**Chapter 1**

**It’s a digital world**

**Digital-Analog**

**Digital:** System that takes values ​​from a specific group of values.

**Analog:** System that takes continuous values.

**The PC as a digital machine**

**How does the computer work?** With current passing through electrical circuits.

Electronic circuits in simplified form consist of wires and switches and can be found in two states:

a) to pass current (1)

b) no current passes (0)

**So the PC is digital, because it can handle a certain number of states: two(2).**

Computers were originally built primarily to perform arithmetic operations. A way had to be found to represent the numbers of the decimal system we use (0,1,2,3,….9). So another numbering system was used: binary, which uses two digits (0,1), assigned to the two different states a computer can understand.

The binary digit (bit): **it can be 0 or 1**, it is the basic information unit of computers and is used to represent numbers, letters, symbols, sounds, etc.

**Representation of symbols**

**Coding:** the mapping of letters, numbers, symbols, etc. to a unique combination of 0's and 1's.

**ASCII code**: 256 different characters are coded the same on PCs. Each character is assigned a unique combination of 0 and 1.

**A character** can be a letter, a number, a punctuation mark and consists of a combination of **8bit=1Byte** which **is the smallest unit** of computer capacity measurement.

**Multiples of BYTE**

(α) KB 1 **K**ilo**B**yte = 1024 Byte ≈ 1.000 Byte

(β) MB 1 **M**ega**B**yte = 1024 KB ≈ 1000 KB= 1.000.000 Byte

(γ) GB 1 **G**iga**B**yte = 1024 MB ≈ 1000 MB = 1.000.000.000 Byte

(δ) TB 1 **T**era**B**yte = 1024 GB ≈ 1000 GB = 1.000.000.000.000 Byte

Consequently, when we convert from a multiple to another greater than we divide by 1000, while, when we convert from a multiple to another smaller one we multiply by 1000.

**Convert binary number to decimal**

To convert a binary number to decimal we work as follows: We analyze the numbers according to their position in powers of 2.

Example

The binary number

**0 1 0 1 0 1 1** analyzed as follows

**26 25 24 23 22 21 20 =**

**64\*0 + 32\*1 + 16\*0 +8\* 1 +4\*2 +2\*1 + 1\*1=43**

**Decimal to binary conversion**

Converting a number to binary is a slightly more complex process. First we divide by 2. The remainder of the division (0 or 1) is the first bit. In the quotient we apply the same process until it becomes 0. Notice that with this method we get the binary digits in reverse order. That is, the units digit is the first. So the number 28 in the binary system is 11100. Indeed we have: 11100 = 1 ∙ 2 4 + 1 ∙ 2 3 + 1 ∙ 2 2 = 16 + 8 + 4 = 28

