Computer Fundamentals

Definition

A computer is an electronic machine or device that performs processes, calculations and operations based on instructions provided by a user.
It has the ability to accept data (input), process it, and then produce outputs as desired.

Uses/Applications of Computer

- Banking
- Education
- Industries
- Entertainments
- Hospitals
- Business
- Defence
- Reservation
- Science and Research
- Data processing

Capabilities of Computer

- Speed
- Storage capacity
- Accuracy
- Deligency

• Versatility

Limitations of Computer

•No IQ

•No Brain

History of Computer

• Abacus (5000 Year before)

• Napier Bones (John Napier 1614)

• Pascaline Machine (Blaise Pascal 1642)

• Difference Engine (Charles Babbage 1822) automatic mechanical computing machine

• Analytical Engine (1833) digital, programmiable and automatic computer

• MARK I (Howard Aiken 1937-44) First fully automatic calculating machine

• ENIAC (J. Presper Eckert and John Mauchly 1943-46)

• EDVAC (1946-52) Electronic Discrete Variable Automatic Computer used stored program

• EDSAC (1947-49) Electronic Delay StoragebAutomatic Calculator

• UNIVAC(1951) First digital Computer

Generation of Computer

On the basis of technology used computer is divided in to generations.

• First Generation (1946-1954) Vaccum Tubes

• Second Generation (1955-1964) Transistors

• Third Generation (1965-1974) Integrated Circuits

• Forth Generation (1975-1990) VLSI (Microprocessor), PC, semiconductor replaced

magnetic core memories, Networking,DOS, Unix, Windows, Apple Os

• Fifth Generation (1991-now) ULSI, Portable PC,CD-ROM, Internet

Difference between Computer and Calculator

The main difference between Computer and Calculator is that the Computer is a simple general-purpose device for performing arithmetic or logical operations and Calculator is a electronic device used to perform arithmetic operations only.

Number System

• Decimal number system
• Binary number system
• octal number system
• Hexa decimal number system
• ASCII
• EBCDIC
• Gray code
• BCD

ASCII

• ASCII abbreviated from American Standard Code for Information Interchange, is a character encoding standard for electronic communication. ASCII codes represent text in computers, telecommunications equipment, and other devices.

• ASCII is a standard that assigns letters, numbers, and other characters in the 256 slots available in the 8-bit code.

EBCDIC

• EBCDIC, in fullextended binary-coded decimal interchange code., Data-encoding system, developed by IBM, that uses a unique eight-bit binary code for each number and alphabetic character as well as punctuation marks and accented letters and non-alphabetic characters.
• EBCDIC differs in several respects from ASCII, the most widely used system of encoding text, dividing the eight bits for each character into two four-bit zones, with one zone indicating the type of character, digit, punctuation mark, lowercase letter, capital letter, and so on, and the other zone indicating the value (that is, the specific character within this type).

Gray code

• Gray code is an ordering of the binary numeral system such that two successive values differ in only one bit (binary digit).
• Gray codes are very useful in the normal sequence of binary numbers generated by the hardware that may cause an error or ambiguity during the transition from one number to the next. So, the Gray code can eliminate this problem easily since only one

bit changes its value during any transition between two numbers.

• Gray code is not weighted that means it does not depends on positional value of digit. This cyclic variable code that means every transition from one value to the next value involves only one bit change.

• Gray code also known as reflected binary code, because the first (n/2) values compare with those of the last (n/2) values, but in reverse order.

Decimal Number	Binary Number	Gray Code
0	0000	0000
1	0001	0001
2	0010	0011
3	0011	0010
4	0100	0110
5	0101	0111
6	0110	0101
7	0111	0100
8	1000	1100
9	1001	1101
10	1010	1111
11	1011	1110
12	1100	1010
13	1101	1011
14	1110	1001

15 1111 1000

BCD

• Binary Coded Decimal or BCD is simply the 4-bit binary code representation of a decimal digit with each decimal digit replaced in the integer and fractional parts with its binary equivalent. BCD Code uses four bits to represent the 10 decimal digits of 0 to 9.

1's & 2's Compliment

• 1’s Complement of a Binary Number

There is a simple algorithm to convert a binary number into 1’s complement. To get 1’s complement of a binary number, simply invert the given number.

Eg. 1’s complement of binary number 110010 is 001101

• 2’s Complement of a Binary Number

There is a simple algorithm to convert a binary number into 2’s complement. To get 2’s complement of a binary number, simply invert the given number and add 1 to the least significant bit (LSB) of given result.

Logic Gates

Logic gates are the basic building blocks of any digital system.

It is an electronic circuit having one or more than one input and only

one output.

The relationship between the input and the output is based on a certain logic. Based on this, logic gates are named as -

- AND gate
- OR gate
- NOT gate
- NOR gate
- NAND gate
- XOR gate