Course Title: 103 Introductions to Computers

UNIT-1: Introduction

1.1 Introduction of Computer

1.2 Applications of Computer

1.3 Types of Computers – Super Computers, Mainframes, Mini Computers,
Micro computers (Desktop, Laptop, Notebook, Tablet, Smart Phones)

1.4 Block Diagram and functional units of computer

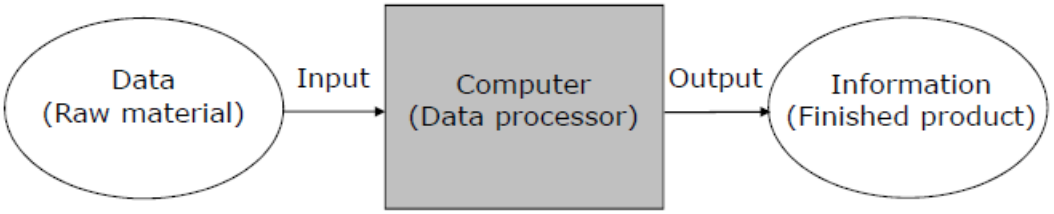
1.1 Introduction of Computer

❖ What is Computer?

✓ A word 'computer' comes from word 'compute' which means 'to calculate'.

✓ Computer is an electronic device, which can accept and store input data, process them and produce output according to the instructions given by the programmer or user.

✓ Activity of processing data using computer is known as data processing



characteristics of computer

Sr. No.	Characteristics	Description
1	Automatic	It carries out a job normally without any human intervention
2	Speed	It can perform several billion (10^9) simple arithmetic operations per second
3	Accuracy	It performs every calculation with the same accuracy
4	Diligence	It is free from monotony, tiredness, and lack of concentration
5	Versatility	It can perform a wide variety of tasks
6	Memory	It can store huge amount of information and can recall any piece of this information whenever required
7	No I. Q.	It cannot take its own decisions, and has to be instructed what to do and in what sequence
8	No Feelings	It cannot make judgments based on feelings and instincts

- **SPEED** : Computer is very fast calculating device. It can execute basic operations like subtraction, addition, multiplication and division at a few microseconds. It can move and copy data at a speed in the order of billion instruction per second.

- **ACCURACY** : Computer always gives accurate results. The accuracy of Computerdoes not go down when they are used continuously for hours together.It always gives accurate results.

- **STORAGE CAPACITY** : Computers have a very large storage capacity. A large volume of information can be stored in the memory of computer and information canbe retrieved correctly when desired.

- **VERSATILITY** : The working of computer with different types of data is known as versatility. That means computer can perform different types of job efficiently. Computer can works with different type of data and information such as visuals, text,graphics & video etc. So, versatility is a most important characteristic of computer.

- **DILLIGENCE** : A Computer can work for long hours with the same accuracy andspeed because it is free from problems of boredom or lack of concentration.

- **POWER OF REMEMBERING:** It can remember data for us.

- **NO IQ :** Computer does not work without instruction.

- **NO THOUGHTS** : Computers have no thoughts because they are machine and theyhave no feelings. Since, computers have no thoughts and feelings so they can't make judgement based on thoughts and feelings.

Give limitations of computer.

Common Sense –

- It doesn′t have common sense like human being has.
- It carries out instructions as given in program even if the instructions lack quality of common sense.

Intelligence –

- It doesn′t have intelligence of its own.
- It operates on the instructions, which may lack this quality.

Decision Making –

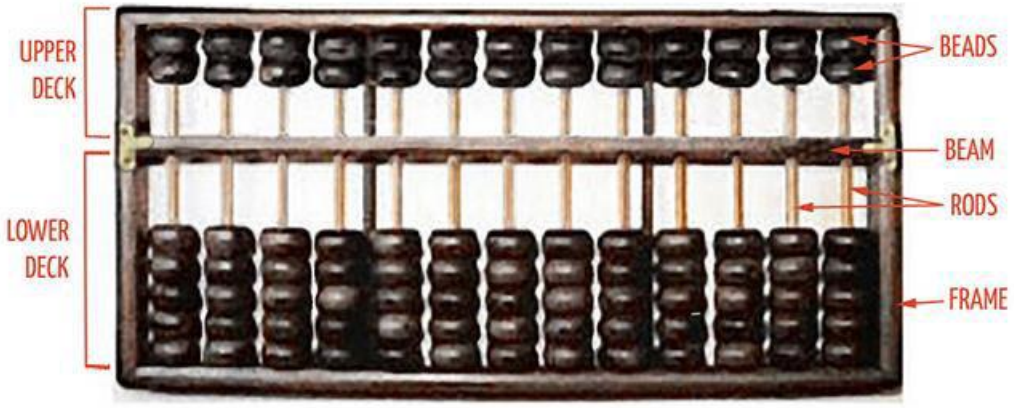
- It lacks the quality of decision making.
- It does only those tasks which are already instructed to it.

Write a note on History of Computers.

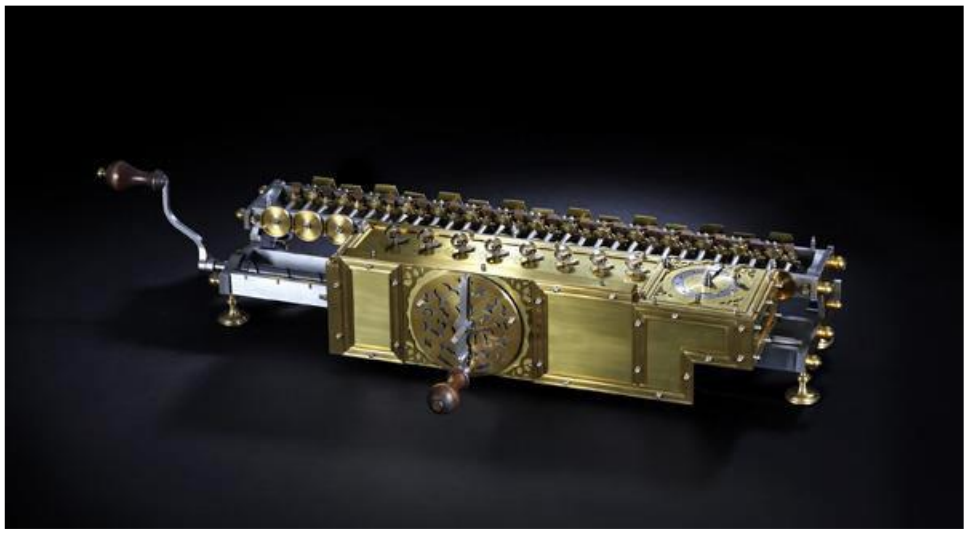
The word **"Computer"** is announced in **1613** and used to describe human who perform calculations and computations.

This definition retains same until the end of **19th century**, when the industrial revolution gave rise to machines whose primary purpose was calculating.

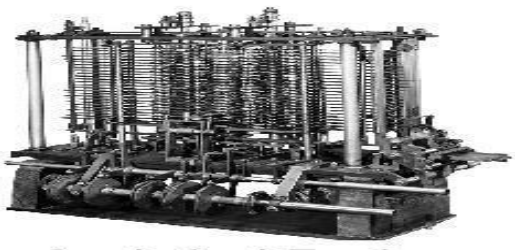
• **ABACUS** is the first counting machine invented by Cranmer **abacus**, which is also known as **SOROBAN**. In this, numbers are represented by position of beads on wire. Its upper part contains 2 beads and lower part contains 5 beads per wire.



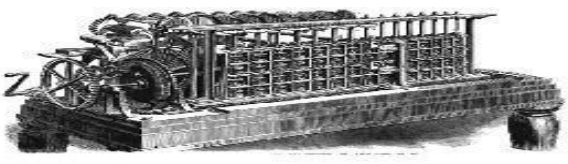
• Another **manual calculating device** was **Jhon Napier's Bone (1614)** or **Cardboard Multiplication calculator (CMC)**.



• In **1822**, **Charles Babbage**, professor at Cambridge University, began developing the first automatic computing machine, known as **difference engine**



Analytical Engine



Differential Engine

He is known as **father of the modern digital computers.**

In **1837**, **Charles Babbage** proposed the **first general mechanical computer**, the **Analytical Engine**. It contained ALU, basic flow control and integrated memory.

• The **Turing machine** was first proposed by **Alan Turing** in **1936** which became foundation for theory about computing and computers.

Explain Generations of Computer in detail.

• The development of computers can be divided into five generations depending on the technologies used.

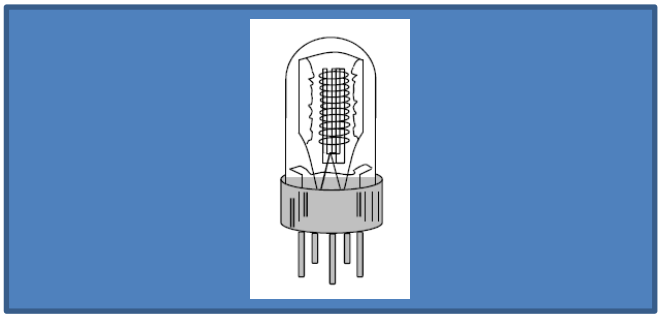
Generation (Period)	Key hardware technologies	Key software technologies	Key characteristics	Some representative systems
First (1942-1955)	▪ Vacuum tubes ▪ Electromagnetic relay memory ▪ Punched cards secondary storage	▪ Machine and assembly languages ▪ Stored program concept ▪ Mostly scientific applications	▪ Bulky in size ▪ Highly unreliable ▪ Limited commercial use and costly ▪ Difficult commercial production ▪ Difficult to use	▪ ENIAC ▪ EDVAC ▪ EDSAC ▪ UNIVAC I ▪ IBM 701
Second (1955-1964)	▪ Transistors ▪ Magnetic cores memory ▪ Magnetic tapes ▪ Disks for secondary storage	▪ Batch operating system ▪ High-level programming languages ▪ Scientific and commercial applications	▪ Faster, smaller, more reliable and easier to program than previous generation systems ▪ Commercial production was still difficult and costly	▪ Honeywell 400 ▪ IBM 7030 ▪ CDC 1604 ▪ UNIVAC LARC

Generation (Period)	Key hardware technologies	Key software technologies	Key characteristics	Some rep. systems
Third (1964-1975)	▪ ICs with SSI and MSI technologies ▪ Larger magnetic cores memory ▪ Larger capacity disks and magnetic tapes secondary storage ▪ Minicomputers; upward compatible family of computers	▪ Timesharing operating system ▪ Standardization of high-level programming languages ▪ Unbundling of software from hardware	▪ Faster, smaller, more reliable, easier and cheaper to produce ▪ Commercially, easier to use, and easier to upgrade than previous generation systems ▪ Scientific, commercial and interactive on-line applications	▪ IBM 360/370 ▪ PDP-8 ▪ PDP-11 ▪ CDC 6600

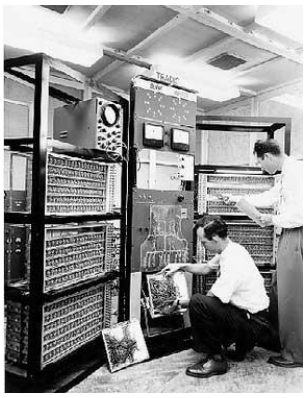
Generation (Period)	Key hardware technologies	Key software technologies	Key characteristics	Some rep. systems
Fourth (1975-1989)	▪ ICs with VLSI technology ▪ Microprocessors; semiconductor memory ▪ Larger capacity hard disks as in-built secondary storage ▪ Magnetic tapes and floppy disks as portable storage media ▪ Personal computers ▪ Supercomputers based on parallel vector processing and symmetric multiprocessing technologies ▪ Spread of high-speed computer networks	▪ Operating systems for PCs with GUI and multiple windows on a single terminal screen ▪ Multiprocessing OS with concurrent programming languages ▪ UNIX operating system ▪ C and C++ programming language ▪ PC, Network-based, and supercomputing applications ▪ Object-oriented design and programming	▪ Small, affordable, reliable, and easy to use PCs ▪ More powerful and reliable mainframe systems and supercomputers ▪ Totally general purpose machines ▪ Easier to produce commercially ▪ Easier to upgrade ▪ Rapid software development possible	▪ IBM PC and its clones ▪ Apple II ▪ TRS-80 ▪ VAX 9000 ▪ CRAY-1 ▪ CRAY-2 ▪ CRAY-X/MP

Generation (Period)	Key hardware technologies	Key software technologies	Key characteristics	Some rep. systems
Fifth (1989-Present)	▪ ICs with ULSI technology ▪ Larger capacity main memory, hard disks with RAID support ▪ Optical disks as portable read-only storage media ▪ Notebooks, powerful desktop PCs and workstations ▪ Powerful servers, supercomputers ▪ Internet ▪ Cluster computing	▪ World Wide Web ▪ Multimedia, Internet applications ▪ Micro-kernel, multithreading, multicore OS ▪ JAVA ▪ MPI and PVM libraries for parallel programming	▪ Portable computers ▪ Powerful, cheaper, reliable, and easier to use desktop machines ▪ Very powerful mainframes ▪ High uptime due to hot-pluggable components ▪ General purpose machines ▪ Easier to produce commercially	▪ IBM notebooks ▪ Pentium PCs ▪ SUN Workstations ▪ IBM SP/2 ▪ SGI Origin 2000 ▪ PARAM Supercomputers

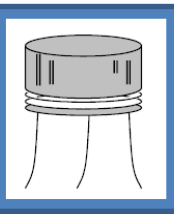
1. First Generation Computer (1942 – 1955) :–



- Use **Vacuum tube** technology
- Generated lot of heat
- Need of A.C.
- Consumed lots of electricity
- Very costly
- Huge in size
- Non portable
- Unreliable
- Punched cards, paper tape and magnetic tape used for input and output slow input and output devices Supported machine language only. Batch processing was use.
- Examples : ENIAC, EDVAC, EDSAC, UNIVAC, IBM 701, IBM 650



2. Second Generation Computer (1956 – 1964):–



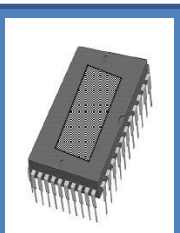
- Use of **transistors**
- Smaller size as compared to 1st generation computers
- Faster than 1st generation computers
- Generated less heat as compared to 1st generation computers
- A.C. needed
- Consumed less electricity as compared to 1st generation computers
- Still very costly
- Magnetic core as primary memory

Magnetic tape and magnetic disks as secondary storage device

- Batch operating system
- Reliable in comparison to 1st generation computers
- Supported assembly languages and high level programming languages like FORTRAN, COBOL. Examples : IBM 1620, IBM 7094, CDC 1604, CDC 3600, UNIVAC 1108, LARC

3. Third Generation Computer (1965 – 1974):–

- **ICs (Integrated Circuits) with SSI**(Small Scale Integration means microchip containing tens of transistors) and MSI (Medium Scale Integration means microchip containing hundreds of transistors) used
- Smaller size
- Faster
- Less maintenance
- Generated less heat
- A.C. needed
- Consumed less electricity



- Still costly
- More reliable in comparison to previous two generations
- Larger capacity disk and magnetic taps as secondary storage
- Time sharing OS
- Supported
- Supported high level language
- Examples : IBM 360 series, Honeywell 6000 series, PDP, IBM 370/168, TDC 316

4. Fourth Generation Computer (1975 – 1989): –

- **ICs with VLSI** (Very Large Scale Integration means microchip containing hundreds of thousands of transistors) technology used
- Very cheap
- Very small size
- Portable and reliable
- No A.C. needed
- Magnetic tapes and floppy disks as portable storage media
- Use of PC′s OS and UNIX OS
- Pipeline processing
- Concept of internet was introduced
- Great development in the fields of networks
- Computers became easily available
- Examples : DEC 10, STAR 1000, PDP 11,CRAY 1 (super computer), CRAY-X-MP (Super Computer)

5. Fifth Generation Computer (1989 – Present) :–

- ICs with ULSI (Ultra LSI means microchip containing millions of transistors) technology used
- Larger capacity main memory and hard disk
- Optical disk as portable storage media
- Development of true artificial intelligence
- Development of natural language processing
- Advancement in parallel processing
- Advancement in superconductor technology
- More user friendly interfaces with multimedia featuresAvailability of very powerful and compact computers at cheaper rates
- Examples : Desktop, Laptop, NoteBook, UltraBook, ChromeBook

1.2 Application of Computer

Computers have become important tools in our day-to-day′s operations. Some of the areas computers are used are in:

Home

Computers are used at homes for several purposes like online bill payment, watching movies or shows at home, home tutoring, social media access, playing games, internet access, etc. They provide communication through electronic mail. They help to avail work from home facility for corporate employees. Computers help the student community to avail online educational support.

- **Communication –**

Using your computer system for the purpose of communication gives you a lot of benefits. For example, if you will use email to send message or anything to your friends or any of your contacts, then you don't have to use pen and paper to write and take that paper to post office and then postman will deliver that later after some or few days that will not good if you want to send any urgent information to the same person.
Therefore, using email, you can also saves your time and cost to deliver any information very fast. You only need a computer and internet connectivity.

- **Entertainment-**

Most of the persons are using computer for entertainment purposes such as:
- Watching movies
- Watching videos
- Listening songs
- Photos
- Animations, games etc.

Computer can be used to create these things in an attractive manner so that user loves to enjoy the things.

- **Medical Field**

Computers are used in hospitals to maintain a database of patients' history, diagnosis, X-rays,live monitoring of patients, etc. Surgeons nowadays use robotic surgical devices to perform delicate operations, and conduct surgeries remotely. Virtual reality technologies are also usedfor training purposes. It also helps to monitor the fetus inside the mother's womb.

- **Industry**

Computers are used to perform several tasks in industries like managing inventory, designingpurpose, creating virtual sample products, interior designing, video conferencing, etc. Onlinemarketing has seen a great revolution in its ability to sell various products to inaccessible corners like interior or rural areas. Stock markets have seen phenomenal participation from different levels of people through the use of computers.

- **Education**

Computers are used in education sector through online classes, online examinations, referringe-books, online tutoring, etc. They help in increased use of audio-visual aids in the education field.

- **Government**

In government sectors, computers are used in data processing, maintaining a database of citizens and supporting a paperless environment. The country's defense organizations have greatly benefitted from computers in their use for missile development, satellites, rocketlaunches, etc.

- **Banking**

In the banking sector, computers are used to store details of customers and conduct transactions, such as withdrawal and deposit of money through ATMs. Banks have reducedmanual errors and expenses to a great extent through extensive use of computers.

- **Business**

Nowadays, computers are totally integrated into business. The main objective of business istransaction processing, which involves transactions with suppliers, employees or customers.Computers can make these transactions easy and accurate. People can analyze investments, sales, expenses, markets and other aspects of business using computers.

- **Training**

Many organizations use computer-based training to train their employees, to save money andimprove performance. Video conferencing through computers allows saving of time and travelling costs by being able to connect people in various locations.

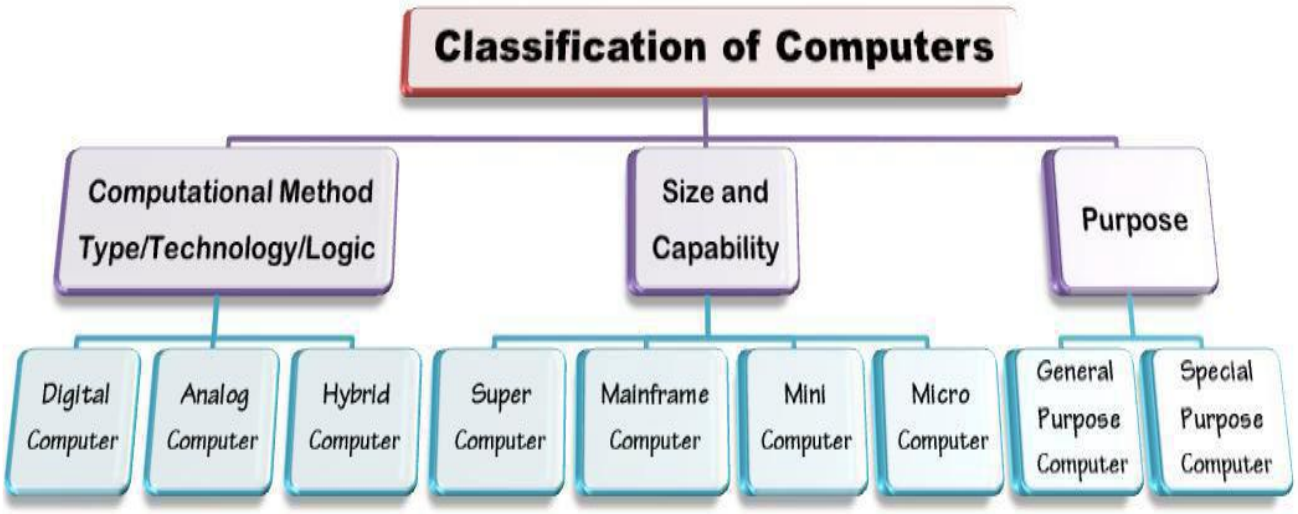
- **Arts**

Computers are extensively used in dance, photography, arts and culture. The fluid movementof dance can be shown live via animation. Photos can be digitized using computers.

- **Science and Engineering**

Computers with high performance are used to stimulate dynamic process in Science and Engineering. Supercomputers have numerous applications in area of Research and Development (R&D). Topographic images can be created through computers. Scientists usecomputers to plot and analyze data to have a better understanding of earthquakes.

1.3 Types of Computers – Super Computers, Mainframes, Mini Computers, Micro computers (Desktop, Laptop, Notebook, Tablet, Smart Phones)



According to computational method type/ functionality or Technology:

1. **Analog Computers –**

- Analog computer is a computer that operates on data in the form of continuously variable physical quantities such as electrical current.
- They are specially designed for storing physical quantities such as current, voltage or frequency.
- Used for measuring pressure, temperature, speed, etc.
- E.g. Thermometer, Speedometer

2. Digital Computers –

- Digital Computer is a computer that works with discrete quantities. It uses numbers to simulate real time processes.
- They are general purpose computers.
- In this type of computer, the data inputted by the user is in the form of character or number which is converted into binary form to store.
- E.g. Desktop, Laptop, etc.

3. Hybrid Computers (Analog + Digital) –

- The computers which combines the technology of Analog and Digital computers, is known as Hybrid Computers.
- Used in Oil Refineries, Robotics, Nuclear Power Plants, Mines, ICU of Hospitals, etc.

According to size & capability:

Since the advent of the first computer different types and sizes of computers are offering different services. Computers can be as big as occupying a large building and as small as alaptop or a microcontroller in mobile & embedded systems.

The four basic types of computers are.

1. Super computer
2. Mainframe Computer
3. Minicomputer
4. Microcomputer

1. Supercomputer

- ✓ The most powerful computers in terms of performance and data processing are the supercomputers.
- ✓ These are specialized and task specific computers used by large organizations.
- ✓ These computers are used for research and exploration purposes, like NASA uses supercomputers for launching space shuttles, controlling them and for space exploration purpose.
- ✓ The supercomputers are very expensive and very large in size.
- ✓ It can be accommodated in large air-conditioned rooms; some super computers can span an entire building.

Uses of Supercomputer

- ✓ Space Exploration
- ✓ Earthquake studies
- ✓ Weather Forecasting
- ✓ Nuclear weapons testing

2. Mainframe computer

- ✓ Although Mainframes are not as powerful as supercomputers, but certainly they are quite expensive nonetheless, and many large firms & government organizations uses Mainframes to run their business operations.
- ✓ The Mainframe computers can be accommodated in large air-conditioned roomsbecause of its size.
- ✓ Super-computers are the fastest computers with large data storage capacity, Mainframes can also process & store large amount of data.
- ✓ Banks educational institutions & insurance companies use mainframe computers to store data about their customers, students & insurance policy holders.

3. Minicomputer

- ✓ Minicomputers are used by small businesses & firms.
- ✓ Minicomputers are also called as "Midrange Computers".
- ✓ These are small machines and can be accommodated on a disk with not as processingand data storage capabilities as super-computers & Mainframes.
- ✓ These computers are not designed for a single user.
- ✓ Individual departments of a large company or organizations use Mini-computers forspecific purposes.
- ✓ For example, a production department can use Mini-computers for monitoring certainproduction process.

4. Microcomputer

- ✓ Desktop computers, laptops, personal digital assistant (PDA), tablets & Smartphone'sare all **types of microcomputers**.
- ✓ The micro-computers are widely used & the fastest growing computers.
- ✓ These computers are the cheapest among the other three types of computers.
- ✓ The Micro-computers are specially designed for general usage like entertainment, education and work purposes.
- ✓ Well known manufacturers of Micro-computer are Dell, Apple, Samsung, Sony & Toshiba.
- ✓ Desktop computers, Gaming consoles, Sound & Navigation system of a car, Netbooks, Notebooks, PDA's, Tablet PC's, Smartphones, Calculators are all type of Microcomputers.

4.1 Desktop -

- ✓ They are small enough to fit on a desk (rather than a server room) so they are called as desktop computers.
- ✓ Most of the equipment used by a desktop is tightly integrated within a single case, although some equipment may be connected at short distances outside the case, such as monitors, keyboards, mice, etc.

- ✓ In general, a desktop will not get much bigger than can be put onto most tables or desks.
- ✓ Its capacity (Processing Power, Memory) is limited for personal use only. So, that they are called personal computer (PC).
- ✓ They are cheap enough to be owned by an Individual (instead of shared within a corporation, or school).
- ✓ The configuration of PCs varies from one PC to another, depending on their usage.
- ✓ PCs generally costs from a few tens of thousands to about lakh of rupees, depending
- ✓ Several individual keep PC in there home to run business from home. PCs are used both by, children and adults, for education and entertainment. Hence PCs are very common everywhere, and can be found in offices, classrooms, homes, hospitals, shops, clinics etc.
- ✓ They are impractical for mobile computing.
- ✓ Popular operating systems for PCs are Ms-DOS, MS-Windows, Windows NT, UNIX, and LINUX.
- ✓ Ex Pentium III, Pentium IV etc.

4.2 Laptop / Notebook -

- ✓ A small, portable computer mainly for use by people who need computing power where ever they go is called laptop.
- ✓ These are light weight computers and can be carried in a briefcase.
- ✓ They are approximately of size of 8.5 x 11 inch notebook.
- ✓ A notebook computer uses a keyboard, Flat screen LCD and touchpad.
- ✓ They have a hard disk, a floppy disk drive, CD-ROM drive
- ✓ Notebook computers can be used while traveling in train or plain etc because they operate with chargeable battery. With a fully charged battery, a notebook computer can be used for a few hours.
- ✓ They are mostly used for word processing, spreadsheet computing, data entry, and preparing presentation materials, while a person Is traveling. They are also used for making presentation, by plugging them into LCD (Liquid Crystal Display) projection system.
- ✓ Processing capabilities of notebook computer is normally as good as an ordinary PC because they both use the same type of processor.
- ✓ Notebook computer generally has lesser hard disk storage then a PC, to keep its total
- ✓ weight around 2 kg.
- ✓ Notebook computers are typically more expensive than normal PC.

4.3 Tablet –

- ✓ A tablet is a wireless, portable personal computer with a touchscreen interface for both input and output.
- ✓ The tablet has Intermediate size between laptop and smart phone. It is smaller than a notebook computer, but larger than a smartphone. They are lighter than laptops.
- ✓ A key component among tablet computers is touch input on a touchscreen display. This allows the user to navigate easily and type with a virtual keyboard on the screen or press other icons on the screen to open apps or files.
- ✓ It has longer battery life than laptop.
- ✓ Since the tablet is flat, it can be laid on the table like a piece of paper or held in the lap and will be barely visible.
- ✓ Tablet uses Android, 105, Chrome OS, or iPadOS as operating system.
- ✓ The screen size of tablet is too small in comparison with a laptop.
- ✓ The cost of tablet is higher compared to laptops for the same processing power.
- ✓ It does not come with optical drives for use with CDs or DVDs.

4.4 Smartphone –

- ✓ Smartphone is a mobile device having capability of a telephone with
- ✓ some computational facility like web browsing, ability to run software
- ✓ applications,
- ✓ Smartphones are limited in the number or ways they can accept user
- ✓ input and provide output.
- ✓ Smart phones are pocket sized computer having facilities, such as calendar, calculator, notepad, etc.
- ✓ Alt smartphones come with some kind of personal information management (P1M) software that typically handles the following tasks to keep you organized:
- ✓ Store contact information (names, addresses, phone numbers, e-nail addresses)

Make to-do lists :

- ✓ Take notes
- ✓ Track appointments (date book, calendar)
- ✓ Remind you of appointments (clock, alarm functions)
- ✓ Perform calculations
- ✓ Can connect to the Internet
- ✓ global positioning system (GPS) devices
- ✓ Run multimedia software

4.4 PDA (Personal Digital Assistant) –

A PDA is small, highly integrated computer usually using flash memory for storage instead of hard drive.

- It uses touch screen technology for both output and input.

It is light weight, portable, has good battery life and fits within the palm.

- It can access the Internet by Bluetooth or WI FI communication.
- It is normally used to keep track of appointment calendars, to-do lists, address books and talking notes.

4.5 Palmtops / Handheld PC

- A computer which is small enough to feet in pocket and operated by keeping it on palm, is called palmtop computer.
- It sacrifices power for small size and portability.
- It is just look like tiny laptop, with a flip-up screen and small keyboard.

4.6 Wearable computers –

- It is worn on the body like a watch and is used by military professionals or doctors to track human actions if their hands are engaged in other activities.
- It does not have to be turned on and off but remain in operation without user intervention.
- For examples, fabric PCs, smart watches

According to purpose:

1. General Purpose Computers –

- Computers used for general requirements like sales analysis, financial accounting, invoicing, inventory management, etc. are called General Purpose Computers.
- Used in commercial and educational applications.

2. Special Purpose Computers –

- Computers which are designed for special purpose like weather forecasting, space applications, medical diagnostics, etc. are called Special Purpose Computers.
- E.g. Chip in Washing Machine

Difference between Desktop and Laptop

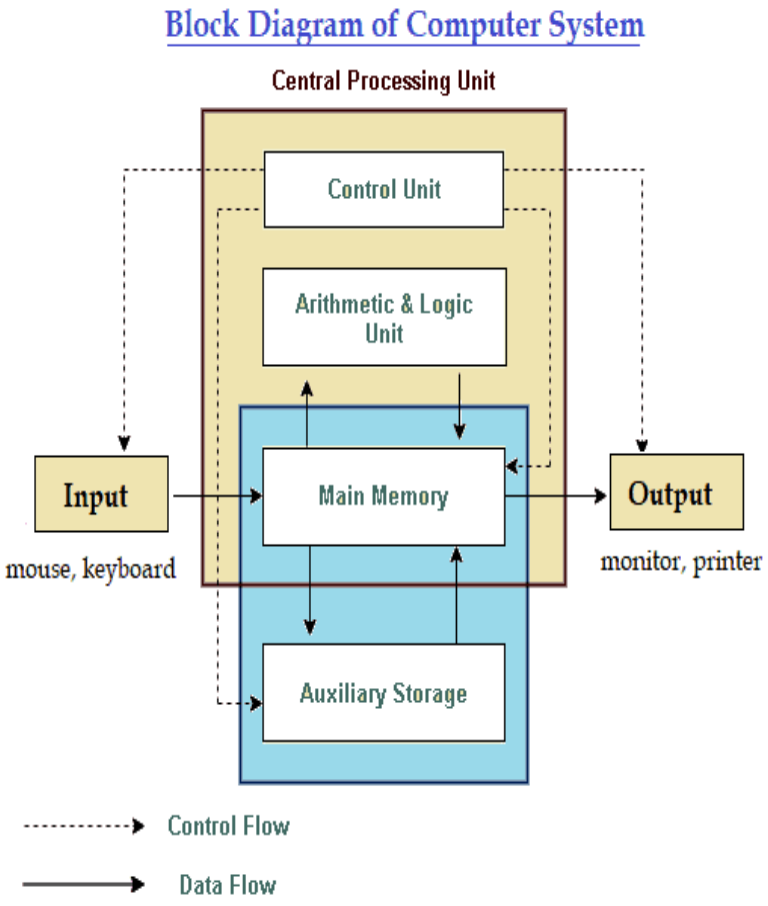
Desktop	Laptop
impractical for mobile computing	Designed for mobile computing
Lower cost	Higher cost
Easily expanded	Difficult to expand
Comfortable ergonomics	Uncomfortable ergonomics (small key board, often with inconvenient placement of function keys)
Easy-to-use mouse or other Pointing device	Awkward pointing devices (some allow traditional mouse to be connected)
High RAM and hard-drive capacity	Somewhat less RAM and hard drive capacity

1.4 Block Diagram and functional units of computer

Functional block diagram consists of four basic units:

1. Input Unit
2. Output Unit
3. Storage Unit
- **Primary storage**
- **Secondary storage**

4. Central Processing Unit (CPU)
- **Control unit**
- **Arithmetic Logic unit**



Input Unit:

- ✓ Computers need to receive data and instruction to solve any problem. Therefor we need to input the data and instructions into the computers.
- ✓ The input unit consists of input devices like keyboard, mouse,etc.

All input devices perform the following functions:

1. Accept the data and instructions from the outside world.
2. Convert it to a form that the computer can understand.
3. Supply the converted data to the computer system for processing.

Output Unit:

- ✓ The output unit of a computer provides the information and results of a computation to outside world.
- ✓ The output unit consists of output devices like printer, Visual display unit(VDU), Speaker, etc.

All output devices perform the following functions:

1. Accept the results produced by the computer, which are in the coded form.
2. Convert the coded results to human readable form.
3. Supply the converted results to outside world.

Storage Unit:

- ✓ The process of saving data and instructions permanently is known as storage.
- ✓ Data has to be stored into the system before the actual processing starts.

Storage unit divided into two types :

1. Primary Storage:

- ✓ It consists of RAM, ROM and Cache memory. CPU can access the content of RAM directly.
- ✓ It is volatile storage that is losses content if power off.

2. Secondary Storage:

- ✓ It consists of Hard disk, CD, DVD, etc. CPU cannot directly access the content on Secondary storage.
- ✓ It is non volatile storage that is it retains content if power off.

The storage unit performs the following functions :

1. Storing all data and instructions before and after processing.
2. Storing intermediate results of the processing.

Central Processing Unit:

- ✓ The CPU is the brain of the computer.
- ✓ The CPU performs the following functions :

1. Performs all calculations.
2. Takes all decisions.
3. Controls all units of the computer.

It consists of following parts :

1. Control Unit (CU)

- ✓ It is responsible for directing and coordinating most of the computer system activities.
- ✓ It does not execute instructions by itself. It tells other parts of the computer system what to do.
- ✓ It obtains instructions from the program stored in main memory,interpret the instructions and issues signals that cause other units of the system to execute them.

2. Arithmetic Logical Unit (ALU)

- ✓ ALU is the place where the actual execution of the instructions takes place.
- ✓ All calculations and comparisons are performed in ALU.
- ✓ ALU is designed to perform the four basic operations add, subtract, multiply, divide and logic operations or comparison such as less than or greater than.
- ✓ The ALU controls the speed of calculations.

3. Registers

- ✓ Registers are small temporary storage location within the CPU.
- ✓ Registers quickly accept, store and transfer data and instructions that are being used immediately to execute an instruction.
- ✓ The control unit of the CPU retrieves data from main memory and places it onto a register.