Bharathidasan University

Centre for Differently Abled Person

Tiruchirappalli Tamil Nadu

Programme Name	Bachelor of Computer Applications (BCA)
Course Name	Computer Fundamentals and Internet Applications
Course code	20UCA1CC1
SEM	I
Unit	I
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Definition of a Computer

A computer is an electronic device that performs operations on data according to a set of instructions (software). It consists of both hardware and software.

Computers are electronic devices designed to process, store, and output data based on instructions. Here’s an overview of the basic components and concepts of computers:

Main Components of a Computer

A. Hardware

The physical parts of a computer. Examples include:

Input Devices: Devices used to enter data (e.g., keyboard, mouse, scanner).

Output Devices: Devices that display or output data (e.g., monitor, printer, speakers).

Central Processing Unit (CPU): The "brain" of the computer that processes instructions.

Memory:

- **Primary Memory**: Includes RAM (volatile memory) and ROM (non-volatile memory).
- **Secondary Memory**: Long-term storage like hard drives, SSDs, and USB drives.

Motherboard: The main circuit board connecting all components.

B. Software

The programs and operating systems that run on a computer:

System Software: Includes operating systems like Windows, Linux, macOS.

Application Software: Programs designed for end-users, such as word processors and web browsers.

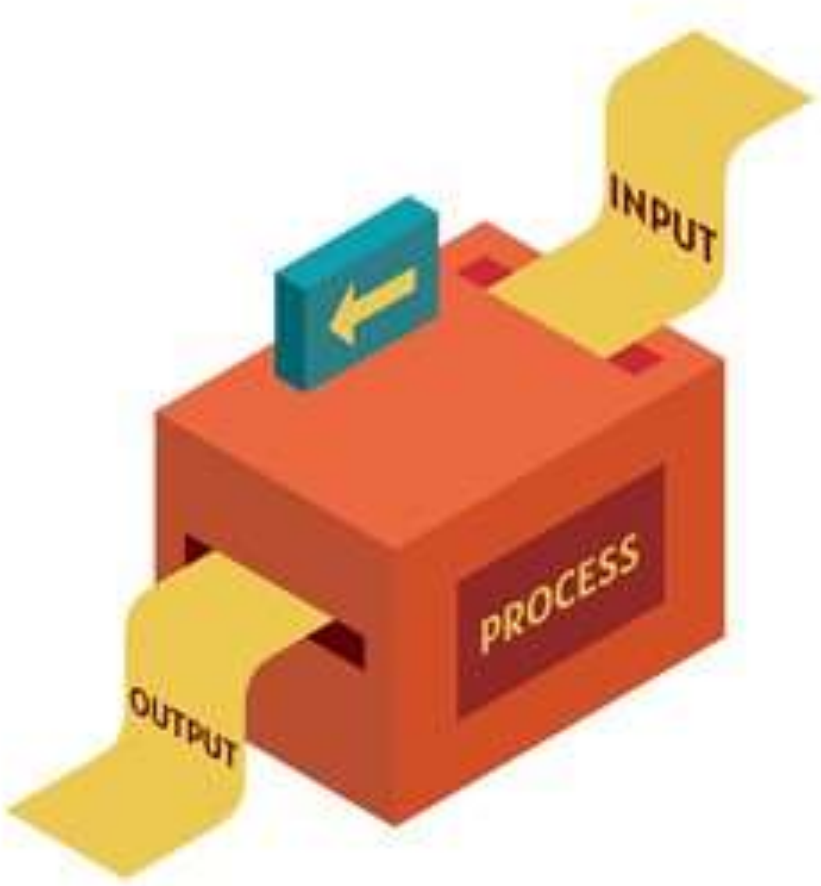
Types of Computers

- **Supercomputers**: Extremely fast, used for scientific calculations.
- **Mainframes**: Large computers used in industries for bulk data processing.
- **Personal Computers (PCs)**: Desktops and laptops for individual use.
- **Embedded Systems**: Computers integrated into devices like cars, appliances, and phones.

Functionality of a Computer

A computer follows these main steps:

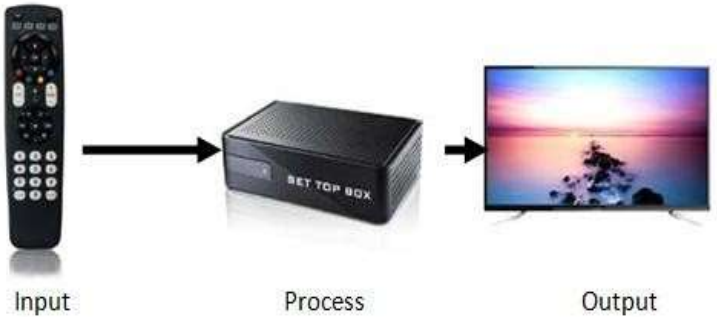
1. **Input**: Data is entered using input devices.
2. **Processing**: The CPU processes the data based on software instructions.
3. **Storage**: Data is stored temporarily (RAM) or permanently (HDD/SSD).
4. **Output**: Results are displayed or output through output devices.

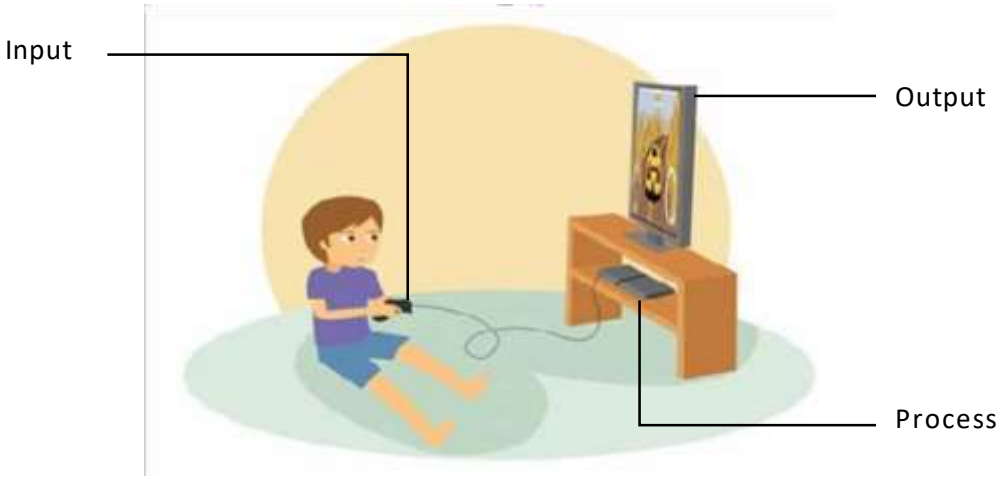


INPUT – OUTPUT DEVICES

Input Devices

- Used to input the data and programs
- Accepts instructions and data from the user





➢ Keyboard

- It is most common input device.
- Used to type data and instructions.
- It has
  - Alphabets (a,b,…,z)
  - Numbers (1,2,…,9,0)
  - Special keys (+,-,<,>,(,….)
  - Function keys (F1,F2,…,F12)

➢ Mouse

- It is a pointing device.
- The mouse is rolled over the mouse pad
- It controls the movement of the cursor in the screen

➢ Scanner

- Used to enter information to the memory
- Works like a Xerox machine

➢ Graphic Tablet

- Used to draw or sketch digitally
- It uses a pen or stylus

➢ Joystick

- Used to control a character or machine
- It is useful for playing games

➢ MicroPhone

- Used to input audio
- Used to convert sound waves into electric waves

➢ WebCam

- Webcam is a digital video device
- It captures either still pictures or motion video
- Used to transmit pictures over the Internet

Output Devices

- Used to show the result

➢ Monitor

- Main output device
- Looks like a television screen
- Displays information in pictorial form

➢ Printer

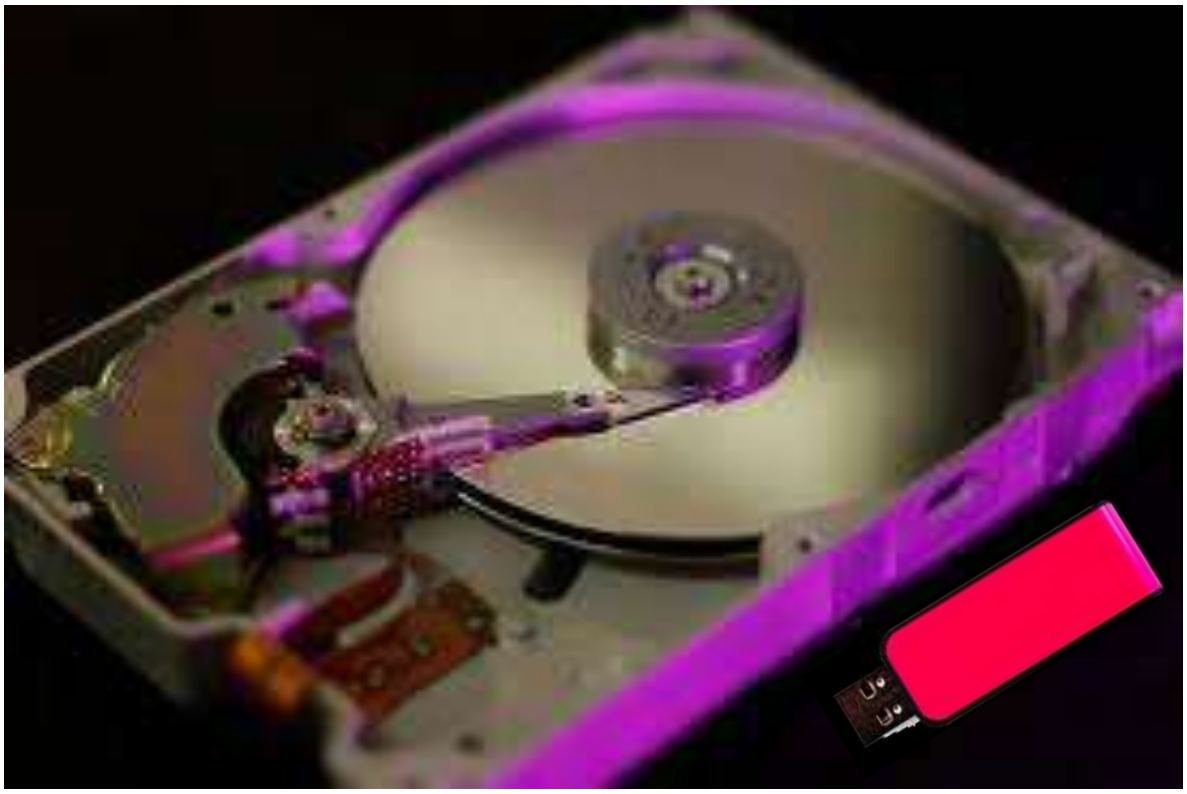
- Used to print information on paper
- Color printers and B&W printers

➢ Speaker

- The purpose is to produce audio output
- This audio output can be heard by the listener

➢ Headphones

- It is a hardware device
- Used to listen audio
- Watch a movie without disturbing



MEMORY DEVICES

Memory Units

- A memory is just like a human brain
- It is used to store data and instructions
- Memory is the storage space in computer
- Main types are RAM and ROM

Memory Access Time

- It is the amount of time to read data from memory
- It's affects how fast the computer process data

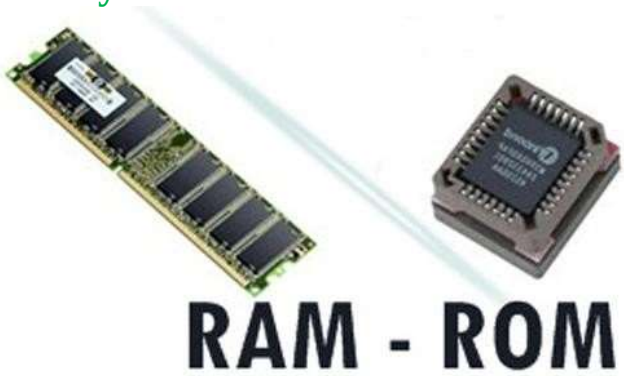
Term	Abb.	Speed
Millisecond	ms	One-thousandth of a second
Microsecond	µs	One-millionth of a second
Nanosecond	ns	One-billion of a second
Picosecond	ps	One-trillionth of a second

Memory Capacity

- It's the number of bytes the chip devices has available for storage

Term	Abb.	Approximate no. of byte	Exact no. of byte
Kilobyte	KB or K	1000	1,024
Megabyte	MB	1Million	1,048,576
Gigabyte	GB	1Billion	1,073,741, 824
Terabyte	TB	1 Trillion	1,099,511,627,776

Classification of Memory Primary Memory



•Main memory

•It holds data and instructions

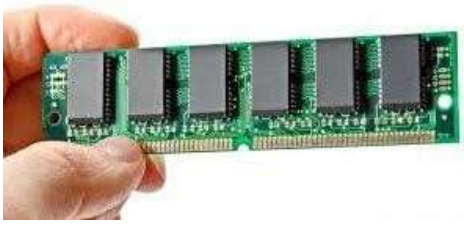
•It has limited capacity

•Data is lost when power is switched off

•It is made up of semiconductor device

•A computer cannot run without primary memory

1. RAM (Random Access Memory)



- Data can be accessed randomly
- Easy and speedy access
- Volatile
- Erased

2. ROM (Read Only Memory)

- Data permanently recorded
- Read Operation only
- Cannot be changed by the user
- Stores boot routine
- Nonvolatile

Secondary Memory

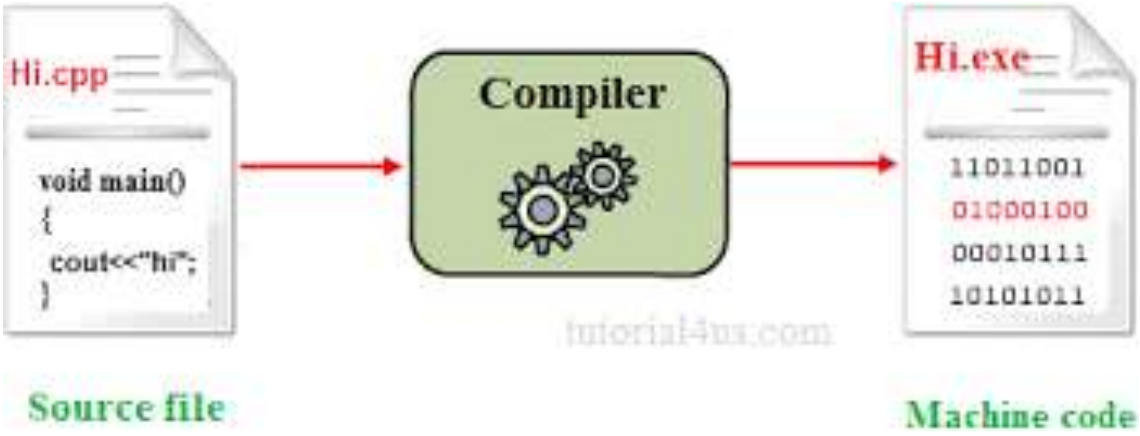
•External memory

•It is slower than main memory

•Used for storing data permanently

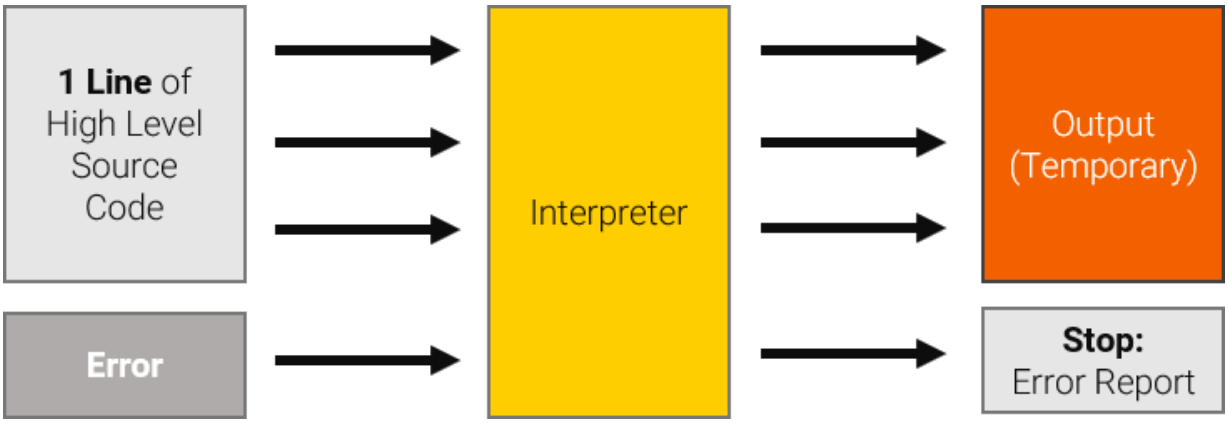
Compiler

- A compiler is a special program
- That turns programming language into machine language
- It takes whole program for conversion
- Displays all errors at the same time



Interpreter

- It takes a single line of code
- It never generates any intermediate machine code
- Displays errors line by line



NUMBER

SYSTEM

Number System

- Number system refers to the
  - Digits
  - Its arrangements
  - Positional weight and
  - Base of number
- Different types of number system are
  - Decimal number system
  - Binary number system
  - Octal number system
  - Hexadecimal number system

Binary number system

- Having base 2
- It consists of 2 bits: 0 and 1
- It is also known as Binary digits
- Examples: $(1011)_2$, $(10001.100)_2$, $(110)_2$

Decimal number system

- Having base 10
- It uses different combinations of 10 symbols to represent any value (i.e. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9)
- Examples: $(795)_{10}$, $(27.364)_{10}$

Octal number system

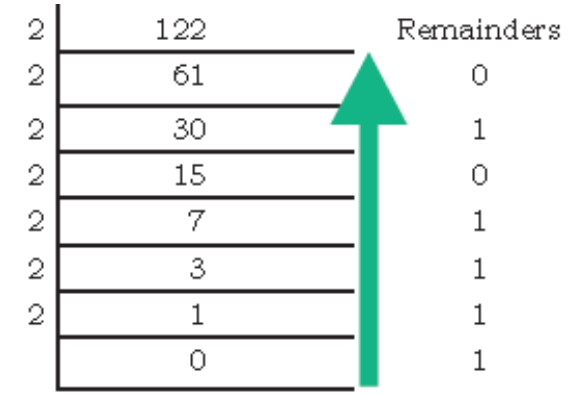
- Having base 8
- It uses different combinations of 8 symbols to represent any value (i.e. 0, 1, 2, 3, 4, 5, 6, 7)
- Examples: $(607)_8$, $(56.743)_8$

Hexa Decimal number system

- Having base 16
- It consists of 16 digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E and F
- It is also called as Hex values
- It is also used in computer memory management
- Examples: (D8C)16, $(3B)_{16}$

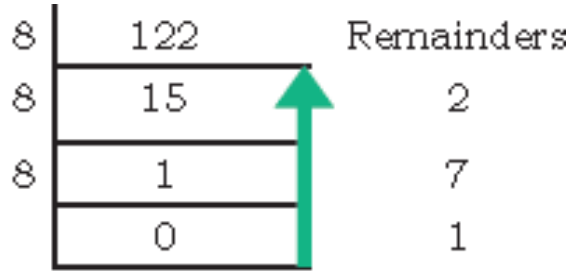
Conversions

- **Decimal to Binary Conversion**
  - The decimal number is repeatedly divided by 2
  - Example: Convert (122)10 to binary number



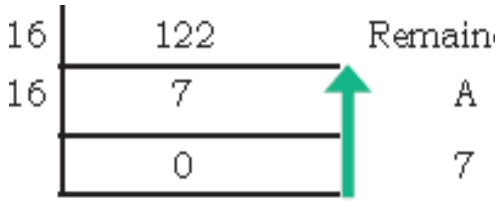
Therefore, $(122)_{10} = (1111010)_2$

- **Decimal to Octal Conversion**
  - The decimal number is repeatedly divided by 8
  - Example: Convert (122)10 to octal number



Therefore, $(122)_{10} = (172)_8$

- **Decimal to Hexadecimal Conversion**
  - The decimal number is repeatedly divided by 16
  - Example: Convert (122)10 to hexadecimal number



[A is equivalent to decimal number 10]

Therefore, $(122)_{10} = (7A)_{16}$

- **Binary to Decimal Conversion**

- The positional values are computed in terms of powers of
  - Example: Convert $(1101)_2$ into decimal number

1	1	0	1
2^3	2^2	2^1	2^0
8	4	2	1

$= 1 \times 8 + 1 \times 4 + 0 \times 2 + 1 \times 1$

$= 8 + 4 + 0 + 1 = (13)_{10}$

Therefore $(1101)_2 = (13)_{10}$

- **Octal to Decimal Conversion**
  - The positional values are computed in terms of powers of 8
  - Example: Convert $(257)_8$ into decimal number

2	5	7
8^2	8^1	8^0
16	8	1

$= 2 \times 16 + 5 \times 8 + 7 \times 1$

$= 128 + 40 + 7 = (175)_{10}$

Therefore $(257)_8 = (13)_{10}$

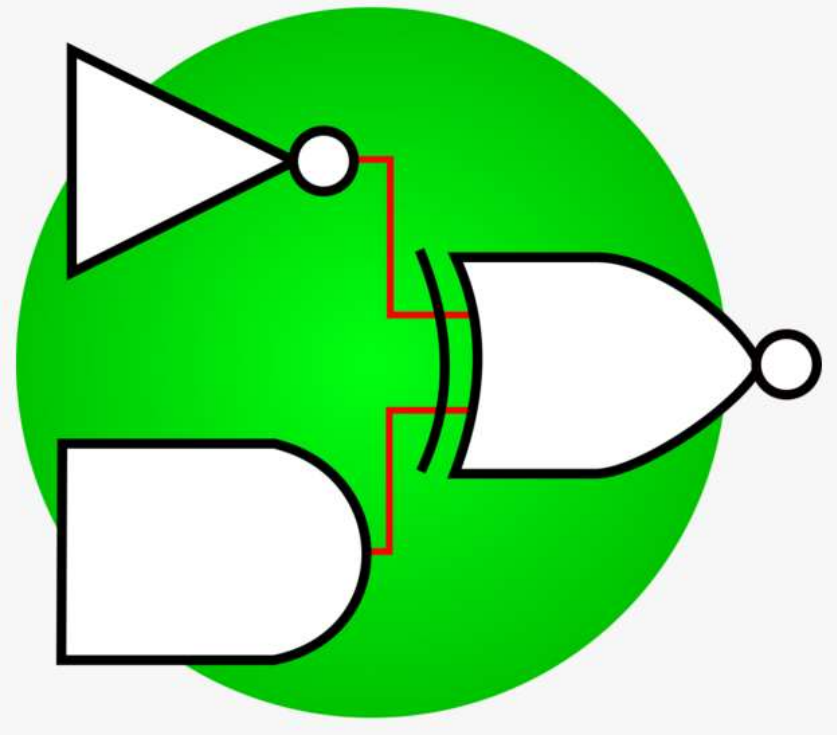
- **Hexadecimal to Decimal Conversion**
  - The positional values are computed in terms of powers of 16
  - Example: Convert $(3A5)_{16}$ into decimal number

3	A	5
16^2	16^1	16^0
256	16	1

$= 2 \times 156 + 10 \times 16 + 5 \times 1$

$= 768 + 160 + 5 = (933)_{10}$

Therefore $(3A5)_{16} = (933)_{10}$



LOGIC GATES

Logic Gates

- Logic gates perform basic logical functions
- Most logic gates take an input of two binary values
- And output a single value of a 1 or 0.
- Basic gates are
    - AND
    - NOT
    - NOR
    - OR
    - NAND
    - XOR
    - **AND Gate**
        - Generates true or 1 only if all the inputs are true or 1
        - It is denoted by (.) operator
        - Graphical representation is

        - Truth table is

A	B	Output (A.B)
0	0	0
0	1	0
1	0	0
1	1	1

    - **OR Gate**
        - Generates true or 1, if any one input is true or 1
        - It is denoted by (+) operator
        - Graphical representation is

        - Truth table is

A	B	Output (A+B)
0	0	0
0	1	1
1	0	1
1	1	1

- **NOT Gate**
  - It inverts the input state from true(1) to false(0) and vice versa
  - It is denoted by (-) or ( ) operator
  - It is also known as inverter
  - Graphical representation is

  - Truth table is

A	Output(A')
0	1
1	0

- **NAND Gate**
  - AND followed by the NOT
  - Generates false or 0 only if both the inputs are true or 1
  - Graphical representation is

  - Truth table is

A	B	Output
0	0	1
0	1	1
1	0	1
1	1	0

- **NOR Gate**
  - OR followed by the NOT
  - Generates true or 1only if both the inputs are false or 0
  - Graphical representation is

  - Truth table is

A	B	Output
0	0	1
0	1	0
1	0	0
1	1	0

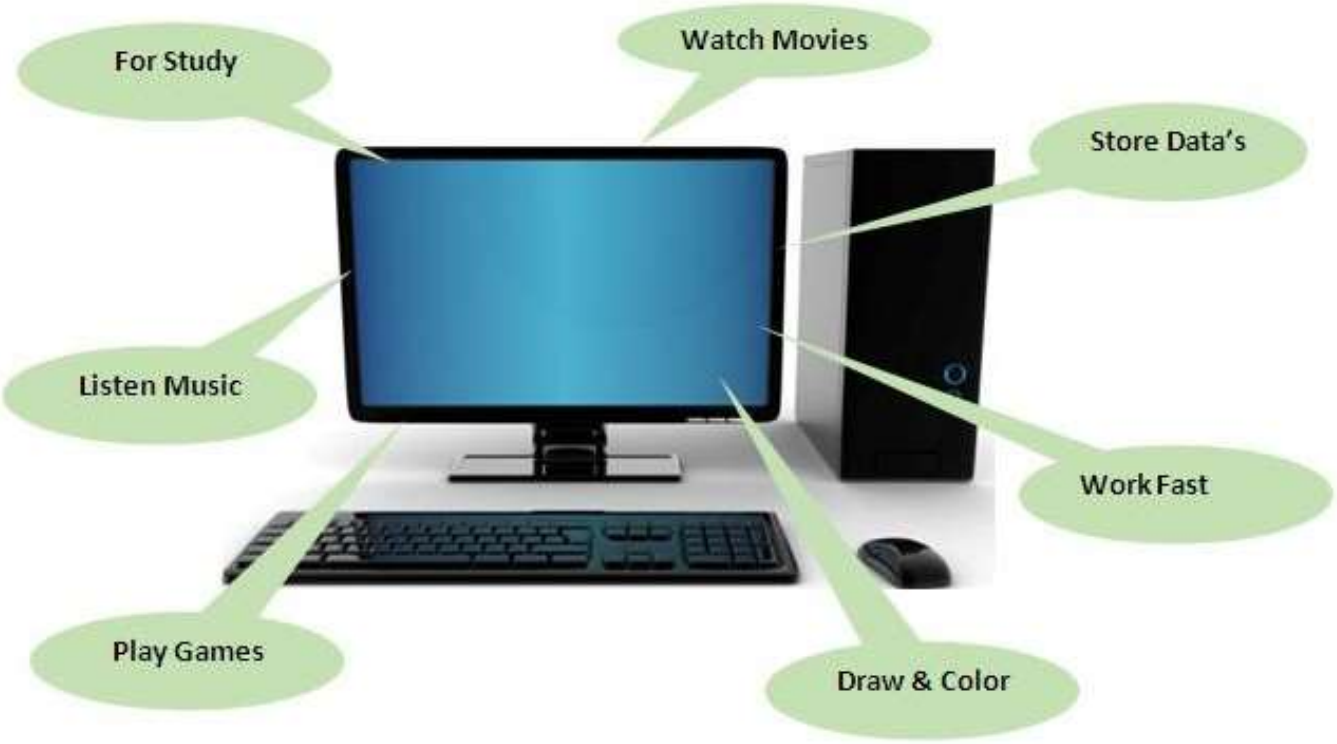
COMPUTER INTRODUCTION

Unit - I – Computer and Number System

Computer - A Smart Machine

- A Computer is an electronic device.
- It runs on electricity.
- Helps us to do our work faster and easier.

Uses of Computer



Desktop Computer

- It is a personal computer
- That fits on a desk.
- It consists of
  - A Monitor
  - A Keyboard
  - A Mouse and
  - CPU

Laptop Computer

- It can be carried anywhere.
- It runs on battery.
- Integrating with a keyboard,
- It is including the touch pad.

Generations of Computers

Generation of Family		Generation of Computer
Great Grand Father and Mother 	↔	I Generation Computer (1946-1959) 
Great Grand Father and Mother 	↔	II Generation Computer(1959-1965) 
Grand Father and Mother 	↔	III Generation Computer(1965-1971) 
Father and Mother 	↔	IV Generation Computer(1971-1980) 
Son and Daughter 	↔	V Generation Computer(1980-till date) 

Places to use of Computer

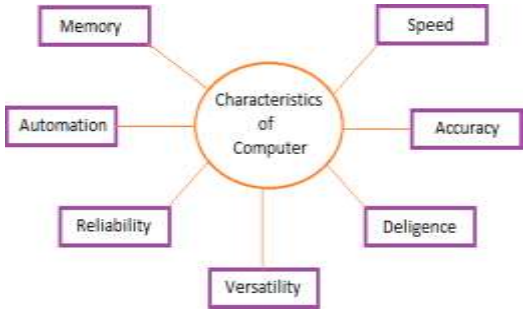
- Computer has become a part of our life.
- Computers are used in our everyday life.
- Computers are used in
  - Home
  - Schools
  - Hospitals
  - Banks
  - Offices
  - Shops
  - Railway stations and Airports
  - Research Centre’s

Computer Parts

- A computer is like our body.
- Every part does some work like our body.
- It has many parts, they are
  - Monitor
  - CPU
  - Keyboard
  - Mouse
  - Printer
  - Speaker
  - Microphone
  - Scanner

Characteristics of computer

- Electronic
- Speed
- Storage
- Accuracy
- Versatility



Classification of Computer

- On the basis of Type / Work
  - Analog Computer

    That uses continuous physical phenomena
  - Digital Computer

    That performs calculations and logical
  - Hybrid Computer (Analog + Digital)

    Capable of inputting and outputting in both digital and analog signals

- On the basis of Size

S.No.	Type	Specifications
1	Micro-Computers	Single user computer system Microprocessor as its CPU
2	Mini-Computer	Multi-user computer system Supporting hundreds of users simultaneously
3	Main Frame	Multi-user computer system Software technology is different from minicomputer
4	Super-Computer	Extremely fast computer Execute hundreds of millions of instructions per second