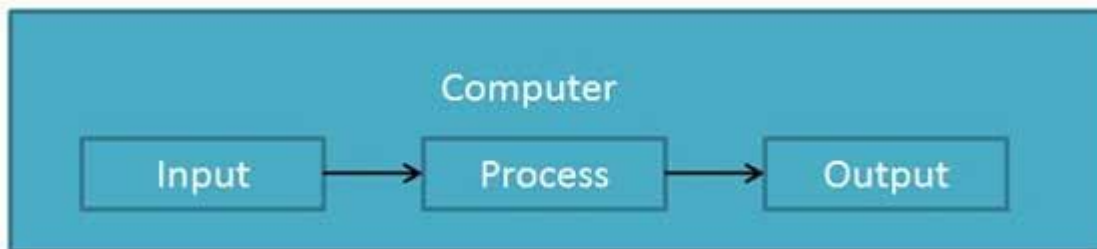# COMPUTER FUNDAMENTALS
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Functionalities of a computer

Any digital computer carries out five functions in gross terms:

- Takes data as input.

- Stores the data/instructions in its memory and use them when required.

- Processes the data and converts it into useful information.

- Generates the output

- Controls all the above four steps.

Definition

Computer is an electronic data processing device which

- accepts and stores data input,
- processes the data input, and
- generates the output in a required format.

Advantages

Following list demonstrates the advantages of computers in today's arena.

High Speed

- Computer is a very fast device.

- It is capable of performing calculation of very large amount of data.

- The computer has units of speed in microsecond, nanosecond, and even the picosecond.

- It can perform millions of calculations in a few seconds as compared to man who will spend many months for doing the same task.

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Accuracy

- In addition to being very fast, computers are very accurate.

- The calculations are 100% error free.

- Computers perform all jobs with 100% accuracy provided that correct input has been given.

Storage Capability

- Memory is a very important characteristic of computers.

- A computer has much more storage capacity than human beings.

- It can store large amount of data.

- It can store any type of data such as images, videos, text, audio and many others.

Diligence

- Unlike human beings, a computer is free from monotony, tiredness and lack of concentration.

- It can work continuously without any error and boredom.

- It can do repeated work with same speed and accuracy.

Versatility

- A computer is a very versatile machine.

- A computer is very flexible in performing the jobs to be done.

- This machine can be used to solve the problems related to various fields.

- At one instance, it may be solving a complex scientific problem and the very next moment it may be playing a card game.

Reliability

- A computer is a reliable machine.

- Modern electronic components have long lives.

- Computers are designed to make maintenance easy.

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Automation

- Computer is an automatic machine.

- Automation means ability to perform the given task automatically.

- Once a program is given to computer i.e., stored in computer memory, the program and instruction can control the program execution without human interaction.

Reduction in Paper Work

- The use of computers for data processing in an organization leads to reduction in paper work and results in speeding up a process.

- As data in electronic files can be retrieved as and when required, the problem of maintenance of large number of paper files gets reduced.

Reduction in Cost

- Though the initial investment for installing a computer is high but it substantially reduces the cost of each of its transaction.

Disadvantages
No I.Q

- A computer is a machine that has no intelligence to perform any task.

- Each instruction has to be given to computer.

- A computer cannot take any decision on its own.

Dependency

- It functions as per a user's instruction, so it is fully dependent on human being

Environment

- The operating environment of computer should be dust free and suitable.

No Feeling

- Computers have no feelings or emotions.

- It cannot make judgement based on feeling, taste, experience, and knowledge unlike a human being.

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Generation

- Generation in computer terminology is a change in technology a computer is/was being used. Initially, the generation term was used to distinguish between varying hardware technologies. But nowadays, generation includes both hardware and software, which together make up an entire computer system.
- There are totally five computer generations known till date. Each generation has been discussed in detail along with their time period and characteristics. Here approximate dates against each generations have been mentioned which are normally accepted.
- Following are the main five generations of computers

S.N.	Generation & Description
1	**First Generation** The period of first generation: 1946-1959. Vacuum tube based.
2	**Second Generation** The period of second generation: 1959-1965. Transistor based.
3	**Third Generation** The period of third generation: 1965-1971. Integrated Circuit based.
4	**Fourth Generation** The period of fourth generation: 1971-1980. VLSI microprocessor based.
5	**Fifth Generation** The period of fifth generation: 1980-onwards. ULSI microprocessor based

COMPUTER APPLICATIONS

Business

A computer has high speed of calculation, diligence, accuracy, reliability, or versatility which made it an integrated part in all business organisations.

Computer is used in business organisations for:

- Payroll calculations

- Budgeting

- Sales analysis

- Financial forecasting

- Managing employees database

- Maintenance of stocks etc.

Banking

Today banking is almost totally dependent on computer.

Banks provide following facilities:

- Banks provide online accounting facility, which includes current balances, deposits, overdrafts, interest charges, shares, and trustee records.

- ATM machines are making it even easier for customers to deal with banks.

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Insurance

Insurance companies are keeping all records up-to-date with the help of computers. The insurance companies, finance houses and stock broking firms are widely using computers for their concerns.

Insurance companies are maintaining a database of all clients with information showing

- procedure to continue with policies
- starting date of the policies
- next due installment of a policy
- maturity date
- interests due
- survival benefits
- bonus

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Education

The computer has provided a lot of facilities in the education system.

- The computer provides a tool in the education system known as CBE (Computer Based Education).

- CBE involves control, delivery, and evaluation of learning.

- The computer education is rapidly increasing the graph of number of computer students.

- There are number of methods in which educational institutions can use computer to educate the students.

- It is used to prepare a database about performance of a student and analysis is carried out on this basis.

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Marketing

In marketing, uses of computer are following:

- **Advertising -** With computers, advertising professionals create art and graphics, write and revise copy, and print and disseminate ads with the goal of selling more products.

- **At Home Shopping -** Home shopping has been made possible through use of computerised catalogues that provide access to product information and permit direct entry of orders to be filled by the customers.

Health Care

Computers have become important part in hospitals, labs, and dispensaries. The computers are being used in hospitals to keep the record of patients and medicines. It is also used in scanning and diagnosing different diseases. ECG, EEG, Ultrasounds and CT Scans etc., are also done by computerised machines.

Some major fields of health care in which computers are used are:

- **Diagnostic System -** Computers are used to collect data and identify cause of illness.

- **Lab-diagnostic System -** All tests can be done and reports are prepared by computer.

- **Patient Monitoring System -** These are used to check patient's signs for abnormality such as in Cardiac Arrest, ECG etc.

- **Pharma Information System -** Computer checks Drug-Labels, Expiry dates, harmful drug's side effects etc.

- **Surgery :** Nowadays, computers are also used in performing surgery.

Engineering Design

Computers are widely used in Engineering purpose.

One of major areas is CAD (Computer aided design). That provides creation and modification of images. Some fields are:

- **Structural Engineering -** Requires stress and strain analysis for design of Ships, Buildings, Budgets, Airplanes etc.

- **Industrial Engineering -** Computers deal with design, implementation and improvement of integrated systems of people, materials and equipments.

- **Architectural Engineering -** Computers help in planning towns, designing buildings, determining a range of buildings on a site using both 2D and 3D drawings.
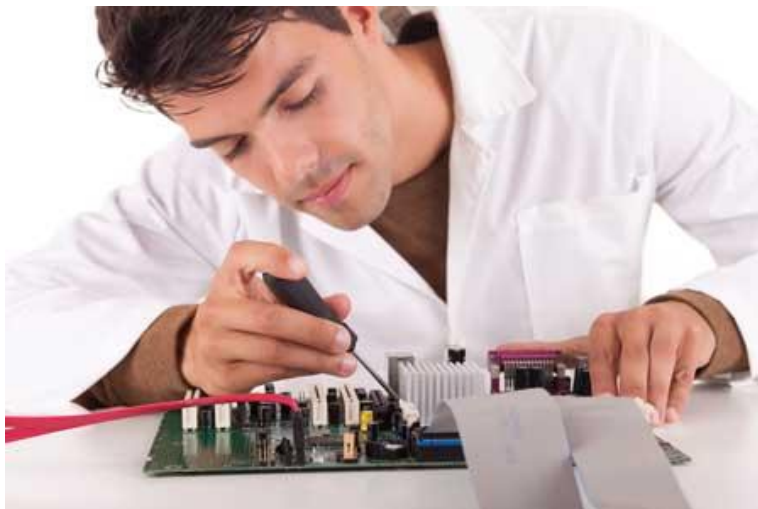
Military

Computers are largely used in defence. Modern tanks, missiles, weapons etc. Military also employs computerised control systems. Some military areas where a computer has been used are:

- Missile Control

- Military Communication

- Military Operation and Planning

- Smart Weapons

Communication

Communication means to convey a message, an idea, a picture or speech that is received and understood clearly and correctly by the person for whom it is meant for. Some main areas in this category are:

- E-mail

- Chatting

- Usenet

- FTP

- Telnet

- Video-conferencing

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Government

Computers play an important role in government. Some major fields in this category are:

- Budgets
- Sales tax department
- Income tax department
- Male/Female ratio
- Computerization of voters lists
- Computerization of driving licensing system
- Computerization of PAN card
- Weather forecasting

CLASSIFICATIONS

Computers can be broadly classified by their speed and computing power.

Sr.No.	Type	Specifications
1	PC (Personal Computer)	It is a single user computer system having moderately powerful microprocessor
2	WorkStation	It is also a single user computer system which is similar to personal computer but have more powerful microprocessor.
3	Mini Computer	It is a multi-user computer system which is capable of supporting hundreds of users simultaneously.
4	Main Frame	It is a multi-user computer system which is capable of supporting hundreds of users simultaneously. Software technology is different from minicomputer.
5	Supercomputer	It is an extremely fast computer which can execute hundreds of millions of instructions per second.

PC (Personal Computer)

A PC can be defined as a small, relatively inexpensive computer designed for an individual user. PCs are based on the microprocessor technology that enables manufacturers to put an entire CPU on one chip. Businesses use personal computers for word processing, accounting, desktop publishing, and for running spreadsheet and database management applications. At home, the most popular use for personal computers is playing games and surfing Internet.

Although personal computers are designed as single-user systems, these systems are normally linked together to form a network. In terms of power, now-a-days High-end models of the Macintosh and PC offer the same computing power and

graphics capability as low-end workstations by Sun Microsystems, Hewlett-Packard, and Dell.

Workstation

Workstation is a computer used for engineering applications (CAD/CAM), desktop publishing, software development, and other such types of applications which require a moderate amount of computing power and relatively high quality graphics capabilities.

Workstations generally come with a large, high-resolution graphics screen, large amount of RAM, inbuilt network support, and a graphical user interface. Most workstations also have a mass storage device such as a disk drive, but a special type of workstation, called a diskless workstation, comes without a disk drive.

Common operating systems for workstations are UNIX and Windows NT. Like PC, Workstations are also single-user computers like PC but are typically linked together to form a local-area network, although they can also be used as stand-alone systems.

Minicomputer

It is a midsize multi-processing system capable of supporting up to 250 users simultaneously.

Mainframe

Mainframe is very large in size and is an expensive computer capable of supporting hundreds or even thousands of users simultaneously. **Mainframe executes many programs concurrently and supports many simultaneous execution of programs**

Supercomputer

Supercomputers are one of the fastest computers currently available. Supercomputers are **very expensive and are employed for specialized applications that require immense amount of mathematical calculations (number crunching)**. For example, weather forecasting, scientific simulations, (animated) graphics, fluid dynamic calculations, nuclear energy research, electronic design, and analysis of geological data (e.g. in petrochemical prospecting).