**Computer:**

Computer is an advanced electronic device that accepts raw data from the user and processes it and forms an output as meaningful information within a short time without any mistakes.

**Basic functional parts of Computer:**

1. **Input:**

   The process of entering data and information into the computer system is called input.

2. **Processing:**

   The process of performing the arithmetic and logical operation on data is called processing.

3. **Output:**

   The process of producing the meaningful and useful information for the user is called output.

4. **Storage:**

   A mechanism that enables a computer to retain data, either temporarily or permanently.

**Components of the CPU:**

1. **Control Unit (CU):**

   It performs overall activities of the computer system.

2. **Arithmetic and Logic Unit (ALU):**

   ALU performs arithmetic and logic operations on data.

3. **Memory Unit (MU):**

   They are often named as immediate memory and they assist ALU and CU in different operations.

**Characteristics of computer:**

All computers have certain common characteristics irrespective of their types and sizes. Computers are capable of doing complex activities and operations. The increasing popularity of computers has proved that they are very powerful and useful tools. Computers provide the processing speed required by all facets of society. The quick service we expect at the bank, at the grocery store, on the stock exchange, and on the Internet are dependent on the speed of computers.

1. **Speed:**

   Computers can do routine calculations at tremendous speed in fact with the speed of light. This speed allows one to do computations that would otherwise be impossible. Progress would be considerably slowed down without them. The speed of a computer at performing a single operation can be measured in terms of :
   - Milliseconds- One thousandth of a second (1/1000).
   - Microseconds-One millionth of a second (1/1000000).
   - Nanoseconds-One billionth of a second (1/1000000000).
   - Picoseconds-One trillionth of a second (1/1000000000000).

2. **Accuracy:**

   Computers operate with almost 100% accuracy. They can perform calculations with such great accuracy as their circuits have no mechanical parts that wear and tear. They only execute instructions input by the user. There may be errors produced by the computers. Sometimes, it is due to the fault in the machine and more often due to 'bugs' in the programs. If the input data are not correct, this may also lead to incorrect output. The computers follow the simple rule of GIGO (Garbage In Garbage Out).

3. **Storage:**

   Computers can store huge amounts of data for a long period of time. A piece of information once recorded (or stored) in the computer, can never be forgotten and can be retrieved almost instantaneously.

| | |
|---|---|
| 1 Nibble = 4 bits | 1 byte = 8 bits |
| 1 Kilobyte = 1024 bytes | 1 Megabyte = 1024 Kilobytes |
| 1 Gigabyte = 1024 Megabytes | 1 Terabyte = 104 Gigabytes |
| 1 Petabyte = 1024 Terabytes | 1 Exabyte = 1024 Petabytes |
| 1 Zettabyte = 1024 Exabytes | 1 Yottabyte = 1024 Zettabyte |

4. **Automation:**

   Computers are quite capable of functioning automatically, once the process is given to the computer. They do not require any instruction from the operator at any stage of the process. Computers can be programmed to perform a series of complex tasks involving multiple programs. Computers will execute the programs in the correct sequence, provided they are programmed correctly.

5. **Diligence:**

   Human beings suffer from physical and mental fatigue. They cannot perform the same task over and over again with the same speed, accuracy and enthusiasm as in the first time. This will affect the performance. Being a machine, a computer does not suffer from such weaknesses. The computer is capable of performing tasks repeatedly at the same level of speed and accuracy even if it has to carry a complex operation for a long period of time. They do not require any instruction from the operator at any stage of the process. Computers can be programmed to perform a series of complex tasks involving multiple programs. Computers will execute the programs in the correct sequence, provided they are programmed correctly.

6. **Versatile:**

   Computers are versatile (can do many types of jobs). It can carry out processes ranging from simple mathematical calculations to highly complex and logical evaluations for any extended period of time. Computers can communicate with other computers and can receive and send data in various forms such as text, video, etc. This ability of computers to communicate to one another has led to the development of computer networks, Internet, and so on. All this is possible because of computers and other related technologies.

**Key terms used in Computers:**

**Data:**

Data is a collection of unprocessed facts, figures, and symbols.

**Information:**

Information is a processed form of data that is organized, useful and meaningful.

**Program:**

Program is a collection of instructions to perform a task which is developed by a programmer.

**Hardware:**

Hardware is any part that has a physical structure that can be touched, seen and felt.

**Software:**

Software is the set of instructions that tells the computer how to perform tasks.

**Firmware:**

Firmware is the information in ROM which is permanent in nature.

**Application areas of Computer:**

Computers have woven into the very fabric of modern life. It has become an indispensable entity in every walk of life. The practical applications of computers are endless. Let us have a brief idea of some of the impacts of computer usage in various sectors of our society. A broad classification of its uses in varied fields are:

1. **Computer in Education:**

   Computers are helping educators make significant changes to the learning process. Computers help children to use all of their senses to extract information. Computers fascinate kids and can draw their full attention, which often results in a deeper focus and concentration. Many schools now have computers that are connected to internal networks and the Internet, allowing students to easily communicate with one another, teachers, and administrators.

   - The computer provides a tool in the education system known as **CBE** (**Computer Based Education**).
   - CBE involves control, delivery, and evaluation of learning.
   - Computer education is rapidly increasing the graph of the number of computer students.
   - There are a number of methods in which educational institutions can use a 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.

2. **Computer in Health:**

   Computers have become an important part in hospitals, labs, and dispensaries. They 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 computerized machines.

   Following are some major fields of health care in which computers are used.

   - **Diagnostic System** – Computers are used to collect data and identify the cause of illness.
   - **Lab-diagnostic System** – All tests can be done and the reports are prepared by computer.

- **Patient Monitoring System** – These are used to check the patient's signs for abnormality such as in Cardiac Arrest, ECG, etc.
- **Pharma Information System** – Computer is used to check drug labels, expiry dates, harmful side effects, etc.
- **Surgery** – Nowadays, computers are also used in performing surgery.

3. **Computer in Military:**

   Computers are largely used in defence. Modern tanks, missiles, weapons, etc. Military also employs computerized control systems. Some military areas where a computer has been used are:
   - Missile Control
   - Military Communication
   - Military Operation and Planning
   - Smart Weapons

4. **Computer in Marketing:**

   In marketing, uses of the 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.
   - **Home Shopping** – Home shopping has been made possible through the use of computerized catalogues that provide access to product information and permit direct entry of orders to be filled by the customers.

5. **Computer in Personnel Management:**

   Employees of an organization constitute its wealth. Computers, by maintaining a database of the employees of an organization, their qualification and performance, help the management to decide on incentives, promotions, training etc. to be provided to the employees. Thus, computers contribute to the growth of the employees of an organization in the long run.

6. **Computer in Law:**

   Forensic science, the scientific study of crime, is a field where computers play an important role. Computers help simulate certain events or crimes and arrive at crucial conclusions. Moreover, the networking of police stations across the world equips the police force to maintain law and order in a better manner by exchanging information on criminals and their movements.

7. **Computer at Home:**

   Computers are used at homes for learning, playing games and fun. Many of the educational software programs are used by children and adults in homes. Edutainment programs enrich students' knowledge and skills. Encyclopaedia, dictionaries, telephone directories and medical references are now available in CD-ROM which contains multimedia capabilities. The Internet connections also provide electronic mail, discussion groups, and other communication options for home users. Apart from learning, they are also used for playing computer games and video games.

8. **Computer in Weather Forecasting:**

   Computers play a crucial role in analysing large quantities of data about the prevailing weather conditions in different parts of the world beamed by satellites. Based on these analyses, weather is forecast for a day, week, fortnight or a month by the meteorological departments, the world over. Such forecasts allow preventive steps to be taken against impending natural disasters.

9. **Computer in Ticket Reservation:**

   Ticket reservation is yet another area which makes extensive use of computers. Powerful computers called servers hold information about trains/flights such as train/flight numbers, their source and destination points, their total seating capacity and seat availability, etc. These details are accessed by the terminals placed at the reservation centres and tickets are booked accordingly.

10. **Computer in Business:**

    A computer has high speed of calculation, diligence, accuracy, reliability, or versatility which has made it an integrated part in all business organizations.Computer is used in business organizations for:

    - Payroll calculations
    - Budgeting
    - Sales analysis
    - Financial forecasting
    - Managing employee database
    - Maintenance of stocks, etc.

**Limitations of Computer:**

The computer can outperform human beings in speed, memory and accuracy but still the computer has limitations. Computers are one of the most powerful tools ever developed. It has many useful applications but however, there are some negative points about computers.

1. Depends on user's input
2. Cannot detect errors in logic
3. Only experts can operate
4. Cannot take its own decision
5. Has no Imagination

**Advantages of Computer:**

1. **Multitasking:**

   Multitasking is one of the major advantages of computers. Person can perform multiple tasks, multiple operations, calculate numerical problems within a few seconds. Computers can perform trillions of instructions per second.

2. **Speed:**

   Now the computer is not just a calculating device. Nowadays computers have a very important role in human life. One of the main advantages of computers is its incredible speed, which helps humans to complete their task in a few seconds. All the operations can be performed very fast just because of its speed elsewise it takes a long time to perform the task.

3. **Cost/ Stores huge amount of data:**

   It is a low cost solution. Person can save huge amounts of data within a low budget. Centralized database of storing information is the major advantage that can reduce cost.

4. **Accuracy:**

   One of the root advantages of computers is that they can perform not only calculations but also with accuracy.

5. **Data Security:**

   Protecting digital data is known as data security. Computers provide security from destructive forces and from unwanted action from unauthorized users like cyberattack or access attack.

**Disadvantages of Computer:**

1. **Virus and hacking attacks:**

   Virus is a worm and hacking is simply an unauthorized access over computer for some illicit purpose. Virus is being transferred from email attachment, viewing an infected website advertisement, through removable devices like USB etc. once a virus is transferred in the host computer it can infect the file, overwrite the file etc.

   For example: Huge portion of the internet was going down including Twitter, Netflix, Reddit and CNN in October 2016 because the largest DDoS attack was launched on service provider DYN using IoT Botnet.

2. **Online Cyber Crimes:**

   Online cyber-crime means computers and networks may have been used in order to commit crime. Cyberstalking and Identity theft are the points which come under online cyber-crimes. **For example**: one may get access to your shopping account like amazon account now that person will be able to know your personal details like debit card or credit card number which can be then misused.

3. **Reduction in employment opportunity:**

   Mainly the past generation was not used to the computer or they have the knowledge of computers. They faced a big problem when computers came into the field. As we have seen in the banking sector, senior bank employees faced this problem when computers came to the banking sector.

Above were the main disadvantages of computers, **no IQ**, **Dependency**, **No feeling**, **Break down** are the basic disadvantages of computers.