

Digit Position
- Integer & fraction

Digit Weight
- Weight = $(Base)^{Position}$

Magnitude
- Sum of "*Digit* x *Weight*

Octal Number System

- Base = 8
  - 8 digits { 0, 1, 2, 3, 4, 5, 6, 7 }
- Weights
  - Weight = $(Base)^{Position}$
- Magnitude
  - Sum of “*Digit* x *Weight*”

Binary Number System

- Base = 2
  - 02 digits { 0, 1}
- Weights
  - Weight = $(Base)^{Position}$
- Magnitude
  - Sum of "*Digit* x *Weight*"

Hexadecimal Number System

- Base = 16
  - 16 digits { 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F }
- Weights
  - Weight = $(Base)^{Position}$
- Magnitude
  - Sum of "*Digit* x *Weight*"

Decimal (*Integer*) to Binary Conversion

- Divide the number by the ‘Base’ (=2)
- Take the remainder (either 0 or 1) as a coefficient from bottom to top
- Take the quotient and repeat the division

Decimal (*Fraction*) to Binary Conversion

- Multiply the number by the ‘Base’ (=2)
- Take the integer (either 0 or 1) as a coefficient from top to bottom

Binary – Octal Conversion

- $8 = 2^3$
- Each group of 3 bits represents an octal digit

Binary – Hexadecimal Conversion

- $16 = 2^4$
- Each group of 4 bits represents a hexadecimal digit

Complements

- 1’s Complement (*Diminished Radix* Complement)
  - All ‘0’s become ‘1’s
  - All ‘1’s become ‘0’s

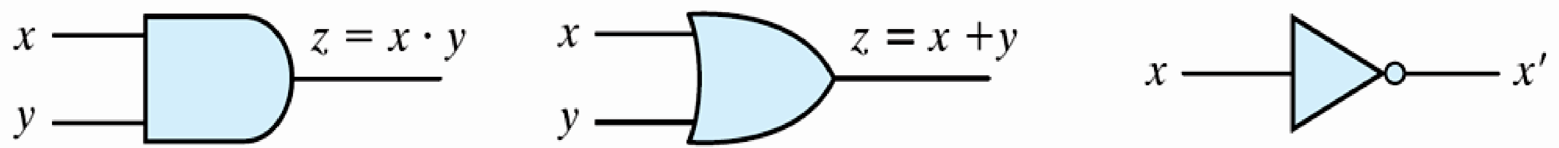
  Example $(10110000)_2$

  ⇨ $(01001111)_2$

- 2’s Complement (*Radix* Complement)
  - Take 1’s complement then add 1

Binary Logic

- Logic gates



(a) Two-input AND gate (b) Two-input OR gate (c) NOT gate or inverter

Queries ...?